

TRAINING RESOURCE MANUAL

The Use of Economic Instruments for Environmental and Natural Resource Management

First Edition 2009

Training Resource Materials

Produced by the United Nations Environment Programme

Preface

This Training Resource Manual provides step-by-step guidance to assist instructors in training policymakers and practitioners in the use of economic instruments for environmental and natural resource management. The Manual offers substantial flexibility for trainers to custom design courses to meet local needs and priorities.

The United Nations Environment Programme (UNEP) designed this Manual for use by trainers who have some background in resource management or a basic understanding of environmental economics. Trainers will be able to use the Manual to produce a range of training courses from short introductory programmes for government officials to intensive programmes for practitioners.

As natural resources come under increasing pressure and countries face ongoing budget constraints, economic instruments – pollution taxes, user fees and other incentives to improve environmental quality – can provide an important tool to complement command-and-control measures to ensure sustainable development.

The challenges, however, arise in the practical application. Understanding the nature and baseline conditions of the problem to be solved as well as choosing instruments most suited to address that structural problem can greatly increase the likelihood of success. However, many countries lack the capacity to do this. Building the capacity of planners, environmentalists and decision makers to design and implement economic instruments is critical to their success. This requires high quality training.

Member governments, through the UNEP Governing Council, have specifically requested that UNEP provides assistance so that countries – especially developing countries and countries with economies in transition – can effectively use economic instruments at the national level. In response to this request, UNEP has developed an integrated range of activities to advance both theory and use of economic instruments in achieving sustainable development including this Training Resource Manual.

Acknowledgements

This Training Resource Manual is the result of a collaboration between UNEP's Division of Environmental Policy Implementation (DEPI) and the Economics and Trade Branch (ETB) of the Division of Technology, Industry and Economics (DTIE).

The Training Manual builds on a report on 'The Use of Economic Instruments in Environmental Policy: Opportunities and Challenges' published by UNEP in 2004 and on a range of standard literature on environmental economics. The 2004 report was prepared under the auspices of the UNEP Working Group on Economic Instruments consisting of twenty-five developed and developing country experts from research institutions, relevant international and non-governmental organization and governments. Hussein Abaza created the Working Group in 2001 in response to a Governing Council request and Anja von Moltke served as the group's coordinator. The Working Group served as advisory body to UNEP's work programme on economic instruments.

Building on this report and soliciting additional research and practical field experience, UNEP commissioned the Kenya Institute for Public Policy Research and Analysis (KIPPRA), based in Nairobi to develop a first draft of the Manual. UNEP would like to extend special thanks to Moses Muriira Ikiara and Erick Mungatana from KIPPRA for their substantive contribution to the first draft of the Manual.

UNEP and KIPPRA presented the first draft to the participants of the regional "Capacity Building Workshop for Policy Makers on the Use of Economic Instruments for Sustainable Development for Africa", held at UNEP Headquarters in Nairobi from 23-25 February 2004. UNEP expresses its gratitude to the participants of this workshop for their critical review and contribution to the preparation of the Manual. Participants included representatives from environmental authorities and research and training institutes from Egypt, Ethiopia, Ghana, Kenya, Nigeria, Senegal, South Africa, Tanzania, Uganda, and the International Food Policy Research Institute (IFPRI).

After further elaboration of the Manual by UNEP, sections of the second draft, including the group exercises, were tested in a "Training-of-Trainers Workshop on the Use of Economic Instruments in Asia" organised by the International Research and Action for Development (IRADe) from 27 to 29 April 2005 in Delhi, India. UNEP would like thank the participants for their comments and feedback provided at the workshop. Participants included representatives from environmental authorities, research and training institutions, universities, and non-governmental organisations in Bangladesh, China, India, Japan, Mongolia, Nepal, Pakistan, Philippines, South Korea, Sri Lanka, and Thailand.

Many thanks are also extended to Doug Koplow and Andrea Smith and for their revision and comments on the second draft of the Manual.

At UNEP, the development of the Manual was initiated under the overall supervision of Hussein Abaza and Nirmal Andrews. Anisur Rahman and Vera Weick coordinated the activities. Desta Mebratu, Anja von Moltke, Fulai Sheng, Anantha Duraiappah and Levis Kavagi provided input at different stages of the development of the Manual. Building on the experiences of practical application, the final version of the Manual was developed by Vera Weick, receiving extensive support from Gary Moore, Tobias Leipprand and Fulai Sheng. Desiree Leon facilitated the processing of the Manual for editing and printing.

About This Manual

This is a training resource manual. It supports the development of training in the use of economic instruments – pollution taxes, user fees, property rights, etc, – for sustainable development in general and for environmental and natural resource management in particular.

It is designed for use by trainers with some background experience and understanding of environmental and natural resource management and at least intermediate level economics. It is meant to assist such trainers prepare and deliver training courses that provide an understanding of economic instruments and a basic capability to use such instruments in a practical setting.

Specifically, the Manual is designed to assist trainers to:

- Identify needs and priorities,
- Custom design training to meet those needs,
- Conduct training to develop new skills among key players,
- Encourage information exchange among policymakers and practitioners.

The Manual offers concepts, tools, and examples for use by trainers, particularly for those in developing countries and economies in transition. It is intended that the concepts and tools be adapted and applied to country-specific environmental and natural resource management needs and priorities.

Local needs and priorities should be identified before the training begins so that they can be incorporated into the training. A training needs analysis could also incorporate local sources of information, contacts, and case studies to make the training more relevant, useful and interesting to course participants.

A range of courses can be prepared using this Manual; for instance, a short programme for high-ranking government officials to introduce them to the benefits of using economic instruments for sustainable development. Alternatively, longer courses can be designed for environmental and natural resource management practitioners who require a detailed understanding of the use of economic instruments for environmental and natural resource management.

Rationale and Background

Various organizations have conducted environmental management training in developing countries over the years. However, these training activities have rarely emphasized the use of economic instruments for environmental and natural resource management. In general, such training has lacked coherence and consistency and has often remained unconnected to broader capacity building efforts.

UNEP developed the Manual to address these issues and to respond to requests for training assistance, particularly from developing countries. The sponsors hope that this Manual will stimulate a wider interest in the use of economic instruments for environmental and natural resource management.

Target Audience

UNEP designed this Manual primarily to aid instructors in training policymakers, their advisers, and practitioners on effective use of economic instruments in designing and implementing environmental policy.

Policymakers and practitioners with a basic understanding of economics and environmental or natural resource issues can make use of the Manual directly to design and implement policy using the tools provided in Part III, though training is highly recommended.

Principles

This Manual reflects a set of core principles. To this end, the Manual:

Adheres to sound training principles. It emphasizes that local trainers take the lead in implementing training using the best principals of instructional design in doing so;

Addresses the needs of participants. It offers a training needs analysis package in Part I to help identify the participants' requirements and relate them to the environmental and natural resource management situation in the countries concerned;

Facilitates the training of instructors. It provides information and tools to design and deliver in-country training courses;

Encourages local institutions and individuals to take ownership throughout the Manual to adapt training on the use of economic instruments to local conditions to facilitate a sense of ownership among trainees and their institutions.

Design of the Manual

The authors designed this Manual to serve as an interactive working document composed of flexible modules that can evolve with use and experience. The training modules can be updated, revised and added to as appropriate as new background materials, case studies, relevant reading materials, or training activities become available.

The Manual consists of Four Parts:

Part I: Preparing the Course provides information necessary for designing a course. The tools contained in Part I can be used to establish training for the use of economic instruments as part of a broader strategy for capacity building appropriate to a given country.

Part II: Trainer's Guide includes suggestions about how to present the materials, lead plenary discussions, and conduct training exercises.

Part III: Training Modules provides text and materials to be adapted to local requirements and realities. The materials draw upon international experience in the use of economic instruments for environmental and natural resource management. Numerous case descriptions and applications of economic instruments are available throughout.

The annexes provide detailed information to be used as a resource both during and following the training. They include a comprehensive glossary, detailed case studies, references and other material.

Part I: Preparing the Course

Introduction: Capacity Building and the Environment The introduction describes the role of capacity building, and training in particular, in the development of effective environmental and natural resources management policy.

Training Needs Analysis This chapter provides guidance on collecting background information and materials on local conditions. The latter can identify specific training requirements and highlight the economic, political and social contexts that should influence the design of the course. The chapter describes several aids and tools that are used for this purpose.

Course Design, Delivery and Evaluation This section provides tools to:

- Develop course outlines,
- Present courses effectively,
- Prepare participants' handbooks, and
- Evaluate the success of a course.

Resource Aids and Templates This section provides a range of concrete materials for use in developing and evaluating the course.

Part II: Trainer's Guide

The trainer's guide offers specific advice for trainers on how to conduct a course based on the text provided in the training modules (Part III), including organising work groups and conducting plenary discussions. Part II includes instructions for the following material:

Course Material The trainer's guide describes the purpose and offers a synopsis of each module of the proposed training course.

Participant Involvement Tools The training involves a considerable number of group exercises and plenary discussions.

Group Exercises at the end of Modules 1, 2, 3, 10 and the case study exercise reviewing Modules 5 to 8 (following Module 8) are designed to reinforce participants' appreciation of the concepts by application to concrete situations. The trainer may wish to use other examples if they are more relevant to the participants in a particular training course.

Discussion Questions are provided for the Modules 4, 5, 6, 7, 8, 9, and 11 to help trainers stimulate discussion among participants on the topic of the module. Trainers should use the discussion to allow participants to share their experiences.

To assist trainers and participants in getting the most out of these exercises, the Manual includes:

- *Instructions for trainers for the organization of the group exercises,*
- *Instructions for group exercises for participants to be used as handouts (in Part III),*
- *Discussion questions for use in plenary session discussions*

All the modules encourage the incorporation of local materials and information. The trainer may add or delete materials to suit the needs of the participants as identified during training needs analysis.

Part III: Training Modules

Part III provides a series of eleven training modules for use by the trainers and training course participants. The text covers various aspects of environmental and natural resource management policy with a focus on the use of economic instruments.

Each module generally consists of several parts:

Defining Terms at the beginning of each module provides the definitions of terms used in the module in the order they appear in the text. The trainer may wish to use these in the training presentation or distribute them to participants at the beginning of the session as reference. (A comprehensive Glossary of all terms related to the training in alphabetical order is available in Annex I of this Manual.)

The Main Text provides a brief review of the major concepts under consideration in the module. The text will help the trainer prepare speaking notes for presentations. Trainers could also distribute the main module texts to participants as part of the training packet.

Case Study Summaries For Modules 6, 7, 8 and 9, the training materials contains specific applications of various economic instruments in countries around the world. These case studies can be used as examples to illustrate points in general presentations or discussions, as the basis of group work sessions, or as background reading material. The Manual provides advice on their use throughout.

Participant Involvement Tools A module either ends with a group exercise or a plenary discussion. Trainer instructions for group exercises for Modules 1, 2, 3, 10 and the case study exercise reviewing Modules 5 to 8 (following Module 8) are provided in Part II, and handouts for participants are provided in Part III. For Modules 4, 5, 6, 7, 8, 9, and 11 guiding questions for plenary discussions are provided in Part II.

The Annexes

Seven Annexes at the end of the Manual provide detailed information to be used as additional material for training course participants during the course or for the development of a more intensive course. The Annexes are:

- I. **A comprehensive glossary** of terms organized in alphabetical order for general reference as a companion to the *Defining Terms* section provided at the beginning each Module.
- II. **A primer on economic instruments** summarizing the uses and benefits of economic instruments and related to content covered in Module 5.
- III. **A matrix for analysing the impact of economic instruments on incentives of firms and individuals.**
- IV. **An extended analysis of selected economic instrument case studies.**
- V. **A template for assessing important factors affecting instrument choice.**
- VI. **A table of common applications of economic instruments by resource area.**
- VII. **A list of additional sources of information and references.**

United Nations Environment Programme

The United Nations Environment Programme (UNEP) is the overall coordinating environmental organization of the United Nations system. Its mission is to provide leadership and encourage partnerships in caring for the environment, by inspiring, informing, and enabling nations and people to improve their quality of life without compromising that of future generations. In accordance with its mandate, UNEP works to observe, monitor, and assess the state of the global environment; improve the scientific understanding of how environmental change occurs; and in turn, determine how such change can be managed by action-oriented national policies and international agreements. UNEP's capacity building work thus centres on helping countries strengthen environmental management in diverse areas, which include freshwater and land resource management; the conservation and sustainable use of biodiversity, marine and coastal ecosystem management; and cleaner industrial production and eco-efficiency, among many others.

UNEP, headquartered in Nairobi, Kenya, marked its first 30 years of service in 2002. During this time, in partnership with a global array of collaborating organizations, UNEP achieved major advances in the development of international environmental policy and law, environmental monitoring and assessment, and our understanding of the science of global change. This work also supports the successful development and implementation of the world's major environmental conventions. In parallel, UNEP administers several multilateral environmental agreements (MEAs), including the Vienna Convention's Montreal Protocol on Substances that Deplete the Ozone Layer, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (SBC), the Convention on Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention, PIC), the Cartagena Protocol on Biosafety to the Convention on Biological Diversity, and the Stockholm Convention on Persistent Organic Pollutants (POPs).

Division of Technology, Industry and Economics

The mission of the Division of Technology, Industry and Economics (DTIE) is to encourage decision makers in government, local authorities and industry to develop and adopt policies, strategies, and practices that are cleaner and safer, make efficient use of natural resources, ensure environmentally sound management of chemicals, and reduce pollution and risks for humans and the environment. In addition, it seeks to enable implementation of conventions and international agreements and encourage the internalization of environmental costs. UNEP DTIE's strategy in carrying out these objectives is to influence decision-making through partnerships with other international organizations, governmental authorities, business and industry, and NGOs; facilitate knowledge management through networks; support implementation of conventions; and work closely with UNEP regional offices. The Division, with its Director and Division Office in Paris, consists of one centre and five branches located in Paris, Geneva and Osaka.

Economics and Trade Branch

The Economics and Trade Branch (ETB) is one of the five branches of DTIE. Its mission is to enhance the capacities of developing countries and transition economies to integrate environmental considerations into development planning and macroeconomic policies, including trade policies. ETB helps countries develop and use integrated assessment and incentive tools for achieving poverty reduction and sustainable development. The Branch further works to improve our understanding of environmental, social, and economic effects of trade liberalization and the effects of environmental policies on trade, and works to strengthen coherence between Multilateral Environmental Agreements and the World Trade Organization. ETB also helps enhance the role of the financial sector in moving towards sustainability. Through its finance initiatives, ETB also helps enhance the role of the financial sector in moving towards sustainability.

Division of Environmental Policy Implementation

The objective of the Division of Environmental Policy Implementation (DEPI) is to promote and support the sustainable management of ecosystems for human well-being. Based on its core competencies, DEPI's responsibility lies in addressing Ecosystem management; Economics of ecosystems; Conflicts, disaster and ecosystem recovery; and Adaptation to climate change. DEPI facilitates implementation of its programmatic areas in developing countries and countries with economies in transition through capacity building, mainstreaming of ecosystem services, technology support, knowledge management, up-scaling from pilot to programme phase, and partnerships for institutional strengthening.

DEPI's activities are implemented by a number of Branches/Units which are principally located in Nairobi and Geneva, namely: Programme Planning and Project Services; Freshwater and Terrestrial Ecosystems; Ecosystems Services Economics; Climate Change Adaptation; Environmental Education and Training; Coastal and Marine Ecosystems - the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities and Regional Seas Programme; and Post-Conflict and Disaster Management with focus on assessment and environmental emergencies preparedness and response.

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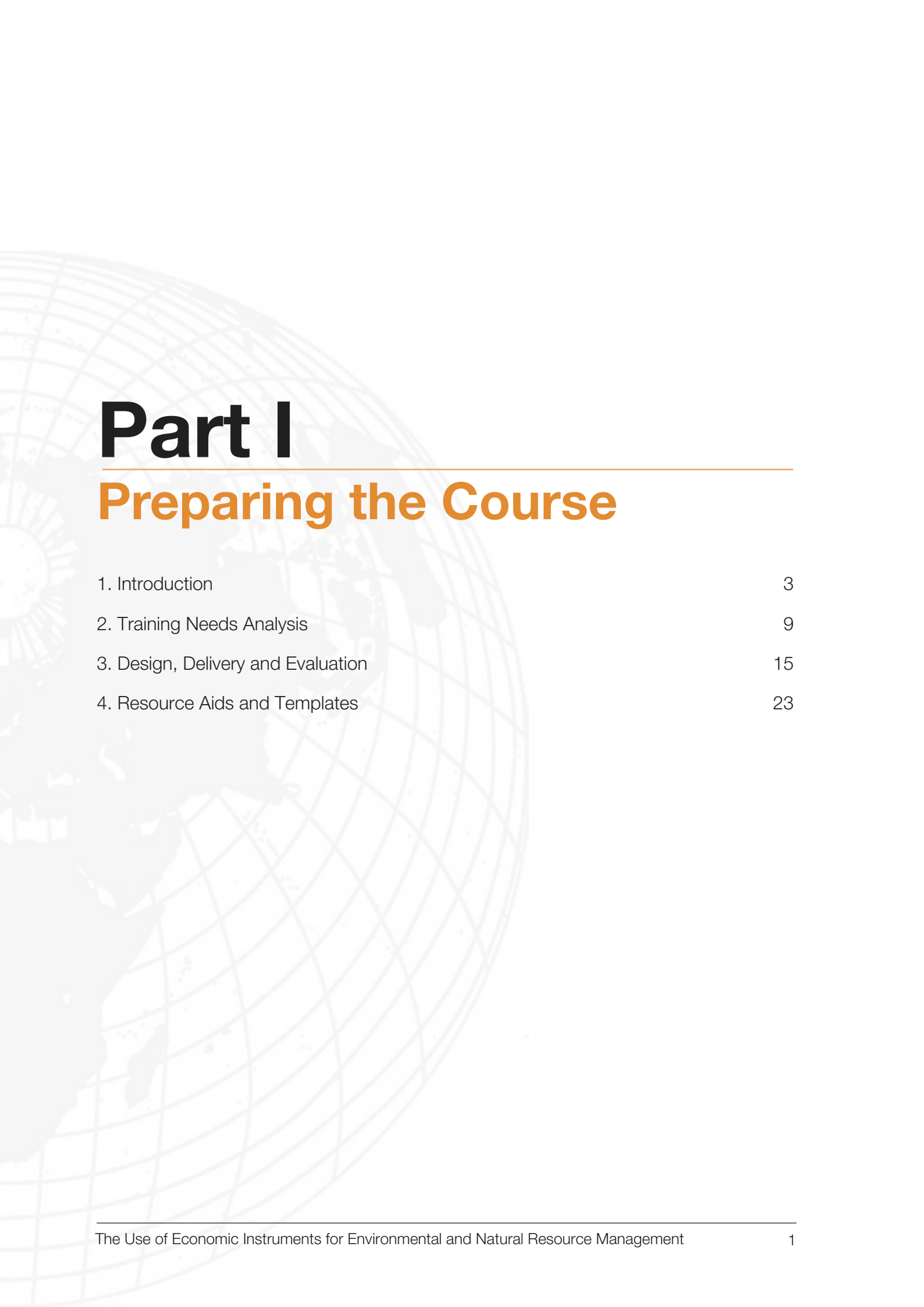
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Part I

Preparing the Course

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1. Introduction¹

This section addresses basic terminology, the context, necessary conditions, and the essentials of quality training.

1.1 Basic Terminology

To understand the subject of this Manual, it is first necessary to understand the meaning of key terms used including:

Economic Instruments are measures that provide economic incentives for sustainable economic development and disincentives for practices that degrade the environment or deplete natural resources. Economic instruments include charges, pollution taxes, tradable pollution permits, transferable development rights and payments for environmental services, among others.

Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.²

Command and Control Measures are legal prohibitions of undesirable practices accompanied by the policing power of the state to control violations of law.

Capacity means the knowledge, skills, and organizational capability necessary to achieve a stated goal. It may also include the political, social, and cultural willingness to support the practical requirements of sustainable development.

Capacity building is the long-term, voluntary process for increasing a country's ability to identify and solve environmental and natural resource problems, to minimize risks, and maximize opportunities. It requires the strengthening, development, and mobilization of human, institutional, and other resources.

Training is a means of developing the knowledge and skills of public officials and practitioners through classroom instruction or self-study combined with practical exercises in the development and application of economic instruments for environmental and natural resource management.

For the training content itself, there are many more terms that both the trainers and trainees will need to understand. Many of these are defined within the Modules provided in Part III of this Manual as well as in a Glossary at the end.

¹ The following sections are based on UNEP (2002).

² This standard definition is taken from UN (1987), the "Brundtland Report".

1.2 The Need for Training

National governments and international organizations alike generally recognize sustainable development as an important and desirable goal. It provides for the long-term welfare of the people without destroying the environment or depleting natural resources, which, over time, undermine all economic growth.

However, failure of markets to prevent or address problems, poor government policy, weak public or private institutions, and failure of command and control measures can undermine the best intentions for sustainable development. Too often the result is environmental degradation; permanent loss of valuable natural resources and, in the end, unsustainable development.

Thus, achieving sustainable development requires not only good intentions, but also skilful management. Economic instruments can serve as valuable tools in addressing market, policy, and institutional failures. They integrate environmental and economic policy, are inexpensive, can be targeted to specific environmental problems, and can change private sector behaviour by altering economic incentives.

Yet economic instruments are sophisticated and often require considerable knowledge and skill to implement. Their use requires that government and non-governmental organizations have the capacity to develop and effectively apply these instruments. This Manual provides guidance for the development of training necessary to build that capacity.

1.2.1 International Support for Capacity Building

The United Nations Environment Programme supports the proposition that all countries should have the capacity to address environmental issues and manage their own natural resources.

The global plan to achieve sustainable development agreed to at the UN Conference on Environment and Development (1992) in Rio de Janeiro³, Agenda 21⁴, stressed the need for capacity building for environmental management generally and for developing countries in particular. To this end the major international lending aid agencies have promoted the capacity development for environmental and natural resource management in developing countries ever since the Rio Summit.

Capacity building measures supported by UNEP emphasize collaboration between international organizations and local organizations. UNEP encourages local organizations to take progressively greater responsibility for long term, structural changes that are necessary to integrate environmental concerns into the mainstream of development activities.

Requests from developing countries for training on the use of economic instruments for environmental management have multiplied over the years. Every indication is that demand for this training will continue to grow. New international requirements and evolving management practices are driving demand for more – and more diverse – training. Trainers will need to keep pace with these developments.

³ This conference is often referred to as The Earth Summit.

⁴ <http://www.un.org/esa/sustdev/documents/agenda21/english/agenda21toc.htm>

1.2.2 Necessary Conditions for Capacity Building

This Manual focuses on training. To be effective, however, training cannot be provided in isolation of other initiatives to strengthen environmental stewardship or their overall relation to the economic and social fabric.

Capacity building encompasses a range of activities in addition to training including enactment of enabling legislation, provision of budget support, and organization of appropriate government agencies.

In countries that have little economic growth, limited finances, lack of political commitment, and public indifference to protecting the environment, the usefulness of training alone can be severely constrained. If training is to be successful, a minimum level of these enabling conditions must be in place already.

One vital prerequisite for building capacity is public awareness of environmental problems and support for measures necessary to address those problems. In many developing countries, capacity building will need to address inadequate public concern for the environment, which is often the underlying cause of depletion of natural resources and deterioration of the environment.

Ways of promoting environmental awareness include:

- *Establishing environmental awards in the community and the workplace*
- *Organizing conferences and meetings to address environmental issues*
- *Holding an environment 'day' or 'week' or events*
- *Soliciting public participation in environmental projects and activities*
- *Recognizing the particular contribution of women, NGOs and local communities*
- *Encouraging corporate environmental policies and programmes, and*
- *Promoting environmental stewardship and community-based resource management*

1.3 Basic Components of Capacity Building

A comprehensive programme of capacity building for the environment should address five issues:

Training and Education—needed to develop the skills and competencies necessary for environmental and natural resource management good practice.

Organization and Management—needed to strengthen the structures, processes and delivery systems for the application of economic instruments for environmental and natural resource management implementation.

Networks and Linkages—needed to foster cooperation, information exchange and professional development among environmental and natural resource management stakeholders, both individuals and organizations within and outside the public sector.

Policy and Institutional Framework—needed to enact legislation, promulgate regulations and institute procedures, and manage programmes to establish economic instruments.

Sensitivity to Social and Economic Context—needed for effective support within the broader society and the political culture of decision-making in the country.

1.4 Essentials of Quality Training

This section provides information to assist in-country trainers to assume this role of training their fellow citizens directly. The training of trainers is particularly important because it allows the primary trainers to transfer their expertise to local personnel who, in turn, can train others within the country.

The purpose of training is to develop knowledge and skills needed by participants. Training will be most effective when carried out within a strategic framework, consistent with the principles of capacity building described above.

In addition, to be effective, training on economic instruments needs to:

Raise Awareness The value of economic instruments for environmental and natural resource management is now recognized in developing countries. This is expected to grow in the coming years. But there is still a general lack of understanding among the general public and key constituencies in most countries. The training should raise the awareness among policymakers and practitioners alike of economic instruments and their effective uses.

Instil Core Competencies Many countries have begun to establish procedures and regulations for use of economic instruments but lack a broad base of policymakers and practitioners who understand the uses of economic instruments to effectively apply them. To address these deficiencies, training should address technical and administrative matters as well as techniques for increasing public participation in developing environmental policy. The latter is acknowledged as a particular weakness in many developing countries.

1.5 Quality Training Practices

The need for consistently high quality training cannot be overemphasized. In this regard, it is important to identify principles of good practices for training on the use of economic instruments and the key aids and measures that support such an approach. The following provides an initial framework for ensuring quality training with an emphasis on four questions:

1. *What are the basic requirements for high quality training?*
2. *What should the training aim to provide for its target audience?*
3. *Who should provide the training?*
4. *How should this activity be designed and delivered?*

Box I-1: Basic Principles for Effective Training

Have Clear Objectives

The purpose of training on the use of economic instruments for environmental and natural resource management is to promote good practice. Therefore, guidance should be sought as to what constitutes good practice in order to clarify the objectives and content of training.

Target the Right People

Environmental and natural resource management training programmes and courses should focus on the needs of well-defined target groups and take, when necessary, sufficient account of their varied background.

Use Appropriate Teaching Methods

These should be practical in nature, action-oriented and emphasize problems and conflict-solving situations, as well as technical skills (including the use of information technology).

Use Effective Training Aids

Effective use should be made of real-world case studies and simulation exercises, role-playing situations, etc.

Choose Trainers Carefully

Develop a roster of suitable environmental and natural resource management trainers to deliver the course. Trainers should possess practical environmental and natural resource management experience and sound pedagogical skills.

Source: Adapted from UNEP, 2002

1.6 Achieving High Quality Training

One approach to understanding the basic requirements of quality training is the 'KITS', which requires that trainers impart all Knowledge, Information, Tools and Skills (KITS) necessary for the target audience to perform to internationally agreed or locally defined standards. The elements of the KITS approach are:

- *Appropriate knowledge of environmental and natural resource management good practice at the level necessary for those being trained to undertake their roles and responsibilities effectively;*
- *Up-to-date information on relevant developments and case experience in environmental and natural resource management, procedure and methodology;*
- *Best-practice tools and lessons that are applicable and work in the situation and setting in question; and*
- *'Hands-on' experience to apply these factors to local problem solving and decision-making.*

1.7 Choosing Trainers

The issues of who should provide training and how to assure their competency are sensitive ones. However, to maintain training quality, the training must address these issues head on. Preferably, those designing and delivering a major programme (for 'training the trainers') should meet basic ESP qualifications, namely:

- *Experience in environmental and natural resource management training and/or practice (and ideally both) in a given country or region;*
- *Sensitivity to local needs and cultural considerations and their reflection in environmental and natural resource management trends and issues; and*
- *Professionalism as demonstrated by a proven record of environmental and natural resource management training and practice in similar contexts and settings.*

2. Training Needs Analysis

The goal of this section is to assist the course designer to compile the information necessary to designing an effective training strategy for the use of economic instruments for environmental and natural resources management objective(s):

By the end of this section, the trainer will be able to:

- *Identify the groups who require training,*
- *Conduct a Training Needs Analysis,*
- *Establish the purpose and scope of the training.*

2.1 Objectives

Whatever the means of gathering information, the main objective is to identify environmental and natural resource management training needs. These include:

- *The target groups to be trained,*
- *The content of the training,*
- *The most effective format for training,*
- *The expected benefits (bearing in mind the larger social, political, economic and cultural context and its likely influence on the planning, and implementation of training courses.*

2.2 Target Groups

Anyone with an involvement or an interest in the use of economic instruments for environmental and natural resource management can benefit from the training. However, experience indicates that the demand for training is more frequent from those stakeholders who have key roles in environmental and natural resource management.

Such stakeholders require training that is more intensive and they stand to gain the most benefit from the training. Other participants in environmental and natural resource management, such as development planners, local administrators and public, community and environmental interest groups may also require and benefit from training, but usually not in as much detail as the above groups.

Box I-2: Main Target Groups for Training

This Manual can assist trainers in developing courses for four main target groups. These are:

Practitioners who need to develop or strengthen their technical expertise in some or all of the different aspects (For example, this group could include staff of major development or proponent bodies, private sector consultants, officials from competent authorities responsible for environmental and natural resource management, etc.);

Decision Makers and Their Policy Advisers, some of whom may have little or no previous exposure to environmental and natural resource management, who need to understand the objectives, procedure and outcomes of economic instruments on environmental and natural resource management and their own role and obligations within the environmental and natural resource management;

Other Stakeholders including members of non-government organizations, interest groups and the public affected by the proposals, who may need to be introduced to environmental and natural resource management to better understand their role and relationship to others; and

Trainers and Course Designers who are identified as candidates to develop and deliver situation-specific training courses.

2.3 Conducting the Needs Analysis⁵

An assessment of national capacity is the first step in selecting an appropriate training strategy. Capacity assessment identifies constraints and opportunities. In many cases, there will be a range of previous activities and ongoing initiatives upon which to build. The scope of training requirements will depend, in part, on the extent to which these other components are in place.

The training needs analysis should assist the trainer/course designer in compiling the information required to design an effective economic instruments training strategy, one that will build institutional and human capacity. Even if specific training needs have already been identified, undertaking all or part of this analysis will still be useful.

Current or recent training and capacity building activities on the use of economic instruments for environmental and natural resource management in the country or region should be reviewed. This will help to determine the feasibility of any proposed training, for example by identifying demands for which there is insufficient provision.

For training to be effective, it should meet:

- *The requirements for improving environmental and natural resource management practice in the region or country and*
- *The specific needs of the people who will attend the training session or course.*

⁵ The analysis of training needs in this Manual requires that the course designer have at least some training and experience in course design.

Training needs analysis should examine the influence of the broader setting (the political, institutional, social, and environmental conditions) on the feasibility of, and options for training on the use of economic instruments for environmental and natural resource management.

Some of these conditions may constrain the introduction and/or implementation of the economic instruments while others may provide opportunities for their use. This information indicates how the design of the training relates to its delivery.

2.4 Using Training Needs Workshops

A training needs workshop is the preferred means of gathering information on training requirements⁶ especially when developing a comprehensive country or region-wide training programme. Before holding such a workshop, the trainer/course designer needs to collect information about the environmental and natural resource management situation in the country and discuss the potential training needs with a wide range of people involved in environmental and natural resource management.

2.4.1 Preparing for the Workshop

A full training needs analysis workshop requires several weeks of planning, analysis and review. In some cases, this process may take longer, such as when defining environmental and natural resource management training needs for varied regions with different problems.

Beyond being a tool for gathering information, the needs analysis workshop can serve, in part, as a consensus building exercise. A consensus building approach helps:

- *Identify the groups requiring training on the use of economic instruments for environmental and natural resource management, their specific needs and the expected benefits of the type of training to be provided,*
- *Consider the influence of the political, social and environmental situation on the training that is being developed, therefore ensuring it is a feasible and effective means of capacity building,*
- *Avoid tensions and disputes that may arise from a more confrontational or majority rule approach.*

The outcomes of the workshop should comprise:

- *A set of summaries of training needs for selected target groups (in table form),*
- *Feedback notes for the trainer/course designer that will assist in planning and delivering the training course or programme.*

2.4.2 Selecting Workshop Participants

Preparing a one-day workshop requires bringing together a range of relevant stakeholders. It is important to ensure a good cross-section of stakeholders active in environmental and natural resource management, including, where possible, some senior decision makers. At a local level, it may be helpful to include members of the community who are involved and knowledgeable about environmental and natural resource management.

⁶ Although the training needs analysis is best carried out as a group activity, the course designer can use a combination of telephone, mail and personal contacts for most of the activities listed in this section. In some cases, training needs may already have been identified or the developer may lack time or money available for a detailed analysis. In such cases, other means should be found to identify and confirm needs, - e.g. consultation with experienced environmental and natural resource management practitioners and trainers.

If the training needs analysis is focused on a particular sector, then a more specialized list of participants may be appropriate. A national level workshop may have between 15 and 50 participants, with representation from both environmental and natural resource management administrators and policy specialists from key implementing agencies.

The choice of appropriate participants is crucial to the success of the workshop. Workshop representatives could include people from the following groups:

- *Administrators/practitioners from environmental, natural resource ministries and agencies,*
- *Elected officials and government ministers,*
- *Representatives of non-government organizations (NGOs),*
- *Aid agencies,*
- *Special groups e.g. minority indigenous peoples, women,*
- *Academics, lawyers, engineers, health professionals,*
- *Trainers and training organizations,*
- *The media, and*
- *Members of community groups.*

2.4.3 Facilitation and Structure

A national level workshop should probably have an experienced facilitator to manage and structure the process. At the local level, less structured meetings could still be very valuable, covering the same ground and pooling the knowledge of available representatives.

2.4.4 Timing and Funding

The trainer should make sure that there is sufficient lead-time to make arrangements, identify, invite and confirm participants, brief participants and produce workshop materials. This may take months rather than weeks. If funding is needed, then probably the planning time line will be longer.

2.4.5 Choosing a Workshop Location

If at all possible, the training designers should hold the workshop in a location away from work places to avoid distractions. In addition, the venue must be large enough to accommodate the whole group comfortably, and allow the group to break into smaller working groups.

2.4.6 Designing a Course Programme

During the phase of the training needs analysis, the training designers need to decide on the length and content of the training course depending on the professional background of the participants who will take part in the course. They will also need to design the specific session of the course programme. For this purpose, they can take use of the training needs workshop discussion guide provided in section 4.1 of Part I.

If the list of participants of the training course is already known before the training needs analysis workshop, the pre-course questionnaire provided in section 4.3 of Part I can be mailed out before the workshop. The responses can then feed into the training needs workshop.

2.4.7 Evaluation and Training Needs Summary

The trainers should conduct an evaluation of the workshop. All participants should receive copies of final training needs summaries and the contact details of the other participants. The workshop leader should distribute these at the end of the workshop rather than sending them out later. A sample of the information that should be included in such a training needs summary can be found in section 4.2 of Part I.

2.5 Gathering Information without a Workshop

If a training needs workshop is not conducted, the trainer/course designer will need to gather the information that will provide an understanding of current conditions for training and insights that can usefully be passed on to course participants. This may be done by interviewing key stakeholders conference call, by telephone conversations with individual stakeholders, or by e-mail, using the same questions that would be put to the Training Needs Workshop. The sample training needs summary provided in section 4.2 of Part I should be completed even if the training needs analysis is conducted without holding a workshop.

3. Design, Delivery and Evaluation

The goal of this section is to provide information and guidance on planning and implementing a course programme. By the end of this section, the trainer/course designer will be able to:

- *Develop a Course*
- *Prepare a Participant Handbook*
- *Address Logistical Concerns*
- *Present a Course Effectively*
- *Evaluate the Course.*

3.1 Developing a Course

Training designers should use results of the training needs analysis as the basis of a course outline and build up from the materials contained in the guidance and modules provided in Part II and Part III of this Manual. Not all modules will need to be used for each training course, nor is it expected that all of the materials relating to a topic will be used.

Trainers are encouraged to adapt the Manual and to develop their own materials in order to meet the specific needs of prospective course participants.

A customized training course can be designed by:

- *Establishing objectives that reflect the priorities already established for training (as indicated in the training needs summary);*
- *Selecting the modules, topic materials and training activities that are appropriate for the target groups; and*
- *Amending and adding to the materials as necessary to meet the participants' needs.*

The training course can be developed from the training needs summaries and discussion sheets produced during the training needs workshop (sections 4.1 and 4.2 of Part I). Taking the information for one target group at a time, the trainer/course designer can select the appropriate modules, topics and training activities. In doing so, the trainer needs to keep in mind the specific training needs of the group and the depth of training required. In this context, it will be very helpful to use the responses on the pre-course questionnaire (section 4.3). The questionnaire should be sent out to participants at this stage if this has not been done before the training needs analysis workshop already.

The choice of training activity depends on the time and resources available and the identified training needs. For example, the emphasis in specialized training should be on practical activities, case examples and relevant tools in the use of economic instruments in environmental and natural resource management. This approach is important especially where participants are required at the end of the course to demonstrate proficiency in analysis of economic instruments for environmental and natural resource management. Site visits and excursions should be used to reinforce the materials whenever possible.

A session planning form should be completed, an example of which is presented at the end of Part I in section 4.4. The trainer/course designer should ensure that the course length is approximately the same as the time available, making appropriate adjustments accordingly.

Do not forget the importance of the opening and closing sessions. If possible, use an interesting and significant person to formally commence and conclude the proceedings.

3.1.1 Preparing the Course Programme

The next step is to complete the programme within the course outline. The required sessions and activities should be fitted into an ordered and logical structure, allowing sufficient time for networking during lunch and tea breaks. Usually, the times indicated for topics in the Session Planning Form will require some juggling or adjustment to fit into a suitable schedule.

Such a programme should be included in the course brochure or participants' handbook discussed in this section. However, much more detailed information, including course notes and resource lists, will be necessary for the trainer to present the course.

3.1.2 Developing Course Materials

Once the programme is finalized, the materials on the topics and training activities should be prepared. This can be done by:

- 1. Working through the information checklist for each topic to collect the necessary documents and materials;*
- 2. Contacting the speakers required to support each training activity (do not forget to draw on the experience of course participants);*
- 3. Adapting the session presentations for each topic to suit the needs of the participants;*
- 4. Preparing overheads and handouts;*
- 5. Selecting and copying materials to include in the pre-training assignment;*
- 6. Reviewing the related literature to identify any relevant case studies and/or lessons of application and use of economic instruments for environmental and natural resource management⁷;*
- 7. Preparing a participant's handbook.*

3.2 Preparing a Participants' Handbook

A participants' handbook should be prepared for each training course. The handbook should preferably be available on the website or as a hard copy. The handbook provides information and guidance on course presentation and can be kept as a resource for future use.

Handbooks can be prepared in loose-leaf form (in a binder), as a booklet, or even as stapled sheets. Regardless of how the material is presented, it needs to be consistent in format.

⁷ A list of sources of information is given in Annex VII.

The contents of the handbook might include:

- *A list and contact details of all course participants, training faculty, course administrators, guest speakers, and site/topic leaders;*
- *The final training programme including a timetable, logistical arrangements for breaks, excursions, etc;*
- *Copies of the reading materials provided for each topic together with any background information;*
- *A list of key references for each topic and resource management in general;*
- *Copies of all overheads, handouts, case studies and other resource materials;*
- *Copies of instructions for group training activities and work assignments with space for making notes; and*
- *An evaluation sheet to be completed and returned at the end of the course.*

3.3 Logistics

The logistics of organizing a training course is a vital but often overlooked activity. The main tasks to be covered are listed below in the approximate order in which they are undertaken:

3.3.1 Choosing a Venue

The venue for training should be as functional and comfortable as possible. In many cases, there may be financial or other constraints, such that it may not be possible to produce ideal training conditions.

However, course organizers should aim to provide some, or all, of the support facilities for efficient and effective training. Facility considerations include:

- *Rooms, seating and desks sufficient to accommodate the number of participants attending for both large group presentations and small group activities;*
- *Location away from work places;*
- *Adequate lighting, heating/cooling, quietness;*
- *Access to electricity;*
- *Provision of, or access to, food and refreshments during breaks;*
- *Communication facilities such as internet, telephone and fax for course leader and participants;*
- *Blackboards and chalk, white boards and markers, flipcharts, overhead transparency sheets and pens;*
- *A table set aside for display of reference materials;*
- *Audio-visual equipment (overhead projectors, slide projectors, video players, tape recorders) and any backup equipment such as bulbs;*
- *Office equipment (computers and printers, photocopying, etc) and any backup equipment such as discs or tapes.*

Depending on the length of the course, there may be a need for participant's accommodation. This can be an important ingredient of course satisfaction and should be of acceptable quality to those attending. In some cases, the location of the venue may be determined by ease of access for possible site visits.

3.3.2 Setting Course Dates

Timing of courses is important at a number of different levels:

- **Time of Year** *Schedule the course far enough ahead of time to accommodate the target groups and to avoid conflicts with holidays, religious festivals, major events, conferences and other training activities or periods when natural events such as floods or rains may make accessibility difficult.*
- **Length of Course** *The course length should be appropriate to the objectives and type of training to be provided for the target group. For instance, courses designed for senior decision makers need to be very short and focused on their immediate concerns and interests, otherwise they will not attract the right people. On the other hand, practitioners may require much longer and more intensive training, which may take place in several sessions (e.g. a series of one or two week courses). These sessions may be coordinated with shorter, specialized training for the one involved in the actual practice of the use of economic instruments for environmental and natural resource management.*
- **Structure of Course Agenda** *Provide sufficient breaks in the schedule. Participants need time off to consolidate their learning, to relax, and most importantly to get to know each other and establish networks that will benefit them in the future.*

3.3.3 Providing Pre-Course Information

A course brochure should be sent out to confirmed and interested participants well in advance of the training. This brochure should describe the location, course objectives, the programme of activities, the training faculty, who will or should attend, and how to register or apply. Make sure that other relevant information is provided as well, including:

- *Contact details for registration and venue;*
- *Any fees and costs to the participants, with details of how these should be paid;*
- *What to bring with them, including any required materials or case studies.*

3.4 Recruiting Trainers

Other than for very short courses, lasting for one half-day or less, a roster of trainers who are knowledgeable about the subject matter should be drawn up.

The session outlines for each topic have been designed on the basis that the lead trainer will recruit local experts to assist in the development of relevant learning materials and/or undertake training activities. At least some of the trainers should have practical experience in the use economic instruments for environmental and natural resource management locally.

During the training course, the trainers should tap into any participant experience or specialized knowledge in using economic instruments. The pre-course questionnaire can provide information about the expertise of course participants. The questionnaire is designed specifically to pre-identify the background, skills and knowledge of course participants and their training needs.

3.5 Presenting the Training Course

Course participants will have different learning styles and responses to training activities, as well as different orientations on the use of economic instruments for environmental and natural resource management. When presenting the course, a mix of training methods and aids should be used to accommodate these differences. The materials in this Manual cater for such a varied approach.

3.5.1 Getting Ready

In most cases, the trainer should visit the training venue and sites well beforehand to note any problems and constraints concerning course presentation. During this visit, contact should be made with local experts and trainers who have experience in the use of economic instruments for environmental and natural resource management, and their views and advice should be sought on presentations and materials. All those who are involved in providing the training, site visits, or talks should be fully briefed on their role and the relationship to course objective, structures, etc.

The participants should also be briefed in advance on how to get the most out of the training course. This is particularly important when interactive training methods are to be used. Participants should know the issues to be covered and the work they will be required to do. The style of presentation and activities need to be tailored to the learning needs and style of participants.

3.5.2 Making Presentations Relevant and Interesting

As indicated above, trainers should be aware of differences in individual learning styles and, as far as possible, take them into account in presenting the course. Particular attention should be given to any cultural issues that may make course members reluctant to participate within group activities. In some cases, a 'warm up' or getting acquainted exercise can help to overcome initial reservations.

The style of presentation needs to be varied in order to keep participants' attention. Lectures should include opportunities for questioning and discussions among participants. They should be interspersed with more interactive training methods, which have proven effective in reinforcing learning and skills acquisition.

Interactive training methods that can be used to make courses more interesting and relevant include:

- *Exercises, role playing and simulation to mimic aspects of the process involved in the use of economic instruments for environmental and natural resource management;*
- *Case studies of locally-relevant environmental problems;*
- *Team assignments/project work, for example to review case studies on the use of economic instruments for environmental and natural resource management;*
- *Site visits and field excursions to observe the effects of the use of economic instruments for environmental and natural resource management.*

3.5.3 Getting Started

Before the training course begins, make sure that all facilities and equipment are ready and that the training and resource materials are at hand. Start formal training sessions with an introductory activity to help participants to get to know each other.

Outline the structure of the course and review the contents of the participant's handbook so that participants are aware of what notes have been provided (this will avoid unnecessary note taking and copying of transparencies or PowerPoint slides). Remember to check that participants understand the information being presented by using the various modes of teacher-student interactions.

3.5.4 Managing Group Training Activities

When planning group activities, the first task is to decide how participants are going to be allocated into small groups. The easiest solution is to allow participants to form their own groups. However, this often means that people who know each other will choose to work together and miss the opportunity of working with new people and being exposed to different ideas and experiences. Preferably, small groups should be formed by the trainer with the aim of balancing representation of the views and interests.

The groups should be monitored to ensure they are functioning successfully and carrying out the required tasks. A checklist for the purpose is given in Box I-3 below. On occasion, there can be personality conflicts within small groups. These can be handled by altering the membership of the groups. However, it should be noted that this type of situation often occurs in real-life applications in resource management and may be used to provide practical lessons and suggest 'coping' strategies, such as the use of mediation techniques.

Box I-3: Checklist to Facilitate Group Training Activities

1. Ensure that group members understand the purpose of the activity and their role in it
2. Answer group members' questions
3. Supply information
4. Facilitate the equitable participation of all of the group members
5. Sort out any conflicts within the group and encourage positive group behaviour
6. Move the group along if it is having difficulties with the proposed task, and
7. Ensure that time schedules are kept.

All small group activities should conclude with a general discussion or reporting session (plenary), which brings all participants together. The trainer should provide a short debrief of the exercise, drawing out the main lessons at the end of the plenary.

3.5.5 Using Case Studies

Case studies and examples of the use of economic instruments for environmental and natural resource management can be an effective training tool. This is most likely when case studies are realistic and relevant to local situations and the experience of course participants. In this context, case studies help the participants understand why and how certain aspects of economic instruments work well (and others do not) in particular environmental and natural resource management situations and the effect this has on decision-making and the outcomes of environmental and natural resource management.

Where appropriate, the training course can be based on a detailed case study to exemplify the main elements of economic instruments. This practical theme will help to knit together the sessions.

Alternatively, specific case studies can be used for a range of purposes; for example, to illustrate the real world constraints imposed on environmental and natural resource management practice by low budgets, limited information and lax administration of procedural checks, or to show what can be achieved through use of economic instruments for environmental and natural resource management.

This Manual contains a number of case studies on the use of economic instruments for environmental and natural resource management with application to developing countries for use and reference. However, the case studies and examples should be reviewed carefully and, if appropriate, adapted to the context and purpose of the training. Often, trainers find it difficult to obtain specific local case studies or materials. Yet, case studies do not necessarily have to be long or detailed to be effective. When designing a case study, trainers can use the template 'Preparing a Case Study' provided in section 4.5 in order to compile the relevant information.

Short, focused local studies can have practical value and immediate relevance, compared to a more extensive case study of a setting that is unfamiliar to the course participants. Useful examples of the use of economic instruments for environmental and natural resource management can be sought by contacting those who are involved or active locally in environmental and resource management.

General principles to be followed in preparing a case study are developed in Box I-4 below. Case study exercises and instructions for trainers are provided in Part III and Part II respectively.

Box I-4: Principles for Preparing Training Case Studies

General principles for preparing case studies include:

1. Choose an interesting and appropriate subject
2. Define clear training objectives
3. Provide an overview for other trainers using the case study
4. Prepare case study information for trainee use
5. Establish a realistic timetable for carrying out the case study
6. Select appropriate group sizes
7. Provide clear instructions to trainers; set clear tasks for trainees
8. Place the case study in context
9. Organize the written presentation of the case study
10. Test the case study before it is finalized.

Source: Adapted from UNEP (2002)

3.6 Evaluating the Training Course

Informal evaluation should be undertaken on an ongoing basis during presentation of the course. Participant feedback can be used to modify and improve the delivery, content and structure of courses.

On completion of the course or programme, an overall evaluation of the training should be undertaken at the following levels: activity, topic, course and, where appropriate, overall programme. A training course evaluation form provided in Module 11 of Part III can be used for this purpose. It is designed to evaluate the success of a course in meeting the needs of participants and can be adapted and applied to specific sessions. Ideally, participants should also be followed up after 6 to 12 months to assess the long-term benefits of the course.

Where the course is part of a larger training programme, the evaluation should be conducted to identify the specific role and contribution of the course in capacity building.

4. Resource Aids and Templates

This section provides various resources the trainer can use for the preparation of the course:

4.1 Discussion Guides

In this section, a collection of discussion questions grouped by context is given. These questions can be used during the training needs workshop to gather information before the course.

4.2 Sample Training Needs Summary

The results of the training needs analysis workshop can be summed up and distributed to the workshop participants using this sample.

4.3 Pre-Course Questionnaire

Course participants should complete this questionnaire in advance to provide the course designer with relevant information about their background and expectations. If possible, the results should feed into the training needs analysis workshop, but they can also be incorporated by the trainer at a later stage if they are not available at the time of the workshop.

4.4 Session Planning Form

This template helps planning and keeping track of the course programme and the time allocations for the various sessions and activities.

4.5 Preparing a Case Study

When preparing a case study, this table helps designers to compile and structure information.

4.1 Discussion Guides

The trainer can use the following discussion guides during the training needs analysis as resources for gathering information for the training course.

4.1.1 Analysing the Political and Legal Context

1. *Are economic instruments being used for environmental and natural resource management in the country? yes/no*
2. *Discuss how the following aspects of politics and law influence the use of economic instruments:*
 - *Level of commitment to democratic principles, common good, individual and collective rights and responsibilities*
 - *Land tenure and ownership*
 - *Political will towards environmental and natural resource management*
 - *Legal/judicial system*
 - *Institutional machinery of government, local and regional issues*

3. *How can the political-legal system facilitate the use of economic instruments for environmental and natural resource management?*

4.1.2 Analysing the Social Context

1. *Are economic instruments being used for environmental and natural resource management in the country? yes/no*
2. *Discuss how the following aspects of society influence the use / non-use of economic instruments for environmental and natural resource management.*
 - *Poverty and its causes*
 - *Literacy levels and access to education*
 - *Culture, language, class structure, religion*
 - *Involvement of local communities, minority groups, indigenous people, women, non government organizations*
3. *Which strategies are appropriate for promoting public involvement in general?*

4.1.3 Analysing the Economic Context

1. *Are economic instruments being used for environmental and natural resource management in the country? yes/no*
2. *Discuss how the following aspects of the economy influence the use / non-use of economic instruments for environmental and natural resource management.*
 - *Level of development and infrastructure*
 - *Macroeconomic/ sectoral policies*
 - *Financial- level of debt, privatisation, restructuring*
 - *Development*
 - *Presence of land use or regional development planning*
3. *Can the economic context be improved to stimulate the use of economic instruments for environmental and natural resource management?*

4.1.4 Analysing the Environmental Context

1. *Discuss the current and potential major environmental problems/pressures facing the country.*
2. *Outline the extent to which key environmental legislation, policies and regulations are in place (e.g. National Environmental Action Plans-NEAPs).*
3. *Outline whether there are detailed policies/laws covering the following:*
 - *International conventions*
 - *Pollution and control standards*
 - *Capacity to enforce regulatory mechanisms*
 - *Water resources*
 - *Energy generation and transmission*

- *Waste management*
 - *Flora and fauna, endangered species*
 - *Natural resource management*
 - *Resource allocation*
 - *Land management*
 - *Land use planning/regional development*
 - *Transportation*
 - *Process of jurisdictional cooperation and coordination*
4. *Discuss the extent to which government departments in all sectors have a mandate to consider environmental issues.*
5. *Discuss the types, sources and availability of environmental information in the country.*

4.2 Sample Training Needs Summary

Description of target group

Training needs

Expected benefits

Areas in which depth of training is required

Skills or prerequisites required

Targeted level in organization / group

Approximate numbers requiring training (annually)

Estimated course length

Suggested course name

Priority of training need

4.3 Pre-Course Questionnaire

To collect information about the participants' background, motivation and expectations, a pre-course questionnaire could be circulated to the participants prior to the training workshop. The following are suggestions for questions that could be included in such a pre-course questionnaire.

Please describe the type of work you do.

What types of problems do you generally deal with? How?

Which problems are the most difficult to deal with? Why?

How familiar are you with economic instruments for environmental and natural resource management?

Have you ever used economic instruments for environmental and natural resource management problems?

Why are you attending the training workshop?

What do you hope to gain from it?

What do you think you could contribute to the training?

What skills do you feel you need particular training in?

Any other ideas or comments?

4.4 Session Planning Form

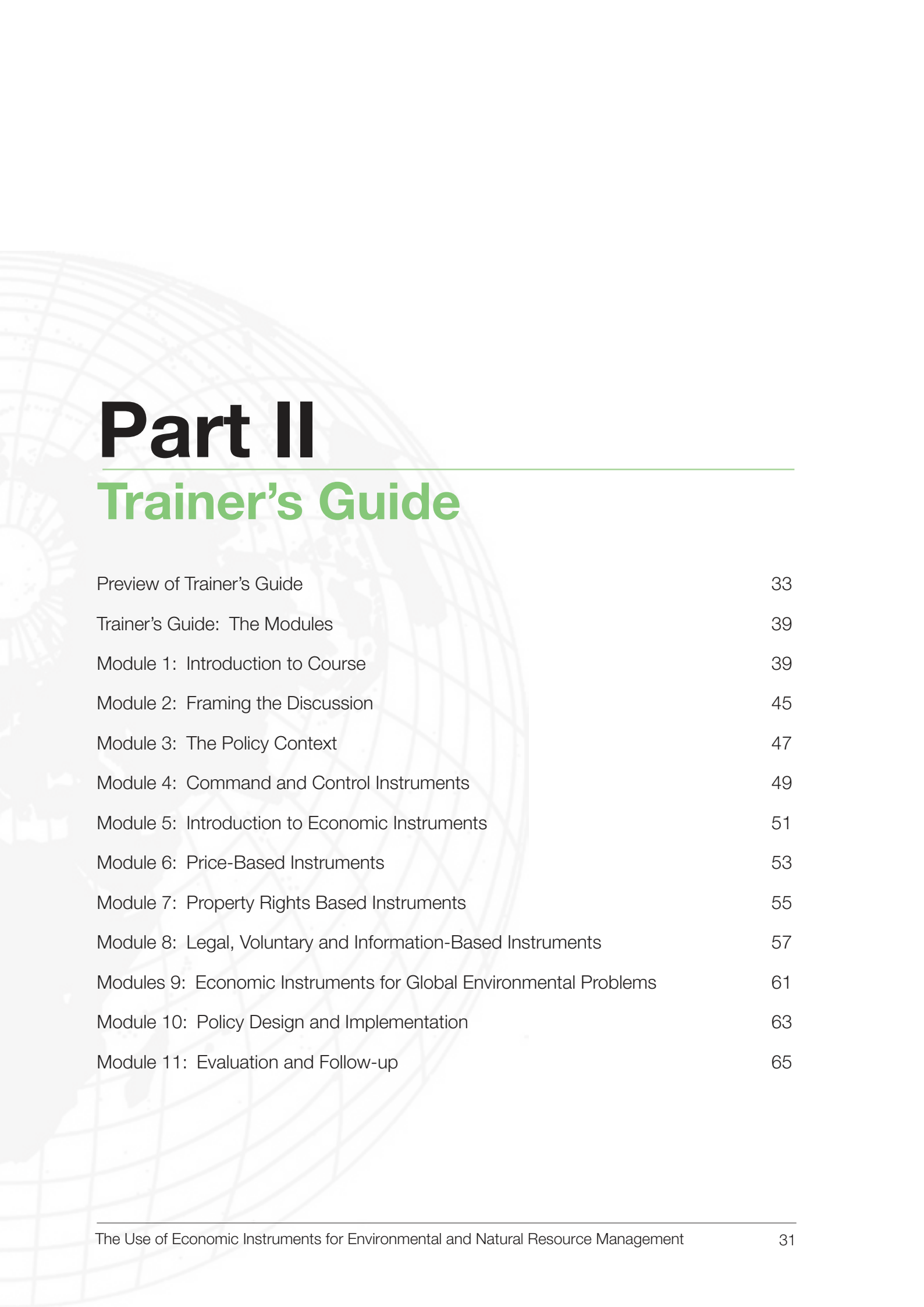
Training topic	Specific needs and training comments	Session duration (hours)	Selected training activity	Activity duration (hours)	Total duration (hours)
Module 1					
Module 2					
Module 3					
Module 4					
Module 5					
Module 6					
Module 7					
Module 8					
Review Exercise					
Module 9					
Module 10					
Module 11					
Site visits					
Approximate total hours					

4.5 Preparing a Case Study

The following template will help designers compile the information around which to build a case study. The categories on the left hand side should help to focus on the relevant information and highlight information gaps. For examples of case studies presented according to this template see Annex IV. For the purpose of group work based on case studies during training, provide the case study text in a narrative style – rather than as a matrix - to ensure that participants do the analytical work.

Title
Country
Problem definition
Environmental impacts
Social impacts
Solution implemented
Summary analysis
Efficacy of existing policy at solving problem
Rationale for success/failure
Unanswered questions
Institutional baseline conditions in country
Legal
Fiscal
Government institutions
Environmental
Details on policy process
History of response
Evaluation of past success/failure
Rationale for using economic instruments
Legal basis for economic instruments
Stakeholder involvement
Lead agencies
Key barriers addressed
Details on policy response
Allocation of initial rights
Ongoing monitoring process
Current successes
Remaining gaps/risks

Source: UNEP (2004)



Part II

Trainer's Guide

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0. Preview of Trainer's Guide

Part II: The Trainer's Guide provides the trainer with all the information necessary to conduct a training course on the use of economic instruments to address environmental and natural resource management problems. It gives an overview of the format of the course, a discussion of relevant trainer's tools, an introduction to pre-training activities, as well as instructions on the 11 training modules themselves.

Material designated to the use by trainers only is included in the text below, while the content of the modules and the handouts for the course participants are contained in Part III. Overhead projection cells are provided on the CD-Rom that accompanies this Manual.

The following provides the trainers guidance and tools for use in conjunction with the text and outside reading.

0.1 Overall Course Design

The training manual is organized into eleven modules. The modules each cover a discreet aspect of the content. The trainer may choose to organize training sessions to correspond to the modules or to expand or contract the information in various modules to fit the overall time available or the needs and interests of the participants. Trainers may wish to divide individual modules for use in two or more sessions. Alternatively, trainers may want to condense two or more modules into a single session.

Three possible training designs are envisioned in the use of the material:

1. *A one day overview session;*
2. *A three to five day training course;*
3. *A traditional university course.*

The contents of this manual are best suited to the preparation of a three to five day training course with appropriate case studies, exercises, and reading materials in addition to the text for each module. The format and instructions of the manual were designed accordingly. The envisioned course would provide policymakers, particularly non-economists, with a sound introduction to economic instruments.

However, to present a shorter course, the trainer would rely heavily on lectures centred on the text of the modules themselves. A one-day session could include a small amount of discussion during or after each session combined with reference to further reading. The trainer would not use the major exercises and case study reviews but could provide the case studies and recommended readings in the training packet.

The manual may also be of use for the development of a traditional university course with each module and associated exercises, case studies and reading materials serving as the basis of one or more class sessions.

0.2 Training Format

The following provides a suggested training format for courses developed from this Training Manual. These will vary in length and intensity depending upon the audience and time available to present the material.

Pre-Training Assignments

Prepare Environmental Problem Identification Questionnaire

Module 1: Introduction to Course

Suggested Group Exercise Module 1: Describe Environmental Problems (Based on Environmental Problem Identification Questionnaire)

Module 2: Framing the Discussion

Suggested Group Exercise Module 2: Shortage of Clean Drinking Water

Module 3: Policy Constraints

Suggested Group Exercise Module 3: Analyse Policy Context of Identified Environmental Problems (This is a follow-up to the exercise in Module 1.)

Module 4: Command and Control Instruments

Suggested Training Activity: Discussion in plenary

Module 5: Introduction to Economic Instruments

Suggested Training Activity: Discussion in plenary

Module 6: Price-Based Instruments

Suggested Training Activity: Discussion in plenary

Module 7: Property Rights Based Instruments

Suggested Training Activity: Discussion in plenary

Module 8: Legal, Voluntary, and Information Based Instruments

Suggested Training Activity: Discussion in plenary

Review Exercise on Modules 5 to 8: Case Studies on the Use of Economic Instruments

Module 9: Economic Instruments for Global Environmental Problems

Suggested Training Activity: Discussion in plenary

Module 10: Policy Design and Implementation

Final group exercise: Finding Policy Solutions to Address Identified Environmental Problems (follow-up to the exercises in Modules 1 and 3)

Module 11: Training Evaluation and Follow-up

Evaluation questionnaire and follow-up discussion

Annexes

Seven Annexes at the end of the manual provide detailed information useful as assignments for training course participants during the course or for the development of a university course. These Annexes are meant for use as an integral part of the training course. The Annexes are:

- I. *A comprehensive glossary of terms related to economic instruments organized in alphabetical order for general reference as a companion to the Defining Terms section provided at the beginning of each module,*
- II. *A Primer on Economic Instruments summarizing the uses and benefits of economic instruments and available for use in training related to Module 5,*
- III. *A matrix tool for analysing the impact of economic instruments on firms and individuals for use in training related to Module 5,*
- IV. *An extended analysis of selected economic instrument cases for potential use in the modules introducing different types of economic instruments,*
- V. *A template for assessing important factors affecting instrument choice for use in training related to Module 10,*
- VI. *A summary of common applications of economic instruments by resource area for use in training related to Module 10, and*
- VII. *An extensive list of references and additional sources of information.*

0.3 Format of the Modules

Each module generally consists of three parts¹:

0.3.1 The Defining Terms Section at the beginning of each module provides the definitions of terms used in the module in the order they appear in the text. The trainer may wish to use these in the training presentation or distribute them to participants at the beginning of the session as reference. (A comprehensive Glossary of all terms related to the training in alphabetical order is available in Annex I of this manual.)

0.3.2 The Main Text provides a brief review of the major concepts under consideration in that module. Modules 6, 7, 8 and 9 additionally include short summaries of case studies on the use of different economic instruments. The text is intended to help the trainer prepare his/her speaking notes for presentations. The main module texts may also be distributed to participants as part of the training packet.

0.3.3 Participants Involvement Tools Group exercises at the end of Modules 1, 2, 3, 10 and the case study exercise following Module 8 are designed to reinforce participants' appreciation of the concepts by application to concrete situations. The trainer may wish to use other examples if they were more relevant to the participants in a particular training course. Discussion questions are provided at the end of Modules 4, 5, 6, 7, 8, 9, and 11 of the trainer's guide to help trainers stimulate discussion among participants on the topic of the module. Trainers should use the questions to allow participants to share their experiences.

¹ Module 1, 10 and 11 follow a different structure.

0.4 Trainer's Tools

Several tools are available to assist the trainer in presenting material, organizing work groups and conducting plenary discussions. These tools include:

0.4.1 Overhead Projection Cells

They are provided on the CD-ROM that accompanies this manual. The trainer should feel free to copy the cells on to transparencies, incorporate them into a Power Point presentation, or merely have them copied and distributed to participants so that they can follow along.²

0.4.2 Charts and Graphs

The main texts of the modules in Part III (particularly Module 2) include a variety of charts and graphs for use as instructional aids. The trainer could copy and distribute these to the participants and may want to incorporate them into overhead projection or PowerPoint presentations. Trainers, however, should avoid both their use in a presentation without distributing them to the participants in addition, as well as the use of complex matrices or wordy overheads in presentations in general.

0.4.3 Case Study Summaries

The training materials contain more than a score of specific applications of various economic instruments in countries around the world. These case studies can be used as examples to illustrate points in general presentations or discussions, as the basis of group work sessions, or as background reading material.

0.4.4 Participants Involvement Tools

The training involves a considerable number of group exercises and plenary discussions. To assist trainers and participants in getting the most out of these exercises, this Trainer's Guide includes:

1. *Instructions for trainers for the organization of the group exercises, and*
2. *Discussion questions for use in plenary.*

The instructions for the group exercises for the participants can be found at the end of the respective module texts in Part III.

0.5 Pre-Training Activities Guide

For the training to be most effective, participants need to come to the training course well prepared. Recommended pre-training activities include completion of environmental problem identification questions and the completion of assigned reading.

0.5.1 Environmental Problem Identification Questionnaire

An environmental problem identification questionnaire offers an excellent opportunity for each participant to identify environmental problems in their country or community prior to the workshop. If possible, the trainer should send the questionnaire to the participants at least two weeks in advance of the course for the participants to complete and return.

² For a set of guidelines on how to prepare an effective PowerPoint presentation see www.hsph.harvard.edu/it/slides/

The questionnaire encourages participants to reflect on environmental conditions in their countries before the training and allows the trainer to adjust the training course to reflect the pressing environmental problems in the participants' own areas.

The trainers and participants can then use the identified environmental problems as the basis for exercises and presentations. If there is more than one representative from one country, participants coming from one country (or community) could jointly identify a problem to work on.

The model Environmental Problem Identification Questionnaire provided at the beginning of Part III offers an example of such a questionnaire.

The problem identified should meet some basic criteria in terms of relevance (i.e., the scope and the number of actors involved) and urgency (i.e., magnitude and incidence of the effects and the level of public pressure on the government or environmental agency to initiate interventions). The participants should do problem identification with as much detail as possible to include at least:

1. *Nature of the problem: overuse of a resource or pollution.*
2. *Potential effects on human welfare and health, and the environment, giving the temporal dimension. The latter becomes important if one is interested in a pollutant that bio-accumulates in the environment or if a natural resource is irreversibly degraded.*
3. *Scope of the problem: Geographical reach of the affected area, i.e. is it a local or regional problem? Vertical dimension of the pollutant, i.e. are the effects felt on the surface or in the upper reaches of the atmosphere?*
4. *Number of people involved: The damage a pollutant causes depends very much on the number of people exposed to the pollutant. Similarly, the magnitude of the welfare losses associated with the degradation of a rangeland depends on the number of farmers involved.*
5. *Number of stakeholders interested in a solution: This will affect the design of the implementation procedure for the selected policy instrument.*
6. *Baseline conditions relevant for the design of policy responses and policy implementation.*

Depending on the immediate objective of the training and the background of the participants, trainers may wish to modify the questionnaire to target specific types of problems or economic conditions. To do so, the trainer can use the 'Template for Assessing Important Factors Affecting Instrument Choice', (Annex V), which provides further clarifying questions and contextual information.

In the exercise in Module 1 each participant will be asked to describe the identified problem and present it to the other participants.

0.5.2 Pre-Training Reading Assignment

To ensure a common understanding of economic instruments it will be useful to give the participants a reading assignment for the workshop. It is most effective for the trainer to supply the participants with short articles or selected pages copied from books rather than to assign entire books or very technical journal articles. This is especially important if the course addresses policy makers, who often have little time to prepare for a training course.

References to suggested reading assignments are provided below. The choice of the reading assignments should be appropriate to the region and overall programme of the training course.

1. Dales, J. H. (1993). "The property interface", in A. Markandya and J. Richardson (Eds): *Environmental economics: A reader*. New York: St. Martin's Press, pp 50 –59.
2. Hardin, Garrett. (1993). "The tragedy of the commons", in A. Markandya and J. Richardson. *Environmental Economics: A reader*. New York: St Martins Press, pp 60-70.
3. Pearce, D. W. and R. Turner (1990). "Renewable resources" (chapter 16), in *Economics of natural resources and the environment*. New York: Harvester Wheatsheaf, pp 241-259.
4. Tietenberg, T. H. (1992). "Economics of the environment: An overview" (ch. 2, pp 18-43) and "Economics of pollution control: An overview" (ch. 14, pp 360-391), in *environmental and natural resource economics (Third edition)*. New York: HarperCollins Publishers.



Trainer's Guide: The Modules

Module 1 Introduction to Course

The goal of the first module is to provide an overview of the course and introduce the participants and the trainers. It will set the stage for all that is to follow. By the end of this module, participants should have a good understanding of the purpose and structure of the course, the value of interactive exercises, and the expectations of other participants and trainers. The following is a recommended outline of what to cover in the first module.

1.1 Introduction of Trainers and Participants

The trainers should introduce themselves and describe their qualifications. Participants should introduce themselves in plenary session, giving their organization and position. (This would be a good time for an icebreaker exercise to make the trainees feel more comfortable. Information about icebreaker exercises can be found at <http://www.mwls.co.uk/icebreak.htm>.)

1.2 Discussion of Participant Expectations

Each participant should describe briefly his or her expectations for the course without going into detail about any specific environmental problem that they would like to have addressed in their home country. The participants should answer the question: What do I want to learn from this training? This will assist the trainers in knowing which elements of the training may need special emphasis or how much detail to provide on any given topic.

1.3 Overview of Course

The trainer should provide an overview of the objectives of the course, the course structure and the topics to be covered and define the issues and core concepts to be discussed during the training. Before the presentation, trainers should also review the goals of each module as provided in the following:

Module 2 – Framing the Discussion reviews the basic concepts and terminology related to the use of economic instruments for environmental and natural resource management. By the end of this module, participants should have a good understanding of the basic concepts and terms relating to the use of economic instruments for environmental and natural resource management.

Module 3 – Policy Context describes how existing conditions in a country affect the use of environmental and natural resource management policy instruments. By the end of this topic, participants will be able to analyse the policy context in their own country for the successful application of policy instruments.

Module 4 – Command and Control Instruments analyzes the three primary command and control instruments used for environmental and natural resource management. By the end of this module, participants will be able to explain how these instruments help solve environmental problems and to explain the reasons for the choice of these instruments.

Module 5 – Introduction to Economic Instruments discusses the three broad categories of economic instruments, the functional objectives of economic instruments, and describes the benefits of economic instruments. By the end of this module, participants will be able to explain advantages of economic instruments and possible objectives that they could achieve.

Module 6 – Price-Based Instruments presents the theory and application of price-based economic instruments such as taxes, fees, and subsidies. Participants will be able to describe price-based instruments and the context in which to use them.

Module 7 – Property Rights Based Instruments discusses the importance of property rights in environmental policy and the use of various property rights-based instruments such as assignment of property rights for protection of the environment and the use of tradable permits. Participants will be able to explain property rights based instruments and when they can best be used.

Module 8 – Legal, Voluntary, and Information-Based Instruments presents the key features of instruments such as fines, liability, performance bonds, voluntary agreements to reduce pollution, and eco-labelling. Participants will be able to explain what legal, voluntary and information-based instruments are and when they can be used.

Review Exercise on Modules 5 to 8: Case Studies on the Use of Economic Instruments provides the opportunity to recapitulate the material of Modules 5 through 8 by analysing case studies within groups. Each group will analyse one case and report the findings to the plenary.

Module 9 – Economic Instruments for Global Environmental Problems reviews economic instruments for the management of environmental and natural resource problems of a global nature. At the end of this module, participants will be able to outline in general terms the application of economic instruments to environmental problems of global concern.

Module 10 – Policy Design and Implementation reviews the main phases of choosing an effective environmental policy instrument (or set of instruments) to address a target environmental problem and the steps needed to implement that instrument. By the end of this module, participants will be able to outline the steps needed to design and implement economic instruments. This module includes a comprehensive final group exercise (building on the exercises in Modules 1 and 3) that will allow participants to review and apply the material they have learned throughout the course.

Module 11 – Evaluation and Follow-up is a final session to evaluate the course and to consider possible uses of the newly learned information in the participants' home countries.

1.4 Introduction to Interactive Exercises

One of the main features of the training will be interactive exercises in which the participants discuss and report on actual cases related to the information presented in each module. In Module 1, the trainer should introduce the participants to the purpose and general procedures of interactive exercises.

The purpose of these exercises is to apply theory and abstract concepts to the real world. The interactive exercises are designed to help the participants grapple with real issues that policymakers face and apply the concepts to the given situation. The exercises require everyone in the course to think seriously about the issue at hand and to be able to articulate their thoughts before the group in some depth.

The course is using two sorts of group exercises:

Self-Identified Environmental Issues

These exercises will involve discussing environmental problems identified prior to the workshop. Working in groups, participants will choose an environmental issue relevant to the concerns of the members. During the training, the group will complete a plan to address the issue using a policy instrument.

The topics covered in the course will provide the building blocks to further analyse and refine the problem identified in the pre-training assignment, design an appropriate economic instrument to tackle the defined problem and finally, design an appropriate implementation and evaluation strategy for the selected economic instrument.

Case Study Exercises

In these exercises participants apply the concepts covered in the module to an actual case study of an environmental problem or group of problems. These exercises help ensure that all of the concepts presented in the course are discussed in some detail.

The material to be covered and the relevance of the environmental problems to the participants will determine the type of exercise used for each module.

1.5 Trainer's Tools

The trainer's tools for this module consist of:

- *Instructions for trainers for the organization of the first group exercise,*
- *Instructions for the participants for the group exercise (Part III, handout provided at the end of Module 1),*
- *A set of overhead transparency cells to help the trainer walk through the overview for the participants (provided on CD-ROM).*

1.6 Module 1 Group Exercise – Instructions for trainers

At the end of Module 1, the trainer could organize a training exercise during which participants describe and present an environmental problem identified by the members of the group. This exercise builds on the Environmental Problem Identification Questionnaire used as pre-training activity.

Participants should take care in identifying the problem because the proposed exercises for Modules 3 and 10 will use the problem for study of the policy context and the development of proposed an economic instrument respectively.

Organization of Groups

The trainer should organize participants into working groups of 3-5 people (depending on total number of participants) that will work according to the same instructions. Participants from the same country³ or community⁴ should join one group and decide beforehand on one environmental problem that they want to present.

Duration of Exercise

The trainer should allow 1½ to 2 hours for the exercise, including presentations by each group.

Resources Required

The participants will need:

1. *Sufficient copies of instructions for group work,*
2. *Flipchart paper or overhead transparencies to present results of group discussion,*
3. *Markers to write on flipchart or transparencies,*
4. *Space where groups can gather (best around a table).*

Group Work

The groups should use the following procedures:

- *Each participant should identify a critical environmental problem in his or her own country (or community). If possible, the participants should select problems for discussion during the training from the Environmental Problem Identification Questionnaires submitted prior to training. (See 0.5 Pre-training Activities Guide.),*
- *Each participant (or team from the same country/community) should then present the analysis of the environmental problem identified in their country or community to the other members of the working group and the group should briefly discuss the different cases. (Each member of the group should be able to present his or her case.),*
- *The group should then select one environmental problem for presentation in the plenary and use in exercises throughout the training. Since there will likely be multiple problems available, the group will need to choose the most useful example for discussion during the training. Participants should select problems with enough scope and complexity to allow extensive discussion and alternative potential solutions,*
- *The group should describe the selected problem in as much detail as possible, touching upon the extent of the problem, the constraints in addressing the problem, and previous attempts to address the problem,*
- *The group should select a speaker and jointly prepare a presentation,*
- *During the group work session, trainers should be available to facilitate the group work and provide further information if available and if necessary.*

³ For the case of an international or regional training workshop that is attended by participants from different countries.

⁴ For the case of a national training workshop that is attended by participants from different sub-regions or communities.

Presentation and Discussion of Results

Following the group work session, participants should meet in plenary to present the results of their discussion. Trainers should facilitate the plenary session summarizing the most important points of the presentations and focusing on aspects most relevant for the further training.

Note: Participants should only identify the problem in this exercise. They should not recommend any solutions at this time.



Trainer's Guide: The Modules

Module 2 Framing the Discussion

Module 2 provides the information needed for an understanding of the basic concepts and ideas behind the use of economic instruments for environmental and natural resource management. The module lays the foundation upon which the remainder of the training rests. As a result trainers should take care to be sure that participants have a thorough understanding of the concepts before moving on to the succeeding modules.

By the end of the module participants should be able to identify the major concepts and issues that affect the implementation of economic instrument policies.

2.1 Format of Module 2

Modules 2 to 9 all consist of three parts: The defining terms, the main text, and either a group exercise or a plenary discussion.

The main text of Module 2 includes a special section that reviews environmental economics with a series of charts and descriptions of their meaning. This section is optional and especially suited for a group of participants with some interest in a mathematical and graphical approach to economics.

The group exercise of this module is designed to reinforce participants' appreciation of the concepts by application to a concrete situation relating to water quality. The trainer may wish to use another example if it is more relevant to the participants.

2.2 Trainer's Tools

The trainer's tools for this module consist of:

- *Instructions for trainers for the organization of the group exercise,*
- *Instructions for the participants for the group exercise (Part III, handout provided at the end of Module 2),*
- *A set of overhead transparency cells to help the trainer walk through the overview for the participants (provided on CD-ROM).*

2.3 Module 2 Group Exercise – Instructions for trainers

At the end of Module 2, a training activity is suggested during which participants apply the concepts learned in the session to the problem of a shortage of clean drinking water.

Issue

A lack of clean drinking water is a common problem in many developing countries. This problem can be analysed by using the concepts covered in Module 2 (For purposes of this exercise assume that the country could have sufficient clean drinking water for the entire population. In other words, severe drought or overpopulation is not a major cause of the lack of clean water.)

Organization of Groups

The trainer should organize participants into working groups of 3-5 people (depending on total number of participants).

Duration of Exercise

The trainer should allow 1½ to 2 hours for the exercise, including presentations by each group.

Resources Required The participants will need:

1. *Sufficient copies of the instructions for group work (in Part III),*
2. *Flipchart paper or overhead transparencies to present results of group discussion,*
3. *Markers to write on flipchart or transparencies,*
4. *Space where groups can gather (best around a table).*

Group Work

The trainer should ask the group to work on the issues of drinking water following the questions suggested in the instructions for participants (see Module 2 in Part III). The group should then select a speaker and jointly prepare a presentation.

Presentation and Discussion of Results

Following the group work session, participants should meet in plenary to present the results of their discussion. Trainers should facilitate the plenary session summarizing the most important points of the presentations and focusing on aspects most relevant for the further training.



Trainer's Guide: The Modules

Module 3 The Policy Context

Policymakers can only deploy economic instruments in the context of existing political, institutional, economic, and societal conditions. Module 3, therefore, describes various conditions in a country that can affect the performance of economic instruments. By the end of this module, participants should be able to analyse the policy context in a country for the successful application of policy instruments.

The information in this module is not complex. Few ideas will be unfamiliar to the participants. Nevertheless, trainers should make clear that they are fundamental to the discussion. No use of economic instruments can succeed without careful consideration of the overall policy context.

3.1 Format of Module 3

After the defining terms section, Module 3 provides a brief review of the major concepts that the participants will need to understand about the policy context in which economic instruments are used.

The group exercise at the end of the module is designed to reinforce participants' appreciation of the concepts by application to a concrete situation relating to the cases identified by the participants in Module 1.

3.2 Trainer's Tools

The trainer's tools for this module consist of:

- *Instructions for trainers for the organization of the group exercise,*
- *Instructions for the participants for the group exercise (Part III, handout provided at the end of Module 3),*
- *A set of overhead transparency cells to help the trainer walk through the overview for the participants (provided on CD-ROM).*

3.3 Module 3 Group Exercise – Instructions for trainers

At the end of Module 3, a training activity is suggested during which participants apply the concepts learned in the session on policy context to the problem identified in Module 1.

Organization of Groups

For continuity of the discussion, the participants should work in the same groups as in the exercise in Module 1.

Duration of Exercise

The trainer should allow 1½ to 2 hours for the exercise, including presentations by each group.

Resources Required

The participants will need:

1. *Sufficient copies of the instructions for group work (in Part III),*
2. *Flipchart paper or overhead transparencies to present results of group discussion,*
3. *Markers to write on flipchart or transparencies,*
4. *Space where groups can gather (best around a table).*

Group Work

The group should go back to the environmental problem that was selected and presented in Module 1. Working in the same groups they should now discuss the policy context that affects the problem in light of the presentation on Module 3. The group should select a speaker and jointly prepare a presentation.

Presentation and Discussion of Results

Following the group work session, participants should be asked to meet in plenary to present the results of their discussion. Trainers should facilitate the plenary session summarizing the most important points of the presentations and focusing on aspects most relevant for the further training.

Note: In this exercise participants should only describe the various elements of the policy context that affect the problem identified in Module 1. They should not recommend any solutions at this time.



Trainer's Guide: The Modules

Module 4 Command and Control Instruments

Even though the overall training course focuses on the use of economic instruments, Module 4 covers the nature and uses of various command and control, because:

- 1. It is easier to see the benefits of economic instruments in the context of all available policy instruments;*
- 2. Command and control instruments may be effectively used in conjunction with economic instruments; and,*
- 3. Command and control instruments are preferable to economic instruments under certain conditions.*

By the end of this module, participants will be able to explain how and when to use command and control instruments to solve environmental problems and explain the reasons for the choice of instruments compared to the use of economic instruments.

4.1 Format of Module 4

Following the defining terms section, the main text of Module 4 provides a brief review of the major concepts related to command control instruments and a description of three types of main command and control instruments for environmental and natural resource management.

At the end of the module, a plenary discussion will give participants the opportunity to discuss issues raised during the presentation and to share their own experiences.

4.2 Trainer's Tools

The trainer's tools for this module consist of:

- A series of discussion questions for use in plenary (provided in section 4.3 below),*
- A set of overhead projection cells to assist the trainer in presenting the material (provided on CD-ROM).*

4.3 Plenary Discussion Questions

For this module, trainers can conduct a plenary discussion with participants discussing their experiences with command and control instruments in their own countries. Here are some questions the trainer could ask to stimulate discussion:

1. *What environmental problems is your country addressing with command and control instruments?*
2. *Which command and control instruments are currently being used?*
3. *What are the reasons these instruments were chosen?*
4. *Are existing command and control policies effective?*
5. *Are there environmental problems not being effectively addressed in your country for which command and control instruments might be effective and why do you believe they would work?*



Trainer's Guide: The Modules

Module 5 Introduction to Economic Instruments

The next four modules will present the various economic instruments available to solve environmental problems. By the end of Modules 5-8, participants should be able to identify economic instruments suitable for addressing different environmental problems and to provide the defensible reasons for their choice.

Before discussing the various types of economic instruments in detail, the general benefits and uses of economic instruments will be discussed in Module 5. By the end of this module, participants should be able to explain the general benefits of economic instruments.

5.1 Format of Module 5

Following the defining terms section, the main text of Module 5 introduces participants to the three broad categories of economic instruments, reviews the functional objectives of economic instruments, and describes their benefits. At the end of the module, a plenary discussion will give participants the opportunity to discuss issues raised during the presentation and to share their own experiences. The module does not include a group exercise since there will be a group exercise after Module 8 covering aspects of Modules 5-8.

5.2 Trainer's Tools

The trainer's tools for this module consist of:

- *A series of discussion questions for use in plenary (provided in section 5.3 below),*
- *A Primer of Economic Instruments (Annex II) presents commonly used economic instruments grouped by the functional objectives they aim to achieve. It also introduces material that can quickly help policymakers narrow the range of instruments once they have defined their problem,*
- *A Detailed Analysis Matrix provided in Annex III shows the link between policy objectives and market incentives and identifies important factors for policymakers to consider when applying particular kinds of instruments,*
- *A set of overhead projection cells to assist the trainer in presenting the material (provided on CD-ROM).*

The Primer and the Detailed Analysis Matrix (Impact of Economic Instruments on Incentives of Firms and Individuals) could be useful background reading for trainers in support of their efforts to guide participants in finding solutions to their environmental and natural resources management problems. It could also be distributed to the participants as a handout.

5.3 Plenary Discussion Questions

For this module, the trainer can lead a plenary discussion with participants to discuss their general experiences with economic instruments in their own countries. Here are some questions that the trainer could use to stimulate discussion:

- 1. What functions could economic instruments have in your country?*
- 2. Are there problems with the definition of property rights in your country?*
- 3. Which environmental problems are affected by property rights, if any?*
- 4. How can economic instruments promote the efficient allocation of natural resources?
Are there examples in your country where these might apply?*
- 5. What are the advantages of economic instruments over command and control instruments?
Use examples from your experience.*
- 6. How can the use of economic instruments promote transparency?*
- 7. Can you think of instances in your country where the use of economic instruments would be inappropriate?*



Trainer's Guide: The Modules

Module 6 Price-Based Instruments

Module 6 presents the key features of price-based economic instruments. Apart from the second half of Module 2, this module is perhaps the most challenging of all those in this course and, as such, needs the most careful preparation.

The first section addresses the economic theory that underlies the use of price-based instruments. Sections on various charges, taxes, fees and subsidies follow. By the end of this module, participants should be able to explain the general characteristics of price-based instruments.

6.1 Format of Module 6

Following the defining terms section, Module 6 provides a brief review of the major concepts related to price-based economic instruments and a description of a variety of those instruments. Nine examples from different countries are included to illustrate the application of price-based instruments and facilitate a discussion.

The plenary discussion at the end of the module will give participants the opportunity to discuss issues raised during the presentation and to share their own experiences. The module does not include a group exercise since there will be a group exercise after Module 8 covering aspects of Modules 5-8.

6.2 Trainer's Tools

The trainer's tools for this module consist of:

- *A set of questions suitable for plenary discussion (provided in section 6.3 below),*
- *Case summaries (given in Part III at the end of Module 6) showing the application of price-based instruments in a variety of actual settings around the world. (NOTE: Several of the cases provided are also included in the examples for the suggested Review Exercise on Modules 5 to 8 following Module 8 in Part III. These case studies are: Grassland Pricing Reform in Philippines, Bulb Markets in Turkey, Reforestation in Brazil, and Perverse Incentives for Pollution in China, and Soil Conservation Efforts in the Dominican Republic). The trainer may choose to use these case studies at the end of this module or save them for the later exercise,*
- *A set of overhead projection cells to assist the trainer in presenting the material (provided on CD-ROM).*

6.3 Plenary Discussion Questions

For this module, the trainer can lead a plenary discussion with participants to solicit an exchange of views on the potential uses of price-based instruments in participants' countries. The trainer may wish to use the case examples at the end of the module as a starting point for discussion. Here are some questions that the trainer could use to stimulate discussion:

1. *What is a Pigovian Tax?*
2. *What can we learn from the Pigovian Tax for the use of price-based instruments?*
3. *Name and describe an input or output tax in your country, if any?*
4. *Does your government use tax expenditures as part of environmental policy? If not, are there instances where they might be useful?*
5. *When is the use of subsidies appropriate?*
6. *Does your country have policies that act as perverse incentives?*
7. *Does your government promote the use of deposit refunds? If not, where could they be applied?*
8. *Do you have other experiences with price-based instruments in your countries?*



Trainer's Guide: The Modules

Module 7 Property Rights Based Instruments

This module presents the key features of property rights based instruments including ways of establishing, clarifying, and enforcing property. By the end of the training, participants should be able to explain the concepts related to property rights based instruments and how the instruments can best be used.

7.1 Format of Module 7

Following the defining terms section, the main text of Module 7, which provides a brief review of the major concepts related to property rights based economic instruments and a description of a variety of those instruments. The text also discusses common property rights issues and the use of tradable emission permits as a form of property. Seven examples from different countries are included to illustrate the application of property rights based instruments and facilitate a discussion.

The plenary discussion at the end of the module will give participants the opportunity to discuss issues raised during the presentation and to share their own experiences. The module does not include a group exercise since there will be a group exercise after Module 8 covering aspects of Modules 5-8.

7.2 Trainer's Tools

The trainer's tools for this module consist of:

- A set of questions suitable for plenary session discussion (provided in section 7.3 below),
- Case summaries (given in Part III at the end of Module 7) showing the application of property rights based instruments in a variety of actual settings around the world. Two of the examples provided below are also included in the examples for the suggested Review Exercise on Modules 5 to 8 (The examples are "Nutrient Trading among Sewage Plants: The State of New South Wales" and "Tenure Reform: Mankote Mangrove, St. Lucia"). The trainer may choose to use these case studies at the end of this module or save them for the later exercise,
- A set of overhead projection cells to assist the trainer in presenting the material (provided on CD-ROM).

7.3 Plenary Discussion Questions

For this module, the trainer can lead a plenary discussion with participants to solicit an exchange of views on the potential uses of property rights based instruments in participants' countries. The trainer may wish to use the case examples at the end of the module as a starting point for discussion. Here are some questions that the trainer could use to stimulate discussion:

- 1. Are there environmental issues in your country that could be improved by clarifying and enforcing property rights?*
- 2. Do you have communal property rights issues in your country? Do these involve ownership or tenure?*
- 3. How could communal property rights instruments improve environmental conditions?*
- 4. How could the various kinds of tradable permits apply to your country?*
- 5. What might be potential problems in using property right based instruments?*



Trainer's Guide: The Modules

Module 8 Legal, Voluntary and Information-Based Instruments

The purpose of Module 8 is to present the key features of legal, voluntary and information-based instruments for environmental and natural resource management. By the end of this module, participants should be able to explain the characteristics and uses of this class of instruments.

8.1 Format of Module 8

Following the defining terms section, the main text of Module 8 introduces participants to legal, voluntary and information-based instruments, reviews the functional objectives of these instruments, and describes their strengths and weaknesses. Four brief examples from different countries are included to illustrate the application of these instruments and facilitate a discussion.

The Plenary Discussion at the end of the module will give participants the opportunity to discuss issues raised during the presentation and to share their own experiences. The module does not include a group exercise since there will be a group exercise after Module 8 covering aspects of Modules 5-8.

8.2 Trainer's Tools

The trainer's tools for this module consist of:

- *A set of questions suitable for plenary session discussion (provided in section 8.3 below),*
- *Three brief examples of application of information-based instruments (given in Part III at the end of Module 8),*
- *A set of overhead projection cells to assist the trainer in presenting the material (provided on CD-ROM).*

8.3 Plenary Discussion Questions

For this module, the trainer can lead a plenary discussion with participants to solicit an exchange of views on the potential uses of legal, voluntary and information-based instruments in participants' countries. The trainer may wish to use the case examples at the end of the module as a starting point for discussion. Here are some questions that the trainer could use to stimulate discussion:

1. *How can legal instruments be used as economic instruments?*
2. *Is liability used as an economic instrument in your country? If so, how?*
3. *Do you use performance bonds? Are they effective?*
4. *What are the benefits of voluntary instruments?*
5. *Do you use voluntary instruments in your country?*
6. *How could disclosure of information improve environmental conditions in your country?*



Trainer's Guide: The Modules

Review Exercise on Modules 5 to 8

Case Studies on the Use of Economic Instruments⁵ (Instructions for Trainers)

Background

The Manual includes a set of freestanding case studies covering the full range of economic instruments. The trainers may wish to devote an entire session to a group exercise based on these case studies. In the context of this training resource manual, they are used as samples for study purposes only and do not want to provide any statement on the policies of the countries involved. Trainers are encouraged to compile similar case studies, which are adjusted to the specific context of the training course (from a specific region, addressing priority problems, involving certain target groups, etc.).

Aim

The aim of the exercise is to enable participants to:

1. *Understand in which context economic instruments have already been used;*
2. *Better understand the process of introducing them as well as the possible benefits and limitations; and*
3. *Gain some perception of what using economic instruments in the participants' countries might involve.*

Group Size

Depending on the total number of participants, form groups of 3 to 6 persons, with each group working on a different case study. In total, four case studies are available. Choose the ones considered most appropriate for the participants of the workshop.

Duration

Take two to three hours for the exercise, including presentations by participants.

⁵ This exercise is based on the case studies, which have been compiled for UNEP (2004): The Use of Economic Instruments in Environmental Policy: Opportunities and Challenges.

Preparation

The trainers need time to familiarize themselves with the case studies prior to the training. Trainers might identify further relevant information, which could be used to assist the working groups. The following material is available in Part III, Review Exercise on Modules 5 to 8 (following Module 8) to be distributed to participants:

- *Questions for group discussion*
- *Four case study summaries*

Resources Required

1. *Sufficient copies of the case study summaries and questions for discussion (provided in Part III),*
2. *Paper or overhead transparencies to present results of group discussion,*
3. *Markers to write on flipchart or transparencies, and*
4. *Space where groups can gather (best around a table).*

Procedures for the Group Work

As an introduction to the exercise, trainers explain objectives and give instructions for group work (Each group works on one case study according to the questions provided and prepares a presentation to report their results back to the plenary). Trainers divide the participants into groups and distribute the relevant case study and questions for group work.

Upon completion of their analysis, groups should meet in plenary to briefly present the results of their discussion. Trainers facilitate the discussion summarizing the most important points of the presentations and focusing on the lessons learned for the participants' own country cases. Participants should provide:

1. *A brief description of the country situation*
2. *The main objective of the economic instrument applied*
3. *The main factors for success or failure*



Trainer's Guide: The Modules

Module 9 Economic Instruments for Global Environmental Problems

Module 9 presents information on the use of economic instruments for the management of environmental problems of global concern. At the end of this module, participants should be able to describe the application of economic instruments to cross-border environmental and natural resource management problems.

9.1 Format of Module 9

Like the preceding modules, Module 9 starts with a defining terms section. The Main Text then provides a brief review of the major concepts related to economic instruments that nations acting together could use to address cross-border environmental concerns such as protecting biodiversity, and controlling greenhouse gases. Two brief examples from different countries are included to illustrate the application of global economic instruments and facilitate a discussion.

The Plenary Discussion at the end of the module will give participants the opportunity to discuss issues raised during the presentation and to share their own experiences.

9.2 Trainer's Tools

The trainer's tools for this module consist of:

- *Summaries of cases showing the application of cross-border economic instruments in actual settings for use in plenary discussion (in Part III at the end of Module 9),*
- *A set of questions for use in plenary discussion (provided in section 9.3 below),*
- *A set of overhead projection cells to assist the trainer in presenting the material (provided on CD-ROM).*

9.3 Plenary Discussion Questions

For this module a discussion in plenary can be conducted with participants discussing their view of the potential for the use of economic instruments to address global environmental problems and potential effects on their countries.

The trainer may wish to use the case examples at the end of the module as a starting point for discussion. Here are some questions that the trainer could use to stimulate discussion:

- 1. Are there any experiences in your countries with direct financial transfers (GEF projects, debt-for nature swaps etc)? Are there any lessons learned?*
- 2. What do you think about international taxation for environmental protection (any opinions)?*
- 3. Are there any experiences in your countries with the implementation of the Kyoto protocol mechanisms (emission trading, joint implementation or CDM-mechanism)?*
- 4. Do you believe that transferable development rights could be used in your country?*



Trainer's Guide: The Modules

Module 10 Policy Design and Implementation

The purpose of this module is to describe the four main phases of choosing an effective environmental instrument to address a target environmental problem. By the end of this module, participants should be able to outline the most important steps for designing and implementing an economic instrument.

10.1 Format of Module 10

Unlike the previous modules, Module 10 does not have a defining terms section since no new terms are introduced. The main text details the steps policymakers need to take in choosing and implementing an effective environmental instrument that will address the target environmental problems given the existing institutional capabilities and environmental policies in the country.

The final group exercise in which participants will work in small groups serves to develop a strategy to address the environmental problems identified in Module 1 and discussed in Module 3. This exercise will give participants an opportunity to reflect on all the aspects that have been introduced in the training, from functions of economic instruments, over different possible instruments to the necessary steps for implementation.

10.2 Trainer's Tools

The trainer's tools for this module consist of:

- *Instructions for trainers for the organization of the final group exercise,*
- *Instructions for the participants for the group exercise (Part III, handout provided at the end of Module 10),*
- *A template assessing important factors affecting instrument choice (Annex V),*
- *A summary of common applications of economic instruments by resource area (Annex VI), and*
- *A set of overhead transparency cells to help the trainer walk through the overview for the participants (on CD-ROM).*

10.3 Module 10 Final Group Exercise – Instructions for trainers

Based on the information provided in all the previous modules, participants should try to find appropriate economic policy instruments to address the environmental problem the group has worked on in Modules 1 and 3. They should use the steps outlined in the main presentation as a guide to preparing a presentation.

Organization of Groups

For continuity of the discussion, the participants should work in the same groups as in the exercise in Module 1 and 3.

Duration of Exercise

The trainer should allow 2 to 2½ hours for the exercise, including presentations by each group.

Resources Required

The participants need:

1. *Sufficient copies of the instructions for group work (in Part III)*
2. *Flipchart paper or overhead transparencies to present results of group discussion*
3. *Markers to write on flipchart or transparencies*
4. *Space where groups can gather (best around a table)*

Presentation and Discussion of Results

Following the group working sessions, participants should present the results of their discussion in plenary. Trainers should facilitate the plenary session summarizing the most important points of the presentations and discussion and focusing on the most important lessons learned.



Trainer's Guide: The Modules

Module 11 Evaluation and Follow-up

Module 11 will help participants and trainers review the economic instruments course as a whole and encourage participants to consider what they can do with the information they have gained. Module 11 will also provide trainers and course developers with useful information for future improvements in the training course itself.

Each participant should complete an evaluation and follow-up questionnaire at the beginning of the Module 11 session (see suggestions below) so that participants give their full attention to the task before beginning final discussions.

11.1 Format of Module 11

“Evaluation and Follow-up” consists of two parts:

The evaluation section provides advice for trainers on conducting evaluation including a sample evaluation form.

The follow-up section offers advice on leading discussion concerning what the participants plan to do when they return home.

11.2 Evaluation

An evaluation session can be valuable for both participants and trainers. For participants the session allows time to reflect on what they have learned and what else they would like to learn on specific topics. The trainers receive information needed to modify and improve the delivery, content and structure of the course. The overall evaluation of the training should be undertaken at the following levels:

1. *Content*
2. *Presentation by Trainers*
3. *Format (e.g. classroom versus roundtable, lecture vs. discussion)*
4. *Activities (e.g. discussions, group presentations, assignments)*
5. *Physical Conditions and Amenities*
6. *Overall Utility of the Course*

The evaluation process should be formal and structured. Too often evaluation amounts to little more than checking boxes on a perfunctory form as participants are leaving to go home offering little of substantive use to either the trainers or participants.

To structure the process, a carefully designed training course questionnaire should be developed and used to gather information for the evaluation. A general example of an evaluation questionnaire is provided in Module 11 in Part III. However, this form should be considered a starting point. It is highly recommended that the evaluation be customized to suit the particular circumstances of each training course. It is especially important to leave room for participants to make specific comments about each session and topic as well as the course in general.

If possible and appropriate in the specific context, the trainer could have the results tabulated by the participants or an assistant during a break. The summarized results can then be copied or displayed on an overhead projection screen to facilitate discussion with the group.

During the discussion, the trainer could probe for opinions about any category where the scores are especially low or high in the overall ratings. For other categories, individuals who have strong feelings should be asked to comment. General discussion should be encouraged throughout.

11.3 Follow-up

The follow-up session brings into focus the participants' ideas about possible uses of economic instruments in their own country. As with the evaluation, the follow-up session should be formal and structured. At the end of training session participants should be asked what they could do with what they learned in the training and with the material that was provided.

To facilitate this discussion, the trainer could distribute a form with a few questions to the participants for completion at the beginning of the Module 11 session. The questionnaire on possible follow-up activities needs to be well prepared but not extensive.

The participants should take ten to fifteen minutes to reflect on one thing that they would like to do, once they come back. This will help participants individually to think about how they could use what they have learned rather than leaving the process to a few outspoken members of the group. Following a short phase of reflecting individually, the trainer should then ask participants to share their ideas.

11.4 Trainer's Tools

The trainer's tools for this module consist of:

1. *A sample evaluation questionnaire to be adapted to the specific circumstances of the training (given in Module 11, Part III),*
2. *A set of questions addressing possible follow-up activities (provided in section 11.5 below).*

11.5 Possible Questions on Follow-up Activities

The following set of questions could assist the participants to brainstorm on possible follow-up activities:

1. *What could you do immediately upon your return to your country?*
2. *What activities could you initiate in the near future?*
3. *What resources would you need?*
4. *What technical assistance would you need and how could you provide it?*
5. *What single problem in your country do you consider most appropriate for the use of economic instruments?*
6. *What economic instruments seem most effective in dealing with the problem?*
7. *What economic instruments may be inappropriate and why?*

Part III

Training Modules

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0. Pre-Training Activities

Before the participants arrive at the training session, they are asked to complete and return an environmental problem identification questionnaire.

Environmental Problem Identification Questionnaire

1. Name of participant(s):

2. Country:

3. What is a pressing environmental problem in your country?

4. Is the problem identified a resource overuse or a pollution problem?

5. What is the scope of the problem? (i.e. is it a local or regional problem?)

6. What are the potential effect(s) of the problem?

7. What are the causes of the problem (economic, institutional, social, natural, etc)?

8. How long has the problem been present?

9. Who are the stakeholders involved in the problem?

10. How many people approximately are affected or have been affected by the problem?

11. Which socio-economic groups in particular are affected by the problem?

12. Does your country's environmental policy explicitly provide for the use of economic instruments in solving environmental or natural resource management problems?

YES	NO
-----	----

If your answer to question 12 is YES, which principles does the policy recommend to be followed in the application of economic instruments (polluter pays, etc.)?

13. What are the past interventions taken to solve the problem?

14. Have the previous interventions had any positive impact on the problem?

YES	NO
-----	----

Please give some details. (If your answer is YES, please give the reasons why you think the interventions succeeded. Likewise, if your answer is NO, please give the reasons as to why you think the interventions failed.)

15. Have you already thought about using an economic instrument to address the problem?

YES	NO
-----	----

If your answer is YES please recommend the economic instrument you think can be used to solve the identified problem. Likewise, if your answer to question 15 is NO, please state why you think economic instruments cannot be used to solve the problem.

16. What could be the initial step(s) in designing and/or improving a future intervention? Who will be involved?

Module 1

Introduction to the course

GOAL

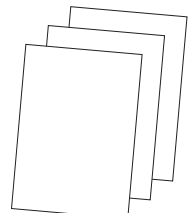


To provide an overview of the course and introduce participants and trainer(s).

LEARNING OBJECTIVE



By the end of this module, participants should have a good understanding of the purpose of the course, including interactive exercises, the agenda, and the expectations of other participants and trainers.



Module 1

Group Exercise

Describe Environmental Problems (Handout)

Objective

Describe the environmental problem in as much detail as possible, touching upon the extent of the problem, the constraints in addressing the problem, and previous attempts to address the problem.

If you have completed the Environmental Problem Identification Questionnaire prior to the course, use this as a basis for discussion.



Remember

In this exercise, you should only select and define the problem. Do not recommend any solutions at this time.



Instructions

1. First, work on your own case individually or in country or community teams (if there are more than one representative from a country or community).
2. Then, present the analysis of the environmental problem identified in your country or community to the other members of the working group and discuss the different cases (each member of the group should be able to present his/her case).
3. Select one case in your group to be presented in the plenary.
4. Jointly prepare a presentation and select a speaker.
5. Present the selected case in the plenary.

Module 2

Framing the Discussion¹

GOAL



To provide an understanding of the basic concepts related to economic instruments for environmental and natural resource management.

LEARNING OBJECTIVE



By the end of this module, participants should have a good understanding of the basic concepts and ideas behind the use of economic instruments for environmental and natural resource management.

¹ This Module is based on:

Markandya, A and J Richardson (eds.) (1993). Environmental economics: A reader. New York, St. Martin's Press,
Pearce, DW and R Turner (1990). Economics of natural resources and the environment. New York: Harvester Wheatsheaf, and
Tietenberg, T H (1992). Environmental and natural resource economics (Third Edition). New York: HarperCollins Publishers.

2.1 Defining Terms

Any discussion of environmental and natural resource management requires an understanding of the specialized terms used. Some of these may be new while others are common terms with a special meaning in this context.

For ease of understanding, many terms are defined at the relevant place in the text itself. Definition of a few basic terms, however, should help begin the discussion. The terms are provided in the order in which they appear in the text.

Pollution: Undesirable by-products of human activity. These may be poisonous in themselves (e.g. heavy metals) or harmful because of their quantity involved (e.g. raw sewage).

Renewable Resources: Natural resources of economic value (e.g. fresh water, oxygen, forests, wildlife, fisheries). Unlike mineral resources, which are mined, the available stock of renewable resources is not fixed but can be increased or decreased. It will increase if allowed to regenerate and decrease if overexploited.

Absorptive Capacity: The ability of the environment to absorb pollutants. If the emissions load exceeds the absorptive capacity, the pollutant poisons the environment.

Public Good: “Good” in this sense means “product or service” rather than “virtue or benefit.” A public good is a product or service that is available to the general public - payers and non-payers alike. In other words, use of the good by one person does not prevent use by others. Examples include national defence, a clean environment, and public fireworks displays. Private businesses cannot sell public goods in markets, because they cannot charge a price and keep non-paying people away.

Externality: The consequence of any economic activity that results in costs outside of the activity. The intended outcome of burning coal may be to generate electricity. The externality is the resulting air pollution that imposes costs on the general public. The negative effects of many economic externalities are often borne by the general public and the problems caused can only be addressed by sound public policy.

Economic Instruments: Economic instruments provide market and financial incentives for polluters and natural resource users to change their behaviour. The economic instruments incentives include such mechanisms as taxes, emission or access charges, marketable permits, and changes to property rights.

Polluter Pays Principle (PPP): The principle that costs and responsibilities associated with pollution should be borne by polluter as much as possible. This is accomplished through a variety of penalties and inducements. (See also Beneficiary Pays Principle in Module 9.)

Command and Control Instruments: The laws and regulation used by governments to directly control pollution and manage natural resources. In the application of these instruments, the government can stipulate the technologies to be used to curb pollution, determine the maximum amount of emissions that can be released into the environment, and regulate the use of natural resources. The instruments are enforced directly by the government rather than depending upon the market.

Flow Resources: Renewable resources like grasslands, forest, water that, if not overused, will naturally renew themselves.

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Fund Pollutants: Wastes for which the environment has some absorptive capacity. Many organic pollutants injected into streams or rivers will be transformed by the resident bacteria into less harmful organic matter. As long as the emissions rate does not exceed the absorptive capacity of the environment, these pollutants do not accumulate to create environmental problems.

Stock Pollutants: Undesirable wastes for which the environment has little or no absorptive capacity. Examples of stock pollutants include non-biodegradable bottles tossed by the roadside; lead and other heavy metals, which accumulate in the soils near the emissions source; and persistent synthetic chemicals such as dioxin. Stock pollutants accumulate over time as the pollutants enter the environment.

Load: The amount of waste products in the environment at any given time. The damage done by the load depends on the capacity of the environment to assimilate the waste products.

Zone of Influence: The geographic area affected by any given environmental or natural resources management problem. Policies addressing the damage caused by local pollutants near the source of emissions will differ from those for regional pollutants affecting wider areas. The local and regional categories are not mutually exclusive; it is possible for a pollutant to be both. Nitrogen oxides released into the air, for example, or chemical discharges into rivers can be both local and regional pollutants.

Surface Pollutants: Substances, which pollute the water, land or air near the earth's surface.

Global Pollutants: Substances that pollute the upper atmosphere, such as Fluorocarbons affecting the ozone layer.

2.2 The Economy and the Environment²

The quality of the natural environment and economic well-being are so closely interwoven as to be invisible until a crisis arises.

Economic activity is a necessary condition for human survival. Yet, all economic activity results in the release of pollutants into the environment and economic activity involves the direct exploitation of natural resources. Increase economic activity raises living standards but results in increased emissions of pollutants and use of natural resources. Thus, the price of economic activity can be steep because a healthy environment is equally essential to human existence.

It is sometimes hard to remember that a healthy environment provides economic services directly to consumers. The air we breathe, the soil for our crops, the water we drink, the shelter and clothing that protect us all derive from the natural environment. Anyone who has experienced the beauty of wildlife parks or a sunset on an unspoiled beach will readily recognize that the environment provides aesthetic amenities for which no substitutes exist.

In economics, the environment is viewed as a composite asset that provides a variety of services. It sustains our very existence but belongs to no one. It has many uses but can be poisoned by a single pollutant. As with other assets, we wish to prevent undue depreciation of this asset's value so that it may continue to provide life sustaining and aesthetic services for the foreseeable future.

² This section is based on Tietenberg (1992), pp 361-362.

The environment provides the economy with raw materials, which are transformed into consumer products by production processes using fuels (wood, oil, gas, nuclear, etc.) drawn from the natural environment. These fuels sustain our transport, homes, and offices. But, exploitation of the natural environment creates two broad categories of environmental problems:

1. *Overuse of Renewable Resources*

2. *Pollution of the Environment*

Overuse of renewable resources and production of excessive waste destroy the economic value of the environmental asset. Overuse depletes renewable resources to the point that they are no longer available for economic use and pollutants can exceed the absorptive capacity of nature poisoning the air, water and land.

2.2.1 Identifying Environmental Concerns

Good public environmental policy requires an understanding of the nature of various pollutants, their effects on the environment, and their costs. Different pollutants often call for quite different policy responses and often require trade-offs between competing public goods. Failure to recognize these policy distinctions can lead to policy failure.

While environmental problems vary in their specific details, they generally involve either overuse of a natural resource (e.g. overfishing an open access fishery) or emissions of pollutants (e.g. release of toxic chemicals into the water or air). Some environmental problems tend to be specific to either rural areas or urban areas, while others are common to both:

Primarily Rural Environmental Concerns

Soil erosion/land degradation/soil nutrient depletion

Mining and minerals development

Agricultural production practices

Forest use and forest management

Rangeland use and rangeland management

Fisheries management

Coastal management

Wetlands draining

Silting up of dams and lakes

Aquifer management and ground water contamination

Discharge of agro-chemical residuals

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Primarily Urban Environmental Concerns

Solid and hazardous waste

Urban development and infrastructure

Transport and communications

Industrial water and air pollution

Noise pollution

Environmental Concerns in Urban and Rural Areas

Climate change

Water supply and quality

Biodiversity and habitat loss

Energy production and consumption

Population growth and distribution

2.2.2 Managing Renewable Resources³

The essential feature of a renewable resource is that, unlike mineral resources, the available amount is not fixed but can be increased or decreased. It will increase if the stock is allowed to regenerate and decrease if overexploited.

There is, however, a limit to the increase of any renewable resource called the maximum stock. No renewable resource can regenerate to levels above the carrying capacity of the ecosystem in which it exists. Therefore, if left alone, blue whales could increase in number, but they would not keep on increasing forever.

This potential for increase is important because the increase in the size of the stock can be harvested and, provided that certain conditions are met, the stock will grow again, be harvested and the process continues. This means that other things being equal, the process of harvesting a renewable resource can continue indefinitely.

Ecosystems are regularly managed to increase the natural resource portion. To boost the sustainable harvest rate of timber, for example, the ecosystem is simplified, harming species that are less visible or less valuable.

The Maximum Sustainable Yield (MSY) occurs when the growth rate of the resource reaches a maximum. The attraction of maximum sustainable yield should be obvious: if we harvest the renewable resource in such a way that we take the maximum sustainable yield from the stock, it will regenerate itself and we can harvest the resource repeatedly without danger of depletion of the resource.

³ This section is based on Pearce and Turner, 1990.

Maximum Sustainable Yield will occur only if the resource is left to renew itself. If it takes one year to regenerate, the maximum sustainable yield can be taken every year. If it takes 20 years, we can harvest maximum sustainable yield only once every twentieth year (in practice it is more complex than this because populations will be of different ages with some of the resource becoming available every year, but the basic idea holds).

However, the danger of over-harvesting of any renewable resource is always present. It is quite easy to make a renewable resource disappear. This will happen if the rate of harvest exceeds the rate of natural growth of the resource persistently. It can also happen if the resource population falls below some critical level, because of over-harvesting or for some other reason unconnected with the direct use made of the resource (e.g., habitat destruction).

When harvesting exceeds natural self-renewal capacity of a species, the population of that species declines towards eventual extinction. When fisheries, for instance, are left unmanaged, fishers all too often become engaged in a 'race for the fish' until there are no fish left to catch.

Whether the population will eventually go extinct or not depends on two crucial factors; whether the population is depleted beyond the Minimum Viable Population (MVP) level and whether any remedial management action is taken upon discovering evidence of resource overuse (assuming that the population has not been depleted below the MVP level).

If the population falls below the MVP level, the species is doomed to extinction unless special species survival programmes are put in place to save the species. This is presumably what has been happening with the management of populations of well-known species like the black rhino and blue whale.

However, if the decline in population is noticed before the MVP is reached, remedial management actions – such as imposing a temporary moratorium on fishing – can be taken to redeem the species, so that the population can build up once again.

2.2.3 The Economics of Pollution

As indicated, economic activity is a necessary condition to human existence, yet it inevitably results in pollution and exploitation of natural resources. To maximise human well-being, the optimal compromise between economic conservation and exploitation has to be found.

2.2.3.1 Trade-offs Economic activity can easily result in overuse of natural resources and excess emissions of pollutants incurring in significant long-term economic costs.

The environmental impact of economic activity is readily apparent in farm runoff and industrial wastes from processing facilities, factories, and coal fired power generation plants. Even seemingly harmless office work or tourism consume food from the farms, use electricity from the power plants; burn fossil fuels for employee transportation; and produce sewage.

Technical change, improved management, and increased knowledge can reduce the tension between economic activity and environmental quality. All contribute to declining emissions (in terms of quantity, toxicity and persistence) in absolute terms or per unit of economic activity, as well as reductions in the cost of pollution controls.

In economic theory, there is an intriguing way to resolve this apparent incompatibility of environmental protection and economic activity, namely by including any externality in decision-making processes.⁴

⁴ Section 2.5 of this module explores this approach of environmental economics in detail.

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Once we have taken all the externalities into account, for example by determining a damage cost per unit of pollution, we have to find the optimal level of pollution that can be determined – the one that maximises societal welfare. To do this, economists use a technique called the efficient allocation of pollution.

2.2.3.2 Efficient Allocation of Pollution When there is competition between equally desirable outcomes (e.g. immediate economic growth and a clean environment) the question becomes: How much pollution should society be willing to accept? The initial reaction of most observers would be that there should be zero pollution. However, in practice there are many circumstances in which zero pollution is not desirable. Economists call this trade-off the efficient (or optimal) allocation of pollution.

We confront this principle every day. Take a non-environmental example: the damage caused by automobile accidents, for example. Obviously, a considerable amount of damage is caused by automobile accidents, yet we do not reduce the damage to zero because the cost would be too high.

The point is not that we do not know how to stop automobile accidents. All we have to do is eliminate automobiles! Rather, the point is since we value the benefits of automobiles, we take steps to reduce accidents (e.g. by improving highway construction, or by requiring drivers training) only to the extent that the costs of accident reduction are commensurate with the damage reduction achieved. Thus, the efficient level of automobile accidents is not zero.

The second point to be made is that in some circumstances, the optimal level of pollution may be zero or close to zero. This situation occurs when the damage caused by even the first unit of pollution is so severe that it is higher than the cost of controlling this unit of pollution. An example would be the treatment of highly radioactive pollutants such as plutonium.

Since pollution directly affects the economy, the efficient allocation of resources must take this into account. The efficient allocation of pollution depends, in part, on the nature of the pollutant:

Allocation of Stock Pollutants: Stock pollutants accumulate in the environment over time and the damage caused by their presence increases and persists as the pollutants accumulate. The efficient allocation of stock pollutants must take this into account.

By their very nature, stock pollutants create interdependency between the present and the future, since the damage imposed in the future depends on current actions.

Allocation of Fund Pollutants: To the extent that the emission of fund pollutants exceeds the assimilative capacity of the environment, they accumulate and share some of the characteristics of stock pollutants. When the rate of emissions is low enough, however, the environment can assimilate the discharges with the result that the link between present emissions and future emissions is broken.

2.2.3.3 Minimization of Costs The normal starting point in allocation analysis is minimization of two kinds of costs: damage costs (damages society suffer as a result of exposure to pollution) and abatement costs (costs society incurs to avoid or reduce the harmful effects of pollution). Damage and abatement costs present the fundamental pieces of information in the economics of pollution control.

To examine the efficient allocation, we need to know something about how damage costs vary with the amount of pollution emitted into the environment and how abatement costs vary with the amount of pollution emitted into the environment. Though knowledge in these areas is far from complete, economists generally agree on the nature of the relationship.

Generally, the marginal damage caused by a unit of pollution increases with the amount emitted. When small amounts of pollutant are emitted, the marginal damage is quite small. However, when large amounts are emitted, the marginal unit can cause significantly more damage.

It is not hard to understand why. Small amounts of pollution are easily diluted in the environment, and the body can tolerate small quantities of substances. However, as the amount in the atmosphere increases, dilution is less effective and the body is less tolerant. Also, larger levels of pollution can lead to abrupt changes in ecosystems. For example, scientists fear the slowdown of the Atlantic Gulf Stream at some level of global warming caused by human emission of greenhouse gases. This would lead to immense climate changes on the European continent. Small levels of global warming, however, will not significantly alter the stream and hence will cause much less damage per unit of greenhouse gases emitted.⁵

Marginal abatement costs commonly increase with the amount controlled. In other words, the reduction of each additional unit of pollution becomes increasingly more expensive.

For example, suppose a factory tries to cut down on its particulate emissions by purchasing an electrostatic precipitator, which captures 80 per cent of the particulates as they flow past the stack. If the source wants further control, it can purchase another precipitator and place it in the stack above the first one.

This second precipitator captures 80 per cent of the remaining 20 per cent, or 16 per cent of the uncontrolled emissions. Therefore, the first precipitator would achieve an 80 per cent reduction from uncontrolled emissions, while the second precipitator, which costs the same as the first, would achieve only a further 16 per cent reduction. Now it should be easy to see that each unit of emissions reduction costs more for the second precipitator than for the first.⁶ Under these circumstances, the optimal level of pollution is not zero.

Additional insights are easily derived from our characterization of efficient allocation. For example, the optimal level of pollution generally is not the same for all parts of the country. Areas that have higher population levels or are particularly sensitive to pollution should have lower equilibrium levels of pollution, while areas that have lower population levels or are less sensitive should have higher equilibrium levels of pollution.

Examples of ecological sensitivity are not hard to find. For instance, some areas are less sensitive to acid rain than others because the local geographical strata neutralize or moderate amounts of the acid. Therefore, the marginal damage caused by a unit of acid rain is lower in those fortunate regions than in other less tolerant areas.

2.3 Measuring the Value of Environmental Assets⁷

Traditional economic analysis measures only the market value of goods and services. Much of what affects environmental quality is outside the market but clearly of value to society and the economy. Without a means to value environmental assets it is difficult to make any kind of objective assessment of the trade-offs involved in pursuing different policies.

⁵ For more information on the Gulf Stream and related abrupt climate change, visit the webpage of the Ocean and Climate Change Institute at www.whoi.edu/occi/

⁶ From a technical perspective, the use of two electrostatic precipitators in a series is not necessarily an optimal solution to the problem of emissions management. The example has just been used to illustrate the shape of the abatement function.

⁷ For further information on valuation of environmental assets and services, see for example "Nature and the Market Place - Capturing the Value of Ecosystem Services" by Geoffrey Heal, Island Press (2000); or also www.natureevaluation.org.

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In current practice, most economists and policymakers continue to compare costs and benefits by way of direct monetary effects - cash inflow and cash outflow. Costs and benefits that are more difficult to express in monetary terms, or that cannot be quantified at all, tend to be overlooked in decision-making despite their considerable value. This is particularly so if they have long-term implications.

2.3.1 Value and the Functions of the Environment

The natural environment has a variety of functions of value to individuals and society. In other words the natural environment does certain very valuable work – e.g. provides breathable air – that is usually not expressed in money terms. Pollution and the depletion of natural resources prevent the natural environment from performing these functions.

Determining the value of the natural environment requires an understanding of these functions. The first step in a valuation exercise is to identify the functions of the particular part of the environment under consideration. The Millennium Ecosystem Assessment⁸ classifies four major functions of service provided by the environment; these are described below.

Provisioning functions: The ways in which the natural environment provides resources essential to human life (food, fresh water, wood, fibre, minerals, and fuel).

Regulating functions: The capacity of nature to regulate essential ecological processes and life support systems (e.g. climate regulation, flood abatement, disease prevention, and water purification).

Supporting functions: Underlying activities that support all other environmental functions (e.g. nutrient cycling, soil formation, primary production).

Cultural functions: Factors that contribute to human well-being by their importance to religion, culture, or individual well-being (aesthetic, spiritual, educational, recreational).

2.3.2 Stakeholders and Value

Different stakeholders often make different and competing claims to various functions of the environment. Different stakeholders also assign different value to the different functions. These competing claims and values can be highly contentious since protection of one function (e.g. production of timber) may eliminate another function (e.g. protection of habitat).

The combination of the various functions and the stakeholders for whom those functions are relevant determines the total economic value of various aspects of the environment. The economic value assigned to the various functions areas thus depends on the groups of people or stakeholders that exert the claim, and is inherently highly subjective by nature.

For these reasons determining the value of environmental assets is not a simple matter. Nevertheless, the more rational the process, the better the decisions will be.

2.3.3 The Use of Valuation Techniques

To include values other than strictly monetary ones, techniques have been developed by environmental economist to find the proper valuation of the positive and negative aspects (benefits and costs) related to clean air, potable water, forests, wetlands, biodiversity or other types of environmental assets. By applying

⁸ For more information see: Ecosystems and Human Well-being - Millennium Ecosystem Assessment (2005).

these environmental economic valuation techniques, the components of environmental assets that have not been considered before can find their way into decision-making.

In that sense, valuation is a support tool but should not be seen as replacing decision-making responsibility. The application of valuation techniques contributes to improving transparency, not only for decision-makers themselves but also for all stakeholders involved in the decision.

Policy decisions, of course, are not made on grounds of measurable value alone; political inertia, self interest, short-term gain vs. long term value and ethical concerns may play a large role as well. Such considerations help frame the debate about a given environmental or natural resource management policy.

These debates will be better informed if policy advocates are able to identify what it is that is of value a proposal seeks to protect or remedy. To determine what is of value requires proponents to analyse and describe the valuable economic and social functions that are affected by the problem in question.

2.4 Typical Failures Leading to Environmental Problems⁹

The problems of resource overuse and pollution described above are the result of human activities, which an economist in broad terms sees as fundamentally being influenced by cost-benefit considerations. As long as the expected benefit from an activity exceeds the cost of the activity, an individual will decide to carry out the activity.

These considerations usually fail to take into account the full costs or benefits of environmental assets since determining the monetary value of intangible goods and services provided by the environmental assets is not easy. The cost that the activity imposes on others or the society at large (the externality cost), thus, is not part of the individual calculation.

2.4.1 Market Failure

Market failure occurs when the markets are not able to reflect all the functions of the environment, and it leads to situations in which the cost of an environmentally damaging activity is not fully covered.

As indicated above, when determining the economic value of a certain environmental asset, decision makers use the easily quantifiable – i.e. financial - costs and benefits related to goods and services traded on the market to determine the value of the asset.

However, there are numerous functions of nature for which markets malfunction, are distorted, or simply do not exist. Economists refer to this as market failure. Markets only exist for some of the functions of nature, such as for timber, minerals, and grazing lands.

Furthermore, the market price of a particular good may not reflect all the costs involved in producing that good. There may be benefits or costs enjoyed or borne by others not directly involved in the production of a good. Economists refer to these costs or benefits as externalities.

⁹ This section is derived from: "Economic Valuation of Forests and Nature - A support tool for effective decision-making", Henk Lette and Henneleen de Boo, June 2002, Theme Studies Series 6, Forests, Forestry and Biodiversity Support Group, International Agricultural Centre (IAC), Wageningen, National Reference Centre for Agriculture, Nature Management and Fisheries (EC-LNV), Ede, The Netherlands.

2.4.2 Policy Failure

Where markets fail, government policy can act to change market conditions – e.g. by imposing taxes on polluters thereby raising their costs of production - to protect the interests of society as a whole. However, it often happens that the government does not step in to correct damage done by market failures. Such inability or unwillingness to act is called policy failure.

In some cases, governments even contribute to keeping the cost of an environmentally damaging activity artificially low by providing perverse incentives, e.g. through subsidies on carbon fuels leading to inefficient use or financing the extension of fleets leading to overfishing.

Policy failure can also result from the inability or unwillingness of the government to act on or even investigate market failures. There are numerous reasons for this lack of action. The government may be:

- *Overly influenced by pressure groups,*
- *Unable to obtain accurate information,*
- *Lacking the resources to pay for needed environmental programmes,*
- *Subject to widespread political corruption,*
- *Unable to overcome entrenched bureaucratic interests,*
- *Unable to co-ordinate the actions of its ministries and agencies.*

2.4.3 Institutional Failure

Even where the government has the will, it may not have the wherewithal to implement environmental policies because of institutional failures. Environmental policy instruments rely on clear and secure property rights and functioning administrative, tax, legal or fiscal systems. If the institutional capabilities needed to promulgate and enforce the instruments in a fair and unbiased manner are lacking the performance of the instruments will suffer.

Institutional failure may also result from the fact that environment ministries or agencies often have far less political power than do finance or trade ministries, or leaders of the executive and legislative branches, all of whom may try to use the power of government to appease or compensate particular constituencies at the expense of environmental quality.

Policymakers need to assess their relative power accurately and plan how to address their weaknesses. For example, approaches that generate revenues and solve environmental problems can bring in allies in the fiscal ministries that would otherwise not come forward.

Institutional failure may also arise from the fact that a country has a weak base of civil society organizations devoted to environmental protection. These organizations often play a critical role in balancing the debate between traditional vested interests and environmental concerns.

Where the government has the will, means and capacity to address environmental problems, it will still need to find and use appropriate policy tools to address the problem at hand. The general nature of these tools is described in the following section.

2.5 Reconciling Economy and Environment

The preceding sections provide the information needed to understand ways of reconciling economic activity and environmental protection, which constitute the very basis of the field of environmental economics.

In the science of economics, economic activity and growth are desirable because they increase overall human well-being.¹⁰ More market activity means more goods and services being consumed, which entails a higher level of welfare. A conventional measure for this market activity that is often used is the gross domestic product, or GDP.

As we have seen in the section on market failures, positive and negative externalities are usually not taken into account in decision-making processes, and they are also not reflected in the GDP. If we succeed in using valuation techniques and economic instruments to incorporate them, we can get a more accurate and holistic framework of ongoing market activities.

Take, for example, a developing country that suffers from water scarcity. There are very few fresh water resources, yet a company plans to build a chemical processing plant next to one of the few rivers, which would severely deteriorate the downstream water quality.

Looking at this from conventional economics, the factory would definitely create economic activity and increase welfare by creating new jobs, raising income and producing goods. Externalities for downstream communities are not taken into account.

Taking the stance of environmental economics, we first need to find the value of the river's freshwater flow for downstream users, and by how much its value would change with the installation of the new factory. An optimal policy decision now compares the damage done to downstream users to the benefits stemming from the new factory. On the one hand, the factory increases economic growth as described above, but on the other, downstream users have less pure water to consume, or they consume an inferior product – polluted water. This represents a negative economic growth. Taking all this into account, we can decide what the best option is in terms of economic growth and increasing human welfare: no factory at all, a factory with pollution control, or the factory without pollution abatement.

An overview of policy tools to deal with environmental problems is given below. The tools will be discussed in more depth in the following modules of this Manual.

2.6 Policy Tools

The policies available to redress environmental problems fit into two broad classes: command and control instruments and economic instruments. Both types of instruments are briefly introduced below. They will be studied in greater detail in succeeding sessions of the training.

2.6.1 Purpose of Environmental Instruments

Both command and control and economic instruments attempt to shift the costs and responsibilities associated with pollution or over exploitation back to the polluter or users in what is called the Polluter Pays Principle (PPP). By pushing the environmental costs back to those causing the damage, these policies use economic competition to force polluters and natural resource users to address the problems

¹⁰ This discussion does not include distributional issues of wealth within a society.

they cause, if only to save costs. The differences between the two policy types, however, are significant in terms of cost and effectiveness.

2.6.2 Command and Control Instruments

As the name implies command and control instruments are the laws and regulation used by governments to directly control pollution and manage natural resources. In the application of these instruments, the government stipulates the technologies that must be used to curb pollution, determines the maximum amount of emissions that can be released into the environment, and regulates the use of natural resources.

Command and control laws and regulations must be observed uniformly as stipulated by all. Polluters have little or no flexibility in the application of command and control instruments. To ensure compliance, the government must police the enforcement and prosecute offenders in a court of law. Such policing usually requires detailed information about regulated industries, since the government must understand the details of industrial technologies.

2.6.3 Economic Instruments

Economic instruments provide market and financial incentives for polluters and natural resource users to change their behaviour and try to consider the three main failures described above. The economic instruments incentives include such mechanisms as taxes, emission or access charges, marketable permits, and changes to property rights. Economic instruments, therefore, encourage reduced emissions and aim to reduce pressure on natural resources.

In economic terms, economic instruments internalise externalities – environmental costs - through increasing the prices that individuals and industries must pay to use resources or to emit pollutants.

As such they address the market failure. As pollution or the use of natural resources become more expensive, polluters and consumers have strong financial incentives to reduce such activities through conservation, substitution of materials, or rationalizing consumption.

Economic instruments possess a number of inherent advantages over command and control instruments for many problems. They are generally more:

1. *Affordable,*
2. *Flexible,*
3. *Responsive, and*
4. *Encouraging to technology innovation.*

The more efficient policy options offered by economic instruments reduce the cost of environmental controls for industry relative to alternative policies and have less detrimental effect on the competitive relationship of domestic industries compared to international competition. Similarly, economic instruments can generate technological innovations in the areas of pollution control that offer the potential for the creation of new domestic industries.

In addition, although economic instruments cannot overcome a corrupt or weak political structure, they can help make moderately functioning governance structures work more effectively. As such they try to minimize possible policy and institutional failures.

2.6.4 Benign Policy Fusion

In practice, economic instruments are used together with command and control instruments to increase policy efficiency, and achieve environmental targets at a lower cost. Economic instruments can complement rather than fully replace command and control policies, offering many potential applications even in countries with substantial policy constraints.

In such situations, command and control regulations can be used to set the broad parameters (e.g., total emissions, total number of licenses) under which economic instruments can be used to obtain a more efficient allocation of responsibility and compliance across firms, as for example in the application of tradable emissions permits (see Module 7).

2.6.5 Potential Conflict Among Instruments

However, it is important to note that although policy elements are routinely combined to address real world problems, these elements can also sometimes work at cross-purposes. Policy instruments must therefore be combined carefully. When this is not done, administrative costs rise and the impact on environmental quality becomes neutral or even negative.

Before proceeding to a comprehensive study of command and control and economic instruments for environmental management, it is important to take cognisance of the fact that these instruments function within a given political, economic, and social context. The purpose of Module 3 is to develop a deeper understanding of this policy context.

2.7 Charting Environmental Economics¹¹

This section demonstrates how problems of exploitation of renewable resources and pollution are addressed in environmental economics using graphs and mathematical formulations for illustration of basic concepts.

2.7.1 The Environment as an Economic Asset

As described before, in economics, the environment is viewed as a composite asset that provides a variety of services. It is the most fundamental economic asset since it provides the life support systems that sustain human existence. As with other assets, the goal is to prevent undue depreciation of the value of this asset so that it may continue to provide life sustaining and aesthetic services in continuity.

The environment provides the economy with raw materials. Ultimately, these raw materials and energy return to the environment as waste products. In addition, exploitation of renewable resources of raw materials can deplete them entirely (see Figure III-2-1).

Defined broadly, the relationship between the environment and the economic system can be considered as a closed system. For these purposes, a closed system is one in which no inputs (energy or matter) are received from outside the system and no outputs are transferred outside the system. An open system, by contrast, is one in which the system imports or exports matter or energy.

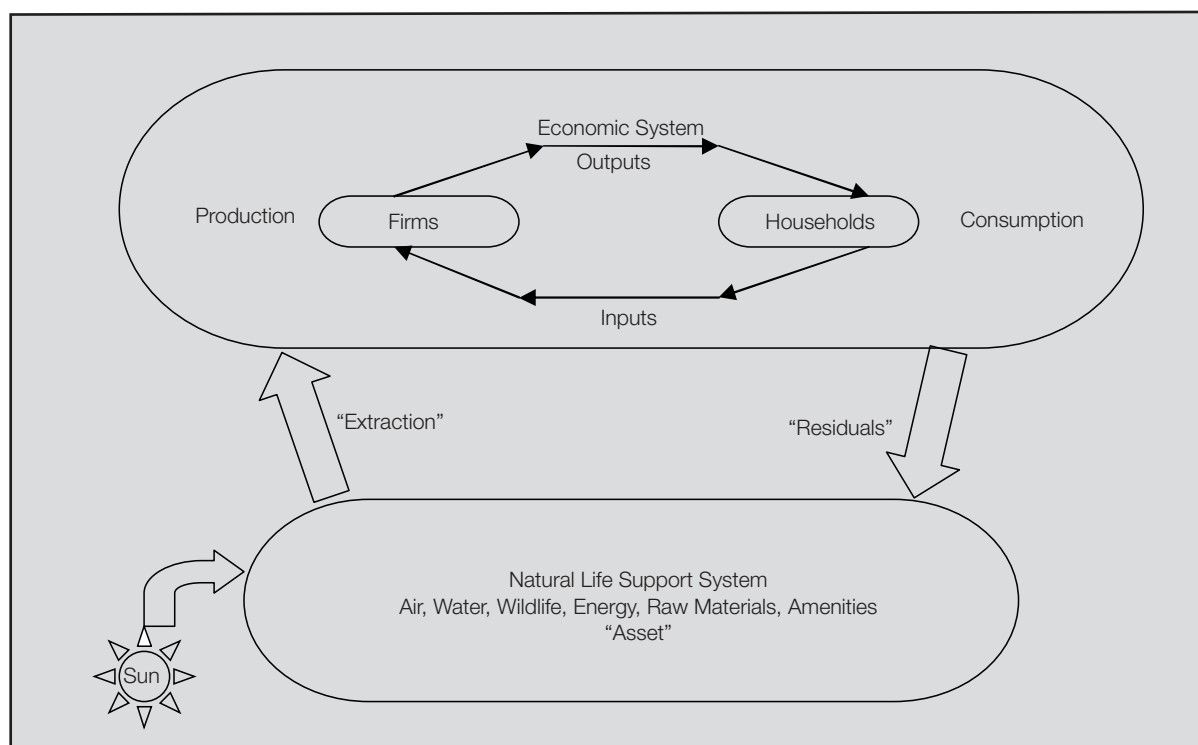
¹¹ While it can be extremely useful to understand economic mechanisms from a mathematical and graphical perspective, the charts and graphs are not absolutely necessary to understand the basic concepts. Section 2.7 is therefore optional. This section is based on Tietenberg (1992), pp 19-21, and Pearce and Turner (1990), pp 241-261.

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If we restrict our conception of the relationship in Figure III-2-1 to our planet and the atmosphere around it, then clearly we do not have a closed system. We derive most of our energy from the sun, either directly or indirectly. Nonetheless, historically speaking, for material inputs and outputs (excluding energy from the sun), this system can be treated as a closed system because the amount of exports (such as abandoned space vehicles) and imports (moon rocks, for example) are negligible. Whether the system remains closed depends on the degree to which space exploration opens up the rest of our solar system as a source of raw materials.

The treatment of our planet and its immediate environs as a closed system has an important implication, which is summed up in the first law of thermodynamics - “energy and matter cannot be created nor destroyed”.¹²

Figure III-2-1: The Economic System and the Environment



The law implies that the mass of materials flowing into the economic system from the environment has to either accumulate in the economic system or return to the environment as waste. When accumulation stops, the mass of materials flowing into the economic system is equal in magnitude to the mass of waste flowing into the environment.

To understand how these general economic concepts relate to renewable resource management and pollution control, it is necessary to turn to the specifics of these topic areas.

2.7.2 Renewable Resources Growth Curves

To illustrate the concepts related to natural resources management, we can observe how a single species grows and the limits to that growth. The simple message is that growth of species is limited by important threshold population levels. If its population reaches the maximum that the ecosystem can support, further growth cannot be achieved.

¹² There is yet another law of thermodynamics called the Second Law of Thermodynamics, which has important implications for natural resource economics (for a brief review, see Tietenberg, 1992 pp 20-21).

On the other hand, if the population falls below the minimum critical or threshold level, the species could be driven to extinction. Between these two critical levels, the growth rate of species increases as the population or stock increases up to a certain level where growth slows down as competition for food, space and other resources intensifies. The graphs, moreover, show the sustainable rates at which the species could be harvested.

Consider a single fish species; then its stock (or biomass) may exhibit growth through time as shown in Figure III-2-2. The curve shown is a logistic function: at low levels of stock the fish multiply, but as they begin to compete for food supplies, their rate of growth slows down and eventually the stock converges asymptotically on some maximum level, the ecosystems' carrying capacity for that species. Note that we have also drawn the curve as beginning at the minimum stock; this is the critical minimum level of population. If the numbers go below this level the species is driven to extinction.

For our purposes, it is useful to look at the information in a slightly different way. Figure III-2-3 plots the same information but shows the growth of the stock on the vertical axis and the level of the stock on the horizontal axis.

Figure III-2-2: Logistic Growth Curve of a Renewable Resource

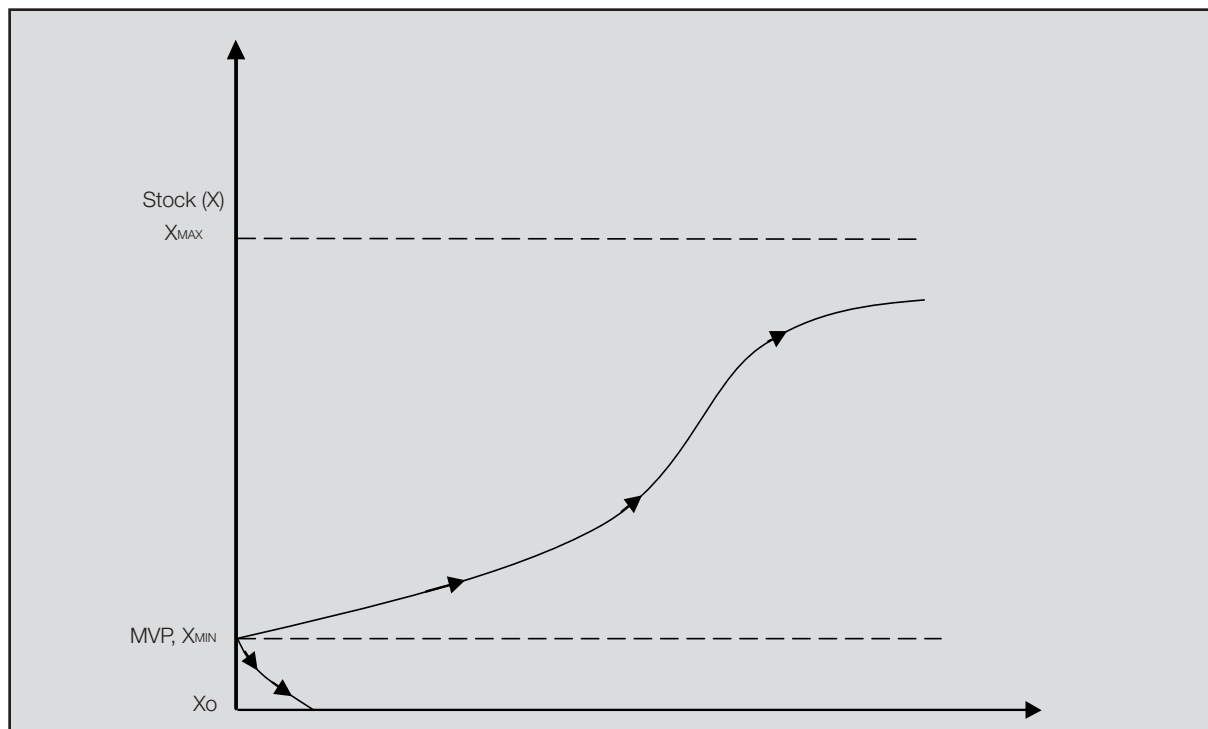


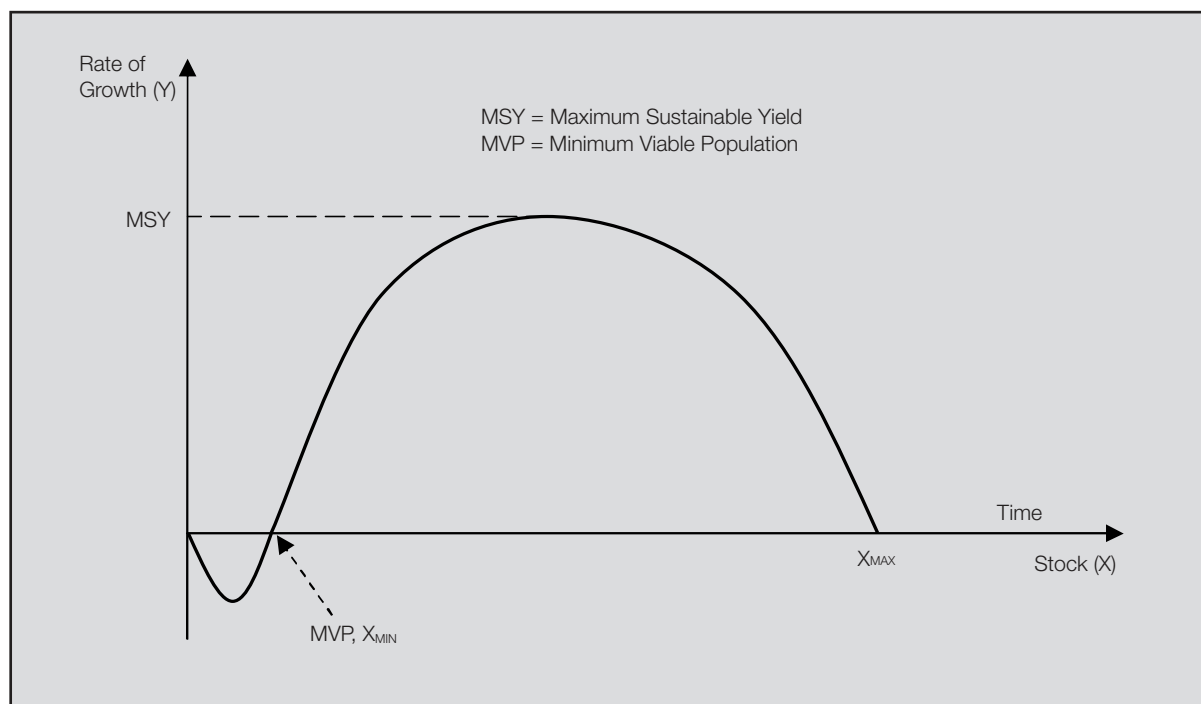
Figure III-2-3 shows that the rate of growth of the stock is negative below the MVP and positive thereafter. It reaches a maximum and then declines as the stock gets bigger. If we leave the resource alone, starting at a population greater than the MVP, it will grow in size until it reaches the carrying capacity of its environment, X_{max} . If we leave it alone at a stock smaller than the MVP, it will decline until the stock reaches zero.

Figure III-2-3 permits us to identify the maximum sustainable yield (MSY), which occurs when the growth rate of the resource reaches a maximum. The apparent attraction of MSY should be obvious: if we harvest the renewable resource in such a way that we take the MSY from the stock, it will regenerate itself and we can take MSY again next time round ad infinitum.

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Note that this can only happen if we leave the resource to renew itself. If it takes one year to regenerate, MSY can be taken every year. If it takes 20 years, we must only take MSY once every twentieth year. (In practice it is more complex than this because the population will be of different ages, but the basic idea is correct.)

Figure III-2-3: Pure Compensation Growth Curve



2.7.3 The Rate of Resource Exploitation

We can now introduce the level of exploitation or harvest or yield of the resource (Equation 2.2). The simplest hypothesis is to use the rather self-explanatory fact that the effort expended on harvesting, E , is proportional to the amount of harvest H , while inversely proportional to the stock size X .

$$E = \frac{H}{X} \quad (2.1)$$

That is, if the harvest H is to be increased at constant stock level X we need to increase the effort level. Or, if we want to harvest the same amount but have a higher stock, we need less effort.

Equation 2.1 can alternatively be written as:

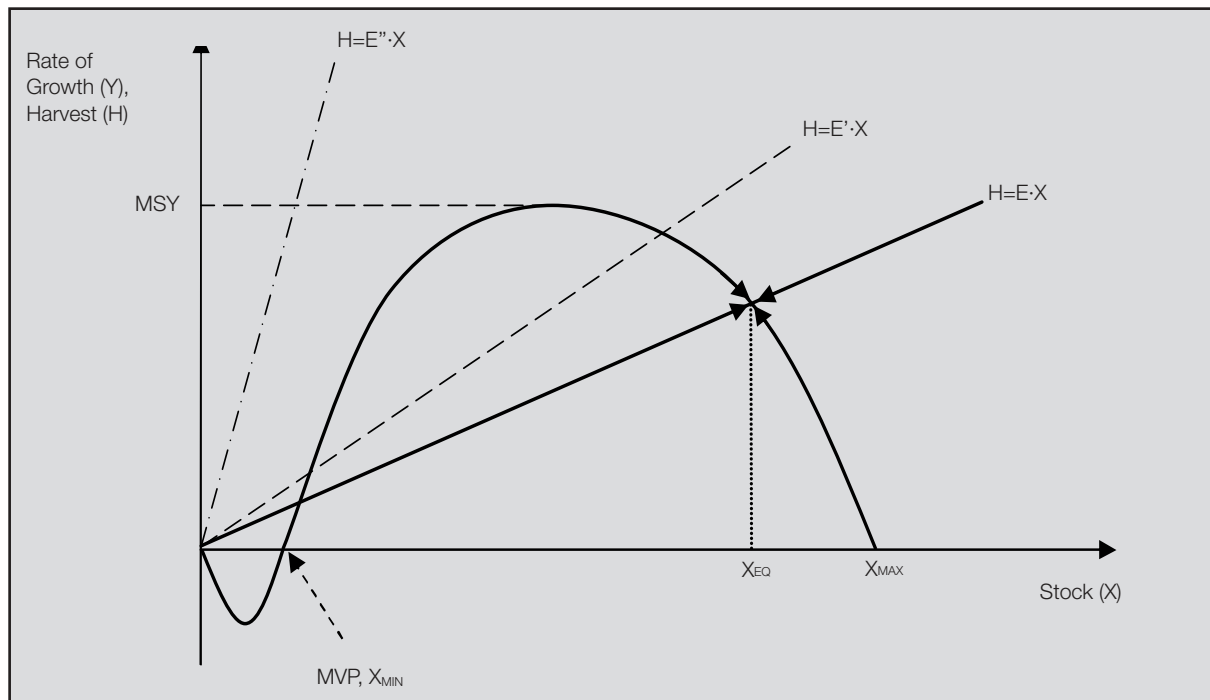
$$H = E \cdot X \quad (2.2)$$

Equation 2.2 enables us to show the rate of harvest in our basic diagram. If we assume the effort as given at a certain level E , the harvest H is determined by the current stock size X . Note that this is a simplification. For example, fishermen would adjust their effort level to the current stock level to maximise their profit and minimise their effort cost. Even though we will not incorporate profit maximisation into our analysis the main results are still valid.

Figure III-2-4 shows three different straight lines, each representing one choice of effort level. Dependent on this effort level, the population will reach a different equilibrium level. For effort E , the arrows indicate the equilibrium. If effort E is chosen, the stock will be depleted until it vanishes.

The dynamic evolution toward the equilibrium is explained in Box III-2-1: The Logic Behind the Effort-Growth Diagram.

Figure III-2-4: Effort-Growth Equilibrium



Box III-2-1: The Logic behind the Effort-Growth Diagram

The following will walk you through the processes that lead to an equilibrium stock using the fishery example.

1. The fishermen choose an effort level, let's say it is E . This puts us on the $H=E \cdot X$ line in the diagram.
2. Assume the initial fish stock is a bit left of X_{EQ} .
3. At this initial stock, we can now read the growth rate Y off the growth curve, as well as the harvest H off the harvest line $H=E \cdot X$.
4. We see that to the left of X_{EQ} , the growth rate Y is higher than the harvest rate H .
5. Therefore, we have an increased population in the next period.
6. This repeats itself until we reach X_{EQ} .
7. If we start to the right of X_{EQ} , the harvest level exceeds the growth level, and the population is reduced in the next period, thus approaching X_{EQ} again over time.

8. This makes X_{EQ} a stable equilibrium. To the right, the population shrinks, to the left, it grows. (The other intersection of $H=E \cdot X$ with the growth curve is not a stable equilibrium: If we are a bit to the right, the population grows, if we are to the left, it shrinks because of higher harvest than growth. Thus, we always move away from this point.)
9. If fishermen choose effort E' we get a somewhat smaller equilibrium stock. If they choose effort level E'' the population is always driven to extinction.
10. No matter which effort level is chosen, the stock will be extinct if the initial stock is below the MVP.

Note: In a model closer to the real world, fishermen would adjust their effort level in order to maximise the income from harvest minus the expense for effort. If fishermen are organised in a group, they may try to keep fishing at a sustainable level in order to ensure the future income stream. If fishermen, however, are competing, they might all try to catch as much fish as possible before others do so, which can result in the extinction of the stock. This is an example of the Tragedy of the Commons (see Module 7).

2.7.4 Resource Overuse

It is conceptually possible to have circumstances where the level of effort exerted on a fishery is so high that the harvest function lies everywhere above the pure compensation curve, as shown in harvest level $E \cdot X$ in Figure III-2-4. Here, the rate of harvest is much higher than the natural self-renewal capacity of the species, with the consequence that the population of the species begins to decline in the direction of extinction).

This is the classical case where the fishery is left unmanaged, and the fishers are engaged in a 'race for the fish'. Whether the population will eventually go extinct or not would seem to depend on two crucial factors; whether the population is depleted beyond the Minimum Viable Population (MVP) level and whether any remedial management action is taken upon discovering evidence of resource overuse (assuming that the population has not been depleted below the MVP level).

If the population is depleted below the MVP level, the species is doomed to extinction unless special species survival programmes are put in place to salvage whatever is possible. This is presumably what has been happening with the management of populations of well-known species like the black rhino and blue whale.

However, if the decline in population is noticed before the MVP is reached, there are several remedial management actions that can be taken to redeem the species, including a temporary moratorium on fishing so that the population can build up once again. Note that flow resources like fisheries can sometimes be boosted through migration. If this migration were regular and predictable, it would influence the minimum viable population level.

2.7.5 The Taxonomy of Pollutants¹³

Pollution control requires a different theoretical framework than natural resources management. Excessive wastes depreciate the environmental asset when they exceed the absorptive capacity of nature. The taxonomy (discussed and defined at the beginning of this Module) includes: stock pollutants, fund pollutants and pollutants classified by their zone of influence: local pollutants, regional pollutants, surface pollutants and global pollutants.

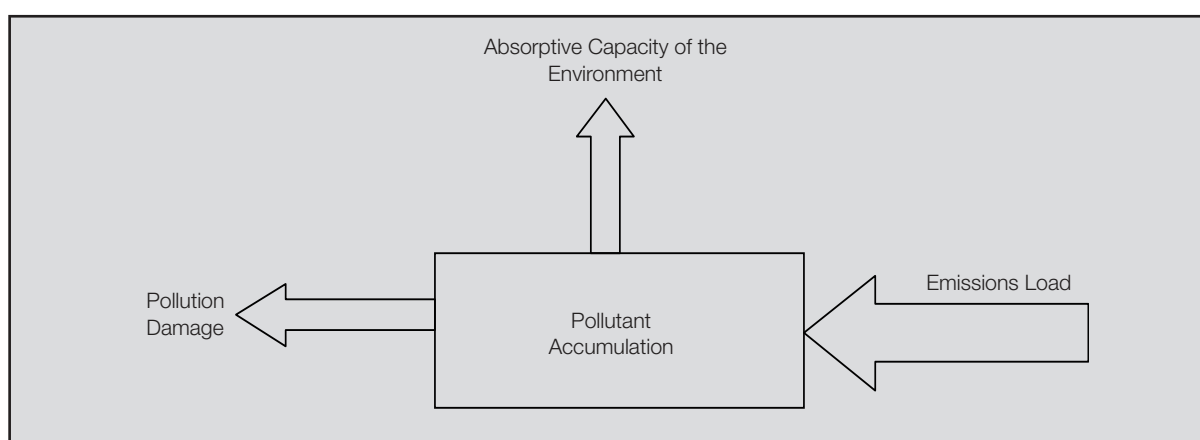
¹³ This section is based on Tietenberg (1992), pp 361-362.

A review of the taxonomy of pollutants is important since the appropriate policy response depends on the type of pollutant. The taxonomy helps in designing responses to the various types of pollution problems. Each type of pollutant requires a unique policy response. The extent of the problem – local, national, global – shapes the policy response as well. The failure to recognize these policy distinctions leads to counterproductive policy.

The amount of waste products emitted determines the load upon the environment. The damage done by this load depends on the capacity of the environment to assimilate the waste products (Figure III-2-5). We call the ability of the environment to absorb pollutants its absorptive capacity. If the emission load exceeds the absorptive capacity, then the pollutant accumulates in the environment.

Given an understanding of the taxonomy of pollutants, the next question is: How much pollution should society accept?

Figure III-2-5: Relationship of Emissions to Pollution Damage



2.7.6 Efficient Allocation of Fund Pollutants

This discussion is focused on fund pollutants, because for fund pollutants effects of current pollution on the environment in the future can be neglected – at least if the pollution level is smaller than nature's absorptive capacity. Efficient allocation of stock pollutants can also be determined, but this requires techniques of intertemporal optimisation, which would be beyond the scope of this manual.

In section 2.2.3.3 we have already discussed the trade-off between damage and abatement costs when it comes to the reduction of pollution caused by fund pollutants. Figure III-2-6 gives a graphical interpretation of the previously presented results.

The per unit (or marginal) damage cost increases as the total amount of pollution increases. The reason is that with a higher concentration of pollution, the damage increases disproportionately, and abrupt changes in ecosystems become more likely. This is represented in the diagram by the upward-sloping marginal damage cost line.

The marginal control cost line is downward sloping. If a lot of pollution is emitted, the cost to reduce pollution by one unit (marginal control cost) is small, while it is large if pollution is already reduced very much. The relevant example given in section 2.2.3.3 is the case of the two electrostatic precipitators.

Figure III-2-6 uses these two pieces of information on the shapes of damage costs and abatement costs to derive the efficient allocation of pollutant.

A movement from right to left refers to greater control and less pollution emitted. A movement from left to right refers to less control and more pollution damage. The efficient allocation is represented by Q^* , the point at which the damage caused by the marginal unit of pollution is exactly equal to the cost of abating that unit of pollution. The following gives an intuition for why Q^* is indeed the efficient level.

Points to the left of Q^* , which involve greater degrees of control, are inefficient because the total abatement costs exceed the total damage costs. The amount of money being spent to avoid (or repair) the damage from pollution is more than the value of the damage caused by the pollution. In other words, by not abating another unit of pollution, the polluter could pay for the extra damage caused by this unit and would still have money left over.

For points to the right of Q^* , the total value of the damage attributed to pollution is higher than the amount of money being spent to avoid (or control) the pollution damage. If an extra unit of pollution is being reduced, those who suffer from the pollution have such a high reduction in damage cost that they could pay the polluter his costs to abate the unit and still have money left over.

The efficient level of pollution is therefore at Q^* , where marginal damage cost and marginal control cost are equal. Moving to the right or to the left would both increase the total cost (damage plus control) incurred by society as a whole.

Figure III-2-6 suggests that, under the described circumstances, the optimal level of pollution is not zero. If you find this disturbing, remember that we confront this principle every day. In section 2.2.3.2 we gave the example of damage caused by automobile accidents. Obviously, a considerable amount of damage is caused by automobile accidents, yet we do not reduce the damage to zero because the cost of doing so would be too high.

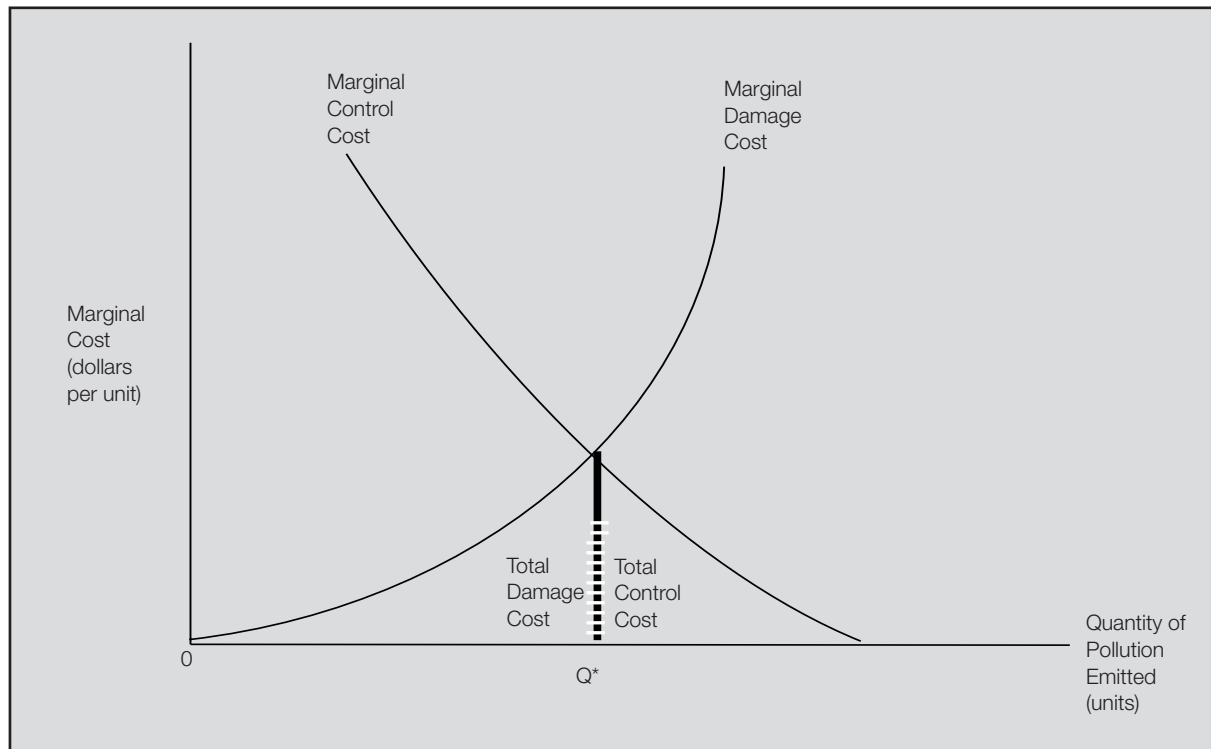
Another example is the lawn on soccer fields. To have good playing conditions for a soccer match, we want the lawn to be in perfect shape. Yet, this would imply that very few matches could be played per year. We might hence decide to limit the frequency of use of the soccer field to a certain amount of trainings per week and prohibit the use of the field while it is raining. The general condition of the lawn will not be perfect any more, but the benefits from allowing frequent trainings outweighs the damage incurred by poorer lawn quality on players' performance. Again, we have to find the efficient level of use (pollution) that equalises marginal control cost to marginal damage. This level would most probably be sustainable, i.e. the lawn regenerates at the same rate it is damaged.

In section 2.2.3.2 we also noted that in some instances, when the damage cost of the first unit of pollution is extremely high, the efficient level of pollution is zero, or close to zero. We would represent this in Figure III-2-6 by shifting the damage cost left (or up, this yields the same result). The intersection of the two curves can then be at $Q^* = 0$ or close to that. A good example for such a scenario is the case of highly radioactive waste such as plutonium as mentioned previously.

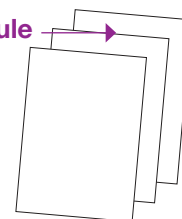
The effect of area-specific damage costs has also been discussed in section 2.2.3.2. To represent different regional sensitivity, we have to draw a graph like Figure III-2-6 for every region, taking area-specific damage costs into account. The result is that Q^* varies among regions. For example, area with higher population levels or areas that contain endangered species might exhibit particularly high damage costs and hence a low efficient level of pollution. Another example, given in section 2.3.2.3 is the sensitivity of a region to acid rain.

In practice, it is often far from easy to draw a diagram like Figure III-2-6. Asked by the government for their marginal pollution control cost function, firms are prone to over-report. The government would then calculate a Q^* that is too high and exert less force on the firms to reduce pollution. Those who suffer from pollution tend to over-report their damage cost hoping for compensation or a reduced level of pollution. It is thus often very difficult and costly to exactly determine the efficient level of pollution, and estimates based on the information available have to be used.

Figure III-2-6: Efficient Allocation of a Fund Pollutant



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Module 2

Group Exercise

Shortage of Clean Drinking Water (Handout)

Objective

Use the concepts of market failure (externalities), policy failure (the case of subsidies), and institutional failure (case of property rights) to analyse the shortage of clean drinking water.

Issue

A lack of clean drinking water is a common problem in many developing countries. This problem can be analysed by using the concepts covered in Module 2 (For purposes of this exercise assume that the country could have sufficient clean drinking water for the entire population. In other words severe drought or overpopulation are not major causes of the lack of clean water.)

Instructions

1. Form groups of 3-5 people
2. Use your existing knowledge and information
3. Include factors that lead to water shortage directly and indirectly
4. Cite specific cases where possible
5. Jointly prepare a presentation and select a speaker
6. Present in the plenary

Questions

1. How can market failures (externalities) cause water shortage?
2. How can policy failures, e.g. subsidies cause water shortage?
3. How can institutional failures, e.g. the lack of well-defined and secure property rights cause water shortage?

Module 3

Policy Context¹

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PART III

GOAL



To describe various existing conditions in a country that can affect the performance of environmental and natural resource management policy instruments.

LEARNING OBJECTIVE



By the end of this module, participants should be able to analyse the policy context in a country for the successful application of policy instruments.

¹ The Module is based on UNEP (2004): The Use of Economic Instruments for Environmental Policy: Opportunities and Challenges.

3.1 Defining Terms

Governmental Authority: The ability of the government to enforce laws and to effectively implement programmes throughout its area of jurisdiction. Neither economic nor command and control instruments policies can be implemented without sufficient government authority.

Property Rights: The right to ownership and use of both tangible (land, buildings, etc.) and intangible (patents, trademarks, copyrights, etc.) property. To be meaningful, such rights must not be able to be revoked without clear transparent legal procedures and proper compensation for the value of the property.

Fiscal Systems: Governmental policies, procedures, and agencies necessary to collect and disperse taxes, fees, etc. The integrity of such systems is vital to the success of all environmental policies whether they use command and control or economic instruments.

Rule of Law: A situation in which a stable, transparent, and impartially administered legal system prevails. Established courts make decisions that are based on written law and open to all parties. Court decisions are not arbitrary, capricious, determined by corrupt practices (bribery, nepotism, etc.), or directed by outside forces (political rulers, vested interests, etc.).

Vested Interests: Those who have a direct financial interest in the content and enforcement of particular laws, regulations, and policies. They are often more organized and vocal than those without a direct financial interest.

Stakeholders: Those who have an interest (or stake) in particular laws, regulations, or policies. These may be companies, individuals, social groups, environmental organizations, or public agencies. They include but are not limited to those who have a vested interest (see above) in the situation.

Cultural Values: The beliefs, habits, and traditions of a group or an entire society that determine the relative worth of ideas, economic activities, types of property, or uses of property. Such values can be of equal or greater importance to policymaking than those of vested interests, and other more immediate stakeholders.

Demographic Conditions: The size, growth rates, and makeup (by age, sex, and ethnicity) of the general population that can affect environmental policy.

3.2 Baseline Legal and Administrative Conditions

Economic instruments do not exist in a vacuum; there is always an existing legal, political, economic, and social framework that shapes the process. The nature and extent of the environmental or natural resource issues themselves are part of this policy context.

Certain baseline legal and administrative conditions are critically important to the success of any public environmental initiatives. If a government cannot enact, administer, and enforce binding legislation it has little hope to establish effective environmental protection and natural resource management policies.

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Specifically, the baseline conditions necessary for the successful application of command and control and economic instruments are:

- *Effective governmental authority*
- *An impartial legal system*
- *Clear and consistent property rights*
- *Effective and consistent fiscal systems.*

These are not absolute conditions for success. Each of these legal and administrative conditions can range from nonexistent to very effective. But without these elements in place at some level, environmental protection policies will fail regardless of the specific instruments put forward.

Policy makers take such baseline conditions into account to obtain a realistic evaluation of policy options. Under any given baseline conditions, certain environmental and natural resource management policies may be more effective than others. To the extent that instrument choice can offset identified weaknesses in baseline conditions, this should be done.

3.2.1 Governmental Authority

All environmental instruments require a government with effective authority. The government must have resources and the will to consistently penalize violators and provide incentives. This, in turn, requires a well functioning set of political institutions.

For command and control environmental laws, the government must be able to set and monitor appropriate standards based on technical assessments rather than purely political ones (though politics will often play some role).

For many economic instruments the government must have functioning tax and budgetary systems in place to be able to provide economic rewards and penalties. Weak or corrupt government institutions quickly render market-based instruments worthless if companies discover that they can continue operating without paying environmental taxes or buying permits.

Even moderate levels of non-compliance undermine compliance by the remaining parties both psychologically and economically, since non-complying private institutions will have lower operating costs.

3.2.2 The Rule of Law

Effective environmental policies rest on the foundation of a stable, transparent, and impartially administered legal system. The rule of law varies widely among countries. In some cases, laws may exist, but are not, or cannot be, consistently enforced. Nothing defeats the effectiveness of any policy more than arbitrary or corrupt enforcement of law.

Companies and individuals abhor uncertainty in economic decisions. If polluters or resource users are uncertain whether their activities will be legal or if they see that the law is unevenly or corruptly enforced, they are unlikely to respond to economic incentives or even invest in the economy at all.

The legal system must operate at both the symbolic - what the courts, or ministries say they are doing - and the instrumental - what they are actually doing - levels. While no country, in either the developed or developing world, has a perfectly fair and open legal system, litigants and defendants must have the normal expectation that they will receive a reasonably fair and unbiased hearing.

Widespread bribery and other forms of corruption not only undermine the legal system but subvert environmental and natural resource management policies as well. There is ample evidence to suggest that the higher the level of corruption, the lower the level of environmental sustainability.

3.2.3 Property Rights

Within the larger legal system, the enactment and consistent enforcement of property rights for all members of society constitutes an economic instrument in its own right.

Economic instruments rely on the operation of market incentives operating within a system of effectively enforced property and contractual law. Without such a system all incentives provided by economic instruments evaporate. The system needs to be transparent, uniform for all property holders, and provide equitable compensation when property is taken for whatever purpose.

Secure property rights are especially important for the institution of pollution taxes or marketable permits. If the legal system cannot enforce property rights, then using permits to curb emissions or restricting access rights to indigenous people to discourage unfettered access are not feasible.

Property Rights vs. Wealth Ensuring property rights is not the same thing as protecting wealth. It should be made clear that respect for property rights does not imply the automatic granting of protection to the property of the rich over the poor or simply adopting the status quo. It is up to society and its government to determine the rules and procedures for allocating property rights.

In the normal course of events, society may redefine and adjust property rights. When doing so, policymakers should make every effort to buffer any social impacts that may occur, especially those that affect the poor. However, once property rights are defined, property owners should feel assured that they will not be subject to arbitrary or capricious expropriation of their legally held property or the rights to the use or income from it.

Public Ownership Challenges Where the government rather than the private sector owns natural resources, action by environmental ministries against the commercial activities of other branches of government can be particularly difficult. Often, national or regional policy priorities lie outside the environmental realm, and environmental agencies may not have sufficient political clout to bring about meaningful policies of any type.

For economies transitioning from state ownership of property to a market economy, the government will need strong fiscal oversight ministries to:

1. *Manage privatisation effectively,*
2. *Assign initial property rights fairly,*
3. *Distribute economic instrument subsidies with equity and efficiency, and*
4. *Represent the public interest against powerful factional opponents.*

3.2.4 Fiscal Systems

A strong fiscal capability – the ability to collect taxes and allocate revenue – must be the norm especially for economic instruments such as pollution tax and user-fee-based systems to have any chance of success.

It is common for environmental incentives to come into conflict with fiscal policies that have the effect of subsidizing greater emissions and resource extraction (in the name of economic development, for instance).

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Even where political factions or powerful vested interest preclude true subsidy reform, identification and publication of existing perverse subsidies is an important step in achieving better decisions.

Removal or mitigation of such ‘perverse’ incentives should be an integral part of any policy package. Effective economic instruments require consistency in incentives to avoid offering such conflicting economic incentives.

Owing to their dependence on fee collection or permit sales, many economic instruments rely more on functioning markets, tax collection, and fiscal payment systems than command and control instruments.

3.3 Nature and Extent of Environmental Problems

The first step in addressing any problem is to understand it. All too often policymakers rely on anecdotal or other informal information to understand the problem. This can be a serious mistake since precious public resources may be spent to address a minor problem instead of a much more severe problem. The nature and severity of the problem should determine the policy response to it.

3.3.1 Evaluating Environmental Problems

To determine the most appropriate instruments to address the environmental problems, policymakers must first determine the nature and extent of the problem. What is, for instance, the:

1. *Nature of the problem. Is it overuse of a resource or a pollutant problem?*
2. *Potential effect on human welfare and the environment including the nature of the problem over time. (The passage of time becomes important if one is interested in a pollutant that bio-accumulates in the environment or if a natural resource is irreversibly degraded.)*
3. *Geographical reach of the affected area. Is the problem a local or regional problem?*
4. *Vertical dimension of the pollutant. Are the effects felt on the surface or in the upper reaches of the atmosphere?*
5. *Number of people involved. (The damage a pollutant causes depends very much on the number of people exposed to the pollutant. Similarly, the magnitude of the welfare losses associated with the degradation of a natural resource depends on the number of people involved.)*
6. *Number of stakeholders interested in a solution. This will affect the design of the implementation procedure for the selected policy instrument.*

3.3.2 Policy Implications

The nature and extent of environmental problems themselves place distinct policy constraints upon decision makers in a variety of ways. For instance:

- *Economic instruments that may work for one set of environmental problems in one country may not be sufficient to address a more severe problem in another.*
- *A less developed country with severe environmental problems will naturally face greater constraints than a developed country with more resources and fewer problems.*

- *A country that is economically dependent upon a marginally profitable and polluting industry will have fewer policy options than countries with more diverse and profitable industries.*
- *Policymakers often have to make choices among which environmental problems to address, because the resources are not available to address all of the issues at one time.*

3.4 The Economy, Culture and Population

Environmental problems can only be understood and addressed in the context of the larger economy and society. The state of economic development, cultural values, and population pressures, often constrains the options available to address environmental problems.

3.4.1 Economic Conditions

The nature of a nation's economy has a major impact on both the environmental problems and the policy responses available and required. Economic conditions provide the basic framework for all environmental protection and natural resources management policy.

The level of economic development determines the type of environmental issues to be addressed and the effectiveness of the various environmental protection instruments available. Low levels of development will likely mean greater rural than urban environmental concerns.

Less developed countries also have fewer available instruments to use. They have less tax base to enforce environmental protections laws and a restricted range of economic instruments that they can use.

The industrial makeup of the economy is another critical factor in environmental policy. Many countries depend on one or a few major industries. Others have a diverse economic base. These conditions greatly impact the type of environmental instruments needed for environmental protection and natural resources management. Here are some examples of the environmental issues faced by differing industries:

Agriculture – Soil erosion, irrigation issues, groundwater pollution or depletion, loss of biodiversity, pesticide and herbicide build-up.

Mining – Destruction of habitat, water and air pollution, defacement of natural beauty.

Forestry or Fisheries – Depletion of resources, soil erosion, habitat destruction.

Heavy Manufacturing – Air and water pollution, health issues.

Tourism, Services, and Light Manufacturing – air pollution caused by auto emissions, water pollution caused by untreated sewage, and loss of natural beauty and recreational assets (beaches, wildlife parks, forest and mountain scenery, skiing facilities).

Rapid Economic Growth – while desirable for general welfare reasons, can obviously have harmful effects on the environment and natural resources. The policy constraint here is that neither government officials nor the general public are likely to support policies that appear to threaten economic growth. In section 2.5, we have already discussed ways to reconcile environmental protection efforts and economics growth by taking externalities into account. This is often called environmental accounting.²

² For more information see Handbook of National Accounting: Integrated Environmental and Economic Accounting – An Operational Manual, UNEP and UNSD (2001).

3.4.2 Vested Interests

Just as weak governance institutions can reduce the likelihood of achieving sound environmental policies, so too can the presence of strong well-organized opposition with a vested interest either in the status quo, or in a specific pathway for the projected change. Evaluation should take place of which groups are most powerful and what their primary goal is likely to be.

The pressures on policy makers from special interests can be immense. Whether they are small subsistence farmers or multinational corporations these groups will seek to protect their interests against any perceived or actual threat to their livelihoods or profits.

The opportunities for corruption are great and, in the absence of effective government, those affected may simply choose to ignore environmental laws. The ability to work with interest groups and stakeholders in shaping and enforcing environmental policies is critical.

Groups with existing rights, whether actual or implied, often have considerable political power and will use it to fight changes to existing policies unless they can be convinced or compensated.

However, many of these stakeholders have legitimate interests that should not be ignored. Any environmental authority will need an ability to work with various stakeholders to ensure that they receive a fair hearing.

3.4.3 Cultural Values

Core cultural values often come into conflict with environmental protection and responsible natural resource management. If the owning of cattle, for instance is the key to individual wealth and social standing then regulating the number of cattle or where they can graze may meet strong opposition no matter what instruments are used to protect the environment or natural resources.

The same is true for dietary preferences (e.g. eating hamburgers, whale meat, or certain species of fish). Despite the environmental damage, the market will remain strong because of such preferences.

External demand for local products – rhinoceros horn, ivory, tropical hardwoods – that result from foreign cultural preferences and provide substantial income for local people, also impose constraints on environmental policy.

Such deeply felt values can undermine any efforts. Cultural constraints are not insurmountable but must be addressed with care and sensitivity. A mix of education, economic incentives, and command and control instruments are often required to address these constraints.

3.4.4 Demographic Conditions

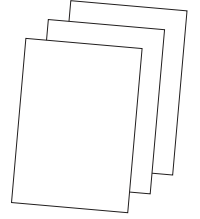
Rapid population growth or sustained high levels of population, especially in rural areas, offer an especially difficult challenge to environmental policymakers. Certain economic activities – farming, fishing, forestry, charcoal manufacture etc – that are sustainable at lower levels can become unsustainable as population grows and as a consequence the level of economic activity increases.

Problems include soil erosion, destruction of natural habitat, population crashes among exploited fish species or wildlife, and increases in stock pollutants beyond the carrying capacity of the environment. Population pressure is a particularly thorny issue for environmental policymakers. Again, there is no single policy or instrument that can solve the problem. Family planning education, economic instruments to encourage alternative, less polluting economic development, and direct economic incentives to protect endangered areas or species may be used in combination to overcome this constraint.



Module 3

Group Exercise



Analyse Policy Context of Identified Environmental Problems (Handout)



Objective

For the environmental problems identified by the group exercise in Module 1, describe how the various elements of policy context would affect the problem.



Instructions

- Return to groups formed in Module 1.
- Discuss the policy context of the environmental problem identified by your group in Module 1, addressing the questions provided below.
- Jointly prepare a presentation and select a speaker.
- Present your results in the plenary.



Questions for Group Discussion

What are the baseline legal and administrative conditions in the country?

What is the economic context of the problem?

Who are the main stakeholders? What are their interests?

What is the role of vested interests?

Do special cultural and demographic conditions affect the problem?

Module 4

Command and Control Instruments¹

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11

PART III

GOAL



To review the three main command and control instruments for environmental and natural resource management.

LEARNING OBJECTIVE



By the end of this module, participants should be able to explain how command and control instrument(s) could be used to help solve environmental problems and explain the reasons for the choice of instrument(s).

¹ This Module is based on Sterner, T (2003). Policy Instruments for Environmental and Natural Resource Management. Washington DC: Resources for the Future, World Bank and FAO, pp. 74-81.

4.1 Defining Terms

Public Good: A product or service that is available to the general public - payers and non-payers alike. ("Good" in this sense means "product or service" rather than "virtue or benefit.") Use of the good by one person does not prevent use by others – e.g. national defence, a clean environment, and public fireworks displays. Private businesses can't sell public goods in markets, because they cannot charge a price and keep non-paying people away.

Technology: Any method of performing a task. There are technologies for the generation of electricity, making charcoal, fishing and all other economic activities. Technology regulation may cover both the equipment and processes used for any economic activity. The regulation of technology is one means of controlling pollution or overuse of natural resources.

Regulation of Technology: Bans or restrictions on specific technologies that cause pollution or deplete natural resources (e.g. ban on the production and use of unleaded petrol).

Zoning: Regulation of the uses of real property to achieve environmental protection in specific locations. Zoning designates permitted uses of land based on mapped zones, and hence can restrict certain types of economic activity in specific zones, for example because of noxious emissions, destruction of natural scenery, high noise levels, etc.

Regulation of Performance: Command and control policies that impose directly enforced limits on the quantity of emissions or harvest of a renewable resource for each individual or firm. The resulting performance standards target individual levels of emissions or natural resource exploitation rather than requiring or prohibiting particular technologies.

Transferable Emission Permits: Tradable permits specifically designed to reduce polluting emissions.

Tradable Permits: Economic instruments used to address environmental problems by requiring each polluter or resource user to obtain permits for the amount of pollution he or she releases. Permits are issued in units of pollutants or rights to harvest a natural resource and may be bought and sold in an open market. The government sets the total number of permits at a level to reduce pollution or protect sustainable levels of a renewable resource. Permit holders have an incentive to reduce emissions or curb harvesting in order to sell excess permits.

4.2 Direct Provision of Public Goods

The purpose of the direct provision of public goods is to maintain environmental or natural resource quality through direct public expenditure. In this context "good" means "product or service" rather than "virtue or benefit." A public good is one that is difficult to keep non-payers from consuming, and use of the good by one person does not prevent use by others.

4.2.1 Examples of Public Goods Provided

Examples include national defence, universal public education, and a clean environment. Private businesses can't sell public goods in markets, because they cannot charge a price and keep non-paying people away. Public goods are paid for by governments because there is no way a private business can profitably produce them. For efficiency, governments usually pay for public goods through taxes or fees.

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In the environmental arena, the government (e.g. through its environmental protection agency) takes direct responsibility for solving a particular environmental or natural resource management problem for which the market cannot successfully provide a universal solution. Examples include:

- *Street cleaning*
- *Disease vector (e.g. mosquito) control*
- *Maintenance of urban water and sewer systems*
- *Maintenance of natural parks and nature preserves*

Such activities, of course, can also be carried out by private companies but only at the behest of the government or quasi-government organization (e.g. a homeowners association), which becomes the sole customer for the service.

4.2.2 Potential Drawbacks of Direct Services

Direct government provision of environmental services is susceptible to the usual problems that confront the provision of public goods. In particular, because the government is providing a public good, it is likely to under supply, more so in countries with weak governance structures and low tax bases. Also, free provision of some public goods such as fresh water will result in overuse by consumers and can lead to exploitation of valuable resources.

Since provision of public goods is often done by political agents allocating public tax money to specific projects, politicians may seek to expand the definition of public goods to subsidize particular constituencies. In addition, political access and power influences which of the many possible projects get funded, and how quickly. The projects of greatest need from a social or environmental point of view may differ markedly from those with the strongest political constituencies or greatest political return for the public official.

Nevertheless, for many problems the direct provision of public goods for the protection of the environment and natural resources is unavoidable.

4.3 Regulation of Technology

At base a technology is any method of performing a task. There are technologies for the generation of electricity, making charcoal, fishing and all other economic activities. The regulation of technology allows governments and their environmental agencies to ban or restrict specific technologies that cause pollution or deplete natural resources. Conversely they may require the use of technologies that reduce emissions or prevent overuse of natural resources.

4.3.1 Designating Technologies

Through the regulation of technology, the government attempts to choose the optimal production or abatement technology as its policy instrument. By designing a standard, the regulator (typically the government through its environmental protection agency) can prescribe the technology that firms and households have to use, prevent their use altogether, or prescribe the conditions under which a polluting technology can operate. Regulations may require the use of the “best available” or “state-of-the-art” technology to ensure that polluters adopt improvements as technology changes.

In certain cases, it is appropriate for the government to designate specific technologies. The government can charge polluters with using ‘unnecessarily’ polluting technology. In such cases the concern is not only the pollution as such but the comparison with other industries or an alternative proven technology.

For example, consider the case where public service minibuses are emitting a lot of smoke yet simple observation may show that other minibuses do not emit as much smoke. The regulator can therefore require the polluting minibus to cut down on its smoke emissions using available cleaner technology.

This approach has a number of variations as indicated by their names:

- *Best Practical Technology (BPT)*,
- *Best Available Technology Not Entailing Excessive Cost (BATNEEC)*,
- *Best Available Control Technology (BACT)*, or simply
- *Best Available Technology (BAT)*.

4.3.2 Zoning

In some cases, governments or its environmental agencies may restrict the location of the use of technology. To do this they use zoning laws to regulate where firms may use certain technologies because they generate excess noise, odours, or potential exposure to hazardous materials in populated areas. On the other hand, these same technologies may be zoned for use in areas where the effects can be absorbed without excessive damage to the environment or natural resources.

4.3.3 Uses of Technology Regulation

Technology standards have been employed for a whole range of purposes including:

Automobile Emissions Control where mandatory installation of catalytic converters on new cars is now almost universal.

Regulation of Nuclear Power where damages from accidents would be high. Here, the goal is zero emissions. Plants are regulated not only by being given maximum emission levels (zero); they usually must comply with more detailed and specific technology requirements, such as multiple control systems and specific kinds of hazardous material containment.

Natural Resource Management where in fishing, for example, the use of cyanide and dynamite are banned. Similarly, in agriculture and forestry, examples of technology regulation include the banning of certain pest control techniques or mandating replanting trees after harvest. Regulations can also require the construction of soil bunds and terraces to prevent soil erosion, or the use of fallow periods or tillage technology.

The regulation of technology through design standards is particularly appropriate under the following conditions:

- *Technical and ecological information about the environmental problem to be resolved is complex.*
- *Crucial knowledge is available at the government rather than at the firm level so that the overall impact of the regulation can be estimated but not the effect at the individual or firm level.*
- *Firms are unresponsive to price signals (e.g., a firm could be operating in a non-competitive setting), or investments to improve environmental practices are large and have little benefit to the individual firm.*
- *Standardization of technology could hold some major advantages for both producers and the general public as in the case of catalytic converters.*

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- *One design or technology is definitely superior to others available, making its mandated implementation the best alternative.*
- *Monitoring costs are high so that monitoring emissions is more difficult than monitoring technology.*

4.3.4 Attraction of Technology Regulation

Mandatory technology design standards are the most commonly used environmental control instruments because they have an intuitive simplicity and they appeal to the desire of policymakers to quickly address (if not solve) the problem at hand.

Use of technology regulation - in appropriate circumstances- can provide clarity of choice, economy of administration, effective control, and ease of monitoring. Design standards are also useful in circumstances, where considerations other than efficiency (e.g., ease of inspection and estimation of effects) may be of overriding concern.

Finally, both regulators and polluters often prefer the use of technology regulation because it is easier to understand and comply with than more indirect methods of pollution control or natural resource management. Such regulation seems intuitively fair because everyone engaged in a certain activity is required to use (or is prohibited from using) the same technology.

4.3.5 Potential Drawbacks of Technology Regulation

One drawback of technology regulation is its inflexibility. Since it is not possible for the regulator to have information about individual abatement levels or appropriate technologies for each firm, the government will designate a standard technology for all polluters (e.g., catalytic converters, filters or chimneys).

The regulations usually prevent a given firm or individual from using an alternative technology even though it may be more effective in a given circumstance. As a result, firms have little incentive to develop better technology. Further, the “Best Available Technology” concept may tend to encourage ‘end of the pipe’ solutions.

4.4 Regulation of Performance

Regulation of performance imposes directly enforced government limits on the quantity of emissions or harvest of a renewable resource for each individual or firm. The resulting performance standards target individual levels of emissions or natural resource exploitation rather than requiring or prohibiting particular technologies.

4.4.1 Performance Standards

In establishing performance standards, the regulator chooses the maximum allowable emissions or harvest for each firm or individual polluter. As such, performance standards are significantly different from technology regulation because they give firms flexibility in the choice of abatement method by which to meet the mandated goal. They also leave the firm a choice between reducing output levels and increasing abatement level per unit of production. They may also allow trade-offs between polluting units within a firm.

Experience has shown that the regulation of performance can lead to increasingly effective solutions to environmental problems. For example, technology for removing effluent gases from motor vehicle exhausts as government emission performance standards have tightened over time.

4.4.2 Tradable Emissions Permits

Tradable emission permits (discussed in detail in Module 7), are a variant of the performance standards instrument. In this situation, the regulator sets a cap on the maximum amount of emissions for all firms and households - which is a command-and control approach - and then issues permits for a set number of emissions units to each firm or individual. These permits can then be traded in the open market, using tradable permits as an economic instrument. Likewise, in fisheries management, a variant of this instrument is also used to set a cap on the maximum amount of fish that can be removed from a fishery in total and by individual license amounts.

4.4.3 Zero Emissions

One particular type of performance standard that deserves special attention is zero emissions or total bans. Such bans may be called for since any level of a given substance may be harmful to human health or harmful to endangered species. Ease of monitoring may explain the popularity of total bans, even in cases where some level of emission or harvest might be possible. Total bans are most often used for radioactive materials, dangerous pesticides, heavy metals (cadmium, lead) and toxic chemicals as well as the trade in ivory and endangered species.

4.4.4 Potential Problems with Performance Regulation

One problem with controlling individual emissions rates such as those set for new cars is that they do not imply full control on total levels of pollution or ambient pollution levels. This is because total pollution levels depend both on the output for each agent and the number of agents operating in the economy.

Even if each polluter produces no more than the permitted amount of pollutant, the total pollutant load will exceed desirable levels when there are too many individual polluters. The same is true with natural resources management where the total harvest (e.g. grazing level, fish catch, tree cutting) can become unsustainable if there are too many harvesters, even though each harvester only extracts his or her permitted amount of the resource.

Another problem issue associated with performance regulation is that regulation of individual performance can be costly because every individual polluter or user must have his or her emissions or usage inspected.

Introduction to Economic Instruments¹

GOAL



To introduce the three broad categories of economic instruments, review the functional objectives of economic instruments, and describe the benefits of economic instruments.

LEARNING OBJECTIVE



By the end of this module, participants should be able to explain certain advantages of economic instruments and possible objectives that they could achieve.

Note: The next four modules will present the various economic instruments available to solve environmental problems. After Module 8, a case study group exercise is suggested to review the material covered in Modules 5 to 8. At the end of Module 10, participants will have another review opportunity in a final group exercise building on the exercises of Modules 1 and 3. Participants will be expected to present the economic instrument(s) that could be applied to solve an environmental problem and the reasons for their choice.

¹ The Module is based on UNEP (2004): The Use of Economic Instruments for Environmental Policy: Opportunities and Challenges. See also Annex II of this manual for *A Primer on Economic Instruments*.

5.1 Defining Terms

Price-Based Instruments: Special government taxes, charges, or fees designed to raise the price of polluting the environment or exploiting natural resources. These policies attempt to set the price for users of environmental and natural resources 'right' to cover the excess social and environmental costs caused by the economic activities of polluters or natural resource users.

Pollution and overuse of renewable natural resources impose costs on society, which are not borne by the private firms and individuals that cause them and which the market does not account for. These costs are a type of externality. Appropriate pricing of resources through price-based instruments sends a more accurate signal to users encouraging more appropriate resource consumption and conservation.

Subsidies: Payments or other economic incentives (e.g. tax breaks) to individuals or firms to compensate expenses incurred through environmentally friendly behaviour, thus encouraging this behaviour.

Perverse Subsidies: Payments such as those that promote certain kinds of economic development or support specific industries (fishing, forestry, etc.) that cause environmental damage. Removal of such subsidies constitutes an economic instrument for environmental and natural resource protection.

Property Rights Based Instruments: Policy instruments that define, adjust, or create property rights to ameliorate environmental damage. They define the basic enforceable law for ownership and use of both tangible (e.g. land) and intangible (e.g. permits) property. More specific instruments include tradable emission permits in pollution management, individual transferable quotas in fisheries management, transferable grazing rights in range management, and transferable development rights in property management.

Legal Instruments: Policy instruments that hold individuals and organizations liable for environmental damage they cause. Legal instruments include criminal penalties, fines, civil liability statutes, and performance bonds.

Voluntary Environmental Agreements: Formal negotiated agreements between companies or groups of companies and the government (or on some occasions nongovernmental environmental groups) to limit pollution or the overuse of natural resources. Such agreements allow the parties to avoid specific legislation or intrusive government regulation or legislation and provide the flexibility that comes with negotiated agreements. Such agreements are backed by the threat of government sanctions if the parties do not adhere to the agreements.

Information-Based Instruments: Methods of informing the public about how eco-friendly a product is. This can be done by labelling, rating, or other techniques. Information-based instruments may also include widespread public education programmes on anti-littering or energy conservation or other high profile campaigns.

Internalising Externalities: Raising the internal costs to the producer to cover the external costs to society of pollution or natural resource exploitation.

Self-Enforcement: A situation in which those regulated by a policy have an interest in seeing that the laws and regulations are enforced. For example, groups given communal property in perpetuity have an incentive to ensure that other people do not encroach on the land, and assets are managed for the long term.

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Transparency: A situation in which information about decisions and actions of the government and those regulated is available to the general public. Transparency is essential for the functioning of most economic instruments.

Compliance Costs: The costs for the polluter or natural resource user of complying with an environmental policy. Such costs need to be factored in when determining cost effectiveness of a policy instrument.

Cost Effectiveness: A situation where the environmental benefit of an economic instrument exceeds the overall cost of managing or enforcing the policy.

5.2 Types of Economic Instruments

Economic instruments provide financial incentives for polluters and natural resource users to reduce output of pollutants and unsustainable use of natural resources. There are three basic types of such instruments:²

Price-Based Instruments. These instruments raise the price of pollution and use of natural resources. They include direct taxation, input and output taxation, emission or access charges, refunded emissions payments, deposit refunds, subsidies and removal of perverse subsidies.

Property Rights Based Instruments. These instruments define, adjust, or create property rights to ameliorate environmental damage. They define the basic enforceable law for ownership and use of both tangible (e.g. land) and intangible (e.g. permits) property. More specific instruments include tradable emission permits in pollution management, individual transferable quotas in fisheries management, transferable grazing rights in range management, and transferable development rights in property management.

Legal, Voluntary and Information-Based Instruments. Legal instruments hold individuals and organizations liable for environmental damage they cause. They include criminal penalties, fines, civil liability statutes, and performance bonds. Voluntary and information-based instruments include voluntary environmental agreements, information campaigns, eco-labelling, and other certification.

In economic terms, economic instruments internalise externalities (environmental costs) through increasing the prices that individuals and industries must pay to use resources or to emit pollutants. As pollution or the use of natural resources become more expensive, polluters and consumers have strong financial incentives to reduce such activities through conservation, substitution of materials, or rationalizing consumption.

5.3 Functions of Economic Instruments³

Every tool has its use. A hammer is good for driving nails but not for swatting flies. The same is true with economic instruments. The function of each instrument – how it works - will determine its best use, alone or in combination with other policy tools.

² Different classifications of economic instruments are available. Some authors differentiate market creation (e.g. tradable permits), fiscal instruments (taxes and tax breaks), liability systems, self-regulation and persuasive instruments; see Panayotou (1998): Instruments of Change, Motivating and Financing Sustainable Development. Earthscan.

³ Annex III provides detailed descriptions of the various functions of economic instruments and their impact on incentives of firms and individuals.

The range of possible economic instruments available is large and potentially confusing for policymakers. Familiarity with the functions of different instruments helps policymakers identify those appropriate for a given environmental problem.

Economic instruments are basically structured to achieve some mixture of three main functions:

- *Redressing problems with property rights that contribute to pollution or poor stewardship of resources;*
- *Establishing and enforcing prices for resources consumed and environmental damage associated with production; and*
- *Subsidizing the transition to preferred behaviours.*

5.3.1 Establish, Clarify or Improve Property Rights

Property rights are society's way of spelling out who may do what with which resources during a certain period of time. Property rights may be assigned by tradition, force or impartial law. The first is vague, the second unjust, and the third essential to the functioning of economic instruments. Property rights laws, openly arrived at and fairly enforced, serve essential functions in the management of the environment. (See Module 3 for a detailed discussion of need for property rights law.)⁴

Property rights-related economic instruments establish, clarify, and improve rights to the ownership and use of property. By using such instruments society is assured that it will have fundamental control of natural resources and environmental assets. Property rights may be individual, corporate, or communal. (Communal property rights can provide secure tenure to impoverished indigenous population groups.)

In general, property rights-related economic instruments allow owners to invest in resources and to extract or harvest them at a sustainable rate. Owners can also be held accountable for pollution created on their property. More specifically, property rights related instruments have four major functions. These are to:

Establish property rights where none existed before. This enables the government to establish clear rules for access to resources and to control overuse.

Clarify rights among competing claims for the same property. Ensuring that property rights are clear to all parties adds security and flexibility to the management of natural resources by removing pressures to 'get what you can' while it is still there.

Modify existing property rights to protect resources and the environment; and

Create the conditions for the trading of intangible property, e.g. through the use of tradable permits. This creates markets for un-priced natural resources and environmental services providing incentives for sustainable management and use (for further detail see row 1 of Annex III).

Note that in economic terms, the existence of clearly defined property rights is necessary to achieve efficiency. In contrast, how the property rights are assigned is a question of distribution. Establishing property rights increases efficiency and therefore overall wealth; allocating property rights distributes property and hence wealth. Policy makers can take use of the independence of these two functions, especially when issues of poverty matter in environmental decision making.

⁴ Having laws on the books is necessary but not sufficient in itself. Arbitrarily promulgated and enforced laws are the same as the rule by naked force. In either circumstance economic instruments for the management of the environment and natural resources will be difficult to apply.

5.3.2 Finance Costs of Pollution and Resource Use

Fees and taxes are the public sector's version of prices. Their function is the same: to recover the cost of providing goods and services from the groups that use them. In case of economic instruments the costs being recovered are the costs of environmental damage or exploitation of natural resources.

Some fees and taxes are intended to raise the price high enough to discourage pollution and overuse of natural resources (taxes on smokestack emissions, grazing fees). Other taxes and fees are set at a level high enough to cover the direct cost of providing an environmental service (e.g. provision of clean water supply and sewage treatment).

The most efficient solutions in an economic sense occur when fees function to recover both the direct government services costs and the environmental costs associated with producing and using a particular product or asset. However, political realities often prevent this outcome and measures with more limited functions must be adopted. The following are some price-based functions and the instruments associated with them:

5.3.2.1 Recovery of the Costs of Government Provided Services. Public sector environmental services providers often fail to recover the basic costs of providing their services. Users then come to expect drinking water, sewage treatment or electricity to be heavily subsidized or free. User fees set to recover the full costs of providing a service can correct this problem.

Certainly, governments should take care to design rate schedules to ensure that the poor have continued access to life sustaining services. But there is little economic or environmental logic in subsidizing all customers (for further detail see row 2A of Annex III).

5.3.2.2 Assurance of Adequate Return on Sale or Lease of Public Assets. When governments choose to sell or lease assets, be they oil reserves in the ground, expansive government owned enterprises (e.g. electrical generating stations or oil refining facilities) or leased grasslands, it is crucial that these sales earn appropriate returns on invested public capital, or on the sale of limited resources.

When proceeds are earmarked at least in part to environmental protection measures, the environmental benefits can be further expanded. Unfortunately, such sales or leases have all too often been used as financial payoffs to political supporters (for further detail see row 2B of Annex III).

5.3.2.3 Compensation for Environmental Damage. Pollution taxes, fees, security bonds, and deposit refund systems all function to ensure that polluters bear the costs for polluting the environment. These economic instruments amount to a charge for the use of the public resource of environmental quality (for further detail see row 2C of Annex III).

5.3.3 Subsidize Sustainable Alternatives

Economic instruments can be used to subsidize environmentally superior alternatives to current practice, which are not – or not yet – competitive in the market. If done properly, such efforts can accelerate the development of these alternatives. However, great care is needed to ensure that subsidies are appropriately targeted, only applied in the short-term, and don't end up making the problem worse instead of better (for further detail see row 3 of Annex III).

The table Annex III, to which the above sections refer, offers a detailed listing of the functions of economic instruments, their impact on the incentives or firms and individuals, examples of instruments for each

function, and factors to be considered in using the different economic instruments to serve a given function.

5.4 Benefits of Economic Instruments

Economic instruments possess a number of inherent advantages over command and control instruments for many problems. Compared to command and control instruments, they generally provide more:

1. *Cost-effectiveness and flexibility,*
2. *Incentives to use innovative abatement technologies,*
3. *Allocation of natural resources to parties who value them most,*
4. *Self-enforcement by aligning public and private interests,*
5. *Transparency, and*
6. *Cost recovery for publicly provided services.*

Although economic instruments cannot overcome a corrupt or weak political structure, they can help make moderately functioning governance structures work more effectively.

5.4.1 Cost-Effectiveness and Flexibility

Economic instruments can reduce the overall cost of achieving emissions reduction and protection of natural resources because they are less expensive to administer and more flexible in application than command and control instruments. In short, they can offer outstanding gains in cost-effectiveness when compared to command and control instruments.

Empirical studies from the United States (US) have shown that the efficiency gains associated with using economic instruments have been substantial. Tietenberg suggests, for instance, that command and control cost approaches to regulate air pollution were as much as 22 times more expensive than the least expensive economic instruments. For the eleven applications studied, command and control approaches were on average six times as expensive.

Similarly, Anderson *et al* estimated that as of 1992, economic instruments for air, water and land pollution within the US had saved more than \$11 billion (US) relative to a command and control baseline.⁵ Assessments of economic instruments in multiple countries by the Organisation of Economic Co-operation and Development (OECD) also form strong evidence of cost savings.⁶

⁵ For further information see: Hahn, Robert (1999). The impact of Environmental Policy, AEI-Brookings Joint Center for Regulatory Studies, Working Paper 99-4.

⁶ For further information see: OECD (1997). Evaluation Economic Instruments for Environmental Policy. The OECD analysed numerous empirical studies on the efficiency gains associated with economic instruments, finding fairly strong evidence of beneficial impacts. The gains associated with any specific economic instrument, however, would be highly influenced by the specifics of the tool applied and the political context in which it was used.

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The cost savings of economic instruments comes, in part, from their more flexible nature, which allows firms to decide on the timing and magnitude of abatement measures. Rather than forcing every firm to meet specific and rigid emissions levels, economic instruments can ensure that the overall economy hits a particular pollution level, while allowing the market to determine which specific firms control how much pollution.

This flexibility encourages industries in which emissions reductions are less costly to cut emissions more than required, reducing the economy wide cost of meeting a specific target level.

With economic instruments, compliance costs usually continue to fall over time. This is a result of improved incentives for polluters or natural resource users to monitor the compliance of others, and also of incentives to invest in and test new control technologies.

These savings, in turn, make higher levels of environmental protection more affordable. This means that for a given environmental budget, economic instruments can buy more environmental protection than command and control instruments.

Flexibility in implementation extends to the timing of upgrades as well. The ability to purchase emissions credits, for instance, or to pay pollution taxes as an alternative to controlling emissions directly allows firms to coordinate their compliance more closely with the normal capital replacement cycle of the plant. This reduces premature capital equipment replacement and additional plant shutdown time.

In reducing the cost of environmental controls for industry relative to alternative policies, economic instruments have a less detrimental effect on the competition of domestic industries with international firms, and allow domestic firms to respond more flexibly to such competition.

Governments enjoy more flexibility with economic instruments as well. If the market does not sufficiently reduce emissions or control overuse of natural resources, government can adjust economic instruments by either increasing fees or decreasing permits. Such a process is generally much easier than legislating changes to command and control regulatory standards.

Box III-5-1 gives a worked out example on the algebra of the cost effectiveness of economic instruments.

5.4.2 Incentives to Use Innovative Abatement Technologies

Because firms can exceed targeted pollution levels by paying extra taxes or fees,⁷ they face much lower risk from trying emerging technologies that may not work perfectly at first and miss the target control level. However, over a longer period of time, these unproven techniques often lead to more effective and less expensive control approaches.

Since excess reductions in emission or use of resources through improved technologies have financial value (e.g. revenues from selling emission permits to others or lower pollution tax bills), firms have a continued incentive to innovate even if they are already in compliance.

An additional benefit of innovation is that when environmental technology innovations in the areas of pollution control reach profitability they offer the potential for the creation of new domestic industries.

⁷ Under certain economic instruments, polluters pay for every unit of pollution emitted into the environment. Consequently, a polluter who wishes to pollute beyond his/her current level is free to do so, as long as extra units of pollution are paid for.

5.4.3 Efficient Allocation of Natural Resources

Economic instruments that auction access to publicly-owned resources - oil, minerals, timber, grazing land, etc. - enable those who value the resources most to obtain them. If structured properly, auction-based economic instruments encourage more sustainable use of flow resources (such as grasslands and water) and more careful use of stock resources (such as oil and coal), in addition to raising revenues for the government. In contrast, command and control instruments often allocate resources uniformly without consideration of their relative value to different groups.

One important concern regarding market-based transfers is that if they are structured improperly (such as when assets are transferred in rigged auctions or other corrupt methods at a fraction of true value; or when bonding for post extraction remediation is not done), resource depletion can actually be accelerated.

5.4.4 Self-Enforcement by Aligning Public and Private Interests

Economic instruments that align public and private interest provide strong incentives for self-enforcement. Firms and individuals are given a vested interest in the proper use of resources and in emitting only as much pollution as allowed. The effect is to create a more decentralized enforcement system for environmental policies, therefore reducing the enforcement burden to the state.

For example, firms that wish to sell excess pollution rights will actively market to firms that need to buy rights. Similarly, groups given communal property in perpetuity have a greater incentive to ensure that other people do not encroach on the land, and to manage assets for the long term, if only to protect the lease or sale value of these rights.

5.4.5 Increased Transparency

Command and control instruments often generate complex permit and reporting requirements. The government and regulated firms too often hold this information closely and make it difficult for outside parties to obtain the information and analyse the effectiveness of the programmes.

In contrast, the information associated with many economic instruments (pollution taxes, marketable permits) is more visible through openly reported trading levels, prices, and fee receipts. As a result, evaluating investment trade-offs is easier to do, and lobbying for special privileges or exceptions becomes difficult.

5.4.6 Cost Recovery for Publicly-Provided Services

Publicly owned or delivered resources such as drinking water or oil-drilling rights can be sold at market prices, or at least at levels that recover the full cost of providing them. Such sales generate revenue that can be used to finance continued provision of government services and encourage increased conservation.

Cost recovery policies sometimes require subsidies to mitigate the impact of charges on the poor or other adversely affected parties. However, even given such subsidies, well managed cost recovery for public services can help finance expansion of public services - such as delivery of clean water - to areas without adequate services.

Box III-5-1: The Algebra of Cost-Effectiveness

This example gives insight in the mathematical calculations that lie behind cost-effectiveness. It requires, however, some knowledge of calculus.

Suppose that two firms can control emissions at the following marginal costs: $MC_1 = \$200q_1$ and $MC_2 = \$100q_2$, where q_1 and q_2 is, respectively, the amount of emissions reductions by the first and second firm. Suppose that with no control at all, each firm would be emitting 20 units of emissions or a total of 40 units for both firms. Suppose the Environmental Protection Agency (EPA) now demands that the two firms together should only emit 19 units of emissions in total (i.e., a reduction of 21 units of emissions is necessary).

One way to achieve this reduction is for the EPA is to require the two firms to share the burden of pollution reduction equally in the mould of a command and control. That is to say, each firm reduces emissions by 10.5 units. Calculating the total cost of this allocation of abatement responsibility is a simple problem of algebra.

We know from the theory of the firm that the total cost to firm 1 [and likewise to firm 2] is calculated by integrating their respective marginal cost functions. Thus:

$$MC_1 = \$200q_1 \Rightarrow TC_1 = \int_0^{10.5} (200q_1) dq_1 = 100q_1^2 \Big|_0^{10.5} = \$11,025.00$$

$$MC_2 = \$100q_2 \Rightarrow TC_2 = \int_0^{10.5} (100q_2) dq_2 = 50q_2^2 \Big|_0^{10.5} = \$5,512.50$$

This means that the total cost of equal reductions would be \$ 16,537.50.

Alternatively, the EPA can tell the two firms 'all I want is a total reduction of 21 units of emissions. How you share this reduction among the two of you is your problem'. In this case, the two firms will take advantage of the knowledge that firm 2 can abate pollution much cheaper than firm 1 in sharing abatement responsibility. It would make economic sense for firm 2 to do more abatement than firm 1, on the understanding that firm 1 would compensate firm 2 for doing the extra abatement.

To see this point, suppose that firm 1 abates a marginal unit of pollution at \$ 200 whereas firm 2 abates the same unit at \$ 100. It is clear that firm 2 would accept to abate a unit of pollution from firm 1 for any amount strictly greater than \$ 100. Likewise, firm 1 would be willing to pay firm 2 any amount strictly less than \$ 200 to abate that unit of pollution. It follows that there is scope for trade in emissions reductions between the two firms by the use of economic instruments. With this in mind, how can one compute the cost effective allocation of abatement responsibility?

A fundamental result in pollution economics states that cost-effectiveness is achieved when firms equalize their marginal abatement costs [on this, see Tietenberg (1992), pp. 369-376]. Thus, the two firms would have to jointly solve the following problem:

$$\$200q_1 = \$100q_2 \text{ [Equal marginal cost condition]}$$

$$q_1 + q_2 = 21 \text{ [The two firms together must abate 21 units of emissions]}$$



Solving the second equation for q_2 and substituting this expression in the first equation, we get an equation with q_1 as the only unknown. This gives us $q_1 = 7$, which we can use in the second equation to obtain $q_2=14$. Hence, at the cost-efficient allocation, firm 1 would abate 7 units of pollution while firm 2 would abate 14 units of pollution. The total cost incurred by firm 1 would be \$4,900 and that incurred by firm 2 would be \$9,800. The total cost of pollution abatement to the economy is \$14,700. These numbers can be calculated by replacing the upper boundary of 10.5 with 7 for firm one and with 14 for firm two in the integral expression above.

Conclusion: By using economic instruments, the economy saves a total of \$1,837.50 in pollution abatement costs.

Source: Tietenberg, T. (1992), p. 389.

Module 6

Price-Based Instruments¹

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PART III

GOAL



To present the key features of price-based instruments.

LEARNING OBJECTIVE



By the end of this module, participants should be able to define price-based instruments and tell when to use them.

¹ This module is based on Sterner, T (2003): Policy instruments for environmental and natural resource management. Washington DC: Resources for the Future, World Bank and FAO, pp. 94-108.

6.1 Defining Terms

Price-Based Instruments: Special government taxes, charges, or fees designed to raise the price of polluting the environment or exploiting natural resources. These policies attempt to set the price for users of environmental and natural resources 'right' to cover the excess social and environmental costs caused by the economic activities of polluters or natural resource users.

Pollution and overuse of renewable natural resources impose costs on society, which are not borne by the private firms and individuals that cause them and which the market does not account for. These costs are a type of externality. Appropriate pricing of resources through price-based instruments sends a more accurate signal to users encouraging more appropriate resource consumption and conservation.

Pigovian Tax: A tax levied to correct the negative externalities of a market activity (after the economist A. C. Pigou). This can be for example an environmental tax or a sin tax (taxes on alcohol or cigarettes). A true Pigovian tax would charge polluters precisely the cost their pollution imposes on society.

Pollution Taxes and Charges: Levies on pollution that seek to internalise externalities of pollution by increasing the price of a polluting activity. They intend to shift the costs of pollution that would otherwise be borne by society back to the polluter. Governments can apply taxes and charges in cases where they are able to monitor and tax the polluting activity (e.g. sewage effluent or smokestack emissions).

Natural Resource Use Fees: Price-based instruments such as mining royalties, stumpage fees, user fees, and land taxes used for natural resource management. Governments impose these fees and taxes to correct market failures (any externalities related to resource use) or institutional failure (the absence of property rights).

Rent: An economics term meaning profit in excess of what would be possible under a perfectly competitive market. (Not to be confused with what an apartment dweller pays a landlord). Monopolies are able to charge rent prices because they have no competition. Government regulation and legislation can protect rent prices for designated beneficiaries as well.

Scarcity Rent: A form of rent income (excess profit) that accrues to an owner of a natural resource just because the resource is scarce. In the absence of property rights – i.e. of private ownership - there is no owner to claim the scarcity rent, and the resource is exploited because its price does not reflect the scarcity. In those cases, price-based instruments such as mining royalties (a payment to the state for the right of use of a state's mineral resources), stumpage fees (a fee typically charged by the government to logging companies for the right to harvest lumber from public land), or user fees (fees charged to users of goods or services provided by the government) can be used as payments for a scarcity rent. This ensures that the resource user pays for the opportunity costs which society incurs when the resource is exploited today and thus will not be available in the future.

Input and Output Taxes: Levies on some input or output that can be easily monitored and that serves as a good indicator or proxy for the regulated pollution. They are often used in cases where the monitoring of emissions is impossible, difficult or costly, so that the government cannot directly tax the polluting activity. Gasoline taxes and vehicle weight charges are examples that are introduced based on the assumption that the ones paying will also be responsible for car emission and thus cause the environmental harm.

Tax Expenditures: A loss of potential tax revenue resulting from an exemption, credit, or refund of taxes for polluters that have introduced abatement or clean technology.

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Subsidies: Payments or other economic incentives (e.g. tax breaks) to individuals or firms to compensate expenses incurred through environmentally friendly behaviour, thus encouraging this behaviour.

Perverse Subsidies: Payments such as those that promote certain kinds of economic development or support specific industries (fishing, forestry, etc.) that cause environmental damage. Removal of such subsidies constitutes an economic instrument for environmental and natural resource protection.

Deposit Refund Systems: A system involving a charge on some particular item and a subsidy for its return. Deposit Refund Systems are combined instruments of charge and subsidy used to encourage environmentally appropriate recycling. Recycling beverage bottles and cans are the most well known example but the principal applies to anything (automobiles, chemicals, fluids) that can cause environmental damage if not recycled.

Refunded Emission Payments (REP): A combined economic instrument that uses both charges and subsidies. A REP is a charge imposed on polluting firms, the revenues of which are returned to the same group of polluters, not in proportion to the payments made but in proportion to another measure such as output. The individual firm pays a tax on emissions and receives back a share of the total fees collected based on output. The net effect of the payment and refund is that firms with above average emissions make net payments to the firms that are cleaner than average.

6.2 Introduction to Price-Based Instruments

Price-based instruments are special government taxes, charges, or fees designed to raise the price of polluting the environment or exploiting natural resources. These policies attempt to set the price for users of environmental and natural resources 'right' to cover the excess social and environmental costs of caused by the economic activities of polluters or natural resource users.

Pollution and overuse of renewable natural resources impose costs on society, which are not borne by the private firms and individuals that cause them and which the market does not account for (market failure). These costs are a type of externality. Appropriate pricing of resources through price-based instruments sends a more accurate signal to users encouraging more appropriate resource consumption and conservation.

6.3 Price-Based Instrument Theory

In economic theory, taxes that are levied to correct negative externalities resulting from a market failure are called Pigovian taxes (after the economist A. C. Pigou). Environmental taxes to collect money from the polluter to cover the cost society suffers from it constitute one example of Pigovian taxes. Another would be sin taxes raised on alcohol and cigarettes.

An environmental Pigovian tax is set equal to the marginal social damage at the optimal level of pollution, and as such is – under a range of circumstances and from a broad perspective² – a full solution to the problem of negative externalities. It compensates society for the damage or use of each unit of environment or natural resources by internalising externalities to the point where pollution reaches an "optimal" level.

In other words, Pigovian taxes discourage firms and individuals from generating excess pollution (since pollution and resource use become more expensive through the taxes or charges) and at the same

² Such an ideal state of affairs would include having fully informed, honest, welfare-maximising regulators and appropriate concepts of property rights.

time provide the revenue to cover the costs of cleaning up the environmental damage, restoring natural resources, and compensating victims of pollution.

The concept of a Pigovian tax is a somewhat theoretical construction used more for analysis than for direct policy application. In an ideal world the government would be able to determine the marginal damage and the marginal abatement or control cost curves for each pollutant and then set the tax or charge equal to marginal damage at the optimal level of pollution, as shown in the graph Figure III-2-6 in Module 2.

This graph in Figure III-2-6 shows how the intersection of marginal damage and abatement (control) cost curves determines the optimal level of pollution. The government can now set the per unit tax on pollution equal to the marginal cost of both curves at their point of intersection, which the polluting firm will be required to pay for each unit of pollutant that it emits. The firm will then produce up to a level at which the gain from emitting an extra unit of pollution equals the tax the firm has to pay on that unit (this is the last profitable unit). Since the gain is simply the abatement cost saved, this level will be the optimal level of pollution. In reality, no government or private organization can have all the data needed to know exactly what an appropriate tax would be. So, one cannot find real world applications where the tool is applied as prescribed by the theory. In real world applications, governments adjust pollution taxes, charges, and fees by trial and error to obtain an approximate solution.³

In the practical policy development, medical practitioners, ecologists or environmental engineers (rather than economists) recommend target levels of pollution or natural resource use without an economic analysis of the marginal costs of the environmental damage. The government then negotiates actual taxation among various interests and imposes them through the political process. Nevertheless, the theory has real value for policymakers in understanding the use of taxes to control pollution and protect natural resources.

6.4 Taxing Natural Resources

In natural resources management, governments use price-based instruments such as mining royalties, stumpage fees, user fees, and land taxes as variants of Pigovian taxes. They impose fees and taxes as part of natural resource management policies to correct market failures (any externalities related to resource use) or institutional failure (the absence of property rights).

As such, natural resource use fees help reduce and compensate for negative effects - loss of natural resources and inherent pollution caused by mining, forestry, and fishing - and impose a scarcity rent (See Defining Terms) when there is no effective owner who can claim such a rent (as for fish stocks for instance). Fees charged for natural resources use are a considerable source of revenue in low-income countries.

6.5 Pollution Taxes and Charges

Following the concept of the Pigovian tax, taxes and charges on pollution try to “internalise the externalities” by increasing the price of a polluting activity. They intend to shift the costs of pollution that would otherwise be borne by society back to the polluter. Governments can apply taxes and charges in cases where they are able to monitor and tax the polluting activity (e.g. sewage effluent or smokestack emissions).

³ Sterner (2003), pp. 96-97 gives an overview of how one can go about this iterative – trial and error – process and of possible problems that may occur.

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Governments can then set aside the revenue raised for addressing the specific problem caused by the activity subject to the tax. Applications of this instrument include effluent charges, pollution taxes, and noise charges.

The taxes or charges are supposed to be set based on the amount of directly measurable pollution though this is usually just an approximation. In fact, policymakers often use other criteria such as budget requirements or political considerations.

6.5.1 Taxes vs. Charges

Although practitioners sometimes use the terms taxes and charges interchangeably, taxes refer to politically rather than administratively decided fees that typically go to the general treasury rather than being set aside for local or sectoral use. On the other hand, sectoral agencies levy, appropriate, and use environmental charges.

Governments may also impose hybrids of taxes and charges such as politically decided taxes earmarked for environmental funds and locally decided charges paid to the general treasury. Earmarking environmental tax revenues for environmental purposes may be a controversial issue, especially in developing countries where public funds are often scarce. If the environmental tax itself gives enough incentive to reduce pollution or resource overuse sufficiently, the tax benefits may be diverted to the general treasury. If on the other hand the tax does not give enough incentive to fully solve the environmental problem (which is often the case) it may be argued that tax revenues should be earmarked for environmental purposes such as publicly financed abatement (e.g. sewage treatment).

6.5.2 Potential Problems of Application

Taxes can have some disadvantages. The relatively complex legal process involved in passing and modifying tax laws makes them difficult to be adjusted to changing conditions. Further, when revenues go to the general treasury rather than to a specific trust fund, the effect of the tax instrument in addressing the specific problem is often lost. Local or industrial sector charges (over which polluters or resource users have some influence) are typically more readily acceptable since the money stays within the sector or the region.

6.6 Input and Output Pollution Taxes

In cases where the monitoring of emissions is impossible, difficult or costly, the government cannot directly tax the polluting activity. To overcome this problem, the government can levy taxes on some input or output that can be easily monitored and serve as a good indicator or proxy for the regulated pollution.

Gasoline taxes are a good example. The relationship between gasoline consumption and the environmental damage caused by vehicle emissions is far from simple and valuing and monitoring each vehicle is too complex to be practical. Therefore, regulators choose gasoline taxes as a proxy even though unused and contained gasoline itself is not a pollutant.

Another application is differentiated vehicle weight charges, where the amount of tax charged on a vehicle depends on its weight. The government bases such charges on the presumption that heavier vehicles are more damaging than the lighter ones.

Economists sometimes refer to input and output taxes as presumptive taxes because, in the absence of direct monitoring, the government presumes that the agent that uses a certain input or produces a certain

output is polluting. Some researchers favour the use of presumptive taxes in developing countries where monitoring individual emissions is often impossible.

6.6.1 Tax Expenditures

The government can exempt polluters that demonstrate abatement or clean technology from taxes or refund presumptive taxes to them. This removes the burden of proof from the government and places it on to the firm. If the output of a firm closely correlates to the regulated pollution, then even a reduction of a regular product tax for this firm may be justified, given it has proven its abatement efforts.

For example, consider a firm that produces hydrochlorofluorocarbons (HCFCs), which are damaging to the ozone layer. An output tax would be about the same as a tax on ozone depletion, but there could be a deduction for HCFCs that are recycled or collected in closed systems.

Presumptive taxes, therefore, can provide an incentive for clean firms to disclose their technology if they can thereby reduce their fee burden. A Swedish tax levied on the sulphur content of fuels provides a good example. The government rebates tax upon proof of abatement. This instrument amounts to a tax expenditure, i.e. an exception to taxation that provides an implicit subsidy for proactive abatement activity.

6.6.2 Combining Instruments

Presumptive taxes alone may not be sufficient to address the issue at hand. In the case of gasoline taxes, input taxes do not provide incentives for technical progress or substitution that could help in abatement. Therefore, governments find it advantageous to combine gasoline taxes with other instruments such as mandatory catalytic converters or even subsidies for such abatement technology. This policy offers an example of combining economic instruments and command and control instruments in managing pollution.

6.7 Subsidies and Subsidy Removal

In addition to input and output taxes, governments can use subsidies to raise the relative price for polluters compared to non-polluters, e.g. by offering subsidies, refunds and other positive payments for improved environmental practices, or by removing perverse subsidies (i.e. those that promote environmentally unsound practices).

Government subsidies can compensate for the cost of environmentally friendly production and consumption behaviour, and thereby encourage such behaviour. Subsidies are especially desirable in situations where polluters cannot be easily identified but where non-polluters will come forward to receive their subsidy.

A subsidy can be either a direct repayment of abatement costs or a fixed payment per unit of emissions reduction. In the latter case, the subsidy serves as a kind of negative tax.

The removal of perverse subsidies – i.e. subsidies that promote economic development and stimulate unsound environmental practices – can also have a direct impact on environmental quality.

6.7.1 Varieties of Subsidies

If the polluting company is out of business, bankrupt or unidentifiable (as is the case with some historic cases of pollution, particularly in developing or formerly planned economies), then the public sector may

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have little choice but to finance cleanup with public funds or subsidize other companies to do the cleanup. As such, subsidies can be a practical alternative, particularly when other instruments or incentives to clean up the environment are not feasible.

Situations where the polluter expressly owns the property rights to a certain resource that society wants (for example, oil discovered below a private property) can also warrant subsidies.

Subsidies are also useful where the government wishes to protect privately owned environmental assets (e.g. land, forests, and waterways) without assuming full ownership or eliminating all private uses. Here are some further broad examples where this tool finds some empirical applications:

- *Subsidized public provision of health, energy, transport, clean water,*
- *Subsidized protection of urban greenery, watershed protection, biodiversity protection,*
- *Subsidies to encourage a shift to preferred products or productive methods,*
- *Tax breaks for the purchase of pollution control equipment.*

The subsidy instrument does not fulfil the Polluter Pays Principle (PPP) and is, partly for that reason, popular with polluters and owners or potential buyers of polluted property whose activities did not cause the pollution.

6.7.2 Perverse Subsidies

Some subsidies, such as those that promote economic development or support specific industries (fishing, forestry, etc.) can cause environmental damage. These are known as perverse incentives. Many observers see removal of perverse subsidies as a far more important issue than providing of subsidies to improve the environment. Such inappropriate subsidies promote rather than prevent wasteful and environmentally destructive behaviour.

Governments usually provide such subsidies in an effort to achieve some other desirable societal good such as economic development, job creation, protection of a way of life, or relief for the poor. From the environmental economics perspective, it is important to stress that any perverse subsidy distorts markets and hence creates inefficiencies. This leaves a society as a whole with fewer resources to address its problems, no matter which ones are the most pressing. Most perverse subsidies are maintained not because they are the only way to promote a certain policy goal, but rather because the benefiting stakeholders have strong vested interests and prevent changes.

Examples of perverse subsidies include:

- *Subsidies to keep energy prices artificially low,*
- *Subsidies found in the fishing and forestry industries.*

Perverse baseline subsidies can severely undermine the efficacy of any and all economic instruments for environmental protection.

Thus, governments should carefully examine the removal of existing perverse subsidies prior to instituting new subsidies, aimed at accomplishing the same purpose. Governments offer perverse subsidies so commonly that observers often classify subsidy removal as an environmental policy instrument itself.

The removal of perverse subsidies is always warranted from an environmental perspective and may even be achieved by offering subsidies to discontinue formerly subsidized but environmentally unsound practices (e.g. generous unemployment payments to fisher folk who will lose their jobs as a result of fishing bans) if this is the only politically feasible way.

6.7.3 Combined Instruments

Subsidies combined with other price-based instruments can be quite effective for environmental and natural resources management. For instance, the government can combine quantity restrictions with a small subsidy for over-compliance or with high fees for pollution emitted above a certain level. Such combinations may serve as a safety valve if regulators are not sure of the optimal pollution pricing level. They may also provide a way to collect information on abatement costs.

6.7.4 Potential Problems of Application

There are two primary problems associated with subsidies as an economic instrument:

Subsidies can be too expensive as a policy instrument especially in developing countries where the opportunity cost⁴ of public funds is high. Removal of perverse subsidies is often politically complicated because subsidies often go to powerful vested interests.

6.8 Deposit Refund Systems

Deposit refund systems involve a charge on some particular item and a subsidy for its return. As such, they are combined instruments of charge and subsidy used to encourage environmentally appropriate recycling. Recycling beverage bottles and cans are the most well known example but the principal applies to anything (automobiles, chemicals, fluids) that cause environmental damage if not recycled.

6.8.1 Rationale for Deposit Refunds

Deposit refunds, and similar systems, operate on the assumption that the consumer or firm will pollute in the absence of the system; for instance, that people will not recycle bottles without financial incentive to do so.

In cases where disposal harms the environment, the deposit refund becomes a tax expenditure on inappropriate disposal. The polluters (those who do not return the item) pay a charge, whereas those who return the item collect a refund and therefore pay nothing.

The distinguishing feature of the deposit refund scheme is that it has a disclosure mechanism; the government or firm pays the refund when the potential polluter demonstrates compliance by returning the item that carries the refund, therefore reducing the need for monitoring of illegal disposal.

The government's role is to require firms to offer the deposit refund system and it may provide a tax credit or deduction for each refund paid as well. Firms not required by governments to do so tend to offer refunds to customers if the tax savings plus reuse and other values are larger than the costs involved.

6.8.2 Potential Advantages of Deposit Refund Systems

There are several potential advantages for firms involved in refund systems. The products (such as used newspapers) might have some reuse value. The offer may be part of a marketing deal to get consumers

⁴ The opportunity cost of funds is the cost 'incurred' by foregoing potential benefits from an alternative use of the fund, i.e. the cost from an opportunity forgone.

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to buy a new model, as is common with cars and trucks. Returned products reduce the firm's taxes if it receives a tax credit or deduction for each refund paid.

As indicated, deposit refund systems usually apply to final outputs such as beverage bottles and cans. However, firms may set up such systems for reasons other than environmental. Firms may simply want to reduce raw materials costs by recycling the product back into new products at a discount to the price of new materials. Refund programmes have spread widely in both developing and developed countries in recent years. In the developed world, the system has very wide applications. For example, Sweden has instituted a deposit refund scheme on scrap vehicles to prevent their abandonment in the woods to rust. It is conceivable that governments could use similar instruments to recover other polluting inputs, such as cadmium or mercury.

6.8.3 Potential Problems with Deposit Refund Systems

The setting up of the deposit refund fee, especially in developing countries where there is no information on the possible reactions of consumers or the environmental impact of some of the wastes, is an iterative process - you have to keep trying to get the deposit refund high enough to stimulate use of the system. This means that it is not possible to know in advance whether a particular fee structure would be successful or not.

6.9 Refunded Emissions Payments

Another combined instrument using charges and subsidies is the Refunded Emissions Payment (REP). An REP is a charge imposed on polluting firms, the revenues of which are returned to the same group of polluters, not in proportion to the payments made but in proportion to another measure such as output. The individual firm pays a tax on emissions and receives back a share of the total fees collected based on output.

The net effect of the payment and refund is that firms with above average emissions make net payments to the firms that are cleaner than average. In the application of this instrument, the firms with high ratios compensate firms that have a low ratio of emissions to output.

Refunded emissions payments can improve pollution control and provide incentives for the adoption of cleaner technology in situations where the government lacks adequate political authority to enforce compliance. Such systems make it easier for politically powerful polluters to comply with environmental regulations. The incentives for abatement with this instrument are essentially the same as with a Pigovian tax, as long as the number of firms is large enough and individual firm's market shares are small.

However, REPs are effectively a market-distorting subsidy, and can even be a perverse subsidy. In the first stance, firms pay for the pollution they produce, which is a pollution charge or tax. In the Pigovian sense, it corrects for negative externalities caused by the pollution. In the second stance, the raised money is returned to the industry, which is basically a general subsidy for this industry and gives it a comparative advantage with respect to other industries.

Take, for example, the industry that produces electricity from coal. A REP system could raise money by imposing a tax per unit of carbon dioxide emitted. The money would then be returned to the power plants according to their share of output of electricity. While this gives incentives to the electricity providers to improve their carbon efficiency, it also subsidises the coal electricity industry in general, giving it a comparative advantage over renewable energy sources, which might not receive any compensation for not emitting any carbon dioxide into the atmosphere. Thus, the price for electricity generated from coal in

the market will be artificially lowered and renewable energies have a competition disadvantage. The main policy advantage of REPs – and of tax-subsidy schemes in general - over taxes relates to the distribution of cost. Because all firms will pay less and some firms even make money in a REP scheme, it will not create the same kind of resistance (and lobbying) from polluters as taxes often do.

The use of refunded emission permits, however, is a relatively new concept and there is little empirical experience around the world.

Price-Based Instruments Cases

Case 1 - Korea Adopts a Massive Deposit Refund System

Korea uses an extensive waste disposal deposit refund system which covers food, beverages, liquor bottles and containers, batteries, tyres, lubricating oil, electric home appliances (and any other item that generates toxic waste), bulky or heavy commodities that require treatment, non-degradable materials and harmful household commodities that should not be mixed with the general waste stream. The manufacturer is required to deposit a certain amount for each unit sold, refundable upon collection and treatment.

Source: Panayotou, T. (1998). Box 4-2, p. 56.

Case 2 - Seed Capital: Externally Financed Development of Premium Flower Bulb Markets in Turkey

Transitional subsidies work best when the need really is short term, and the newer approaches are quickly shown to be viable in the marketplace. Indigenous propagation of threatened Turkish bulbs provides one such example. To offset an accelerating loss in national wild stocks, the World Wildlife Fund (WWF) decided to fund demonstration projects on the propagation of domestic bulbs as a substitute.

The WWF project also benefited immensely from the fact that domestic bulbs were increasingly being specified in international trade contracts as the knowledge about dwindling wild stocks grew. Using contracts with growers, plus capitalization funding to finance the initial purchases of plant stock for the participating families, the Fund was able to jump-start a more sustainable domestic industry.

In this situation, project returns were sufficient to make the enterprises viable. In addition, adoption of the new approach was widespread because it required little change in existing routines of participating families and increased their economic gains.

Source: UNEP (2004).

Case 3 - Sweden Offers Sulphur Tax Rebates for Abatement

In Sweden a substantial tax is levied on the sulphur content of fuels (over \$4 per kg of sulphur) but this is rebated for large emitters who can prove how much sulphur emission they have abated. For large emitters, therefore, the effect of the sulphur tax is precisely the same as the emissions tax; for everybody else the tax on the sulphur content of fuels provides incentives to switch to low-sulphur fuels and to reduce energy use overall.

The tax has been extremely effective as it is relatively simple to implement because it can be levied at wholesale level. The national target for sulphur emissions was met several years ahead of the schedule, and the revenue from the tax was actually lower than projected, as a result of the extensive fuel-switching and emission reductions that followed introduction of the tax.

Source: Panayotou T. (1998). Box 4-2, p. 53

Case 4 - Grassland Pricing Reforms in the Philippines

Pasture Lease Agreements (PLAs) for ranchers to graze cattle on public lands have existed for decades in the Philippines. The lease lasts 25 years, and is renewable for another 25. Prices for these rights have been extremely low (roughly US\$0.30/hectare/year). As a result, a relatively small group of people has gained control over much of the public grasslands for the 50-year lease period.

The ability to shift cattle to new pastures they control has also reduced the incentive for sound management of the pastureland, and led to land degradation in many parts of the country. Although existing rules require ranches to file annual operating plans as well as a management plan every eight years, there is virtually no government follow-up to ensure plans are actually being implemented. This is the result of insufficient funding as well as difficult terrain to oversee.

To improve land management, the Department of Environment and Natural Resources (DENR) has been working for years to raise the fee to a more reasonable level. The target fees were estimated based on a study of the market value of grazing rights, and finally implemented in 2001. The target fees were set in three tiers, reflecting differing grassland quality, with the lowest being 24 times the current fee.

Despite some evidence that even this fee was too low, and the fact that 80 per cent of the surcharge could be used to correct degradation on the leases, the ranchers have fiercely resisted the increase. A number have refused to pay the higher rates, a situation the DENR had not been prepared for. As a result, fee collection has stopped entirely on these parcels. Also, a top government official, without any advance consultation with the DENR, pledged to cut the grazing fees sharply during a visit to the region. This pledge triggered suspension of the fee pending further clarification from the DENR.

Though the rationale for charging market rates for grazing makes a great deal of economic and environmental sense, DENR has been unable to overcome local political opposition. As a result, the grasslands remain under great threat, and additional resources that the higher fees would have brought in are not available to stem the damage. Existing ranching practices are unsustainable, and current regulations on management reporting and planning by ranchers are not enforced. In the face of such opposition regarding fee levels and enforcement, auctioning of rights could have offered a better solution.

Source: UNEP (2004).

Case 5 - Botswana Proposes Reform of Forest Management Fee System

Alarming deforestation rates were evident in some parts of the forest reserves in Botswana, owned commonly by the State. Existing command and control approaches were not working. These included restrictions on any cutting in forest reserves without prior permission, the use of local committees to develop conservation-minded use plans, and the ability of the Ministry of Agriculture to declare regions “planning areas,” thereby instituting cutting restrictions.

A payment scheme, including payment of fees and royalties, was also of limited success. Fees were set at a flat rate, regardless of the diameter of the trunk (i.e., no linkage to value or board feet). This encouraged harvesting of the oldest trees first, removing many of the large anchor trees that help maintain biodiversity and wildlife habitat, and that should normally be left even after cutting. Trees less than 35 centimetres in diameter had no royalties at all, also contributing to excessive removal. Royalties were paid only on the tree trunk, valuing other parts of the tree effectively at zero.

Widespread over-harvesting has led to increased tree litter and fire risks. The tree litter problem is compounded by the high damage rates and inefficient processing associated with inexpensive stumpage

(overall yield is only 18 per cent). Finally, elephant herds in some forests such as the Chobe knock down many trees, exacerbating the fire risk. With prime wood so inexpensive, there has been little incentive to spend time on salvage.

Fee reforms have been proposed to address most of these problems. Fees would be higher, recovering a fuller set of the costs associated with timber activities, including government oversight and fire suppression/prevention. The royalty rate for damaged stock is lower, to encourage salvage harvests, though it is not clear from existing data how the government will ensure honest reporting on this issue.

In addition, the royalty rate will cover the entire tree, not just the trunk, to encourage better usage. Finally, to curb problems of trying to oversee many small cutters, concessions have been limited to large firms. The reforms make sense in terms of the type of incentives they provide to wood harvesters. Unfortunately, available information does not provide details on whether even the new, higher fees are sufficient to change behaviour, nor on how the government will enforce the new charges.

Finally, one critical aspect of resource extraction does not seem to be addressed: how reforestation and sustainable cutting practices will be encouraged.

Source: UNEP (2004) and Fidzani N.H. (2000) in Rietbergen-McCracken and Abaza (2000).

Case 6 - Reforestation Effort in Brazil

In an effort to encourage good reforestation practices, timber policies in Brazil charge a tax on wood consumption except when the harvesting is offset by equivalent reforestation. Recognizing that there are insufficient resources to oversee reforestation directly, Brazil has chosen to forego revenues from timber sales so long as the cuts are properly replanted.

However, the programme has generally failed. The tax on wood consumption is set too low to make it worthwhile for the foresters to replant. In any event, the programme is poorly enforced so that foresters rarely pay the tax at all. Monitoring is difficult especially in frontier regions. Those forestry fees that were collected usually go to pay administrative costs rather than support the environmental purposes for which they had originally been intended.

This is clearly a case of where a lack of institutional capacity resulted in neither the environmental nor the fiscal goals being met.

Source: UNEP (2004).

Case 7 - Dominican Republic Conserves Soil

In the El Naranjal watershed in the Dominican Republic, US AID funds provided subsidized credit to participating farmers adopting soil conservation measures. Initial adoption rates were quite high (90 per cent in 1985), yet by 1990, only half of the farms continued to practice the conservation measures, as the subsidies had stopped. As further subsidies were expected, farmers actually delayed rational conservation measures in order to wait for the payment.

The follow-on project of US AID recognized that the farms were already receiving tremendous benefits in the form of subsidized irrigation water. This second project tied continued access to subsidized water to proper adoption of soil conservation measures. The result has been substantial use of conservation techniques without additional direct subsidies.

Source: UNEP (2004).

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Case 8 - Perverse Incentives for Pollution in China

In an attempt to curb pollution from factories, the government set up an emissions fee. These fees constituted business expenses under Chinese law, and were deductible from taxes. Given common Chinese corporate tax rates of 33 per cent, this means that for each dollar in fees, roughly one-third remained in the firm as a tax-shield, reducing taxes that would have been paid on other net income. Thus lowering emissions had a direct effect on profits.

In addition, in an effort to accelerate installation of pollution controls, the Chinese government set up a rebate system, whereby 80 per cent of the fee collected would be returned to the enterprise for investment in pollution controls. Thus, from this original dollar in fees, 33 cents comes back through reduced tax burden and 80 cents comes back in a rebate, for a total of US\$1.13. Thus, paying the pollution fees offered a net gain of roughly 13 per cent. In other words, it was more profitable – by 13 cents on the dollar – to continue polluting than to reduce emissions.

This perverse incentive made firms not wish to invest in pollution controls, lest they lose the privilege of paying emissions fees to earn a quick 13 per cent return on their money. The ability to do so was the result of a lack of political will or capability to ensure rebated fees were invested in pollution controls as required rather than spent elsewhere in the business.

In an attempt to solve the problem, the government replaced fee rebates with loans; however, enforcement has been weak. In addition, the funds from the 20 per cent of fees not returned to the enterprise goes to the local environmental authorities, and this has supposedly given them an interest in maintaining funding through maintaining emissions. Had rebates actually been put to use in upgrading pollution controls, this may not have been such a bad policy.

Source: UNEP (2004).

Property Rights Based Instruments¹

GOAL



To present the key features of property rights based instruments.

LEARNING OBJECTIVE



By the end of this module, participants should be able to explain what property rights based instruments are and when they can be used.

¹ This section is partly based on Sterner (2003). Policy Instruments for Environmental and Natural Resource Management, pp 109-114.

7.1 Defining Terms

Tradable Permits: Economic instruments used to address environmental problems by requiring each polluter or resource user to obtain permits for the amount of pollution he or she releases. Permits are issued in units of pollutants or rights to harvest a natural resource and may be bought and sold in an open market. The government sets the total number of permits at a level to reduce pollution or protect sustainable levels of a renewable resource. Permit holders have an incentive to reduce emissions or curb harvesting in order to sell excess permits.

Tenure: The right to hold and use property and its resources under defined conditions. Tenure differs from outright ownership in that the tenured property cannot usually be bought and sold although tenure rights in the form of tradable permits may be bought and sold.

Tragedy of the Commons: A metaphor describing the mechanism leading to the overexploitation of common resources. Each individual involved has an incentive to increase his or her own benefit from the resource before others do so. The result is an overuse that may be unsustainable and can lead to the extinction of the resource.

Prisoner's Dilemma: A parable used to show the game theoretic aspect of the tragedy of the commons (see above). Two prisoners have both the choice of testifying against each other or keeping quiet. If both did the latter they would get a light sentence, but the game theoretic analysis shows that, in the particular setting, their preferred strategy is to betray their fellow prisoner. The result is the worst possible for them – a tough sentence for both prisoners.

Communal Tenure: The right of a group, usually traditional users from one ethnic or social group, to hold and use property. Traditional tenure is often ill-defined. Serving as an economic instrument, communal tenure can be created or clarified under conditions requiring the protection of the environment. Communal tenure is not granted to individuals in the group and cannot usually be bought and sold in the market.

Common Property Rights: Similar to communal tenure with the exception that the land or property in question may be bought and sold by the group. As an economic instrument common property rights can be granted or clarified to encourage protection of the environment or natural resources.

Emission Reduction Credit: Credits given to those firms that reduce emissions more than required. Firms can either sell them to firms whose emissions are above the statutory minimum or bank for their own use in the future.

Ambient Permit Trading: A variant of tradable emission permits in which the value of emission reduction credits differs from region to region depending on the relative ambient concentrations so as to discourage development of 'hot spots'.

Output Based Allocation: The initial allocation of pollution permits based on relative output levels of existing firms.

Cap and Trade Programmes: An economic instrument by which the government sets the total allowable pollution or resource harvest units in a given area and over a given time period (the 'cap') and then leaves polluters or resource users to trade this total among themselves using the market.

7.2 Introduction to Property Rights Based Instruments

The purpose of using property rights based instruments is to manage the environmental assets by creating, clarifying, and enforcing rights to specific property. Some property rights based instruments define rights to ownership of existing property. Others create property in the form of tradable permits to use resources or emit pollutants.

Both of these instruments give the authorized parties a direct financial stake in the renewable natural resources and environment in general. This, in turn creates self-interest for reducing pollution, for maintaining sustainable harvest rates, and for the direct monitoring and control of illegal activities.

During the 20th Century, particularly since the end of World War II, international political organizations such as the United Nations (UN) have played an active role in defining rights to the environment. The UN Universal Declaration of Human Rights² first established the right to the protection of property rights.

This Declaration was followed by many more property rights related declarations, treaties, conventions, agreements and protocols that span the spectrum of environmental and natural resources (desertification, migratory species, biological diversity, wetlands, endangered species, hazardous wastes and disposal).³ Some of the more important environment-related agreements that have been adopted in recent years include:

- *Rio Declaration on Environment and Development (June 1992),*
- *UN Framework Convention on Climate Change (May 1992),*
- *Montreal Protocol on Substances that Deplete the Ozone Layer (Sep. 1987),*
- *United Nations Convention on the Law of the Sea (through which coastal countries receive extended property rights to adjacent portions of the ocean).*

7.3 Establishing, Clarifying and Enforcing Property Rights

Property rights are the societally sanctioned rights to ownership and use of both, tangible (e.g. land) and intangible (e.g. patents) property. Clearly defined and enforced property rights are the foundation of all markets.

Property rights provide policy makers with two separate tools. First, their establishment gives the incentive to use existing resources sustainably and efficiently. Second, policy makers can decide how they want to distribute the rights. Taking use of the latter aspect can often help in getting support for suggested policies, for example by assigning property to the poor, to traditional users, or to important stakeholders.

Property rights are generally established in three ways: tradition, force of arms, and legal regulation. The first is often vague. The second is disruptive and unjust. The third - legal regulation - is the only way that property rights can be securely defined, that markets function efficiently, and that the environmental assets can be protected.

² United Nations (1948).

³ Some national governments have gone further. In Kenya, for instance, the Environmental Management and Coordination Act of 1999 gives citizens the property rights to a clean environment.

Using legal regulation, the government can establish property rights by defining and allocating existing property rights and by creating new forms of property (tradable licenses to fish or to emit pollutants) to which rights may be assigned. This process of establishing and clarifying property rights can be seen as an economic instrument in itself.

The pressure to establish or clarify property rights, generally, increases as the supply of a given type of property decreases due to resource depletion or increases in pollution even as the demand remains steady or grows.

Conditions such as traditional but vaguely documented claims to ownership or free use of land, water, etc, or widespread absentee ownership of land with uncertain tenure for users of the land often lead to overuse of resources and uncontrolled environmental pollution.

In addition, as pressure grows on the use of scarce resources the threat of violence among competing claimants, public corruption, and extreme poverty increase. Under these circumstances, clearly defined property rights provide incentives to control pollution impacting the property or to ensure a sustainable use of renewable resources.

Empirical evidence demonstrates that individuals or groups with secure property claims have greater economic incentives to long-term protection of the property's natural resource and environmental assets. On the other hand, those who have no clear property rights and who rely on traditional or vague claims to the use of common resources, often have strong incentives to maximize use of the resources - to avoid letting others gain the benefits at their expense. They also do not have much incentive to protect the property from environmental pollution. Two terms that are commonly used to describe this situation are given in Box III-7-1.

Box III-7-1: Tragedy of the Commons and Prisoner's Dilemma

Tragedy of the Commons This metaphor relates to common grazing lands shared within village communities in former times. Locals were entitled to put animals on the 'common' for grazing. Without a clear regulation, each farmer had the incentive to increase his number of animals on the commons, because the extra damage caused by overgrazing was marginal but his gains were significant. While this logic works for each single farmer, the overall result was intense overuse of the pasture which could render the commons useless for grazing, reducing everyone's benefits. This metaphor shows how the lack of clearly assigned property rights can lead to inefficiency and disadvantages for everybody.

Prisoner's Dilemma This term is related to the game theoretic aspect of the tragedy of the commons. Imagine two prisoners who are suspected to have committed a crime together. They are interrogated separately, and each is informed that if he testifies against his colleague, he himself will get away without punishment and his colleague gets a heavy sentence. They also know that if they both keep quiet, their guilt cannot be proven and they will face a very light sentence. If both testify against each other, the punishment will be medium. Each prisoner faces the dilemma between trusting his colleague and betraying him. A game-theoretic analysis shows that if both prisoners only care about their own benefit, they will choose to testify. The dilemma can be resolved by giving the prisoners an incentive not to betray each other. In the case of the commons, this is done by assigning clear property rights.

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The establishment (including definition, granting or allocation), and clarification of property rights include a variety of policies that facilitate improved stewardship of the environment, such as:

- *The granting of communal tenure in the use of public property by local communities under conditions that promote sustainable use of natural resources and the reduction of pollution.*
- *Permanent transfer of tenure rights or ownership from large absentee owners or the government to those who actually farm the land or use the resources. These are sometimes called “land to the tiller” programmes.*
- *Transfer of public enterprises, which have weak incentives to maintain environmental quality, to private individuals or organizations to which strong incentives may be applied. (Obviously, transfer from public to private ownership without economic or regulatory incentives does little to help the environment.)*

7.3.1 Common Property Rights and the Environment

In the context of natural resource management in developing economies, common property resource management (CPR) is particularly important. In developing economies the right to use common property (grazing lands for example) is usually established by tradition, and the resource can be freely used by anyone. Such a system naturally encourages each user to maximize their amount of use.

The very act of defining the right to use common property (who, when, how much, under what conditions) creates an economic instrument to manage the use of natural resources and control of the pollution of common property. Using this economic instrument, it becomes possible for the first time to overcome the tragedy of the commons and rationally manage the use of common property. The common property may still belong to everyone in society but the use of it is regulated to prevent abuse.

Sterner gives a detailed review of the ecological conditions that require improved CPR management (e.g., when the resources of an ecosystem are erratic, caused, for example, by unreliable rainfall), as well as possible problems, such as the desire of each user to maximize their own use, which will eventually lead to the degradation of community property resources.

The literature recognizes three strategies that countries can use to address such overuse of common property resources. These are:

1. *‘Perfect’ government control,*
2. *Privatisation, and*
3. *Cooperative management with local enforcement.*

The latter is considered the superior alternative in many settings. Using such a strategy requires that seven essential conditions be met for stable common property resource management. These are:

- *Boundaries are clear and outsiders can be excluded,*
- *Rules are adapted to site-specific conditions,*
- *Decision-making is participatory (democratic),*
- *Locally designated agents monitor resources,*
- *A local court or other arena is available to resolve conflicts,*
- *Graduated sanctions are used to punish infringements,*
- *Outside government respects the CPR institutions.*

7.3.2 Potential Problems with Common Property Solutions

There are many problems associated with the definition and management of common property rights. These include cases where:

- *A lack of trust among the actors can lead to poor results (e.g. traditional users of grazing lands do not trust government representatives from the capital).*
- *It is difficult to create communal property rights (e.g., global warming or ozone layer depletion).*
- *The creation of property rights disenfranchises the poor and therefore contributes to worsening poverty (e.g. where, “squatters” or subsistence users lose traditional but informal rights to use property).*

7.4 Tradable Permits

The second type of property right is the right to limited use of public assets such as the right to emit pollutants, to take fish from public waters, or graze livestock on public lands. As economic instruments, these property rights take the form of tradable permits.⁴

7.4.1 Establishing Tradable Permit Systems

In order to create a tradable permit system, the government:

1. *Determines the total amount of a resource to be used or pollutant to be emitted,*
2. *Issues individual permits to use some part of the total limit, and then*
3. *Allows the permits to be bought and sold.*

For the system to work the total number of permits should not exceed the estimated capacity to assimilate pollutant loads without deteriorating environmental quality, or, in the case of renewable resources, the yield or harvest that can be taken without a decline in the stock size.

The use of tradable permits regulates the total amount of resources that can be extracted or pollution emitted but leaves it to the market to determine who will extract the resources or emit the pollution and at what price.

In using this instrument, the decision maker says in effect “in the next ten years, we will only allow a total of X tons of pollutant to be released into the atmosphere” or “for the next ten harvest seasons, the total amount of tilapia to be harvested from Lake Victoria is X tons per season” to be consistent with sustainable management of the environment or the resource base.

The government has the option of auctioning the permits, or of distributing them for free. Auctioning will ensure that the market value of the permit is raised by governments. It is often applied when permits are to be given to larger, profit-oriented companies. If issues of poverty are a major concern, or if resistance among participating stakeholders against auctioning is insurmountable, permits can also be given out for free. In both cases, a permit allows its holder to emit a certain amount of pollutant or to harvest a certain amount of a resource in a specified period of time.

⁴ As an economic instrument tradable permits differ from licenses – e.g. for hunting or fishing – which also seek to regulate the total take, in that the licenses cannot be traded and have little associated economic incentives other than the cost of the licenses, which is usually small.

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After the allocation of permits (through auctioning or free distribution) a firm wishing to emit or harvest beyond what their permits allow can only do so at the expense of another firm. This is possible since it is feasible for a firm to emit less pollutant or harvest less than the permits it holds allow. The permits that are not needed can then be sold to another firm. For example, a firm in a fishery can choose to harvest fewer fish than its allowable quota and sell the extra permits to another firm.

Essentially, this system creates property rights to the environment, therefore removing the public goods character of the environment. These property rights internalise externalities and create incentives for resource protection and the resource in question will have a good chance of being put into the most economically efficient use.

For such a scheme to work efficiently, the allocated permits must be transferable to new as well as existing holders of permits. A permit holder must be able to sell his permits if he or she is making losses and wishes to exit from the market. A new firm that wants to enter the market can only do so by purchasing rights from a firm already operating in the market.

7.4.2 Types of Tradable Permits

Tradable permits are issued under a number of names depending on the issue to be addressed including:

- *Tradable Emission Permits in pollution management*
- *Individual Transferable Quotas in fisheries management*
- *Transferable Grazing Rights in range management*
- *Transferable Development Rights in property management.*

7.4.3 Empirical Applications

Thus far, the most successful permit-trading programmes include:

Emission Reduction Credit Programmes: A firm that reduces emissions more than required gets credit for the extra reduction, which the firm can either sell to firms whose emissions are above the statutory maximum, or can bank for its own later use.

Ambient Permit Trading: A variant of tradable emission permits in which the value of emission reduction credits differs from region to region depending on the relative ambient concentrations so as to discourage development of 'hot spots'.

Output Based Allocation: This is used for the initial allocation of pollution permits, based on relative output levels of existing firms.

Cap and Trade Programmes: In this instrument, the government sets the total allowable pollution or resource harvest in a given area and over a given time period (the 'cap') and then leaves polluters or resource users to trade this total among themselves using the market.⁵

⁵ Please also see Module 4, chapter 4.4.2.

7.4.4 Potential Problems of Application

Several conceptual and practical problems must be overcome in the application of tradable permits. These include:

- *For the permits or quotas to work, they must acquire the characteristics of other property rights, such as permanence and reliability. The defining feature of traditional property rights is that they are perceived to be permanent. It is this permanency that gives owners the confidence and incentive to make long term and costly productive investments in their properties.*
- *If permits or quotas are not seen as a real title for property, the market for them will not develop. Without a market their worth as an economic instrument is nil. In addition, potential buyers of permits need to understand the market, which may require considerable public education.*
- *In the case of natural resource management, a lack of knowledge among users of the resource about the underlying ecosystems and lack of agreement about how they should be managed can create major difficulties. Policymakers need to ensure that all stakeholders have a common agreement about the essential facts and trust in the research that produced them.*
- *Many features of permit systems (i.e. the definition, number, duration, and temporal and spatial validity of the permits and the proposed method of their allocation) cannot be decided using only ecological and technical calculations. At bottom, these become political decisions. These decisions are crucial for the performance of the programme but can entail immense political pressure because permits transfer valuable property rights and, potentially, substantial wealth.*
- *Finally, there is the problem of thin markets and transaction costs. If a permit system is established but very few people are willing to trade, this constitutes a thin market, and the market will not develop properly. The same is true if traders of permits incur high transaction costs, for example if the trading process is lengthy and complicated or involves fees. Designers of tradable permit systems need to make sure that the permit market is sufficiently big to allow for multiple trades, and they need to find ways to keep transaction costs low.*

For tradable permits to work properly, prescribed targets for total use of emissions must be responsive to changes as the operating environment changes, for example as abatement technology improves. For instance, if a standard abatement technology commonly used by all companies used to have 60 per cent efficiency in eliminating pollutants but now has 80 per cent efficiency.

This means that most firms would have extra credits to sell or bank leaving few potential buyers and little incentive to reduce pollution. In such a situation, the total permitted pollutants would need to be reduced again creating the scarcity required for a market to work.

Property Rights Based Instruments Cases

Case 1 - Tenure Reform: Mankote Mangrove, St. Lucia

A common property rights economic instrument proved ideal in the efficient management and sustainability of the Mankote mangrove forest ecosystem in the Caribbean nation of St. Lucia.

The Mankote forest comprises the largest contiguous tract of mangrove in St. Lucia and 20 per cent of the total mangrove area in the country. The government had traditionally prohibited exploitation of the publicly owned forest but allowed open access. The prohibitions proved ineffective. Widespread and uncontrolled charcoal harvesting threatened to destroy the entire forest.

The imminent destruction of the forest, in turn, greatly endangered the many ecosystem services the mangrove forest provides, including maintaining coastal stability, preserving water quality, serving as a fish breeding and nursery ground, trapping silt, and providing an important bird habitat.

Most of the charcoal was harvested by extremely poor subsistence harvesters who had no legal right to any use of the publicly owned mangrove resources. The harvesters had no ready alternative employment should their access to the mangroves be cut off due to either resource depletion or effective policing.

To protect the mangrove as both an ecological and economic resource, the government organized the subsistence users into a collective and granted clearly defined communal tenure rights for charcoal extraction. For the first time, the harvesters had a direct stake in the sustainability of Mankote resources. Communal tenure also gave each individual harvester an incentive to monitor his peers and ensure mangrove cutting regimes were properly followed.

Technical training on effective ways to manage cuts was provided, as well as periodic monitoring of the overall mangrove health (as measured by tree size and number of new stems). Longer-term efforts to reduce the economic pressure on the mangrove were implemented using job training programmes and the attempted development of a hardwood forest outside of the mangrove. (This last element has been of limited success).

As part of the programme, Mankote was established as nature reserve. Thus, not only did the programme secure the tenure of the charcoal harvesters, it worked successfully to prevent threats to the Mangrove from large-scale development or fishing.

By modifying property rights, St. Lucia (in large part due to efforts of the Caribbean Natural Resources Institute, a regional NGO) has been able to protect the Mankote Forest and all its ecosystem services. Mangrove depletion has stopped and tree cover is now increasing, all without displacing jobs.

Despite the overall success, the case does have some problems that should serve as a caution to users of this model:

The process has taken more than 15 years. Many resources at risk elsewhere would not survive such a long policy gestation period.

The harvesters' tenure may not be secure. The tenure is granted through a letter from the Deputy Chief Fisheries Officer; it is not clear how much legal protection such a letter provides. Threats from outside developers remain, and challenging the validity of the tenure rights would seem an obvious tactic.

Intensive development at the borders of Mankote could fragment ecosystems sufficiently to reduce the viability of the area.

Finally, there is little information on how the new tenure holders will constrain internal growth of their group to ensure harvest pressures remain sustainable.

These continuing issues indicate that no environmental programme - even when using highly effective economic instruments - is ever really finished. Nevertheless, the St. Lucia experience provides an outstanding example of how property rights measures can be used to address difficult environmental issues.

Source: UNEP (2004).

Case 2 - The Botswana Tribal Grazing Land Policy

In the early 70s in Botswana, the number of cattle herds expanded rapidly due to increased use of veterinary medicine and a breakthrough in water technology, which allowed the drilling of new wells. Increased herds, under a system of uncontrolled grazing, caused serious overgrazing around villages, surface water sources and bored wells. This led to soil erosion and bush encroachment, further reducing the amount of grazing land available and putting a serious risk to the life stock sector's long term sustainability and economic viability. The effects were worst for small cattle owners, whose herds grazed in or near their villages, contributing the problems of inequity and social tensions to the environmental and economic damage.

To encourage individual herders to behave in a socially optimal manner (and internalise the externalities), it was suggested to privatise part of the rangelands - a prescription supported in Botswana and other countries by international and bilateral agencies - through a programme entitled "the Tribal Grazing Land Policy" (TGLP). The stated objectives of the policy were to:

- *Facilitate the introduction of improved management practices and range conservation;*
- *Increase productivity through the use of high off-take rates (This is the ratio of animals being slaughtered over a year to the total herd size in that year); and*
- *Upgrade rural living standards by reducing the income gap between the rich and poor.*

The reasoning behind using privatisation to achieve the first objective was that exclusive rights over land would give farmers an incentive to control livestock numbers and improve range conservation. This would then lead to the second objective, namely to double the productivity of the rangelands. The third objective was to be achieved by moving the big herders away from the concentrated areas, thereby creating space for the poor to expand their herds.

To achieve these objectives, the TGLP subdivided the rangelands into three zones, with each zone meeting the needs of particular groups of livestock owners:

Commercial Zones in which private farms would be given exclusive property rights. Farms in these zones would be commercially managed using modern techniques such as water distribution through pipeline systems, fencing and high off-take rates. Rent was also to be paid and the revenue to be put into developing the communal zones.

Communal Zones where the majority of small farmers would keep their cattle, with a restriction on the maximum number of animals for any individual or family. The construction and use of new and existing private water supplies was restricted and new privately owned boreholes would only be permitted if they were used for watering small numbers of livestock and for purposes of crop cultivation.

Reserved Zones for future use by those with no cattle at the time and by future generations. They were to be used for wildlife, mining and arable agriculture.

This change in land tenure - a property rights based economic instrument - was combined with two complementary price-based economic instruments. Those who were allocated land had to pay a yearly rent for the use of the farms. The exclusive right holders also received interest subsidised loans and a 60% subsidy from the government for drilling and equipping boreholes.

Once the government decided to go ahead with the implementation of the policy, a major public education programme was launched to ensure the people had a full understanding of the policy and the reasoning behind it. The public education programme took the form of a nation-wide campaign by cabinet ministers

addressing village-level public meetings, government officials leading seminars and formation of radio learning groups at the village level.

An evaluation of the TGLP that was done about ten years later showed that the objective of doubling productivity of the rangelands was not achieved (the output per head remained approximately the same for both privatised ranches and communal ranges). Granting exclusive rights did not result in better range management on most ranges. Mismanagement on private farms again led to overstocking, overgrazing, inefficient utilization of rangelands and poor performance.

To make matters worse, when their ranges became overgrazed politically influential TGLP holders were allowed to move their cattle off their own ranches into communal razing lands. These “dual rights” exacerbated the problem of equity that the policy was meant to address and contributed to further damage to communal grazing land. Thus, the policy that was supposed to enhance the definition of property rights actually clouded them further by allowing cattle owners to claim both private ownership and communal property rights.

The failure of the TGLP can be largely attributed to the fact that false assumptions were made from the beginning. These included:

- *Land was not set aside for the proposed reserved zones since the amount of available land had been overestimated. Most of the land thought available was found unsuitable or already populated by hunters and gatherers, which resulted in a legal battle over whether the nomads have legal rights to the land in totality or just for the purpose of hunting.*
- *The policy failed to take baseline administrative and political conditions into account. It was assumed that it would be feasible to apply compulsory stock control regulations without political interference. This turned out not to be the case.*
- *The land set aside for privatisation was undervalued. The charges levied for exclusive rights were too low and grossly underestimated the value of the land. This attracted the participation of speculators not interested in raising livestock but in simply reselling the grazing rights.*
- *The valuation failed to take into account damages suffered by indigenous Bushmen and wildlife displaced through the establishment of the ranches. A proper valuation taking this into account would have increased rents at least one hundred-fold.*

Source: Fidzani, N. H (2000) in Rietbergen-McCracken and Abaza (2000), pp. 19-30.

Case 3 - Wildlife User Rights in Zimbabwe

In the late 1980s Zimbabwe recognized the need to halt the decline of wildlife resources in communal areas and to create alternative benefits for the local communities. Wildlife populations in communal areas had been declining for two reasons: Rapid population growth, requiring more land for agriculture and livestock; and the perception of local people that wildlife is a nuisance rather a resource, since they suffer net costs - such as crop destruction - from the presence of wildlife.

To halt the decline in wildlife resources, Zimbabwe initiated the Communal Area Management Programme for Indigenous Resources (CAMPFIRE) to:

- *Conserve the environment and sustain economic viability through wildlife utilization;*
- *Reduce conflicts between wildlife and agricultural development by fencing;*
- *Increase rural employment and incomes; and,*
- *Create local institutions for indigenous resource management.*

The main economic instrument used in the CAMPFIRE programme is a property rights regime that decentralized wildlife user rights. With respect to the revenues generated, the following secondary economic instruments were used:

1. *Auctioning of user rights;*
2. *A net-revenue sharing formula to cover resource maintenance, administrative, and monitoring costs;*
3. *Flexible, locally determined distribution of local revenues; and*
4. *Compensation for wildlife damage.*

The implementation of these policies was expected to lead to a reversal in the trend of wildlife decline in communal areas and an increase in wildlife-related benefits for the local population.

In the past, wildlife conservation relied heavily on regulations and because of enforcement problems there was a vacuum in resource management. Under the new approach the government legislated that wildlife users rights be decentralized to councils and communities in CAMPFIRE areas.

Under the scheme, the central government delegates wildlife user rights to district councils subject to a number of conditions. The district councils are required to develop a management plan and an institutional plan outlining decentralization to the local communities and the approval of all quotas by the Wildlife Department. The District Councils can then delegate the rights to local communities that apply to be part of the programme.

Annual wildlife counts user quotas are set by the Department of National Parks and Wildlife Management for each community involved in the programme. With assistance from the government and some NGOs, communities prepare the required annual plans to utilize the wildlife resources.

Basic uses are hunting and game viewing. Additional revenue may be obtained through wildlife processing activities, such as the processing of wildlife skins. Communities may either manage the wildlife resources themselves, or as is more commonly the case, lease out the rights to a private management company. A revenue sharing formula ensures that sufficient funds are available for both resources management and the local communities. International donors have subsidized the overhead costs of CAMPFIRE projects.

CAMPFIRE has been successful in:

- *Raising revenue, with 90 per cent of the revenue coming from hunting;*
- *Gaining wide acceptance, as evidenced by the increased participation of local communities; and,*
- *Changing people's perception of wildlife, from seeing it as a nuisance to seeing it as a valuable resource.*

Other positive factors of the programme include:

- *The revenue-sharing formula appears to have good compliance rates.*
- *Compensation to people for crop and animal losses by wildlife is paid from the allocation to the local population.*
- *The ability of communities to agree on the distribution of the local revenue enhances household security and local development. (During droughts, for instance, a large part of the revenue is given to households).*

There is limited quantitative data on the environmental impact of the programme, though some research reports indicated that wildlife resources had stabilized in CAMPFIRE areas after a few years. Nevertheless, there have been concerns about the sustainability of the programme:

- *There is a risk of over-hunting. Since revenues are mostly from hunting, in particular of elephants and buffalo, there is always a temptation to allow over-hunting. Furthermore, pressure for higher quotas is likely to increase if economic hardship persists or wildlife resources decline. To avoid over-hunting, quotas must be rationally set, impartially administered, and rigorously enforced.*
- *The future of the wildlife resource in communal areas is determined by a number of factors, many of which are beyond the control of the local communities (including population growth and resettlement).*
- *Programme revenues have become an important source for district councils. To avoid councils appropriating an excessive share of the revenue, the formula for revenue sharing needs to be strictly applied.*

Source: Arntzen, J W (2000) in Rietbergen-McCracken and Abaza (2000), pp 46-53.

Case 4 - Transferable Quotas for International Fisheries Protection

Fisheries have long been a “commons” problem, since fish dwell in unmanaged ecosystems accessible by many countries. Historical controls to address this problem have focused on restricting access.

Nationalization of 200 miles of coastline by most countries helped reduce fishing pressure for a while, by curbing access of foreign fleets to domestic waters. However, even with such restrictions, problems remained. Two main economic counter currents undermined the effect of restricted access to the fisheries.

These were:

- *Continual technical improvements in fleets that made each boat a more efficient vessel for harvesting fish and,*
- *Large subsidies of fishing-related operations and capital equipment (e.g., subsidized loans for boats) created a massive overcapacity of vessels. The World Bank has estimated that during the 1990s, annual subsidies were equal to between 20 and 25 per cent of global fishery revenues.*

The combination of these two developments has depleted many fisheries to the point of total collapse of the fishery.

Using transferable quotas over the past 30 years, many countries have implemented market-based approaches to ration access to fisheries and manage both local and international fisheries. Various called Individual Transferable Quotas (ITQs) or Individual Fishery Quotas (IFQs), the rights allow the holder to catch a specified proportion of the total allowable catch each year. The total catch represents the central government’s estimate of how many pounds of a particular fish species can be sustainably harvested.

The theory of ITQs is clear. Where there once was unlimited and free access to fish, users must now be licensed. This has a number of advantages:

- *With quotas users can space out their catch more regularly without fearing that others will overuse the resource, enabling them to fish more when prices are high, increasing their profits.*
- *The aggregate catch of the vessels is limited, ensuring sufficient fish survive to rebuild stocks.*

- *Each license holder has an incentive to ensure other vessels do not fish illegally, since this reduces the available catch for license holders and depresses the value of the licenses on the spot market, which existing quota holders can sell.*

The Organization for Economic Co-operation and Development (OECD) has reviewed 31 fisheries across six countries using some variant of this approach and concluded that catch levels were maintained at or below catch limits in 24 cases. In 23 cases, the permits also improved the cost-effectiveness and profits of the fishery. While overall employment generally fell, part-time and seasonal jobs were often replaced by more stable, year-round work.

The success of the programmes seems to be dependent upon some key criteria:

Accurate Estimates of Sustainable Catch. If the total catch values are too high, transferable permits have the perverse effect of increasing the cost-effectiveness of the unsustainable exhausting the resource. OECD noted that there were at least temporary declines in fish stocks within 24 fisheries. This seems to have been caused by a basic problem in the way total catch was calculated, and that the error eliminated many of the environmental and ecological benefits of the economic instrument.

Consistent Administration. In the Netherlands (sole and place fisheries) and Norway (cod fishery), ITQs failed to halt the increase in catch because license holders found that the state was shutting entire fisheries down even if individual quota holders had not yet met their quotas. As a result, quota holders continued to have a “race to fish” to exhaust their catch limits first before access was closed off.

Resistance to Political Pressure. Errors in total catch values may not all be technical. Regulators in South Africa have been under continued and intense political pressure to increase total catch figures, irrespective of the environmental cost of doing so. Such pressure exists in most countries, but total catch figures are most likely to be manipulated for private gain where institutions are weak or corruption is widespread.

Correct and Complete Information. Catch quotas are often based on landing statistics. Many fishermen destroy catch at sea to produce acceptable landing numbers making it impossible to reconcile the landing statistics with the actual pressure placed on marine ecosystems. It has been suggested that a post-landing spot market for ITQs, allowing fisherman to purchase excess quotas, may alleviate this pressure to some degree.

Avoidance of High Grading. In a practice called “high grading” fishing crews discard smaller fish (that often die) at sea in order to maximize the value of the catch that is officially landed. Differential landing taxes, with higher levies on bigger fish, in theory could make fishermen neutral with regards to the maturity of their catch. However, the cost of monitoring needed to accurately set and implement such taxes could be quite large.

Thus far, fisheries managers have steered clear of multi-catch fisheries because of the complications involved. The programmes have instead been targeted to single species. While bundled ITQs covering common mixtures of species could be created, implementing it in practice is difficult as by-catch (i.e. the catch of unwanted species) is likely to vary by region.

Source: UNEP (2004).

Case 5 - Transferable Fisheries Quotas – The Chilean Case

The case of Chilean fisheries illustrates the role special interest politics can play in regulating fisheries. The country has three main fishery interest groups: northern fishermen, southern fishermen, and artisanal fishermen (who use small boats and stay close to shore).

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Political manoeuvring of the northern and southern fishery corporations focused on access to the initial fishing rights, and ways to use this property for competitive advantage. The artisanal interests have opposed the ITQs with the argument that the small boats, and the communities they support, would be frozen out of their livelihood.

The ultimate decision to auction long-term fishing rights helped ensure more access to outside parties but still allow unregulated open access for artisanal interests. This free access to fisheries may be one reason that the number of artisanal vessels grew by 27 per cent between 1994 and 1998. Efforts to set up a separate class of ITQs for the artisanal fishermen are now under consideration.

Overall, use of the ITQs in Chile has remained small, with applications to only four fisheries covering roughly one per cent of total landings. The rest remain under a complicated and not particularly effective system of access controls, fleet limits, and equipment restrictions.

Ownership of ITQs is highly concentrated (two groups control 75-90 per cent of the northern harvest) and there have never been fines levied for infractions of the ITQ rules. There has also been some evidence of pricing collusion stemming from the small number of dominant actors in the market.

These factors underscore the need for credible monitoring and enforcement even for economic instruments, as well as addressing baseline issues such as market power.

Nonetheless, the programme does incorporate a number of useful elements, including caps on ITQ ownership by any single party and a 10 per cent annual depreciation of quotas, ensuring there will be regular auctioning and pricing of the rights. Some Chilean fisheries have undergone stock recoveries. Many fishing operators say they have been able to improve the quality of their final products, plan more effectively to meet higher price demand periods, and reduce social conflict with their workers by offering more regular work schedules.

Source: UNEP (2004).

Case 6 - Nutrient Trading at Sewage Plants

The state of New South Wales, Australia has achieved cost efficiency by using nutrient (the organic components of untreated sewage) trading to allocate responsibility among three sewage treatment firms. The savings came primarily through capital cost savings achieved by concentrating investments to curb nutrients in one or two plants instead of all the three. This way, upgrades could more closely be timed to coincide with normal capital investments than would have been possible under a uniform standards approach.

When nutrients are discharged en masse to waterways, they generate algae blooms which, in turn, use up all of the oxygen in the water killing other life. As a result, treatment of nutrients is a central job of sewage treatment plants before the wastewater can be released to the surrounding environment.

Beginning in 1996, three sewage treatment plants owned by the Sydney Water Corporation in the South Creek area of the Hawkesbury-Nepean River initiated a nutrient trading system.

Under the regime, the three plants are allowed to trade portions of their nutrient discharge allocations, so long as the aggregate loading limit is not exceeded. The process of intra-firm trading within a set geographic area is called a “bubble,” since a single limit or bubble applies to the river, rather than to a single plant. The trading scheme set target reductions by 2004 of 83 per cent of the phosphorous and 50 per cent of the nitrogen previously discharged. Oversight is provided by the local regulatory body.

Capital investments to curb nutrients can be concentrated in one or two plants, versus all three; and upgrades can be more closely timed with normal capital replacement than would have been possible under a uniform standards approach.

The programme is generally considered a success. After three years, there were substantial reductions in nutrient loadings, at a much lower cost. The cost savings, estimated at 37 per cent as compared to each plant meeting uniform requirements, come primarily through capital cost savings.

In addition, plans to expand the trading system to more parties and to non-point sources of nutrients as well, have been under discussion for some time, but have not been implemented yet.

However, the most recent research report on the programme does not provide monitoring data, nor does it estimate the overall impact of the programme on environmental quality in the receiving waters. This is an important data gap since detrimental effects of excessive loadings can be localized within receiving waters (causing “hot spots” of environmental damage).

This case illustrates that applications of tradable permits of any type needs to evaluate the likelihood and impacts of such hot spots in order to be sure that the overall environmental objectives of the programme are met.

Sources: UNEP (2004) and Kraemer, Interviews, and Kampa (2002).

Case 7 - Leaded Gasoline Trading in the USA

A system of trading designed to reduce gasoline lead to 0.1 grams per gallon over five years was used to phase out leaded gasoline in the US. The system allowed refiners and importers to trade lead reduction credits.

During the 1980s, restrictions to the use of lead additives in petrol were set up in the US, with the ultimate aim of phasing out use of leaded petrol entirely. To ease the process of adjusting to the more stringent standards, especially for smaller suppliers, a lead trading system was instituted in 1983.

The programme was slated to operate during the five-year transition period to the new lower limit of 0.1 grams per gallon. The lead reduction credits were created when suppliers of leaded petrol achieved lead levels lower than those required by the new limits. The system allowed for both internal “trading” (i.e. flexibility) for an individual supplier, as well as external trading between suppliers. Beginning in 1985, refineries were allowed to “bank” lead credits for use in future years.

The general consensus is that this programme performed successfully, reducing costs by approximately US\$ 250 million per year. No leaded gasoline is now sold in the United States. Among the factors to which its success has been credited are:

- *A clear definition of rights and obligations;*
- *A predefined time over which the programme would operate;*
- *A homogeneous product with a clear definition for all market participants; and*
- *Low transaction costs in implementing trades.*

Sources: UNEP (2004) and OECD (2001).

Module 8

Legal, Voluntary and Information-Based Instruments¹

GOAL



To present the key features of legal, voluntary and information-based instruments for environmental and natural resource management.

LEARNING OBJECTIVE



By the end of this module, participants should be able to explain what legal, voluntary and information-based instruments are and when they can be used.

¹ This module is based on Sterner, T (2003). Policy instruments for environmental and natural resource management. Washington DC: Resources for the Future, World Bank and FAO, pp 115-126.

8.1 Defining Terms

Legal Instruments: Policy instruments that hold individuals and organizations liable for environmental damage they cause. Legal instruments include criminal penalties, fines, civil liability statutes, and performance bonds.

Liability: Legal obligation to pay for damages caused. A law, for instance, may permit an activity (oil drilling) but require the company to bear all the costs of environmental damage caused by the activity.

Performance Bonds: A form of insurance required to ensure that the company will be able to pay for any environmental damage caused by its activities.

Voluntary Environmental Agreements: Formal negotiated agreements between companies or groups of companies and the government (or on some occasions nongovernmental environmental groups) to limit pollution or the overuse of natural resources. Such agreements allow the parties to avoid specific legislation or intrusive government regulation or legislation and provide the flexibility that comes with negotiated agreements. Such agreements are backed by the threat of government sanctions if the parties do not adhere to the agreements.

Information-Based Instruments: Methods of informing the public about how eco-friendly a product is. This can be done by labelling, rating, or other techniques. Information-based instruments may also include widespread public education programmes on anti-littering or energy conservation or other high profile campaigns.

Labelling (Environmental): The use of product labels to inform consumers that a product has been manufactured, mined, or harvested in accordance with certain environmental standards or practices (e.g. organically grown). The intention is to allow consumers to purchase products that were produced with the least harm to the environment.

Environmental Certification: A process by which the manufacturing or harvesting process is inspected and certified to be consistent with certain environmental practices.

ISO 14000: International Standards Organization rules for environmental practices and for independent verification of those practices. The ISO 14000 family of standards is primarily concerned with what an organization does to minimize harmful effects on the environment caused by its activities, and to achieve continual improvement of its environmental performance. Governments may require ISO 14000 certification for government contractors to promote environmental protection.

Eco-Management and Audit Scheme (EMAS): Voluntary instrument introduced in 1995 in the European Union, which acknowledges organizations that improve their environmental performance on a continuous basis. EMAS registered organisations are legally compliant, run an environment management system and report on their environmental performance through the publication of an independently verified environmental statement. They are recognised by the EMAS logo, which guarantees the reliability of the information provided.

8.2 Legal Instruments

Many economic instruments are enforced, in part, through the awarding or withholding of economic benefits and are, to some extent, self-enforcing. However, all economic instruments require at least some penalties to ensure full compliance.

Legal instruments are designed to ensure the enforcement of rules by increasing the economic cost of non-compliance. These economic penalties remove the competitive advantage that the firm would gain through non-compliance. Most enforcement relies on three types of legal instruments imposing economic penalties: fines, liability and performance bonds.

8.2.1 Fines

When a firm has knowingly violated environmental or health laws to make a profit, fines are commonly imposed by the government. Fines are relatively easy to impose and can often be assessed on the spot. In some cases special administrative procedures and courts are established to allow more efficient use of fines as an economic instrument. The use of fines to ensure compliance, however, requires that the government has sufficient police or inspectors, appropriate legal staff, and a functioning legal system.

From an economic perspective, the penalty imposed by fines must be large enough to actually deter undesirable behaviour. Small fines may be seen as merely a cost of doing business. Not only the amount of the fine itself is important, but also the probability of being caught when violating an environmental law. Companies will have an economic incentive if their expected cost from a violation, namely the probability of being caught multiplied with the level of the fine, is higher than the benefit they expect from bypassing the rules.

8.2.2 Liability

Under liability sanctions, an accused violator may be taken to court – by either the government or private plaintiffs - to compensate for the cost of environmental damage. Liability sanctions are usually easier to enforce and much more costly to the violator than are fines. They do, however, require a fully functioning legal system and, even then, may involve prolonged litigation.

Companies could be strictly or partially liable for damages caused and this may have important implications for their behaviour. Negligence or fault-based liability (forms of partial liability) implies that the person injured has the right to compensation only if the party causing the injury has taken less than due precautions. Strict liability means a right to compensation irrespective of precautions.

Both principles should lead to the same level of care, but under partial liability the violator could rely on the experience that many people that suffer injury never litigate. Suing a large firm or government agency is risky and expensive, and many individuals do not have the necessary resources to hire a lawyer and proceed with a lawsuit. Strict liability gives more rights to the injured individuals and can be seen as the ultimate policy instrument that promotes the internalisation of all environmental damages and risks.

8.2.3 Performance Bonds

Governments often require that firms have special insurance, known as a performance bond, to ensure that they have the wherewithal to actually pay for the environmental damages they cause.

An economic deterrent effect for potential violators is the increased cost for future performance bond insurance – or the inability to obtain such insurance at all - if the firm needs to use the insurance to cover

environmental damage liabilities. In addition, firms will not be able to purchase performance bonds if bonding companies deem them likely to violate environmental regulations in the future.

Performance bonds have the advantage that they make it relatively certain that governments or private plaintiffs can recover damages. The fact that insurers are assessing the risks of non-compliance increases the effectiveness of environmental policies.

However, the use of performance bonds is usually restricted to industries with a greater than average risk of causing significant environmental damage – oil transport, forestry, mining, heavy industry – where the additional cost of the bond insurance is commensurate with the risk.

8.2.4 Use of Legal Instruments

The character of economic penalties applied to environmental problems depends on how much a firm or individual can be held responsible for causing the environmental damage - the degree of causality. For a new environmental problem – where the polluter could not have anticipated the hazard - the regulators often offer information about causes of the problem and suggest technical solutions in combination with a threat of penalties for future non-compliance.

With environmental problems where casual relations are more established, the choice and level of legal penalties will depend upon the exact level of abatement required as well as the timing, location and character of emissions. Fines may be sufficient for relatively minor violations but legal liability or performance bonds required for potentially major problems.

The effect of liability will be felt seriously when the level of damage reaches a level sufficient to justify lengthy and often complex legal proceedings. (It is not uncommon for firms to sue each other in determining the party responsible, or most responsible, for the damages.) As indicated the requirement of performance bonds is usually limited to relatively high-risk activities where the potential damage may be extremely large.

When the offence causes serious damage to human health or death administrative and financial sanctions are often not sufficient. In such circumstances, the responsible managers or employees may be punished under the criminal law system.

8.2.5 Potential Problems with Legal Instruments

The empirical application of these instruments may be difficult in those developing countries where the judicial systems are weak. Specific problems with the use of legal instruments include the very high costs of litigation, lack of information about liability, and poorly or incompletely defined property rights making responsibility for damages uncertain and the imposition of penalties impossible.

8.3 Voluntary Environmental Agreements

Voluntary environmental agreements are agreements among private firms, government agencies, and/or nongovernmental organizations designed to encourage voluntarily investment, clean-up, or other changes to reduce negative environmental impacts. The incentives for such agreements include subsidies, favours, positive publicity or good relationship with the government.

In recent years, 'voluntary agreement' has become a popular catchphrase among environmental policy experts. Such agreements are promoted as a useful instrument for policy making. According to the US

government (1998), more than 13,000 US firms, nongovernmental organisations and local agencies were estimated to be involved in voluntary government initiatives in 2000.

8.3.1 Nature of Voluntary Agreements

Voluntary agreements are more complex than the name might imply. They are usually neither entirely voluntary nor precisely agreements among equal parties.

The word voluntary implies that the polluters are not coerced. Yet if the agreement were purely voluntary on the part of polluters or resource users, it would not be considered a public policy instrument. In fact it would be more proper to call them negotiated agreements among the various parties.

Similarly, the word agreement suggests more than a purely autonomous decision by the polluter. In fact, the agreement is usually more a form of a verifiable contract between environmental regulators and polluting firms.

To serve as an economic instrument the agreement needs to produce a level of abatement beyond the one achieved without government involvement. For these reasons, voluntary agreements are often organized and facilitated by the government rather than arising from within the regulated industries.

8.3.2 Characteristics of the Agreements

Under voluntary agreements firms agree to invest, clean up, or undergo changes to reduce negative environmental effects. In exchange, the firms may receive subsidies or other benefits. Most agreements also have some or all of the following characteristics.

They:

1. *Forestall more intrusive government legislation.*
2. *Allow the polluters to adopt cleaner technology in exchange for more lenient regulation.*
3. *Offer at least some official protection against civil liability lawsuits.*
4. *Allow all industry stakeholders to assume similar costs giving no firm a cost advantage.*
5. *Facilitate agreement within an industry on technology to be used or prohibited to abate pollution or protect natural resources.*
6. *Operate under waivers from antitrust and other regulations to allow cooperation among competing companies.*
7. *Include subsidies for firms that abide by the terms of the agreement.*
8. *Produce some positive outcome for the firms such as good publicity, a good relationship with the government, and perhaps speedier and less formal treatment of other environmental controls.*

In developing agreements the government agency may negotiate an agreement with a single firm (especially if it is a large firm with a major impact on the environment) or with multiple firms represented by a trade association or other intermediary organizations.

8.3.3 Perceived Benefits

The relative benefit of voluntary agreements over command and control instruments or the more measurable benefits of most economic instruments may be as much a cultural or a psychological one as one of effect.

It has been suggested that the ‘covenanting process’—that is, the dialogue itself, rather than the formal agreement—has been touted as the main feature that makes voluntary agreements successful.

8.3.3.1 Benefits to Firms. Voluntary agreements allow firms to save face before their stockholders while accepting the fact that they must spend company funds to reduce emissions or curtail exploitation of natural resources. As a matter of corporate image and public relations, firms may prefer a new label on what is essentially the same old negotiation with an environmental protection agency. The proactive, voluntary approach may be a good way not only of building public image but also of pre-empting effort by the government.

By taking the initiative in some areas, a firm may be able to divert attention from other areas and be able to set a level of environmental standard closer to its preference. By winning the public relations war, a firm may be able to focus on issues and solutions of its own choosing.

8.3.3.2 Benefits to Government and Society. The government and society receive benefits for voluntary agreements as well:

1. *A government regulatory agency can improve its image with the public, elected officials and the general business community by presenting itself as open-minded and reasonable in its dealings with the private sector rather than inflexibly bureaucratic.*
2. *Since firms have signed the agreements voluntarily, they are more likely to comply with the measures to which they agreed.*
3. *The public nature of the agreement also improves the chances of compliance by firms wishing to avoid public embarrassment.*
4. *The agreements provide the benefit of reduced government regulatory costs insofar as the agreements are self-policing.*

There may be genuine altruism or at least enlightened self-interest considerations by the firm entering into voluntary agreements. However, some firms may voluntarily participate only to the point at which marginal abatement costs are equated with their own intangible costs (or “secondary loss effects”) of causing environmental damage such as a negative reputation that could mean lost sales, and strained relations with neighbours, workers and customers.

8.3.4 Applications

Voluntary agreements are popular in cases where firms are in some way rewarded for engaging in more abatement than would normally be required. Voluntary agreements are most promising when the opportunity for technical abatement is good while imperfections (in the product or technology markets) make the use of conventional instruments such as taxes difficult. In addition, voluntary agreements are an alternative to taxes when emissions verification is problematic.

From the government perspective, voluntary agreements may be most attractive in cases where the government does not have sufficient power to coerce the polluter. In contrast, firms may be more inclined to voluntary agreements when the state has sufficient power to enforce its will without an agreement, because then, firms will be motivated to negotiate the best conditions possible.

The notion that voluntary agreements work best against a backdrop of tougher instruments is illustrated by the case of the voluntary banning of chlorine from paper bleaching in Sweden. The companies stopped

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using chlorine, although their response was a reaction to plans to introduce an environmental tax on chlorine. Presumably, the demand for 'green' labels on paper products also contributed to this shift.

As the Swedish government and parliament were drafting the laws, industry decided to be a 'first mover' and voluntarily ban chlorine. In this way, they avoided the tax payment, gained good publicity, and set a precedent for future battles concerning environmental legislation.²

8.3.5 Potential Problems with Voluntary Agreements

A weakness of voluntary agreements is that they depend on other tougher instruments to function. Strong environmental lobbies that stimulate firms to acquire 'green' labels and therefore voluntary agreements moreover are often lacking in developing countries. This means that the potential for voluntary agreements in such countries appears to be weak.

8.4 Information-Based Instruments

All policy instruments require information to function, but public disclosure of information can be an economic instrument in its own right. As an economic instrument, public disclosure can change environmental behaviour of polluters and consumers by directly influencing the market. The instrument is used to publicize those firms or products that meet certain standards in the way they are produced or harvested.

Information-based instruments are becoming increasingly popular among theorists and in real world applications. Information provision has been referred to as the 'third wave' of environmental policy making (presumably after command and control instruments and economic instruments), and its popularity can be explained by the changing costs of providing, processing and disseminating relevant information.

Information disclosure as an instrument for pollution management is particularly promising in situations where administrative costs of more traditional policies are excessive.³ In addition, there is growing acceptance of public disclosure for natural resources management in both industrialized and less developed countries (e.g., organic farming, forest certification programmes).

8.4.1 Forms of Disclosure

Information disclosure can take a number of forms, depending on the degree of interpretation and aggregation of information and on the character of the organization that is responsible for certification.

Forms of information disclosure include:

Labelling, in which products are directly labelled as being environmentally friendly or meeting certain criteria (e.g. low energy usage, organic).

Public Disclosure, in which comparative information about the environmental practices or violations of environmental law of different companies is made available to the public. Product by product comparison can also be provided.

Ratings or rankings provide information about the environmental impact of a product or the environmental performance of a firm on the relative scale (e.g. Grade 1, 2, or 3). The advent of the internet has made such information easy to access and increasingly powerful.

² Sterner (2003), pp 119-122, provides a more detailed discussion on the potential and scope of voluntary agreements for enhanced environmental management.

³ Sterner (2003), pp 122-126, gives a number of applications of this tool, especially in northern Europe.

Environmental certification of firms, which use a fixed system of certification within some predetermined bounds such as ISO 14000 or EMAS standards.⁴ These systems are usually oriented towards the management structures of firms, and not towards compliance with environmental standards or environmental performance *per se*.

8.4.2 Categories of Disclosure

Direct disclosure programmes fall into three categories:

Type 1 relies on voluntary certification that companies can apply for. Independent agencies set criteria and evaluate the products and applications. The certification is often conducted by independent non-governmental organizations. Environmental certifications of firms by ISO 14000 or EMAS standards are Type 1 disclosures that provide information about a firm's procedures and management processes that affect environmental quality. Reviews for these certifications are conducted by independent international organizations using trained inspectors.

Type 2 relies on the producers' claims (set in-house) without fixed criteria or independent outside review. The carmaker Volvo, for instance, provides detailed environmental data and evaluates its performance according to several criteria and its own internal goals. The results are published in environmental reports.

Type 3 labelling is the provision of raw data, without interpretation or judgment, which is sometimes done in the form of a life-cycle analysis (LCA). As such, Type 3 provides qualified product information - a description of individual effects - but without outside evaluation.

One example of a Type 3 labelling programme is the US Toxics Release Inventory (TRI), a programme for public disclosure of information in which the industry using toxic substances provides raw data to public authorities⁵. One criticism of the TRI is that the public cannot interpret such information. However, experience has shown that, building on such information, other rating and evaluation programmes have sprung up.

An example of such an evaluation programme is the one run by the US based organisation called SCORECARD⁶, which provides summarized information to nongovernmental organisations, investors, neighbours of emitting firms and others. SCORECARD provides detailed maps of the US that can be zoomed in to the street level to provide all TRI data as well as other information (such as health effects) in a format that is relevant for local decision makers.

8.4.3 Targets of Disclosure

Disclosure programmes may also be categorized by the item certified (the target): they can provide information about products, the firms themselves, or their processes and management procedures.

8.4.3.1 Products. Product labelling programmes have been around for decades. In recent years, however, the number of product labelling programmes has been increasing rapidly. Examples include:

⁴ EMAS: Eco-Management and Audit Scheme of the European Union and ISO 14000: International Standards Organization rules for environmental practices (for more information see http://europa.eu.int/comm/environment/emas/index_en.htm and <http://www.iso.org/iso/en/iso9000-14000/index.html>).

⁵ The TRI is designed purely to provide information to the public about releases of toxic substances, most of which are not subject to standards or regulation. The TRI states that firms with 10 or more full-time employees that also use 10,000 pounds or more of a listed chemical per year or import, process or manufacture 25,000 pounds or more of chemical of a listed chemical per year must file an annual report on each of the chemicals in the plant.

⁶ www.scorecard.org.

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- *'Organic' certification of food, which is widespread, and probably one of the oldest programmes.*
- *Type 1 'green' labelling of products, which has become popular in northern Europe. The German Blue Angel, started in 1977, was the first national eco-labelling programme. In Scandinavia, the Nordic Council of Ministers started the Nordic Swan in 1989, and in Sweden the Swedish Society for Nature Conservation (a nongovernmental organisations) runs the Environmental Choice independent labelling programme.*
- *Certification programmes such as the Canadian Environmental Choice, the US Green Seal, the Japanese ECO MARK and the French NF Environment (OECD, 1997). Further, the Eco-tourism Society of Kenya (ESOK) is working on an eco-labelling programme for the eco-tourism sub-sector.*

8.4.3.2 Firms or Plants. Some programmes rate firms or plants rather than products, and often have a government ministry rather than a nongovernmental organisation as their rating or certifying agent. Similar to public disclosure programmes for products, these programmes can use rankings and ratings such as the Programme for Pollution Control Evaluation and Rating (PROPER) that was temporarily introduced in Indonesia. PROPER is a system for emission reporting, evaluation and control of emissions reports and ratings as well as assistance and advice to the firms. Each industry is graded, and ratings are based on several parameters in the reports.

8.4.3.3 Processes and Management Procedures. This kind of certification – such as ISO 14000 and EMAS certifications - evaluates the internal environmental policies and practices of firms. The administrative routines and administrative structures of firms (or other organizations) are certified, not the environmental standards or performance as such.

ISO 14000 certification requires adoption of an environmental management system and specifies requirements for establishing an environmental policy, determining impacts of products or services, and planning and meeting environmental objectives through measurable targets.

Companies are required to organize credible procedures for environmental management and to aim at continually improving their environmental management. In return, companies are certified, which at least in some markets adds value to the firm by boosting its credibility. ISO 14000 certification may be particularly useful to those firms contracted by governments if the government restricts itself to only contracting firms that meet environmental management standards.

8.4.4 Potential Problems with Information-Based Instruments

Problems with the use of information-based instruments include:

1. *Low-income levels in developing countries may prevent the majority of people from being able to make consumer choices, which are necessary for information-based instruments to be effective.*
2. *Agents may use 'green' and 'eco' labels as mere mantras without necessarily adequately protecting the environment. One area where this seems to be prevalent is in 'eco-tourism'.*
3. *There may be inadequate knowledge or concern about the advantages of green products.*

Legal, Voluntary and Information-Based Instruments Cases

Case 1 - Performance Bonds for Forest Management

In its efforts to promote sustainable forest management, the Department of Environment and Natural Resources of the Philippines introduced a new type of forest lease agreement, known as the Industrial Forest Management Agreement (IFMA). Under the agreement, private concessionaries are assigned responsibility for management of not only production forests but also protection forests and industrial plantations in deforested land, all within a single unit.

IFMAs are awarded not to the highest bidder, but to the concessionaire who is prepared to post the highest performance guarantee bond – called the Forest Guarantee Board (FGB) – to ensure that all obligations under the lease would be discharged. The FGB is in effect a refundable deposit with the government.

The form of FGB is left unspecified and most IFMA holders opt to post a surety bond obtained from a bonding company in exchange for collateral and annual premium payments, rather than a cash bond deposited in one interest-bearing account. This system has demonstrated the scope of innovative market-based instruments to internalise the benefits (or costs) of good (or bad) management in the form of capital costs.

Source: Panayotou, T. (1998).

Case 2 - Nordic Eco-Labeling

In 1989, Finland, Iceland, Norway and Sweden introduced the Nordic Eco-labelling programme, the first harmonized voluntary multinational eco-labelling programme. The objectives of the programme are to guide consumers in choosing the least environmentally harmful products, to encourage the development of environmentally friendly products and to tap market forces to reinforce the effect of environmental legislation.

The programme is operated by the national boards in each member country, which establishes specific criteria and award labels. The criteria are based on life cycle analysis of products, including consumption of natural resources and energy and generation of air and water emissions and solid waste.

Source: Panayotou, T. (1998).

Case 3 - Eco-Labeling in Developing Countries

Several developing countries, including China, Korea, Peru and Costa Rica are beginning to introduce eco-labelling programmes. Following the Rio Summit, the Chinese government introduced the 'Ten Points for Environment and Development', which designates the development of environmentally friendly products as one of the country's priorities.

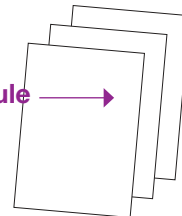
In 1993, the National Environmental Protection Agency (NEPA) established the National Environmental Labelling Programme, and in 1994 established the China Committee for Environmental Labelling to administer the Programme, select product categories, set criteria, and approve certifications.

Source: Panayotou, T. (1998).

Case 4 - Voluntary Agreements in India

The government of India has launched a campaign to encourage the industry (especially small and medium scale firms) to organize itself in Waste Minimization Circles. Each Circle brings together representatives of industries related either by process, product or location, to exchange information on waste reduction approaches and experiences. With leadership from within the group and technical assistance from a resource person from universities or technical institutions, each group meets periodically to discuss action-oriented ways to minimize waste.

Source: Panayotou, T. (1998).



Modules 5 to 8

Review Exercise

Case Studies on the Use of Economic Instruments¹ (Handouts)



Instructions for Group Discussion

1. Read the case study individually
2. Discuss the questions within your group
3. Elect a speaker
4. Prepare a presentation to report back



Questions for Group Discussion

1. What is/are the environmental problem(s) described in the case study?
2. What are the baseline conditions in the country (legal, fiscal, government)?
3. What is / are the economic instrument(s) chosen? What is / are its / their objective(s)?
4. Who are the main stakeholders involved?
5. What are the main factors for success or failure?
6. What message can you take for your own country case?



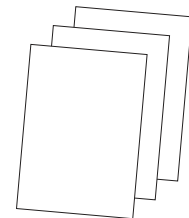
Report Back

The report back to the plenary should include:

- A brief description of the country situation
- The main objective of the economic instrument applied
- The main factors for success or failure

¹ The case studies used in this exercise are based on UNEP (2004).

Case Study 1



Recovering Reasonable Fees from Resource Users

The public sector invests hundreds of millions of dollars to bring services to the populace of many developing countries: electricity, drinking water, and wastewater treatment are examples. Similarly, government owned natural resources comprise an asset of the state, owned by its citizens. There are strong arguments to be made for supporting cost recovery from beneficiaries for both consumptive (e.g., harvesting firewood, grazing) and non-consumptive (e.g., recreation) use. Despite the logic behind cost recovery, there is a widely held belief that many of these municipal services should be free.

An Example from the Country C

Pasture Lease Agreements (PLAs) for ranchers to graze cattle on public lands have existed for decades in Country C. The lease terms last 25 years, and is renewable for another 25. Grazing fees were first imposed in 1961 through Administrative Order 08 at an average rate of less than US \$0.01/hectare per year. An initial fee increase was authorized in the Forest Land Grazing Lease Agreement of 1982. Fees were raised again in 1991 to the current rate of US \$0.30.

Compliance with the fees has generally been quite high given the still very low rate. The low rates also led to a relatively small group of people gaining control over much of the public grasslands for the 50-year lease period. The ability to shift cattle to new pastures they control has also reduced the incentive for sound management of the pastureland, and led to land degradation in many parts of the country.

Although existing rules require ranches to file annual operating plans as well as a management plan every eight years, the Department of Environment and Natural Resources (DENR) has lacked resources to oversee management plans. This is the result of insufficient funding as well as difficult terrain to oversee.

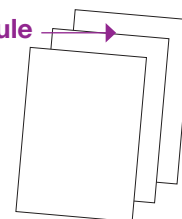
To address the problem, DENR's Ecosystems Research Development Board (ERDB) evaluated what the true economic rent should be, accounting for the cost of various measures to rehabilitate existing damages, and the economics of alternative land uses.

While more than 10 times higher than the prior charge, the new rates were still believed to be only slightly more than half the lowest economically justifiable rent on the land. In addition, the charge had a five-year phase-in period. To support the transition, the policy included increased technical assistance as well as fee reductions for sound land management.

Rights have continued with existing holders, with the price of those rights (through an annual rental fee) set by statute. The fee adjustment was authorized by Department Administrative Order 2001-05, which took effect in August 2001.

Despite some evidence that even this fee was still low, and the fact that 80 per cent of the surcharge could be used to correct existing damage on the grassland the ranchers have fiercely resisted the increase. A number have refused to pay the higher rates, a situation the DENR had not been prepared for.

There had been a series of public hearings run by ERDB to discuss existing and proposed grazing fees. Ranchers were already well organized as a stakeholder group, and strongly opposed rate increases. They argued that the government should view their presence on the land as a benefit in that it curbed squatting



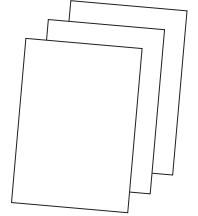
by migrants. They also mobilized strong political actions against the ERDB and DENR to oppose the rate increases.

As a result, DENR ended up collecting nothing from them mainly due to its little capability to carry out full enforcement. Furthermore, during a trip to the region in early 2002, a top government official promised to reduce the fee substantially “to encourage breeding and create 60,000 jobs”. This statement undermined current efforts to collect the higher fees, and led DENR to suspend its collection pending formal clarification on how to proceed.

DENR has been unable to overcome local political opposition. As a result, the grasslands remain under great threat, and additional resources that the higher fees would have brought in are not available to stem the damage. Existing ranching practices are unsustainable, and current regulations on management reporting and planning by ranchers are not enforced. As a result, ranchers continue to have low cost, long-term access to public grazing lands with little incentive for proper land management.

In the face of such opposition regarding fee levels and enforcement, auctioning of rights could have offered a substitute for a user fee. Although auctions will not work for cost recovery on government owned or built infrastructure, they can be very helpful for applications where there is little fixed infrastructure and the users can be quickly changed.

Case Study 2



Limiting Access to Publicly Owned Resources

Overuse of natural resources through open and unrestricted access by many parties is a recurring environmental problem, often referred to as the “tragedy of the commons” (See Module 7). The policy challenge is not only to constrain resource use, but also to do so in a way that does not require an unreasonable level of government oversight.

An Example from Country D

The Mankote Mangrove comprises the largest contiguous tract of mangrove in Country D, and 20% of the total mangrove area in the country.

Country D’s Forest, Soil and Water Conservation Ordinance of 1946 and its Wildlife Production Act of 1980 gave the government a legal framework for regulating harvesting activities on public lands. However, little was actually done to regulate or control the harvesting of charcoal using mangrove wood and Country D’s natural resource management agencies remained perpetually underfunded.

As a result, charcoal harvesting from the trees was widespread and uncontrolled and put the mangroves into severe environmental decline. Charcoal was harvested by local subsistence populations that were extremely poor and had no legal right to any use of the publicly owned mangrove resources. They did not have obvious alternative employment should their access to the mangroves be cut off due to resource depletion or degradation.

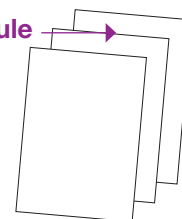
The local population already allowed time for the trees to regenerate before returning and left species that did not make good charcoal to provide cover and impede evaporation of the swamp. Nevertheless, the loss of Mangrove posed a significant threat to the many ecosystem services that mangroves provide, including maintaining coastal stability and water quality, serving as a fish breeding and nursery ground, trapping silt, and providing important bird habitat.

To address the problem, subsistence users were organized into an informal cooperative (ACAPG Aupicon Charcoal and Agricultural Producers Group) and given communal legal and exclusive rights to harvest the charcoal. Initial rights were given for free to members of ACAPG. Since they were subsistence harvesters, securing their tenure increased their interest in sustainable management of the resource.

In addition, they became involved with a joint monitoring programme with a regional NGO, the Caribbean Natural Resources Institute (CANARI), to obtain accurate and timely information on the overall health of the mangrove resource (as measured by tree size and number of new stems).

The group committed to a set of rules for sustainable use of the mangrove. These included a ban on cutting any trees that lined the waterways, the preservation of large trees, and cutting on a slant to preserve the tree’s stump.

Cutting rights were also organized, with each charcoal producer getting access to one area for a season, and rotating to a different area the next season. Cutting areas are well known to avoid conflicts between cutters and encourage monitoring of compliance behaviour by other members of the cooperative.



Technical training in effective ways to manage cuts was provided. Longer-term efforts to reduce the economic pressure on the mangrove were implemented using job training programmes and the development of a hardwood forest outside of the mangrove.

In 1996, the Department of Fisheries, which oversees the reserve, formalized the long-standing de facto agreement under which ACAPG members got exclusive rights to the use of timber resources from within the grove.

By clarifying charcoal harvesting rights, Country D has been able to protect the Mankote Mangrove and all the ecosystem services it provides. Mangrove depletion has been stopped and tree cover is now increasing, all without displacing jobs.

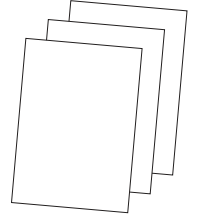
The approach made sense because the subsistence harvesters were the primary cause of the problem. With no formal rights to the resource, they had little incentive to invest in longer-term resource management. Prior to the establishment of ACAPG there was no effective control at all on charcoal production. Self-monitoring of cutting by different members of the cooperative (each protecting their individual interests) has made enforcement of the agreement both easier and less expensive.

Finally, in addition to securing the tenure of the charcoal harvesters, the programme worked to prevent threats to subsistence harvesting from large-scale development or fishing by establishing Mankote as a nature reserve.

Despite the overall success, the case does have some problems. The process has been extremely long, taking more than 15 years. Many resources at risk would not survive such a long policy gestation period.

Efforts to shift from mangrove to hardwood from plantations near Mankote have had limited success, partly due to the lack of experience the producers have with agriculture and marketing.

Case Studies 3



Reducing Pollutant Loadings to the Environment

Although pollution to air, water, and land occurs in many industries, pollution intensity (emissions per unit produced, or per dollar of sales) varies widely. Even within a single industry, there are widely varying emissions levels depending on the technology employed and the sophistication of management.

An Example from a Province in Country A

When nutrients are discharged en masse to waterways, they generate algae blooms, which, in turn, use up all of the oxygen in the water killing other life. As a result, treatment of nutrients is a central job of sewage treatment plants before the wastewater can be released to the surrounding environment.

To limit the nutrients discharged to waterways, the Province in Country A had command and control regulations in place and combined those with a new approach. Beginning in 1996, three sewage treatment plants owned by the Water Corporation in the South Creek area of the River initiated a nutrient trading system.

Under the regime, the three plants are allowed to trade portions of their nutrient discharge allocations, so long as the aggregate loading limit is not exceeded. The process of intra-firm trading within a set geographic area is called a “bubble,” since a single limit or bubble applies to the river, rather than to a single plant.

The trading scheme set target reductions by 2004 of 83 per cent of the phosphorous and 50 per cent of the nitrogen previously discharged. The local regulatory body provided oversight.

After three years, there were substantial reductions in nutrient loadings, at a relatively low cost. The cost savings, estimated at 37 per cent as compared to each plant meeting uniform requirements, come primarily through capital cost savings.

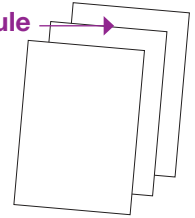
Capital investments to curb nutrients could be concentrated in one or two plants, versus all three; and upgrades can now be more closely timed with normal capital replacement than would have been possible under a uniform standards approach.

However, monitoring data was not complete in the review, and the overall impact of the programme on environmental quality in the receiving waters was not available. This is an important data gap since detrimental effects of excessive loadings can be localized within receiving waters (causing “hot spots” of environmental damage).

Applications of tradable permits of any type need to evaluate the likelihood and impacts of such hot spots in order to be sure that the overall environmental objectives of the programme are met. In addition, plans to expand the trading system to more parties, and to non-point sources of nutrients as well, have been under discussion for some time, but have not been implemented yet.

An Example from Country B

In an attempt to curb pollution from factories, the government of Country B set up an emissions fee. These fees constituted business expenses, and were deductible from taxes. Given common corporate tax rates



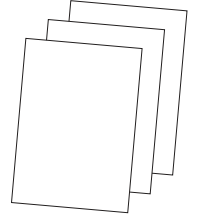
in Country B of 33 per cent, this means that for each dollar in fees, roughly one-third remained in the firm as a tax-shield, reducing taxes that would have been paid on other net income.

In addition, in an effort to accelerate installation of pollution controls, Country B's government set up a rebate system, whereby 80 per cent of the fee collected would be returned to the enterprise for investment in pollution controls. Thus, from this original dollar in fees, 33 cents comes back through reduced tax burden and 80 cents comes back in a rebate, for a total of US\$1.13. Thus, paying the pollution fees offered a net gain of roughly 13 per cent.

This perverse incentive made firms not wish to invest in pollution controls, lest they lose the privilege of paying emissions fees to earn a quick 13 per cent return on their money. The ability to do so was the result of a lack of political will or capability to ensure rebated fees were invested in pollution controls as required rather than spent elsewhere in the business.

In an attempt to solve the problem, the government replaced fee rebates with loans; however, enforcement has been weak. In addition, the funds from the 20 per cent of fees not returned to the enterprise goes to the local environmental authorities, and this has supposedly given them an interest in maintaining funding through maintaining emissions. Had rebates actually been put to use in upgrading pollution controls, this may not have been such a bad policy.

Case Studies 4



Subsidizing Transition to Sustainable Alternatives

Encouraging environmentally sustainable practices and technologies through government subsidies is commonly raised as a suggestion. There are many options for how subsidies can be provided, ranging from direct grants to low interest loans, from government indemnification to tax subsidies. The instrument that is chosen, as well as the behaviours for which the subsidy is earned, have important implications for the types of behaviour that is encouraged.

The case studies below illustrate some of the complexities associated with trying to accelerate transition to environmentally preferable alternatives.

An Example from Country X

In an effort to encourage good reforestation practices, timber policies in Country X charge a tax on wood consumption, except when the harvesting is offset by equivalent reforestation. Recognizing that there are insufficient resources to oversee reforestation directly, these countries have chosen to forego revenues from timber sales so long as the cuts are properly replanted.

The programmes have generally failed due to fees that are very low and poorly enforced. Especially in frontier regions, monitoring is difficult. A lack of institutional capacity and/or will yields a situation where neither the environmental nor the fiscal goals are being met. Forestry fees that were historically collected in Country X were often completely used up to finance administrative overhead in the oversight agencies rather than the environmental purposes for which they had originally been intended.

An Example from the Country Y

In an important watershed in Country Y, Technical cooperation funds provided subsidized credit to participating farmers adopting soil conservation measures. Initial adoption rates were quite high (90 per cent in 1985), yet by 1990, only half of the farms continued to practice the conservation measures, as the subsidies had stopped. As further subsidies were expected, farmers actually delayed rational conservation measures in order to wait for the payment.

The follow-on technical cooperation project recognized that the farms were already receiving tremendous benefits in the form of subsidized irrigation water. This second project tied continued access to subsidized water to proper adoption of soil conservation measures. The result has been substantial use of conservation techniques without additional direct subsidies.

An Example from Country Z

Country Z's bulbs were threatened at some point of time. To offset the accelerating loss in national wild stocks, a large environmental NGO decided to provide some seed capital to fund demonstration projects on the propagation of domestic bulbs. The Fund financed the initial purchases of plant stock for the participating families and established contracts with the growers.

As the knowledge about dwindling wild stocks grew, the NGO project also benefited from the fact that domestic bulbs were increasingly being specified in international trade contracts. Under this condition, project returns were sufficient to make the enterprises viable. In addition, adoption of the new approach was widespread because it required little change in existing routines of participating families and increased their economic gains.

The Fund was able to jump-start a more sustainable domestic industry and the new approach was shown to be viable in the marketplace.

Module 9

Economic Instruments for Global Environmental Problems¹

GOAL



To review economic instruments for the management of environmental and natural resource problems of a global nature.

LEARNING OBJECTIVE



By the end of this module, participants should be able to outline in general terms the application of economic instruments to environmental problems of global concern.

¹ This module is based on Panayotou, T. (1998): Instruments of Change, Motivating and Financing Sustainable Development, Earthscan/UNEP, pp 86-101.

9.1 Defining Terms

Financial Exchanges: Arrangements whereby a country or a nongovernmental environmental organization provides financial incentives to developing countries, local jurisdictions, or other groups to engage in environmentally friendly practices (discontinue destroying tropical forests, reduce polluting emissions, etc.). These incentives may involve direct grants, debt relief, or trade concessions.

Beneficiary Pays Principle: The inverse of the polluter pays principle (see Module 2). In this case those who benefit pay for maintenance of environmental quality. This has particular application when developed countries are paying for global environmental benefits supplied by low-income developing countries (e.g. protection of rain forests which store greenhouse gasses).

Debt-for-Nature Swaps: A financial exchange whereby a developing nation's monetary debt to another country is reduced in return for improvements in environmental protection in the developing country. The debt relief is given as a compensation for the developing nation forgoing income that it would receive for licensing environmental destructive practices (e.g. mining, logging rainforests).

Bioprospecting: Collection of biological samples in living things that will have some medical or commercial use (plants, animals, micro-organisms) and the collection of indigenous knowledge related to these resources. Bioprospecting has to be allowed by the biodiversity-rich country and must benefit it (and the communities that traditionally use these resources) as well as the corporations (usually from developed countries) or universities collecting the resource. Bioprospecting must follow the rules of international treaties and national laws.

Transferable Development Rights (TDR): A mechanism that allows landowners to sell their development rights to other property owners. In TDR schemes, development per area is restricted by legislation, and can even be completely prohibited in some designated areas whose preservation is in the public interest. Landowners not wishing to, or not being allowed to, take use of their development rights can sell them on the market to others who thus expand their original development restriction level.

Internationally Transferable Emission Permits: Cross-border tradable permits to emit pollutants, which have been included as instrument under the Kyoto Protocol. These permits are similar to domestically tradable emission permits but are established by an international agreement. The Kyoto Protocol allows Annex I countries (mainly developed countries) to acquire units from other Annex I countries and use them towards meeting their emissions targets under the Kyoto Protocol. This enables countries to make use of lower cost opportunities to reduce emissions, irrespective of the country in which those opportunities exist.

Kyoto Protocol: International agreement concluded to at Kyoto Japan where it was adopted by the Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC). It became effective in 2005 and is a first step toward setting binding obligations on countries to reduce pollutants.

The Protocol establishes binding commitments for countries specified in Annex I of the protocol (mostly developed countries) to reduce greenhouse gas emissions and allows trade of emission permits among them. (It has several "Annexes" making separate provisions for developed, and developing countries, and countries in transition in addressing global environmental problems). The full name is The Kyoto Protocol to the United Nations Framework Convention on Climate Change.

Click on the tabs to the right to go directly to each Module —→

Clean Development Mechanism (CDM): An instrument authorized by the Kyoto Protocol that enables both the private and the public sectors of Annex I countries (mostly developed countries) to invest in projects, which result in emission reduction undertaken in non-Annex I countries (mostly developing countries and countries in transition). The investing (Annex I) country receives credits against its Kyoto Protocol emission reduction commitments for some of the resulting reductions in the non-Annex I country.

Joint Implementation (JI): A provision of the Kyoto Protocol that allows Annex I countries to implement projects that reduce emissions, or remove carbon from the atmosphere, in other Annex I countries, in return for emission reduction units. The investing Annex I country can then count the carbon benefits towards meeting its emissions targets under the Kyoto Protocol.

9.2 Global Reach of Economic Instruments

Environmental resources and environmental problems are distributed unequally among countries. Some countries have large, but threatened rain forests which serve as a sink for global greenhouse gases; others have critical but endangered spawning grounds for the world's fisheries. The same holds true of various pollutants. These are issues of national but also global concern. Similarly, emission of pollutants into air and water varies among countries, but in the end the pollutants know no boundaries.

This leads to a situation where some countries contribute disproportionately – either per capita or by total volume - to global environmental degradation. Fortunately, the scope of economic instruments can be extended beyond the management of domestic environmental problems to issues of the global commons: conservation of forests and marine resources, the preservation of biodiversity, and protection of the global air supply, climate and ozone layer.

Just as the environmental problems are spread unevenly, the cost of controlling global pollutants and conserving natural resources of global importance varies significantly among countries. This variation provides favourable grounds for the application of economic instruments, such as direct financial exchanges and tradable permits.

9.2.1 Role of Developing Countries

Over the last several decades, the demand for global environmental action has come mainly from the developed countries, which have sufficiently high incomes to be concerned with environmental amenities and distant threats to their life and health. However, many of the best opportunities for addressing global environmental issues are to be found in developing countries, e.g. by virtue of their greater biodiversity, the sheer biomass needed to serve as the sink for greenhouse gases, and lower energy efficiency (e.g. widespread use of wood for fuel) and therefore greater scope for efficiency gains.

Under these circumstances equal or proportional emission reductions or conservation by all countries would be excessively costly, if not totally unacceptable to developing countries. Nor would such proportional reductions supply the optimum benefits, which are disproportionately available from developing countries.

In this situation, economic instruments can allow countries that can supply environmental amenities to meet global demand on behalf of others at lower cost and still gain from it. In terms of efficiency, the cost of global environmental improvement can be minimized (cost-effectiveness). In terms of distribution, the wealthy beneficiaries would pay and the poor countries would benefit (equity) along the lines of the Beneficiary Pays Principle (BPP).

In the absence of a global government with taxation power, the willingness by developed countries to pay for conservation could be captured through new innovative trading arrangements between developed and developing countries. Developing countries need financial resources and efficient technology to pursue sustainable development. In exchange they can offer:

- *Unmatched biological diversity which can best be preserved on site,*
- *Forests of global significance in terms of their impact on global atmospheric balance and biodiversity habitat,*
- *Environmental amenities which include wildlife and other natural assets of recreational, educational and scientific value,*
- *Low cost reduction of carbon emissions.*

9.2.2 Ownership vs. Development Rights

For developing countries the global nature of environmental problems can be a problem. Developing countries often perceive the pressures from developed countries to protect environmental and natural resources of global importance as a challenge to their ownership and sovereignty over their own resources. Much of the conflict between developed and developing countries over conservation arises from a failure to distinguish between ownership and the spatial exercise of development rights.

The first step in using economic instruments to address international environmental issues is, therefore, to recognize the developing countries' ownership of their resources and their right to develop them in order to maximize their own benefits. This will set a solid foundation for the use of economic instruments. With recognition of their ownership rights, developing countries with globally important resources could offer to trade environmental conservation permits for financial and technological resources.

9.3 Mechanisms for Global Environmental Protection

While there is a well-developed global market for financial and technological resources, there is no such market for the conservation of biological or protection of environmental assets. This is due to the nature of these resources (global externalities), the lack of well-defined (and fully recognized) property rights and the difficulty of enforcing contracts across borders in the absence of a 'global authority', which would supersede national sovereignty. Moreover, the object of conservation and exchange is difficult to define and monitor. Despite these difficulties, some exchanges of this nature have taken place.

9.3.1 Direct Financial Exchanges

One approach to facilitating cross border environmental protection is to provide money or financing in direct exchange for development rights. Examples include:

- *Debt-for-nature-swaps,*
- *The Global Environmental Facility (GEF),²*
- *Bioprospecting rights purchased by the Merck Pharmaceutical Company in Costa Rica, and*
- *The EcoFund in Poland created through debt-conversion by Paris Club countries.³*

² The Global Environmental Facility (GEF) was established in 1999 with an initial budget of USD 1.3 billion to provide grants and concessional funds over a three-year pilot phase. It is now an established institution receiving regular capital replenishment, with contributions mainly coming from developed countries. The facility assists developing countries to address four areas of global environmental concern: global warming, loss of biodiversity, pollution of international waters and depletion of stratospheric ozone.

³ For more information on the EcoFund, visit the website www.ekofundusz.org.pl; More information on the Paris Club can be found at www.clubdeparis.org.

These international financing mechanisms rely largely on voluntary contributions by nations, and as such they face the risk of unstable resource flows for international environmental investments.

9.3.2 International Environmental Taxation

International environmental problems such as global warming, biodiversity loss and ozone depletion can be described as global public good problems that call for global environmental taxation. Similar to public goods at national level, where taxes are used to ensure their supply, international environmental taxation could be used to increase the price of the good and generate revenue for its sustainable provision. This however would require sovereign nations to yield their sovereign powers of taxation to a supranational authority. Three such taxes have been proposed in the past:

- *An international foreign exchange transaction tax (known as Tobin Tax),*
- *An international carbon tax on energy fuels,*
- *An international airport tax.*

The Tobin Tax would generate the largest revenues but has no direct positive environmental effects (the revenues, however, could be earmarked for environmental protection purposes).

While the debate on these instruments of international taxation is on-going, little progress has been made towards serious consideration of any of them, largely because of the reluctance of sovereign nations to yield taxation powers to a supranational authority.

In the absence of the political will among governments to do so, alternative actions have been proposed such as the harmonization of national taxes through international agreements and non-sovereign international taxes along the lines of the European Union taxes. Those involve minimal delegation of sovereignty by member states that are allowed to keep percentages of the tax revenues for their own use.

9.3.3 Transferable Development Rights

To help developing countries maximise benefits while still protecting the environment, it is possible to completely separate development rights from ownership rights, through the instrument of transferable development rights (TDRs). Such rights can be bought and sold in the open market without affecting the underlying ownership of property.

The basic mechanism of TDRs functions in the following way: Legislature defines a certain amount of development that is granted to owners of property. In addition, certain zones may be established in which the use of these development rights is not permitted. Property owners outside these zones, if they want to exceed their pre-assigned development permissions, can buy additional development rights from other landowners, especially from those who are not entitled to the use of their rights.

Alternatively, if the government is not concerned about the protection of specific areas but only wants to limit the amount of total development, it can confine itself to restricting the development rights per area in general without defining specific zones of protection. The market will then efficiently allocate the total allowable amount of development.

To make a market for TDRs work, the government needs to create sufficient scarcity of development rights. Then, those who are not entitled to take use of their property rights (for example because their land is part of a nature reserve) can recover the value of their rights by selling them. A TDR scheme can significantly reduce the pressure on valuable ecosystem areas by putting them on equal footing with development areas. Owners of such property can recover the full market value of their unused development rights.

Transferable development rights have been used extensively in the conservation of historical buildings, archaeological sites, cultural heritage, wetlands and coastal areas.

The classical example of TDRs is air rights in New York City. The height of buildings in New York City is limited by legislation to a certain amount of storeys. In addition, historical buildings and parks are protected by prohibiting the use of the air rights on those areas. Investors who want to exceed the maximum building height on their property may do so by purchasing air rights from other areas. In November of 2005, Christ Church of Manhattan sold its unused air rights for \$30 million, transferring them to a site close to Central Park where a taller tower can now be built.⁴

The concept of TDRs makes possible the creation of conservation areas without the need for assessment of land values and compensation: it simply creates a market with the demand and supply of development rights that results in an equilibrium price at which exchange or transfers take place. The use of TDR schemes is today under consideration by a number of countries as an instrument for the conservation of their own greenbelts, forests and their biodiversity.

In principle, there is no reason why transferable development rights could not be used internationally as an instrument of payment by the developed countries for conservation and supply of environmental services by the developing countries. Tropical countries could set aside habitats for biodiversity conservation and divide each habitat into a number of TDRs, corresponding into an area unit, say, a hectare. Each TDR would state the location, condition, diversity and degree of protection of the habitat and any special rights that it conveys to the buyer/holder. TDRs could then be offered for sale both locally and internationally at an initial price offer that fully covers the opportunity cost of the corresponding land unit (i.e., the net present value of the income stream of the foregone development opportunity).

It would be preferable to start at a relatively high price to test the market, since under-valuation is irreversible following sale while over-valuation is reversible. If the price turns out to be too high to clear the market (i.e., to exhaust the supplied TDRs for a particular habitat), the price can be lowered to attract additional demand. Alternatively, the quality of the TDRs can be enhanced by enlarging the area to include additional biodiversity values or by improving its protection and management.

The potential buyers of international TDRs include local and international environmental organizations, local and international foundations and corporations, developed country governments, chemical and pharmaceutical companies, scientific societies, universities and research institutions, and even environmentally minded individuals from developed countries. The motivation for purchasing TDRs will naturally vary among prospective buyers. Some may be interested in research, others in conservation and others may speculate on an increase in value over time.

Despite the variety of benefits that TDRs may confer to prospective buyers and holders, it is unlikely that there will be sufficient demand to preserve all habits that are worth conserving. However, one great advantage of these mechanisms for the conservation of tropical forests and biodiversity is that they provide developing countries with substantial transfer in financial resources without compromising national ownership or sovereignty over tropical forests.

9.3.4 Internationally Transferable Emissions Permits

International transferable emissions permits are an application of the same principles embodied in international transferable development rights and domestic emission permits. The total allowable level

⁴ See “\$430 a Square Foot, for Air? Only in New York Real Estate” in New York Times, November 30, 2005.

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of emissions for the world could be established and then permits issued to each country on the basis of specific criteria such as population. The permits could be traded among countries or by firms within countries.

Emission permits are potentially in high demand in developed countries. Conversely, developing countries have a comparative advantage in supplying emission rights in exchange for financial and technological resources. For example, while reductions in CO₂ emissions in Japan and the European Union may cost over US\$ 50-100 per ton, they might cost under US\$ 20 per ton in developing countries such as India and China (assuming that energy efficiency is lower leaving still more room for improvement).

If “CO₂ emission reductions” were a conventional commodity, developed countries would seek to obtain their supplies from developing countries where they can be obtained at lower cost. As with transferable permits traded within a country (see module 7), allowing emissions trading across nations would obtain a given reduction of emissions at the lowest possible cost. It would also encourage technology transfer and flow of financial resources from developed countries to developing countries in the interest of both, the protection of global climate and sustainable development.

For developing countries, transferable emission permits would provide a strong incentive to become more efficient in order to save emission permits which they could sell to other countries or which they could use for their own industrial expansion.

A global emission trading system promises huge economic and environmental benefits. There are, however, two major obstacles that stand in the way. First, there needs to be a binding obligation of countries to contain their emissions. In addition, global emission trading faces a whole range of technical and political problems.

9.3.5 Mechanisms under the Kyoto Protocol⁵

The Kyoto Protocol to the United Nations Framework Convention on Climate Change (adopted in December 1997 by the Conference of the Parties of the Climate Convention and entered in force in 2005) is a first step in the direction of setting binding obligations for the reduction of pollutants. It established binding commitments for countries specified in Annex I of the protocol (mostly developed countries) to reduce greenhouse gas emissions and allows trade among them.

9.3.5.1 Emissions Trading. The Kyoto Protocol allows Annex I countries to acquire units from other Annex I countries and use them towards meeting their emissions targets under the Kyoto Protocol. This enables countries to make use of lower cost opportunities to reduce emissions, irrespective of the country in which those opportunities exist. Transfers and acquisitions of these units are to be tracked and recorded through a registry system. Governments may also authorize legal entities (e.g. businesses, non-governmental organizations and other entities) to participate, under their responsibility, in the emissions trading.

The Kyoto Protocol further introduced Joint Implementation Projects (JI) and the Clean Development Mechanism (CDM) to facilitate trade between developed countries and countries with economies in transition, and between developed countries and developing countries.

9.3.5.2 Joint implementation. The Protocol allows Annex I countries to implement projects that reduce emissions, or remove carbon from the atmosphere, in other Annex I countries, in return for emission

⁵ For more information on the Kyoto protocol, see: http://unfccc.int/kyoto_mechanisms/items/1673.php.

reduction units. Unlike the CDM, the Joint Implementation Mechanism does not create additional emission permits, but constitutes a transfer of the carbon benefits of the implemented project from the host country to the investing country. This mechanism allows Annex I countries with high emission reduction cost to meet their reduction targets under the Kyoto Protocol in a more cost effective way, namely by investing in countries with relatively low per unit reduction costs.

A JI project might involve, for example, replacing a coal-fired power plant with a more efficient combined heat and power plant. Most JI projects are expected to take place in the Annex I countries with economies in transition in Eastern Europe. JI projects must have the approval of all countries involved, and must lead to emission reductions or removals that are additional to any that would have occurred without the project.

9.3.5.3 Clean Development Mechanism. This instrument enables both the private and the public sectors of Annex I countries to invest in projects undertaken in non-Annex I countries (mostly developing countries and countries in transition), which result in emission reduction, and to receive credits for some of these reductions against their commitments.

Such project activities are to assist the developing host countries in achieving sustainable development and in contributing to the ultimate objective of the Climate Convention.

A Clean Development Mechanism (CDM) project activity might involve, for example, a rural electrification project using solar panels or the installation of more energy efficient boilers. The CDM is expected to generate investment in developing countries, especially from the private sector, and promote the transfer of environmentally friendly technologies in that direction.

Economic Instruments for Global Environmental Problems Cases

The following case studies offer an opportunity for participants to discuss cases where global environmental problems are being tested. They are provided so that participants may understand the issues and difficulties in using this type of instrument.

Case 1 - Biodiversity Conservation on the Akamas Peninsula, Cyprus – Proposed Transferable Development Rights

The Akamas Peninsula has an area of 250 square kilometres and is situated in the northwest of Cyprus; it is considered to be the last virgin territory in the eastern Mediterranean. This unique area has remained almost untouched by development despite the quadrupling of the number of tourists who have visited the island in the last ten years alone.

Due to the variety of its geomorphological features and the microclimate of its individual localities, Akamas displays a large concentration of biotopes, making up a unique ecosystem. The area supports an indivisible natural resource base comprising a rich flora and fauna, beautiful beaches and landscape, and interesting historical, archaeological and cultural heritage.

The flora of Akamas includes at least 20 endemic rare species. About 14 different kinds of orchids and the *Tulipa cypria* (a rare endemic species) are also found in the area. Akamas also hosts the loggerhead turtle (*Caretta caretta*) and the green turtle (*Chelonia mydrias*), both under threat of disappearing from the Mediterranean, as well as a rare species of vulture (Griffon vulture), a fresh water crab (*Potamion potamios*) and endemic species of birds and butterflies. In addition, the area is used as a temporary stopover by a multitude of birds when migrating from one continent to another.

The remarkably rich natural resources of Akamas are undergoing severe pressures and are threatened with degradation from a variety of sources including:

- *Day visitors in the area destroying flowering plants, forests, and animal species;*
- *Property owners putting pressures on the government to open up the area for tourist development; and*
- *Inhabitants in nearby villages demanding some kind of development.*

The government has responded by zoning part of the Akamas area as a non-development area, stopping short of declaring it a national park. This response has intensified the conflict. On one side, local and international environmental groups such as the Friends of Akamas and Greenpeace find this response inadequate protection for the last unspoiled part of the island and demand stricter policies and the declaration of the area as a national park.

In the opposite camp are the inhabitants of villages surrounding Akamas, who own land in the area. They are demanding that the government provide them with roads and other infrastructure for tourist development as it has in the rest of the island. Being among the poorest people on the island, they see tourist development as their only chance for a better life. They have allied themselves with developers in lobbying the government to open the area to tourist development, and they are especially distressed because the prices of their land have dropped significantly following the government restrictions on development.

Government appropriation of the land with compensation is not possible because of the high cost of paying for the land at its market value (as coastal property suitable for tourist development).

The result of these unresolved conflicts is that Akamas is neither a protected national park nor a managed tourist development zone. The stalemate neither protects biodiversity nor allows development to proceed. This uncertain situation is open to pressures for readjustments, exemptions and relaxations, which prey on nature in a silent but equally destructive way.

A resolution of these conflicts - which are not unique to Akamas but arise throughout the island - could be a transferable development rights scheme proposed by the Enallon Environmental Management Centre.

The concept of transferral of development rights would ensure that areas of natural beauty be preserved in their natural state. It has been introduced in Cyprus for the first time in recent legislation for the preservation of buildings of unique cultural and historical value. It is proposed that sites of natural beauty or those that are rich in ecological and biological resources could also be preserved through the use of this mechanism, without depriving their owners of their development rights and without paying compensation.

The coastal area and, in fact, all of Cyprus would be divided into development areas and conservation areas. Landowners in conservation areas would retain their rights but they would not be allowed to exercise them on the site. They would instead be allowed to sell or transfer these rights to property in development areas, thus sharing in the benefits of development without actually developing their own land, which would remain in their hands in a natural state.

It is estimated that the net present value (NPV) of preservation benefits in terms of improved quality of tourism in the development areas combined with ecotourism on the conservation area would exceed the net present value of forgone earnings from not developing Akamas into a mass tourism area like other parts of the Island.

Unfortunately, even though a transferable development rights scheme had been suggested as early as 1994, up to today such a proposal has still not been adopted. Other initiatives to protect the Akamas peninsula have also failed so far and the peninsula remains under threat.

Sources: Panayotou, T. (1998) and <http://www.conservation.org.cy/akamas/akamas.htm>.

Case 2 - The Costa Rican Environmental Service – Payments Scheme and Certified Tradable Offsets

In an effort to halt deforestation and encourage reforestation, in the 1980s the Costa Rican government introduced tax credits incentives for landowners maintaining forests on their lands. To allow smallholders, who usually paid no taxes, to benefit from the scheme, the government allowed the reforestation tax credits to be traded. This created the first rudimentary market for environmental services in the country.

In the 1990s, this scheme was reformed and expanded into a comprehensive system of payments for environmental services, both local and global. The government identified four sets of services, which are provided by forested private lands that are external to the owner and for which he/she receives no payment and therefore faces inadequate incentives to provide them:

- *Watershed protection services (local/national);*
- *Ecotourism attraction (local/national);*
- *Biodiversity conservation (global); and*
- *Carbon sequestration (global).*

The government sought both instruments for internalising these values to the landowners (i.e. instruments for effecting commensurate payments) and financial resources to finance these payments. It was recognized that at a minimum, farmers must be compensated for the opportunity costs (forgone benefits from current land uses, mainly cattle ranching) estimated around \$30 per ha per year. This set the lower bound for the payments.

The upper bound was set by the value of the environmental services provided to both the local/national economy and to the global community. This value was conservatively estimated to be in the range of \$40-60 per ha per year (more generous estimates put the value of environmental services of forests in Costa Rica in the range of \$100-200 per ha per year). The government settled on an incentive payment of \$50 per ha per year, higher than the average opportunity cost and lower than the 'value' of environmental services provided.

Funding for the payment of environmental services contracts is obtained from a sales tax on fossil fuel and from the Carbon Fund, which serves as a depository for revenues obtained from carbon sales to the international community. The Carbon Fund buys environmental services from farmers and resells them to beneficiaries.

The Carbon Fund has established Certifiable Tradable [Greenhouse Gas] Offsets or CTOs, which is a financial instrument for transfer (sale) of carbon offsets in the international market. CTOs are pre-approved, transferable and guaranteed by Costa Rica for 20 years. The first CTOs for 200,000 tons of carbon were sold in July 1996 to Norway for \$2 million. The Centre for Financial Products purchased 1000 CTOs for resale in secondary financial markets. The Centre has an exclusive contract to broker 4 million tons of Costa Rican Carbon over the next 20 years with a floor price of \$10 per ton generating at least \$40 million in revenues. Costa Rica expects to eventually supply 15 million tons of carbon to world markets.

Sources: Panayotou, T. (1998) and Castro et al (2000).

Module 10

Policy Design and Implementation¹

GOAL



To describe the four main phases of choosing an effective environmental policy package to address a target environmental problem.

LEARNING OBJECTIVE



By the end of this module, participants should be able to outline the most important steps for designing and implementing an economic instrument.

¹ This Module is based on UNEP (2004): The Use of Economic Instruments for Environmental Policy: Opportunities and Challenges.

10.1 Introduction to Policy Design and Implementation

While an understanding of the theoretical benefits of particular economic instruments can be useful, practical consideration of the status quo in a country, including institutional strength, existing policies, and stakeholder power dynamics, will have enormous influence in deciding the most viable policy approach.

The purpose of this module is to assist policymakers in choosing an effective environmental policy package that will address the target environmental problems given the existing institutional capabilities and environmental policies in the country.

Policy choice and implementation encompasses four main phases.

- **Phase 1: Conduct Policy Analysis.** *The first step in developing effective policy entails a careful analysis of the perceived problem, a review of the instruments available to address the problem, the conditions under which these instruments will be used, and the likely effect of various instruments or combinations of instruments on the problem. This phase is usually concluded with the drafting of initial policy recommendations.*
- **Phase 2: Engage Stakeholders.** *Phase 2 brings in stakeholders for feedback on initial policy recommendations and collects important information on how to refine these to increase their likelihood of success or to gauge any major resistance. This input is then fed back into the information bank developed in Phase 1.*
- **Phase 3: Finalize Policy.** *Phase 3 takes the general information assembled in Phase 1 and 2 and uses it to develop final policy proposals.*
- **Phase 4: Implement and Evaluate.** *This involves gaining political support, passage of any necessary legislation, establishing regulations, and establishing administrative, monitoring, enforcement, and evaluation procedures. Once legislation is enacted a strict timeline for implementing the chosen policy package should be prepared. Similarly, additional work on any measures needed to assess impacts of the change on poverty or international competitiveness may also be required.*

The following sections describe the requirements of each of these phases in more detail. Some key questions to ask are presented, including a sample “Policy Ranking Template” (table III-10-1) aiming to organize the data in a way that makes the choices, information gaps and trade-offs clear to see. A complete ‘Template for Assessing Important Factors Affecting Instrument Choice’ summarizing the main issues, clarifying questions and implications on policy choice and application of economic instruments is provided in Annex V. Annex VI provides a list of common applications of economic instruments by resource area.

10.2 Phase 1 - Conduct Policy Analysis

Poor planning and programme design are major causes of programme failure. If the problem is not fully understood, if stakeholders do not have ownership, if institutions are not up to the task, if alternatives are not carefully considered, or if the programme design is too complex the economic instrument will most likely not do what it was intended to do.

The first phase involves finding and organizing all the relevant information available on the problem to be solved. Careful consideration regarding problem definition and the interests of various stakeholder groups can prove very valuable.

10.2.1 Establish and Use Data Systems

Good public policy rests on a solid foundation of scientifically collected and verified data about the environment and natural resources of the country or region where environmental programmes are to be implemented.

Policymakers should make sure that appropriate agencies continually collect and organize data into time series to document changing conditions. Without consistent and reliable information it is difficult to set rational priorities, to choose appropriate policy instruments, to address perceived problems, or to measure progress once such policies are in place.

Thus, if functioning systems do not already exist for the collection and analysis of information on ambient air and water quality, effluent levels and sources, soil conditions, stocks and loads of natural resources, sustainability of fisheries, grasslands, and forests, etc., they need to be established.

While certain environmental problems – polluted air and water, devastated forests, declining fish catches, – may be apparent to all, the nature, extent, and causes of the problems are usually not so apparent. Good environmental data will identify industries, firms and communities complicit in the environmental degradation. The use of economic instruments further requires reliable information on governmental tax collection and expenditures as well.

Any data set to be used in the policy development should be assembled and published so that stakeholders can evaluate and comment on its validity. After final comments and any needed changes to the data, the government should give public notification of its findings. All further policy pronouncements and papers should clearly identify the sources, means of collection, and other relevant information about the research used as a basis for policy recommendations.

In some instances, it may not be possible for the policymaker to wait until perfect data sets are available. In the real world, there will be many gaps in the information needed and much information will be sketchy at the outset. Nonetheless, policy planners should make every effort to use the best available information and continuously work to improve data sources and collection methods.

Of course, having such information and not using it systematically is the same as not having the information in the first place. Each step in the policy development, implementation, and evaluation stages should rest on the best data available. Each proposal – whether to set priorities, to define problems, to propose solutions, or to establish evaluation criteria – should derive from objective information that all parties can use with confidence.

Good data, however, is no substitute for good policy. Policy planners need to avoid the common temptation to pick and choose which data to use. Too often policymakers will allow their use of data to be driven by ideology or unspoken assumptions.

Even with good data and its appropriate use, there can still be honest disagreement about the meaning of the information on a given problem and the measurable effect of any given proposal. At some point the making of policy will become a matter of judgment. Nonetheless, informed judgment is invariably better than uninformed judgment.

10.2.2 Set Priorities

When faced with multiple environmental problems, the policymaker should make conscious and well-reasoned choices about the order of priority with which to address them. The criteria should not only

rank the problems from the most to least serious but also take into account those that are most tractable to solution.

A minor problem with an easy solution may move to the head of the priority queue for example. Information and justification for priorities chosen should be made generally available to allow all stakeholders to understand the reasoning and supporting evidence behind the decision.

10.2.3 Define Problem Clearly

There is an old saw that says: “If you don’t know where you are going you won’t be happy when you get there.” Spend the necessary time clearly defining the problem. This requires identifying special interests, and evaluating past attempts to address the problem as well defining the actual environmental issue.

If the description of the problem is overly general (air pollution vs. air pollution caused by automobile emissions), vague (poor air quality), or ambiguous (polluted air except that caused by certain industries), the resulting policy will likely miss the mark. Be especially careful of terminology. Too often different observers have a different definition for the same term. (Do you want clean water for fishing or for drinking?). Avoid such misunderstanding with clear and unambiguous definitions.

Incorporate realistic assessments of the limitations not only of the policy instruments themselves but of the underlying political, social and economic conditions, and of the institutions that will be executing the policies as well.

Define environmental problems in measurable terms. Without measurement there is no way of knowing the extent of the problem or how well any programme is addressing the problem once the programme is in place. In defining environmental problems one needs quantifiable measures to describe the existing natural resources base, sources of the environmental damage, and measures to describe how the costs of that damage are spread among other users and the surrounding population.

Quantifiable measures of the anticipated improvement and optimal environmental conditions should also be identified. The measure of these optimal conditions and the measures used to define the problems should be the same.

10.2.4 Clarify Policy Goals

Decide what you want to achieve – in measurable terms - over specific time periods. For a variety of reasons, the goal of a given programme will not always be a complete solution to the problem. The extent of remediation expected should be clearly-stated. Goal definition should include a primary goal, e.g., to curb over-fishing to ensure future catches are sustainable, and any secondary goals that may be relevant. Secondary goals in this case might include protecting subsistence fishermen or coastal fishing communities.

While primary goals are generally related to human health and environment, secondary goals often relate to poverty reduction, job protection/creation, or preserving culture or community. In some circumstances, secondary goals can be cleanly blended into policy. Most times, however, trade-offs are needed.

10.2.5 Determine Baseline Conditions

The appropriate policy response hinges on a clear and realistic understanding of baseline conditions. Sometimes this may mean a less effective policy on a theoretical basis is actually the most appropriate one given institutional capabilities. If limitations are not recognized, there is strong likelihood that new

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instruments will fail, leaving the underlying environmental problem unsolved. While improvement in the structure or performance of institutions can improve over time, it is unwise to depend on them in the short run.

Though every country wants to portray an image of clean and efficient governance, few nations can truly boast such systems. The level of competence and honesty of any institution that will be used to develop, promulgate, monitor or enforce the policy in question needs to be realistically assessed. Policy analysts should evaluate the following areas critical to the success of any environmental initiative.

10.2.5.1 Governmental Capacity. Many economic instruments depend on functioning tax, legal and fiscal systems. Economic instruments may be efficient in theory, but if the institutional capabilities needed to promulgate and enforce the instruments in a fair and unbiased manner are lacking, the performance of the instruments will suffer.

Policymakers should be aware of the fact that command and control policy instruments usually rely on the same functioning tax, legal or fiscal systems as economic instruments. Policy comparisons should therefore take common weaknesses into account when evaluating options.

Weak institutions may be simply unable to carry the load of a proposed policy. In such cases it is best to choose economic instruments that can be adapted to, or that compensate for identified institutional weaknesses, if possible.

If existing institutional or economic weaknesses preclude any policy solution, there may be no alternative but to implement institutional reforms, particularly if the environmental problems are severe. Such reforms would obviously require a broader coalition than just environmental interests.

10.2.5.2 Environmental Agency Power. Many environmental protection packages originate with environment ministries, which generally have far less political power than the finance or trade ministries. Powerful leaders of the government's executive and legislative branches may try to use the power of the government to appease particular constituencies at the expense of environmental quality.

Environmental policymakers need to assess their relative power accurately and plan how to address their weaknesses. For example, approaches that generate revenues as well as address environmental problems can bring in allies in the fiscal ministries that would otherwise not come forward.

10.2.5.3 Fiscal Cash Flow Implications. Analysing cash flows associated with a policy can be helpful in making realistic assessments of existing institutional leverage. If revenues are to be collected, how are fees to be set? Who will collect the money, and do they have appropriate experience? Will the revenues be linked to solving the environmental problem, or simply diverted to the general treasury?

Where the promulgating or implementing agencies control neither the budget nor the revenues derived from the instruments used, overcoming powerful opponents could be quite difficult. On the other hand, solutions that generate new revenues or that establish new markets (such as permits) where polluters must compete against each other rather than requiring extensive ministry oversight can be helpful in gathering support of fiscal agencies.

10.2.5.4 Social, Cultural, and Demographic Implications. Environmental policies may affect strongly held social and cultural beliefs or practices. As an example, restricting the ownership of cattle in

culture where cattle are a sign of wealth and status will require special efforts to show the benefits of the restrictions. Similarly, population pressures may be a direct cause of a given environmental problem – especially where land ownership is undefined. Addressing the environmental problem will mean addressing the population and land use issues as well.

10.2.5.5 Economic Conditions. Since all environmental and natural resource management problems stem from economic activities, it is imperative that there be a clear understanding of the economic implications of proposed policies. The level of dependence of the society and economy on the economic activity causing a problem will greatly influence the ability to execute a policy.

Execution will be easier if the economic activity causing the environmental problem is marginal to the overall economy and society than if it affects a basic source of livelihoods of the country or region. In the latter situation, it may not be possible to adopt an ideal, but highly disruptive, policy instrument and longer term less intrusive policies may need to be adopted. On the other hand, economic instruments may be able to draw people and organizations away from the activity causing the problem.

10.2.6 Evaluate Trade-offs in Choosing Instruments

All policies involve trade-offs. For example, losses in the efficiency of an instrument must be balanced against the ease and timeliness of implementation given social and political realities. Similarly, in order to make packages acceptable to key parties, transitional subsidies are sometimes included, even if not all are targeted to the most vulnerable populations affected.

Carefully consider more than one alternative measure to address identified problems and determine the tradeoffs involved. Even if environmental policies often increase overall welfare, they usually imply short-term social costs or negative influence on economic indicators, not to mention the fiscal impact on the government's budget. These aspects need to be balanced against the benefits expected.

Try to answer the questions: Which option gives the greatest amount of environmental benefit with the least amount of economic or social costs? Do the proposed policies yield any long-term benefits that may promote economic growth and social development? If there are weaknesses in baseline institutions, then implementing command and control instruments may have the same problems as economic instruments. In such circumstances, economic instruments that can operate at a more decentralized level may be preferable.

Describing these trade-offs for a particular situation is useful to ensure full consideration of the implications of a decision and the implicit compromises they contain. Similarly, evaluating alternative solutions is important. For example, rather than providing subsidies to affected sectors, a gradual phase-in of policies can also reduce the transition costs without public expenditure. The following criteria should be assessed for the different policy options:

10.2.6.1 Environmental Effectiveness. Although some compromises may be necessary, the key criteria when determining which options are acceptable should still be how well the proposals achieve the primary environmental objective. Periodic re-evaluation is needed, as strong lobbying efforts can sometimes quietly supplant secondary or tertiary objectives for the core environmental one, eroding the effectiveness of the policy over time.

10.2.6.2 Availability of Policy Windows. Existing laws and regulations often have entrenched supporters, and getting rid of these laws and regulations entirely is not likely to happen. Similarly, the time necessary

to create entirely new regulatory systems and programmes may be too long to affect critical environmental problems. Thus, policymakers should look for ways to apply economic instruments within the context of existing rules. There are three main windows of opportunity:

- Improving the efficiency and flexibility of existing regulations;
- *Improving cost recovery (e.g. making sure associated revenues go to the environmental programme they are meant to support rather than to the general treasury); and*
- *Amending existing regulations to address new problems.*

While these solutions may be less effective than if policy responses could be designed from scratch, the windows approach reflects political realities and provides a foothold for more effective environmental protection. In many cases, demonstrating success for economic instruments at the margin can generate the political will to expand their role over time.

10.2.6.3 Ease of Introduction. Even without constraints posed by existing environmental legislation, environmental controls are often broadly opposed by various interest groups. Extensive conflict can greatly water down initiatives and long gestation periods can allow environmental damage to occur unchecked in the interim.

In many cases, the opposition interests actually grow more organized and powerful during the delays, undermining any change in policy. Choosing policies that achieve somewhat less, but are acted upon more quickly, may therefore be the better choice.

Economic instruments have the advantage that they can be incrementally made more stringent over time (e.g., in the case of tradable permits, by removing some of the existing permits). One strategy is to have them less stringent initially to reduce opposition, but becoming more restrictive automatically over a 3-5 year period.

A longer phase-in can also help keep implementation costs lower. Gestation periods can be quite long, generally due to attempts to resolve political disagreements. Thus, even a 5-year delay may be shorter than the time needed to move through the political process if it is a contentious one.²

10.3 Phase 2 – Engage Stakeholders

Anyone with an interest – a stake – in the outcome of the policy is a stakeholder. Consulting with stakeholders – whether they have an interest in the status quo or in promoting change – is vital to the success of any environmental policy.

Stakeholder input serves two main functions: it provides an important factual input into policy design and implementation; and it provides a venue for affected parties to speak about what are often contentious and even quite emotional issues.

Stakeholders are likely to have valuable information. They can suggest useful insights and effective solutions to environmental problems. Consulting stakeholders can also reveal the source and depth of potential opposition by identifying which parties are harmed by changing the status quo.

² One caveat: the stronger interest groups will often try to slow or eliminate the increased stringency before it takes effect. Initial policies need to anticipate this pressure and deal with it from the outset.

This type of information enables policymakers to make realistic assessments of the political barriers to action and the social implications of policy proposals.³ If key stakeholders are not consulted they can often destroy the chances of a policy's success. It is important to approach the engagement of stakeholders as an integral and well-organized part of the policymaking process.

10.3.1 Identify Stakeholders

The identification of stakeholders is the starting point for any efforts to engage relevant groups in a process of evaluating and refining an initial list of policy choices. Although stakeholders will differ by country and problem area, they will generally involve industry and economic interest groups, government, workers, social and environmental welfare organizations, as well as ordinary, and often voiceless, citizens. These groups will need to have some general acceptance of the policy path, though full consensus need not be the goal.

Organized groups – governmental agencies, corporations, nongovernmental environmental organizations, trade associations, unions, etc. – are the most likely to make their voices heard. But it should not be forgotten that ordinary citizens, especially the poor who are less likely to be organized, constitute stakeholders as well.

In identifying stakeholders policymakers should evaluate the relative power of different groups as well as what the primary concerns of each are likely to be. In many cases, the stakeholders' concerns will revolve around protection of jobs, short-term profits, or access to valuable natural resources. For groups with these concerns environmental quality may be a low priority in comparison.

Who to Consult? Most environmental problems will have three main stakeholder interests:

1. *Those responsible for the problem;*
2. *Those affected by the problem; and*
3. *Those affected by the proposed solutions.*

The identification process will also need to take into account the relative organization and influence of various stakeholders including:

1. The Well Organized and Economically Powerful who tend to have direct and concentrated interests in either keeping things as they are (e.g., companies that do not want to reduce their emissions) or in modifying regulation in a specific manner (e.g., companies making pollution control equipment who would benefit from more stringent regulations).

2. The Unorganised, Uneducated, and Poor within Society who may be affected by proposed policies but who have neither the financial resources nor the skills to carefully evaluate planned government actions. Often they are fragmented and powerless, unable to play a role in the evolution of the policy package without explicit government effort. Yet, these are generally the very same groups most affected by the lack of environmental controls or by the planned policy changes.

3. Those Secondarily Affected by the Proposed Solutions. These stakeholders may be unaware that they will be affected at all and are easily overlooked in the policy development process. These could include low skilled workers who could be thrown from work as environmental controls take effect or

³ This assessment process is sometimes called *factional analysis*.

population centres near inefficient plants where pollution levels could actually rise as inefficient plants purchase emissions credits.

4. The Full Range of Business Interests. A few very large firms tend to be more powerful in opposition to change than a large number of small businesses. If people with ties to the government control the firms, the potential for them to alter or block the policy direction will be even larger. The challenge in addressing the concerns of the more powerful groups is to ensure that they will not derail the policy entirely through influencing the structure of the rules or instruments or by perpetual delaying tactics.

Among any of these stakeholders, groups with existing rights (whether actual or implied) will usually have the greatest interest in fighting changes to existing policies. They will need to be balanced against other groups with interests in change or at least with a more disinterested view of the situation.

10.3.2 Organize Stakeholder Input

Soliciting stakeholder input is not as simple as calling a meeting and collecting comments. The process will need to be carefully organized. The process of organizing stakeholder involvement will vary with the country in question and its cultural traditions and political climate. However, the following guidelines will assist the policymaker in organizing stakeholder input:

1. Use a Variety of Outreach Methods. Stakeholder engagement can be organized through formal meetings, and such meetings can play an important role in allowing affected parties to air their concerns publicly. However, more frequent, less formal contacts and briefings may be more effective as an information gathering tool, keeping the process moving forward and facilitating iterative policy refinements. Less formal contacts also allow people to provide information more anonymously, which can encourage more forthright sharing of views.

2. Solicit Input Early and Often. Stakeholders will need to be consulted frequently throughout the policy development and implementation process. They need to feel that they are being heard from beginning to end. Involving stakeholders early in the process is helpful, even if these contacts are informal. This sends an important signal that the government officials will make decisions in an informed and unbiased manner.

3. Set and Keep to a Clear Schedule. A carefully organized process with a pre-set timeline for sharing information and comments ensures both fairness and the appearance of fairness (which is just as important). It gives all stakeholders a clear understanding of when and how to make their voices heard. Unless both data and comment deadlines are strictly enforced, stakeholders will not take them seriously, and the process risks manipulation by vested interests. Stipulating deadlines for particular input also assures that the policymakers retain control of the process. Here are a few suggestions about input schedules:

- *The timetable should allow enough time for all parties to provide input while providing discipline needed to complete the work efficiently.*
- *The process should provide that any relevant data be submitted by clearly established and reasonable deadlines. Such data should include any information relevant to the magnitude of the problem, the impact on various parties, and the impacts of potential solutions (especially on the choice of instruments). Data not provided by the set deadlines should be ignored.*
- *Subsequent to the release of policy options for comment, there should be a relatively short window for comments after which a final policy package would be chosen.*

- *Government officials and agencies should be bound by the deadlines and not be allowed to go outside of the process to solicit information or comments after the deadlines are passed. Applying the same requirements to the government as to private individuals and groups sends a strong signal in terms of equitable treatment for all parties in the process, as well as allowing for a more rapid process of policy development.*

4. Be Clear About How Information will be Used. It is not enough to talk to stakeholders. If their advice is never taken, they will likely oppose any resulting policy. The stakeholder consultation is a means of coming to informed decisions, not necessarily as a way to reach a complete policy consensus. Any requirement for complete consensus among all parties can easily become an opportunity for affected parties to delay action indefinitely.

Making it clear that the goal of stakeholder consultation is information gathering rather than complete consensus building will help avoid unnecessary bottlenecks. Rather than full consensus, defining zones of agreement between parties, and clarifying the trade-offs among various options, may be sufficient to gain broad support for the final policy recommendations.

5. Operate Transparently. Openly publish and widely distribute all policy proposals in an easily accessible format. Provide lists of all meetings regarding the proposals, and distribute comments received to all parties. This helps stakeholders know that they will be heard fairly and that any efforts to influence the process by dishonest means are likely to become public. Because the environmental authorities often have less power than many of the affected industries or their political partners, built-in transparency protects them from pressure tactics used by companies or other ministries.

6. Publish Participant Lists. While individual conversations can be private, policymakers should always publish a list of all groups and individuals with whom they speak. This spotlights situations where parties with vested interests may flood the process with their representatives. The list should also be reviewed for the opposite problem - who is missing - to ensure that all important stakeholder interests have been heard.

7. Explain Decisions. As decisions will always go against the wishes of some stakeholders, it is important that policymakers state publicly why particular decisions were reached and why they went against the stated interests of a particular stakeholder group. The process of simply acknowledging the opposing positions can do much to ameliorate resentment by these parties, as they can see that their views were considered.

8. Avoid Seizure of the Process by Stakeholders. Care should be taken to avoid a situation in which the better organized interests seize control of the stakeholder input process. This can cause unnecessary delays and drive the process toward solutions that serve the interests of special interests but not the general public. Two techniques in particular can help prevent stakeholder seizure of the process:

- *Obtain reliable and independently derived data on the sources of environmental damage to avoid depending on organized interests for information, which can distort the policy process in their favour.*
- *Expand outreach by financing participation in meetings, providing public access to Internet facilities and visiting geographic areas where the voiceless are concentrated to keep these parties abreast of the process or involve them in decisions and emerging issues. Since many of the poor are concentrated within particular geographic areas, simply walking around and talking to people can be a valuable, low-cost way to gather and share information.*

10.3.3 Use Stakeholder Input to Refine Policy Options

As policymakers gather information from stakeholders it can be fed back into the information gathered earlier allowing a more refined understanding of the problem. This allows refocusing the policy options, narrowing the choices, and identifying the appropriate flanking measures to implement, with particular economic instruments to address the social or political barriers. (Flanking measures commonly involve exemptions, deferrals, or transitional subsidies to help those groups -often the poor- most adversely affected by a policy change).

Issues regarding international competitiveness provide an example of how stakeholder input can positively affect policies. Domestic industries may be concerned that they will be harmed by environmental controls not faced by their international competitors. Understanding the dynamics of the specific markets and industries affected can expand the range of choices. For example, rather than exempting large domestic industries from important environmental policies as is often done, a solution might be to try to establish parity by ensuring imported products meet similar standards.

10.4 Phase 3 - Make Policy Choices

The purpose of assembling information in Phase 1 and engaging stakeholders in Phase 2 is to help policymakers develop policy options. Moving to make concrete policy choices is not always easy. Because every situation is different, it is difficult to offer specific guidance on how to do this. However, some general guidelines can help policymakers to choose the most appropriate options for further consideration. These include specifically the recognition of policy trade-offs and realistic assessments of policy limitations.

10.4.1 Choose the Simpler Approach

Policy design should be commensurate with the problem to be solved. Avoid overly complicated policies; the simpler solution is almost always the best.

If the problem is local, local solutions may be best. If the problem involves a handful of industries with similar production processes, establishing a national trading system probably does not make sense as costs of control will be similar across plants.

Simple easy to administer solutions, however, are often more difficult to arrive at, or even imagine, but they are almost always more efficient and effective.

10.4.2 Match the Policy to the Problem

In the end, actual reduction of pollution or conservation of natural resources depends upon choosing the right policy instruments given baseline conditions, the problem to be solved, and stakeholder feedback. A wide range of factors influence the choice of effective policy instruments including environmental laws already in place, the power and technical capability of ministries involved, and the broad economic conditions within the country.

Obviously, the option with the highest efficacy, lowest side-effects and greatest feasibility given existing power and institutional dynamics would be best. However, it is unlikely that any option will score the highest for each category, so trade-offs will be needed. Unfortunately, there is no formula for finding the right balance. Box III-10-1 presents some common problems and economic instruments useful in addressing them.

Box III-10-1: Common Environmental Problems and Useful Policy Responses

Overuse of Natural Resources. Property rights-oriented approaches, such as granting or selling the rights to access or develop particular resources to specific groups, can work well in situations where current use patterns are depleting the resource base. Where informal access patterns by local users are codified, subsistence livelihoods can be protected while concurrently providing much improved direct incentives to manage the resource for the long-term.

Even in more international markets, permits that differentiate commercial and subsistence users can help achieve a balance between resource protection and employment. If consumption must be curbed, buy-out or phase-out of the existing de facto rights is a possibility.

Industrial Pollution - Disparate Technologies. Where emissions of pollutants come from many industrial sources, there is likely to be widely varying costs to abate the pollution. In these circumstances, there are often large efficiency gains from imposing pollution taxes, fees, or tradable permits relative to mandatory standards under a command and control regime.

Industrial Pollution - Standard Technology, Few Producers. Where there are few producers, all relying on similar production technologies, disparities in control costs are generally much lower. These circumstances suggest minor gains from trading alongside potentially large oversight costs to create a market. Command and control regulatory approaches may be the more efficient option.

Known Damage Thresholds. Where regulators have a good sense of the point at which emissions will cause health problems or ecosystems begin to fray, tradable permits are often the best choice. Caps on emission/extraction can be set in advance, either based on absolute values (e.g., tons of salmon that can be caught) or on relative values (e.g., percent of total allowable catch), allowing markets to allocate the rights efficiently. Policy adjustments should be made on a regular basis to adapt to changing conditions or errors in the initial caps.

Publicly Provided Services. The objective of policies affecting publicly owned service organizations (e.g. water, sewer, or electrical utilities) is to institute pricing that achieves full recovery of costs through user fees, but with a rate design that protects the poor. Attempts to cover costs of the enterprises often bring to light their inefficiencies, increasing pressure for improved management and governance structures.

The combination of revenue collection and increased organizational efficiency can be a powerful help to governments. Improved cost recovery can make system upkeep easier, with resultant improvements in efficiency of resource use, and more feasible system extensions, often with associated equity benefits such as providing electricity or sewage services to poorer regions for the first time.

Highly Politicised Government Enterprises. Influencing government-owned enterprises, especially in highly politicised natural resource extraction areas (e.g. oil, natural gas, and other minerals), presents special challenges. Such enterprises face difficult obstacles in preventing corruption given large cash flows and poor transparency and therefore in instituting appropriate environmental controls (government litigation against itself being uncommon).

In such cases, most experts believe that both the fiscal and environmental well-being of the country can be served through privatising the enterprise if not ownership of the resource itself. This can be done either through a direct sale, or by floating a portion of the company in international stock markets. Stock market listing requirements provide important leverage to facilitate disclosure and transparency, and to overcome special interests benefiting from the status quo.

Transitioning to New Technology. Moving an existing market structure to one that includes more environmentally-friendly approaches involves multiple challenges: developing a technology that works; convincing firms to use the technology; and ensuring that the final product can actually be sold.

Some market shifts that mostly require changes in management (e.g., soil conservation on farms) can often be accomplished by making the continuation of existing subsidies contingent on the adoption of sustainable practices.

Where new equipment must enter the marketplace but is still more expensive, policies should reward initiatives once they are sold. Therefore, rather than subsidizing research and development (R&D) or plant construction for wind power, a subsidy per unit of wind power purchased in the market would be provided.

10.4.3 Mitigate Hardships

Policy proposals should include appropriate measures to ameliorate negative impacts, for example transitional support for displaced individuals or poor segments of society.

Where policy implementation is anticipated to cause undue hardships on segments of the population, transitional measures need to be built into the initial policy package. Possibilities include phasing in limits slowly to avoid sudden changes in prices or access rights; exemptions for groups who face high compliance costs but are minor contributors to the problem; or transitional subsidies to highly affected groups.

Solutions that mitigate hardships should adhere to the polluter pays principle as closely as possible, resisting the inevitable efforts by industry groups to have their entire transition costs shifted to the taxpayer. Aside from the reduction in hardship, the flanking measures play an important role in mitigating political opposition to the new policy.

10.4.4 Avoid Inappropriate Use of Economic Instruments

Understanding the conditions when economic instruments are not appropriate is equally important. Box III-10-2 identifies specific conditions where the use of economic instruments may not achieve the desired environmental and economic objectives.

Box III-10-2: When not to Use Economic Instruments

Emergency Conditions. When problems have severe implications, emergency conditions arise, and behaviour needs to stop immediately, directive bans may be more appropriate. Property rights or licensing approaches could work where some activity, albeit a much lower level, would be acceptable.

Excessive Monitoring Costs. Where monitoring costs are too high to achieve a specific environmental outcome, as when there are a large number of very small transactions (e.g., emissions trades), command and control instruments may be a better fit. Similarly, where there are a very small number of homogenous parties, emissions trading would not have an effective market and few efficiency gains would be achieved through trading. Monitoring and oversight costs would exceed the benefit of economic instruments.

Fragmented Oversight Authority. Where authority to set and enforce regulations for the implementation of economic instruments is highly fragmented across institutions, effective oversight of market-based instruments might become impossible. In such cases, command and control instruments tailored to the existing oversight authorities might be more efficient.

Social Stigma. Societal factors can also make market-based approaches more difficult. For example, communal societies may not adapt well to individual members of the society holding particular rights or paying particular fees. In other societies, the activities that would be affected by the economic instruments may have a close link to social status, generating strong resistance to change.

An example is the loss of cattle (and with it prestige) if market-based individual grazing rights policies are attempted in some cultures. However, in these circumstances, economic instruments might work when applied at the community level since the communal decision-making can maintain the existing social hierarchy as access rights are granted.

Insurmountable Opposition. Where political power and interest group factions remain strong, policymakers need to judge the most prudent course. Political power can be used when establishing economic instruments to generate loopholes, exemptions or windfalls, in exactly the same way as this power is applied in command and control instruments. Privatisation can be used as a front for corrupt sales to transfer state-owned assets to private parties with no gain to the public.

High Level of Dislocation. Where large numbers of people will be displaced or unemployed as a result of economic instruments and there is little that can be done to mitigate hardships, caution is required.

10.4.5 Use Subsidies Carefully

In attempting to mitigate hardships, or to achieve political consensus, it is quite common to offer subsidies to affected parties. However, providing temporary or transitional subsidies to facilitate changes should be used sparingly since any subsidy distorts markets and makes them less efficient. In addition, they are often very difficult to end once started.

Rather, subsidies should focus on protecting the poorest sectors of society from any severe impacts of the change. This could be done with:

- Payments to affected poor individuals for transitional assistance, e.g.:
 - For the introduction of environmentally sound technologies.
 - In situations where social benefits greatly exceed private benefits (e.g. the reduction of overgrazing among traditional herders).
 - In situations where payments can be decoupled from any activities causing environmental damage, and limited in time.
- *Pricing mechanisms - offering subsidies flowing only to basic foodstuffs - in societies where central governments cannot be relied upon to provide direct subsidies to the poor.*
- *Support for subsistence sectors decoupled from environmentally damaging production and shifted to subsistence consumption.*

10.4.6 Prioritise Options

Table III-10-1: Policy Ranking Template provides a simple template that can be used to compare the final options across key criteria. The use of a matrix ensures that important data and impact categories are compared for each option. Each separate option generates two columns in the table. The first, "Option Review" will provide very brief text summaries of the policy alternative.

The second, "Ranking", provides comparative rankings that will make policy comparisons easier to do. Ranking methods can be changed to suit needs and preferences (e.g. use of numbers rather than high, medium low; or by weighting some criteria more than others).

Similarly, evaluation criteria can be modified as well to better reflect the objectives of policymakers. This type of comparison can be helpful in trying to decide amongst the final slate of options.

Table III-10-1: Policy Ranking Template

Policy parameter	Option review*	Ranking* (H,M,L)
Description		
Main policy		
Choices re: distribution of initial rights, ability to transfer, duration and caps		
Performance		
Environmental efficacy		
Complexity		
Cost of implementation and operation		
Anticipated side-effects		
Social: highly impacted groups (exposure, job loss, increased poverty)		
Short-term economic impacts		
Long-term economic impacts		
Trade and competitiveness impact		
Proposed flanking measures		
Feasibility		
Institutional capability to implement?		
Powerful opposition?		
Other factors of interest/concern		

* Each of the final policy options should have its own review and ranking columns.

10.4.7 Finalize Policies

Once the general policy principles and instruments have been accepted, policymakers must refine the policy to make it a workable legislative or regulatory proposal. It is necessary to determine how the policy is to be implemented. There must be clear rules for compliance and enforcement, consistent monitoring of progress, and clearly established evaluation criteria. These are discussed below:

1. Ensure Predictability. Policy proposals should have clear rules for their application. The goal is to establish a predictable and transparent set of controls for market participants and citizens alike. This facilitates long-term planning and investment, increasing the efficiency of the rules. Because knowledge about the environmental and health risks of particular activities will continue to grow, provision should be made in the final legislation to allow modification to incorporate new information.

2. Establish Transparent Regulatory Procedures. Most environmental programmes will require the adoption of specific regulations following the adoption of any legislation incorporating the final policy proposals. Such regulations are the crux of what polluters and resource users need to do to comply with the law. The process of adoption and execution of regulations must be transparent and include sufficient

time for review, comment, and explanation of government decision on issues raised before final adoption of any implementing regulations.

3. Determine Methods of Reliable Enforcement. Any law or regulation that lacks provision for effective enforcement is bound to be ineffective. Even for economic instruments that rely on the market to provide solutions, proper auditing of the use of emission permits and punishment of transgressors, for instance, will be needed to ensure that the system will be effective. The policy proposal needs to specify the manner and methods through which the policy will be enforced and specify the responsible agency. It is useful to estimate budget authorization levels needed to enforce the proposed policy.

4. Ensure Objective Dispute Resolution. Coupled with enforcement, dispute resolution procedures prevent abuse of government power, misunderstandings about the meaning of regulations, liability, and other issues. Dispute resolution procedures may include recourse to civilian courts, to administrative law courts, to arbitration or to some combination of these. The exact procedures need to be carefully spelled out in the final policy proposal.

5. Build in Monitoring Procedures. The policy proposal should have a built in system of continuous oversight and monitoring, preferably with public reporting, to ensure that the instrument is doing what it should or to find out when alternatives are needed.

6. Establish Rigorous Evaluation Criteria. Policymakers are sometimes uncomfortable with adopting serious, scientific evaluation of programmes for fear of finding problems that might embarrass the government or a specific agency. However, rigorous openly reported evaluation has many benefits. It can help bring attention to the successes of the programme rather than to isolated anecdotal problems which inevitably occur.

The last point of the above needs particular attention. In addition to regular monitoring, rigorous evaluation gives policymakers information needed to continuously improve environmental management. Some programmes will need more support. Others - temporary subsidy programmes for example - may need to be terminated as their usefulness ebbs.

Economic instruments are often easier to measure than command and control instruments, since simple-to-gauge metrics such as price of a pollution permit, tax levels, presence of performance bonds, etc., are clearly visible. Policymakers should plan to track relevant parameters over time and to make them public. The Organisation for Economic Co-operation and Development (OECD) has developed useful guidance on evaluative criteria for economic instruments, which are given in Box III-10-3. A comprehensive set of criteria needs to be established before project implementation to avoid that only those criteria are tested that can easily be met.

Box III-10-3: Evaluating Economic Instruments⁴

Environmental Effectiveness: Are emissions levels or resource depletion rates falling? Are ambient concentrations in the surrounding environment declining? (These are critical metrics to establish both baseline values and measurements over time. Unfortunately, even this basic data is often lacking).

Economic Efficiency: Are costs of emissions rights stable or declining? Are they less expensive than projected in advance? (Falling values normally indicate that businesses are finding more efficient abatement methods.) Are new abatement technologies entering the market? Are trades being used? (Falling values with declining trades suggest either that new non-polluting options have emerged or that polluters are not purchasing required permits).

Administration and Compliance Costs: Has the public sector implemented an effective administrative oversight programme for the policies? How expensive is this to run relative to the value of trades occurring, emissions reductions realized, or anticipated cost of command and control programmes? How expensive are the administrative costs to the private sector relative to those normally incurred under a command and control approach? Are institutions cooperating to achieve the policy objective, or are efforts being blocked?

Revenue Generation: Are user fees sufficient to cover the full costs of providing particular public services? Are fees appropriately levied on different user groups? Are environmental taxes high enough to trigger appropriate price increases in the products/production processes of concern? Are revenues retained to support additional environmental protection efforts or diverted to the general treasury?

Wider Economic and Social Effects: Are there noticeable (positive or negative) effects on employment, poverty, trade, competitiveness, growth, or rates of innovation that can be reasonably attributed to the environmental policies being evaluated? Where these impacts are negative, are they transitory or permanent? Can policy modifications mitigate the transitional dislocations?

Anticipate the Need for Long-Term Funding: External resources (e.g., from non-governmental organisations or international agencies) can support policy research, initial implementation or staff training for economic instruments-based programmes. However, such organizations should not be relied on to support ongoing operations as the entire effort will be at risk when funding priorities change.

A long-term plan for implementing and overseeing the policy should be considered at the outset. Because different policy options can place very different long-term monitoring and enforcement responsibilities on the government, advance attention can ensure a more robust policy solution in the long-term, rather than one for which adequate funding will be a perpetual problem.

⁴ OECD, (1997) Evaluating Economic Instruments for Environmental Policy, pp. 91-99.

Because many economic instruments also raise revenue through licensing fees or permit sales, such programmes have the potential to be self-sustaining. However, diversion of collected funds for other purposes (such as to general government spending) can negate this policy benefit.

Prepare a Well-Reasoned Report on Policy Recommendations: Policy recommendations should be presented in clear language accessible to non-experts along with an analysis of their strengths and weaknesses. The resulting report should include options that have the most reasonable chance of success given the existing baseline conditions and the seriousness of the environmental or natural resource depletion problem. Further refinement and finalization of policy recommendations will:

- *Incorporate relevant stakeholder feedback,*
- *Address the concerns of government officials responsible for adopting and implementing the policy, and*
- *Adopt additional design elements related to the practical execution of the policy.*

The preparation of a closely reasoned and substantiated policy options paper represents a great improvement over unsubstantiated guess work that too often drives policy solutions.

10.5 Phase 4 - Implement and Evaluate

The policy implementation and evaluation phase involves moving from outreach and data gathering to choosing and implementing a final policy package. If the earlier phases have been completed well, a good deal of the rationale for the policy choice, and the outreach to affected parties, will already have been done. Important aspects of policy execution are discussed below:

10.5.1 Reach Political Agreement

Never underestimate the challenge of reaching political agreement. Having a good policy is just the beginning and must compete with other government priorities and the influence of opposing political interests.

The process of attaining political agreement needs to be managed strategically to defuse potentially fatal opposition. Political agreement, however, does not necessarily require general consensus; only enough political support to execute the policy.

Political acceptability can be enhanced if policies have an easy-to-understand technical basis, the oversight agency demonstrates adequate capabilities to perform required monitoring and evaluation, and credible financial penalties and sanctions are introduced. Stakeholder support can be especially helpful in negotiating the political terrain.

10.5.2 Enact Legislation

It is not enough to have prepared excellent policy proposals. It is critical that legislation be drafted to fully reflect the final policy proposals and be enacted without deletion of key provisions or dilution of the economic instruments being proposed. Similarly, monitoring of the legislative process can help prevent debilitating amendments. Again, stakeholder support can be critical to ensure passage of effective legislation.

10.5.3 Provide Resources

A programme without necessary funding is no programme at all. In gaining political support, it is therefore critical that government officials with budgetary authority understand and accept the programme and ensure sufficient funding to operate. Even economic instruments that generate funds from dedicated fees or taxes will need initial funding to establish the programme.

10.5.4 Promote Collaboration

Instrument choice will influence which relationships are most critical to establish and maintain. Economic instruments that bring in public revenues or solve problems for other ministries as well as protecting the environment offer immediate allies. Strong existing relationships between the government and certain stakeholders may support execution of the programme.

10.5.5 Market the Programme

To gain widespread acceptance, programme administrators must explain the policy being implemented, why it was chosen, and what steps are taken to ensure that this decision makes sense and incorporates the feedback from the various stakeholder groups. The basic explanation should be concise, easy to understand, and released at the same time as the policy package choice. Where decisions go against the expressed position of stakeholder groups engaged in Phases 2 and 3, it is important to recognize this disparity and to explain the reasons for the decisions being made. Follow-up is also needed to address questions and to provide continued updates of progress or resistance to the policies.

10.5.6 Continuously Monitor and Evaluate

It is not enough to have a monitoring and evaluation system on paper. It must be rigorously implemented from the beginning of the programme. In this regard, measurement is essential. Total quality management expert W. Edward Deming noted that if “we can’t measure it, we can’t manage it.” Measurement is needed to evaluate progress, to determine when policy modifications are needed, and to learn from the existing applications so new applications are easier to accomplish.

Both the environmental problem and the baseline conditions change over time; this can change the incentives faced by firms and resource owners. The more complicated a programme is to monitor and enforce, the less likely it is to succeed, especially in the developing world.

The details of monitoring and enforcement needs will be shaped by the specific programme. These components need to be included in the management process from the outset. Often data on the severity of baseline environmental damages or emissions can strengthen the power of the environmental interests to prevent policy derailment.

Maintaining strict control of the input process and timeline during the evaluation phase is a central part of this process, signalling that the ministry is open to outside information but will control how this information is being used. Do not let anyone fudge the numbers and stick to the evaluation criteria that have been defined beforehand (see section 10.4.7).

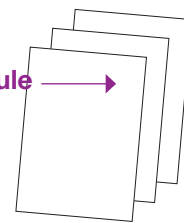
10.5.7 Enforce the Law

Establishing policy credibility is critical if the affected parties are to take it seriously. Credible and strong enforcement actions from the point of implementation are also critical. As with inviting information during policy development, the strong enforcement actions should also be supported with outreach and compliance support to help industries having trouble complying. However, unless violators are brought to task for failing to control their resource use or emissions, credibility for the programme and possibly the ministry overall can decline rapidly.

10.5.8 Stay on Course

Political challenges will almost certainly continue even after policy instruments have been chosen. Imposing realistic tax rates or fee levels on established resource users or polluters can be most difficult. Such matters are at the heart of nearly all political processes.

Political patience may also be tested when the economic instrument involves the creation and support of new markets (e.g., for pollution permits), especially where there is no history of strong markets in other commodity areas. Public officials expect immediate results from policy initiatives and need to be realistically informed about the time required to build successful markets.



Module 10 Final

Group Exercise on Identified Environmental Problems

Finding a Policy Solution (Handout)

Objective

Based on the previous Modules, try to find a policy solution for the environmental problem that you have worked on in Modules 1 and 3.



Instructions

Work in the same groups as in the exercises in Modules 1 and 3.

Make a plan for designing an economic instrument to address the previously identified environmental problem.

- Specify the information and analysis you would need
- Specify relevant stakeholders and mechanisms of involving them
- Propose economic instrument or set of instruments that could address the problem and explain your choice
- Identify prerequisites for implementing an economic instrument

Steps of the Exercise

- Discuss the above points in your group
- Jointly prepare a presentation addressing the above points
- Select a speaker
- Present your case in the plenary

Module 11

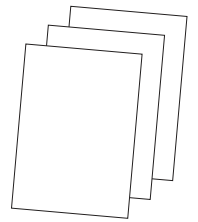
Course Evaluation and Follow-up

EVALUATING THE TRAINING COURSE



An evaluation session can be valuable for both participants and trainers. For participants the session allows time to reflect on what they have learned and what more they would like to learn on specific topics. The trainers receive information needed to modify and improve the delivery, content and structure of the course.

Training Course Evaluation Form (Handouts)



The following form is provided as an example only and should be modified by the trainer to fit the needs of the actual course agenda being used.

Name of training course:

Dates of training course:

Name of trainer:

Presentation of Individual Topics: Which topics were the most interesting or useful and which were the least? Could you please make a brief comment explaining your reason?

most interesting	least interesting

Comments:

Are there any topics that you might think could be added to, or deleted from, the course?

Impressions of Training Course as a Whole

Tick the circle that best describes your assessment about the training course

1. Course overall

☐ ☐ ☐ ☐ ☐

boring interesting

2. Understandability

☐ ☐ ☐ ☐ ☐

poor good

3. Coverage of subject

☐ ☐ ☐ ☐ ☐

poor good

4. Information content

☐ ☐ ☐ ☐ ☐

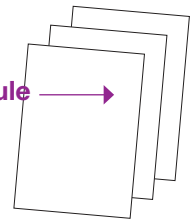
Not informative informative

5. Relevance to my needs

☐ ☐ ☐ ☐ ☐

Not relevant very relevant

Click on the tabs to the right to go directly to each Module →



1

2

3

4

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6

7

8

9

10

11

PART III

6. Pre-training assignment

☐ — ☐ — ☐ — ☐ — ☐
 Inadequate very adequate

7. Organisation of training

☐ — ☐ — ☐ — ☐ — ☐
 Not well organized well organized

8. Trainer knowledge of
subject material

☐ — ☐ — ☐ — ☐ — ☐
 Poor very good

9. Background information

☐ — ☐ — ☐ — ☐ — ☐
 Insufficient about right too much
☐ — ☐ — ☐ — ☐ — ☐
 Too general about right too specific

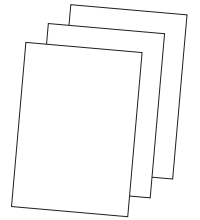
10. Comments

11. How could the training course be improved?

12. Will the participant handbook be useful to you in the future?

13. What follow up activities or materials would be useful for you?

Course Administration and Facilities



Tick the circle that best describes your feelings about the course administration and facilities.

14. Course administration	☐	☐	☐	☐	☐
	Poor				good
15. Course facilities	☐	☐	☐	☐	☐
	Poor				good
16. Accommodation	☐	☐	☐	☐	☐
	Poor				good
17. Meals and refreshments	☐	☐	☐	☐	☐
	Poor				good

18. Comments:

Optional

19. Your professional background:

20. Your organization/agency/institution:

21. Your position/function:

22. Your first language:

Annexes

Additional Training Materials

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Comprehensive Glossary of Terms Related to Economic Instruments



Any discussion of environmental and natural resource management requires an understanding of the specialized terms used. Some of these may be new while others are common terms with a special meaning in this context.

For ease of understanding, many terms are defined at the beginning of the relevant training module or in the text itself.

Annex I

Comprehensive Glossary of Terms Related to Economic Instruments

Absorptive Capacity: The ability of the environment to absorb pollutants. If the emissions load exceeds the absorptive capacity, the pollutant poisons the environment.

Ambient Permit Trading: A variant of tradable emission permits in which the value of emission reduction credits differs from region to region depending on the relative ambient concentrations so as to discourage development of 'hot spots'.

Ambient Standards: Legal ceilings placed on the concentration level of specific pollutants in the air, soil, or water.

Asset: An entity that has value and forms part of the wealth of the owner.

Beneficiary Pays Principle (BPP): The inverse of the polluter pays principle. Those who benefit pay for maintenance of environmental quality. This has particular application when developed countries are paying for global environmental benefits supplied by low-income developing countries (e.g. protection of rain forests which absorb greenhouse gasses).

Benefit: In public policy a benefit may include many different - and sometimes conflicting - outcomes. These may include financial gain for private corporations, increases in tax revenues for governments, reduction in pollution, protection of natural resources, or general voter approval. Similarly short term benefits may be outweighed by long term costs and vice versa. Policymaking requires balancing benefits among themselves as well as against measured costs.

Benefit-Cost Analysis: An exercise which attempts to quantify both the benefits and costs in comparable terms in order to compare them.

Bioprospecting: Collection of biological samples in living things that will have some medical or commercial use (plants, animals, micro-organisms) and the collection of indigenous knowledge related to these resources. It is often argued that bioprospecting has to be allowed by the biodiversity-rich country and must benefit it (and the communities that traditionally use these resources) as well as the corporations (usually from developed countries) or universities collecting the resource. Bioprospecting must follow the rules of international treaties and national laws.

Cap and Trade Programme: An economic instrument by which the government sets the total allowable pollution or resource harvest units in a given area and over a given time period (the 'cap') and then leaves polluters or resource users to trade this total among themselves using the market. (See Tradable Permits).

Clean Development Mechanism (CDM): An instrument authorized by the Kyoto Protocol that enables both the private and the public sectors of Annex I countries (mostly developed countries) to invest in projects, which result in emission reduction undertaken in non-Annex I countries (mostly developing countries and countries in transition). The investing (Annex I) country receives credits against its Kyoto Protocol emission reduction commitments for some of the resulting reductions in the non-Annex I country.

Command and Control Instruments: The laws and regulation used by governments to directly control pollution and manage natural resources. In the application of these instruments, the government can stipulate the technologies to be used to curb pollution, determine the maximum amount of emissions

that can be released into the environment, and regulate the use of natural resources. The instruments are enforced directly by the government rather than depending upon the market.

Carrying Capacity: The level of population of any species that a given habitat can sustain indefinitely.

Common Pool Resource: A resource which is available to everyone and which cannot be divided among users (e.g. clean air).

Common Property Regimes: A property rights system in which resources are owned and managed collectively by a group rather than by individuals.

Common Property Rights: Similar to communal tenure with the exception that the land or property in question is owned rather than leased by the group. As an economic instrument common property rights can be granted or clarified to encourage protection of the environment or natural resources.

Communal Tenure: The right of a group, usually traditional users from one ethnic or social group, to hold and use property. Traditional tenure is often ill-defined. Serving as an economic instrument, communal tenure can be created or clarified under conditions requiring the protection of the environment. Communal tenure is not granted to individuals in the group and cannot usually be bought and sold in the market.

Compliance Costs: The costs for the polluter or natural resource user of complying with an environmental policy. Such costs need to be factored in when determining cost effectiveness of a policy instrument.

Cost Effectiveness: A situation where the benefits of a policy instrument exceed the overall cost of managing or enforcing the policy.

Cultural Values: The beliefs, habits, and traditions of a group or an entire society that determine the relative worth of ideas, economic activities, types of property, or uses of property. Such values can be of equal or greater importance to policymaking than those of vested interests, and other more immediate stakeholders.

Debt-for-Nature Swaps: A financial exchange whereby a developing nation's monetary debt to another country is reduced in return for improvements in environmental protection in the developing country. The debt relief is given as a compensation for the developing nation forgoing income that it would receive for licensing environmental destructive practices (e.g. mining, logging rainforests).

Demographic Conditions: The size, growth rates, and makeup (by age, sex, and ethnicity) of the general population that can affect environmental policy.

Deposit Refund Systems: A system involving a charge on some particular item and a subsidy for its return. Deposit Refund Systems are combined instruments of charge and subsidy used to encourage environmentally appropriate recycling. Recycling beverage bottles and cans are the most well known example but the principle applies to anything (automobiles, chemicals, fluids) that can cause environmental damage if not recycled.

Eco-Management and Audit Scheme (EMAS): Voluntary instrument introduced in 1995 in the European Union, which acknowledges organizations that improve their environmental performance on a continuous basis. EMAS registered organisations are legally compliant, run an environment management system and report on their environmental performance through the publication of an independently verified environmental statement. They are recognised by the EMAS logo, which guarantees the reliability of the information provided.

Economic Instruments (EI): Economic instruments provide market and financial incentives for polluters and natural resource users to change their behaviour. The economic instruments incentives include such mechanisms as taxes, emission or access charges, marketable permits, and changes to property rights.

Emission Charge: A fee, tax or financial penalty levied on emitters for each unit of a pollutant emitted into the air or water.

Emission Reduction Credit: Credits given to those firms that reduce emissions more than required. Firms can either sell them to firms whose emissions are above the statutory minimum or bank them for their own use in the future.

Emission Standard: A legal limit placed on the amount of a pollutant an individual source may emit.

Enforceability: The degree to which it is possible to enforce a law or to protect a right. In discussion of property rights, it is the degree to which owners can protect legally held property from involuntary seizure or encroachment from others.

Environmental Certification: A process by which the manufacturing or harvesting process is inspected and certified to be consistent with certain environmental practices.

Externality: The consequence of any economic activity that results in costs outside of the activity. The intended outcome of burning coal may be to generate electricity. The externality is the resulting air pollution that imposes costs on the general public. The negative effects of many economic externalities are often born by the general public and the problems caused can only be addressed by sound public policy. (See Internalise Externality).

Financial Exchanges: Arrangements whereby a country or a nongovernmental environmental organization provides financial incentives to developing countries, local jurisdictions, or other groups to engage in environmentally friendly practices (discontinue destroying tropical forests, reduce polluting emissions, etc). These incentives may involve direct grants, debt relief, or trade concessions.

Fiscal Systems: Governmental policies, procedures, and agencies necessary to collect and disperse taxes, fees, etc. The integrity of such systems is vital to the success of all environmental policies whether they use command and control or economic instruments.

Flow Resources: Renewable resources like grasslands, forest, water that, if not overused, will naturally renew themselves. (See also Renewable Resources and Fund Pollutants).

Free Rider Effect: A situation in which some users enjoy the benefits of goods or services purchased by others without paying anything themselves (e.g. countries that decide not to take any steps to control global warming can “free ride” on the steps to reduce greenhouse gases taken by others).

Fund Pollutants: Wastes for which the environment has some absorptive capacity. Many organic pollutants released into streams or rivers will be transformed by the resident bacteria into less harmful organic matter. As long as the emissions rate does not exceed the absorptive capacity of the environment, these pollutants do not accumulate to create environmental problems.

Global Environmental Facility (GEF): A global fund, established in 1991, managed by the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP), and the World Bank. GEF helps developing countries fund projects and programmes that protect the global environment, including projects related to biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants.

Global Pollutants: Substance that pollutes the upper atmosphere, such as fluorocarbons affecting the ozone layer.

Governmental Authority: The ability of the government to enforce laws and to effectively implement programmes throughout its area of jurisdiction. Neither economic nor command and control instruments policies can be implemented without sufficient government authority.

Government Failure: The inability or unwillingness of government to redress environmental imbalances.

Greenhouse Gases: Global pollutants (e.g. carbon dioxide, methane) which contribute to climate modification (global warming) by absorbing the long-wave (infrared) radiation, thereby trapping heat which would otherwise radiate into outer space.

Information-Based Instruments: Methods of informing the public about how eco-friendly a product is. This can be done by labelling, rating, or other techniques. Information-based instruments may also include widespread public education programmes on anti-littering or energy conservation or other high profile campaigns.

Individual Transferable Quota (ITQ): A means of protecting a fishery and the income derived from it by limiting the number of fish caught through the use of tradable permits. Individual fishers are allocated quotas that entitle them to portions of the authorized total allowable catch. These quotas can be used, or kept for later use, or sold to other fishers.

Input and Output Taxes: Levies on some input or output that can be easily monitored and that serves as a good indicator or proxy for the pollution that is to be regulated. They are often used in cases where the monitoring of emissions is impossible, difficult or costly, so that the government cannot directly tax the polluting activity. Gasoline taxes and vehicle weight charges are examples that are introduced based on the assumption that the ones paying will also be responsible for car emission and thus cause the environmental harm.

Institutional Failure: A situation where the government does not implement environmental policies because of an inability or unwillingness of its agencies or institutions to operate functioning administrative, tax, legal or fiscal systems. To the extent that institutional capabilities needed to promulgate and enforce the policy instruments effectively are lacking, the performance of the instruments will suffer.

Internalising Externalities: Raising internal production costs to cover the external costs to society of pollution or natural resource exploitation.

Internationally Transferable Emission Permits: Cross-border tradable permits to emit pollutants, which have been included as instrument under the Kyoto Protocol. These permits are similar to domestically tradable emission permits but are established by an international agreement. The Kyoto Protocol allows Annex I countries (mainly developed countries) to acquire units from other Annex I countries and use them towards meeting their emissions targets under the Kyoto Protocol. This enables countries to make use of lower cost opportunities to reduce emissions, irrespective of the country in which those opportunities exist.

ISO 14000: International Standards Organization rules for environmental practices and for independent verification of those practices. The ISO 14000 family of standards is primarily concerned with what an organization does to minimize harmful effects on the environment caused by its activities, and to achieve continual improvement of its environmental performance. Governments may require ISO 14000 certification for government contractors to promote environmental protection.

Joint Implementation (JI): A provision of the Kyoto Protocol that allows Annex I countries to implement projects that reduce emissions, or remove carbon from the atmosphere, in other Annex I countries, in return for emission reduction units. The investing Annex I country can then count the carbon benefits towards meeting its emissions targets under the Kyoto Protocol.

Kyoto Protocol: International agreement concluded to at Kyoto Japan where it was adopted by the Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC). It became effective in 2005 and is a first step toward setting binding obligations on countries to reduce pollutants. The Protocol establishes binding commitments for countries specified in Annex I of the protocol

(mostly developed countries) to reduce greenhouse gas emissions and allows trade of emission permits among them. (It has several “Annexes” making separate provisions for developed, and developing countries, and countries in transition in addressing global environmental problems.) The full name is The Kyoto Protocol to the United Nations Framework Convention on Climate Change.

Labelling (Environmental): The use of product labels to inform consumers that a product has been manufactured, mined, or harvested in accordance with certain environmental standards or practices (e.g. organically grown). The intention is to allow consumers to purchase products that were produced with the least harm to the environment.

Legal Instruments: Policy instruments that hold individuals, firms, and organizations liable for environmental damage they cause. Legal instruments include criminal penalties, fines, civil liability statutes, and performance bonds.

Liability: Legal obligation to pay for damages caused. A law, for instance, may permit an activity (oil drilling) but require the company to bear all the costs of environmental damage caused by the activity.

Load: The amount of waste products in the environment at any given time. The damage done by the load depends on the capacity of the environment to assimilate the waste products.

Marginal: Small, literally at the margin or edge, as in a small change, commonly interpreted as a one-unit change.

Marginal Cost: The extra cost of producing one more unit of a good.

Market: Any arrangement whereby goods and services are freely exchanged between buyers and sellers based on agreed-upon prices and without coercion.

Market Failure: An inability of the market to compensate for the costs to society – the externalities - of pollution or loss of natural resources. Market failure occurs because the market does not require companies or individuals to internalize externalities.

Maximum Sustainable Yield: The maximum harvest that can be sustained indefinitely from a renewable resource.

Minimum Viable Population: The level of population of a species below which regeneration is negative, leading ultimately to extinction.

Natural Resource Use Fees: Price-based instruments such as mining royalties, stumpage fees, user fees, and land taxes used for natural resource management. Governments impose these fees and taxes to correct market failures (any externalities related to resource use) or institutional failure (the absence of property rights).

Net Benefit: The excess of benefits over costs.

Nonpoint Sources: Diffuse sources such as runoff from agricultural or developed land.

Non-renewable Sources: Finite resources, such as iron ore or oil, that cannot be renewed.

Open Access Resources: Resources which anyone may use without payment to any owner or government entity.

Opportunity Cost: The cost of choosing one thing over another where doing one thing prevents doing another. If a family buys an expensive house they may have to forego eating out to make the mortgage payments. Not being able to eat out is the opportunity cost. The ultimate source of opportunity cost is scarcity (unlimited wants and needs, but limited resources).

Output Based Allocation: The initial allocation of pollution permits based on relative output levels of existing firms.

Performance Bonds: A form of insurance required to ensure that the company will be able to pay for any environmental damage caused by its activities.

Perverse Subsidies: Payments such as those that promote certain kinds of economic development or support specific industries (fishing, forestry, etc.) that cause environmental damage. Removal of such subsidies constitutes an economic instrument for environmental and natural resource protection.

Pigovian Tax: A tax levied to correct the negative externalities of a market activity (after the economist A. C. Pigou). This can be for example an environmental tax or a sin tax (taxes on alcohol or cigarettes). A true Pigovian tax would charge polluters precisely the cost their pollution imposes on society.

Point Sources: Sources of pollution that discharge effluent through a readily identifiable emission point such as a discharge pipe. (Most industrial and municipal sources are point sources).

Policy Failure: The inability or unwillingness of government to address problems resulting from the failure of the market to address externalities such as pollution or loss of natural resources (See Market Failure, Institutional Failure, and Internalize Externalities definitions.)

Pollution: Undesirable by-products of human activity. These may be poisonous in themselves (e.g. heavy metals) or harmful because of the quantity involved (e.g. raw sewage).

Polluter Pays Principle (PPP): The principle that costs and responsibilities associated with pollution should be borne by the polluter as much as possible. This is accomplished through a variety of penalties and inducements. (See also Beneficiary Pays Principle)

Pollution Taxes and Charges: Levies on pollution that seek to internalise externalities of pollution by increasing the price of a polluting activity. They intend to shift the costs of pollution that would otherwise be borne by society back to the polluter. Governments can apply taxes and charges in cases where they are able to monitor and tax the polluting activity (e.g. sewage effluent or smokestack emissions).

Price-Based Instruments: Special government taxes, charges, or fees designed to raise the price of polluting the environment or exploiting natural resources. These policies attempt to set the price for users of environmental and natural resources 'right' to cover the excess social and environmental costs caused by the economic activities of polluters or natural resource users.

Pollution and overuse of renewable natural resources impose costs on society, which are not borne by the private firms and individuals that cause them and which the market does not account for. These costs are a type of externality. Appropriate pricing of resources through price-based instruments sends a more accurate signal to users encouraging more appropriate resource consumption and conservation.

Prisoner's Dilemma: A parable used to show the game theoretic aspect of the tragedy of the commons. Two prisoners have both the choice of testifying against each other or keeping quiet. If both did the latter they would get a light sentence, but the game theoretic analysis shows that, in the particular setting, their preferred strategy is to betray their fellow prisoner. The result is the worst possible for them – a tough sentence for both prisoners.

Property Rights Based Instruments: Policy instruments that define, adjust, or create property rights to ameliorate environmental damage. They define the basic enforceable law for ownership and use of both tangible (e.g. land) and intangible (e.g. permits) property. More specific instruments include tradable emission permits in pollution management, individual transferable quotas in fisheries management, transferable grazing rights in range management, and transferable development rights in property management.

Property Rights: The right to ownership and use of both tangible (land, buildings, etc.) and intangible (patents, trademarks, copyrights, etc.) property. To be meaningful, such rights must not be able to be revoked without clear transparent legal procedures and proper compensation for the value of the property.

Property Rules: Legal rules that govern the initial allocation of entitlements to property including intangible property such as tradable permits. Valuation of the property is left to the market.

Public Good: “Good” in this sense means “product or service” rather than “virtue or benefit.” A public good is a product or service that is available to the general public - payers and non-payers alike. In other words, use of the good by one person doesn’t prevent use by others. Examples include national defence, a clean environment, and public fireworks displays. Private businesses cannot sell public goods in markets, because they cannot charge a price and keep non-paying people away.

Refunded Emission Payments (REP): A combined economic instrument that uses both charges and subsidies. A REP is a charge imposed on polluting firms, the revenues of which are returned to the same group of polluters, not in proportion to the payments made but in proportion to another measure such as output. The individual firm pays a tax on emissions and receives back a share of the total fees collected based on output. The net effect of the payment and refund is that firms with above average emissions make net payments to the firms that are cleaner than average.

Regional Pollutants: Air or water borne pollutants that can cause damage beyond the immediate vicinity of an emission source.

Regulation of Technology: Bans or restrictions on specific technologies that cause pollution or deplete natural resources (e.g. ban on the production and use of unleaded petrol).

Regulation of Performance: Command and control policies that impose directly enforced limits on the quantity of emissions or harvest of a renewable resource for each individual or firm. The resulting performance standards target individual levels of emissions or natural resource exploitation rather than requiring or prohibiting particular technologies.

Renewable Resources: Natural resources (e.g. fresh water, oxygen, forests, wildlife, fisheries). Unlike mineral resources, which are mined, the available stock of renewable resources is not fixed but can be increased or decreased. It will increase if allowed to regenerate and decrease if overexploited.

Rent: An economics term meaning profit in excess of what would be possible under a perfectly competitive market. (Not to be confused with what an apartment dweller pays a landlord). Monopolies are able to charge rent prices because they have no competition.

Rule of Law: A situation in which a stable, transparent, and impartially administered legal system prevails. Established courts make decisions that are based on written law and open to all parties. Court decisions are not arbitrary, capricious, determined by corrupt practices (bribery, nepotism, etc.), or directed by outside forces (political rulers, vested interests, etc.).

Scarcity Rent: A form of rent income (excess profit) that accrues to an owner of a natural resource just because the resource is scarce. In the absence of property rights – i.e. of private ownership - there is no owner to claim the scarcity rent, and the resource may be exploited because its price does not reflect the scarcity. In those cases, price-based instruments such as mining royalties (a payment to the state for the right of use of a state’s mineral resources), stumpage fees (a fee typically charged by the government to logging companies for the right to harvest lumber from public land), or user fees (fees charged to users of goods or services provided by the government) can be used as payments for a scarcity rent. This ensures that the resource user pays for the opportunity costs which society incurs when the resource is exploited today and thus will not be available in the future.

Self-Enforcement: A situation in which those regulated by a policy have an interest in seeing that the laws and regulations are enforced. For example, groups given communal property in perpetuity have an incentive to ensure that other people do not encroach on the land, and assets are managed for the long term.

Stakeholder: Those who have an interest (or stake) in particular laws, regulations, or policies. These may be companies, individuals, social groups, environmental organizations, or public agencies. They include but are not limited to those who have a vested interest in the situation.

Stationary Source: An immobile pollution source (e.g. factories as opposed to automobiles. See Point Source).

Stock Pollutants: Undesirable wastes for which the environment has little or no absorptive capacity. Examples of stock pollutants include non-biodegradable bottles tossed by the roadside; lead and other heavy metals, which accumulate in the soils near the emissions source; and persistent synthetic chemicals such as dioxin. Stock pollutants accumulate over time as the pollutants enter the environment.

Stock Resources: Resources, like minerals, that once used cannot be renewed.

Subsidies: Payments or other economic incentives (e.g. tax breaks) to individuals or firms to compensate expenses incurred through environmentally friendly behaviour, thus encouraging this behaviour. (See also perverse subsidy)

Surface Pollutants: Substances, which pollute the water, land or air near the earth's surface.

Tax Expenditures: A loss of potential tax revenue resulting from an exemption, credit, or refund of taxes for polluters that have introduced abatement or clean technology.

Technology: Any method of performing a task. There are technologies for the generation of electricity, making charcoal, fishing and all other economic activities. Technology regulation may cover both the equipment and processes used for any economic activity. The regulation of technology is one means of controlling pollution or overuse of natural resources.

Tenure: The right to hold and use property and its resources under defined conditions. Tenure differs from outright ownership (see property rights) in that the tenured property cannot usually be bought and sold although tenure rights in the form of tradable permits may be bought and sold.

Total Allowable Catch (TAC): The total tonnage of particular fish species that is deemed sustainably harvestable based on monitoring of fishery health and thus is set as the quota.

Tradable Permits: Economic instruments used to address environmental problems by requiring each polluter or resource user to obtain permits for the amount of pollution he or she releases. Permits are issued in units of pollutants or rights to harvest a natural resource and may be bought and sold in an open market. The government sets the total number of permits at a level to reduce pollution or protect sustainable levels of a renewable resource. Permit holders have an incentive to reduce emissions or curb harvesting in order to sell excess permits.

Tragedy of the Commons: A metaphor describing the mechanism leading to the overexploitation of common resources. Each individual involved has an incentive to increase his or her own benefit from the resource before others do so. The result is an overuse that may be unsustainable and can lead to the extinction of the resource.

Transferable Development Rights: A mechanism that allows landowners to sell their development rights to other property owners. In TDR schemes, development per area is restricted by legislation, and can even be completely prohibited in some designated areas whose preservation is in the public interest.

Landowners not wishing to, or not being allowed to, take use of their development rights can sell them on the market to others who thus expand their original development restriction level.

Transferable Emission Permits: Tradable permits specifically designed to reduce polluting emissions.

Transferability: The right of owners to voluntarily sell or donate property rights.

Transparency: A situation in which information, decisions, and actions of the government and those regulated are available to the general public. Transparency is essential for the functioning of most economic instruments.

Uniformly Mixed Pollutants: Air pollutants that are not harmful locally because they are uniformly mixed with the ambient atmosphere but cumulatively can cause harm for the entire planet. (Examples include ozone-depleting gases and greenhouse gases).

Vested Interests: Those who have a direct financial interest in the content and enforcement of particular laws, regulations, and policies. They are often more organized and vocal than those without a direct financial interest.

Voluntary Environmental Agreements: Formal negotiated agreements between companies or groups of companies and the government (or on some occasions nongovernmental environmental groups) to limit pollution or the overuse of natural resources. Such agreements allow the parties to avoid specific legislation or intrusive government regulation or legislation and provide the flexibility that comes with negotiated agreements. Such agreements are backed by the threat of government sanctions in case the parties do not adhere to the agreements.

Zone of Influence: The geographic area affected by any given environmental or natural resources management problem. Policies addressing the damage caused by local pollutants near the source of emissions will differ from those for regional pollutants affecting wider areas. The local and regional categories are not mutually exclusive; it is possible for a pollutant to be both. Nitrogen oxides released into the air, for example, or chemical discharges into rivers can be both local and regional pollutants.

Zoning: Regulation of the uses of real property to achieve environmental protection in specific locations. Zoning designates permitted uses of land based on mapped zones, and hence can restrict certain types of economic activity in specific zones, for example because of noxious emissions, destruction of natural scenery, high noise levels, etc.

A Primer on Economic Instruments¹



This Annex provides a brief overview of the structure and application of common economic instruments. As outlined in the text, the instruments are usually implemented to achieve one of a handful of objectives: establishing property rights, recovering revenues, ensuring fair returns on asset sales, protecting against environmental damages from activities, or subsidizing the transition to cleaner alternatives. The sections below provide more detail on each area, including how the policy instruments work and what parameters can be altered in order to modify the policy impact.

One perhaps obvious, but nonetheless important caveat is that these descriptions are generalizations of policy approaches. Where social, political, or economic pressures on people are severe (e.g., populations facing starvation or corrupt regimes seeking to sell national assets), environmentally-detrimental behaviour is likely to dominate regardless of what policy constraint is supposedly in place. However, under a range of more normal conditions, economic instruments can be extremely effective tools.

¹Adapted from UNEP (2004): The Use of Economic Instruments in Environmental Policy: Opportunities and Challenges.

Annex II

A Primer on Economic Instruments²

1. Establishing, Clarifying or Improving Property Rights

A range of instruments including permits, quotas, licensing or concessions, and litigation rights aim to achieve this policy objective. Owners tend to take more care to protect their resources than do users who have no stake in the long-term productivity of the resource. Owners are also more willing to invest money to improve these assets, believing they will achieve higher long-term returns, and can use these assets as collateral for loans with which to finance resource management or upgrades.

With a well-functioning legal system, clear property rights also empower owners to enforce contracts against vendors or subcontractors who have not properly protected resources during extraction activities. Owners are not necessarily sole individuals: community or corporate ownership is also included.

An important limitation of property-rights is that they work less well when the property is less tangible (e.g., air pollution versus grazing rights) or more widely dispersed (e.g., local air emissions versus global emissions). In addition, market allocations may sometimes need to be constrained by governments to protect the resource base or to avoid “hot spots” where trades concentrate emissions within sub-populations or ecosystems.

a. Variations in Property Rights

Depending on how property rights are assigned, allocated, and transferred, owners will face very different incentives, and governments can experience very different costs.

Initial Allocation Options. Rights can be given for free or auctioned. Auctions raise revenues for governments and provide better price signals. Give-aways are sometimes justified on the ground that they reduce the economic shock to existing producers who previously paid nothing. They may also help overcome political resistance to the new policy. The grants may be based on current (or partial historical) gross emissions (grandfathering) or on emissions per unit output (output based).

Regardless of the method, such grants, by definition, favour the status quo and can create barriers to entry for newer, cleaner firms. Benchmarking firms, which is to award permits based on some form of a performance standard, can reduce this bias somewhat, but requires a fair degree of additional administration.

If resale markets are not liquid, initial recipients may not face accurate price signals about the value of their resource/pollution rights, under-investing in controls. Often, the aggregate rights available are capped at a particular level to protect the resource, a common example of mixing command and control with economic instruments approaches.

Types of Ownership. Rights can be owned by individuals, firms, or communally. Communal rights can be a good solution for subsistence communities, though care must be paid to how the community itself sub-allocates these rights to its members and controls new members from entering the community and

² This annex follows the same structure and numbering as Annex III - Impact Economic Instruments on Incentives of Firms and Individuals. Annexes II and III can be used in conjunction.

putting the resource base under excessive pressure again. Where subsistence groups rely on a low level of resource access, a market divided into two branches may be set up with large firms competing for marketable rights and subsistence farmers/ranchers/fishermen granted subsistence access for free.

Tradable or Not. Rights can be tradable or not. Tradable rights provide better price signals and stronger incentives for improvement, since firms can always earn money if they can reduce their need for the rights via internal reform or innovation. One drawback to marketable rights is that they may marginalize small producers as existing owners sell out to large companies with economies of scale. Even where not marketable to third parties, policies may allow averaging of emissions across a plant or company, a process that can also generate substantial efficiencies for industry.

Duration. Rights can be in perpetuity (ownership rights) or for a limited period of time (use rights). Development rights, such as patents and prospecting rights, can last for a decade or more, but are not permanent. Some permit regimes have rights expire to provide increased pressure for innovation on the rights holder. Phased expirations also ensure that there is an active market in the rights as expiring allocations must be repurchased. This helps create a more liquid market for the permits, and more accurate pricing. Longer durations are generally more valuable to the owner, but provide less flexibility to the public to modify the terms by which public resources are used.

Temporal Flexibility. Rights can sometimes be used over multiple years, rather than being restricted to a single year. By allowing firms to avoid premature removal of capital, to average emissions across production cycles, or to ensure adequate time to vet new technologies, temporal flexibility can bring down the cost of achieving a particular environmental goal. Temporal flexibility policies can include:

- **Banking** involves receiving credit for going below the firm's annual allotment in early years, then using or selling credits above its allotment in later years.
- **Borrowing** is the reverse, where emissions or extraction is higher than allowed in early years, but lower in future years.

b. Examples of Creating, Clarifying or Improving Rights

Market Creation. Rights are created where previously behaviour was unconstrained. Economic instruments-based approaches often allow countries to meet the same pollution target they could stipulate by regulation, but at a lower cost.

- *Tradable emission/effluent permits*
- *Tradable catch quotas*
- *Tradable development quotas or rights (location stays the same, developer changes)*
- *Transferable development rights (location shifted to less environmentally sensitive area; developer can stay the same or change).*
- *Tradable water shares*
- *Tradable resource shares*
- *Tradable land permits*
- *Tradable offsets/credits*

Clarification of Basic Property Rights. Government policies fix existing problems in the ownership of resource rights. Clear title clears the way for longer-term investment and management.

- *Ownership rights: land titles, water rights, mining rights*
- *Use rights: licensing, fishery access, use concessions*
- *Development rights: patents, prospecting rights*

Property Rights Protection. Government policies make it easier for existing owners to enforce their rights against potential usurpers.

- *Contract law: right to sue if contracts not followed*

2A. Revenue Recovery on the Provision of Public Services

Governments around the world provide wide-ranging goods and services with both direct and indirect environmental impacts. Examples include electricity, water, wastewater treatment, rubbish removal and recycling, hazardous waste collection and treatment, and wide ranging transportation services. When these services are provided free or at subsidized rates the providing agency may be starved for revenue and unable to maintain, upgrade, or expand its infrastructure and service area.

In practice, this often means that the poorest or most rural areas get much-delayed access to basic resources, or no access at all. On the demand side, consumers have little incentive to use the resources wisely, generating a corrosive spiral of unchecked over consumption (and sometimes depletion) followed by demands for larger infrastructure, and sometimes by irrational expansion of this infrastructure.

a. Variations in Revenue Recovery

Rate Structures are commonly adjusted so that the poor receive inexpensive (or free) access to a subsistence quantity of the resource (water, energy).

Increasing Block Rate structures accomplish this same goal by providing the first units of consumption to all customers inexpensively then increasing the unit cost substantially for higher usage rates. Special higher rates are often applied to customers (e.g., industries) that require more expensive and specialized services, such as when they discharge more difficult to treat industrial wastewater to a publicly owned wastewater treatment plant.

Cross Subsidies. Reduced rates are one form of cross-subsidies. As noted above, these can sometimes be used to provide basic services to the poor. Often, however, cross-subsidies also provide below-market prices to heavy industrial users of municipal services, such as aluminium smelters or steel mills. Removing these types of cross-subsidies can improve pricing accuracy and encourage more environmentally sustainable consumption.

Recovery Rate. Depending on the political circumstances, revenue requirements can include recovery of public sector administrative overhead, and a fair cost of capital/rate of return on invested public funds. Full recovery of these costs should always be the goal, as doing so provides pricing more in line with the actual cost of tied-up public funds and allows better choices to be made with regards to future investment into substitutes.

One caveat. Where the public has already built and paid for the infrastructure, encouraging lots of users (of, for example the sewers) to stop using the system can rob a municipality of important revenues if there are easy and cheap ways for these users to cut back. Each situation should be evaluated separately, though full costing should always be used when evaluating new investment.

Phase-in. Where users have not historically paid anything for the public services provided, rates may be phased in over a period of time to reduce the transitional hardships. A phased approach can also help avoid the loss of baseline users (as stated above) when the exact cost at which they exit the system is not known.

b. Examples of Revenue Recovery

Charges for services provided directly to consumer

- *User fees for municipal water, wastewater treatment, energy*
- *Collection charges for solid waste pickup*
- *Tolls on public roads*
- *Access fees (e.g., for recreational access)*

Charges for impacts that new demand will put on existing infrastructure

- *Impact fees*

Charges to recover the public sector overhead associated with providing goods and services to users:

- *Administrative charges*
- *Regulatory oversight charges*
- *Enforcement action surcharges*

2B. Ensuring Fair Market Value for Public Assets

Item 2A addresses operating municipally-owned organizations. In contrast, this class of instruments deals with ways to realize fair market value for public citizens on the sale of municipally-owned infrastructure and organizations (privatisation), or on the sale of publicly owned natural resources.

Natural resource sales occur on a regular basis in most countries, as the government often owns the land from which the minerals are extracted. Organizational sales occur less frequently, but can be used to allow governments to focus on more basic services, or to bring a fiscal discipline to the enterprise that was politically or organizationally impossible for the government to establish itself.

The sums of money involved often run into the billions of dollars; as a result, policy instruments must ensure that this value is not stolen or mismanaged by public officials and their relations.

Transparency is of extreme importance in these situations, and corruption has been endemic throughout the world both with privatisations and with resource concessions. Payment terms need to be clear, and formal procedures for collecting, investing, and safeguarding resultant funds are needed.

Since asset sales are in many ways a windfall, some governments have set up financial management structures to convert the windfall into a more diversified basket of income-producing assets (often

stocks and bonds) for the long-term benefit of its citizens. This helps ensure that at least part of the wealth created is protected from short-term political pressures to spend the funds in less productive ways.

a. Variations of Achieving Fair Market Value

Auction Method. There are a variety of different auction techniques, depending on what type of resource is being sold, and whether there is only one auction winner or multiple ones.

Eligible Bidders. Generally, the more bidders, the more competitive the auctions. Opening bidding to international firms, and to groups (e.g., environmental NGOs) who might retire rather than exploit the rights, can increase the returns to the taxpayer. However, countries need to be sure they can take effective enforcement actions against multinationals if there is a problem with how they extract the resources; and are willing to enforce purchases that close off the resource to all extraction.

Payment Structure Depending on the certainty of asset value and the goals of the government, sales can have different mixes between cash bonus payments (paid at the time a license is awarded), rental payments (for the right to hold access to resources within a particular year), and contingent payments such as royalties (paid only as resources are extracted and/or sold).

b. Examples

For achieving break-even revenues and/or fair market value on asset sales:

- *Competitive auctions for resource rights or access.*
- *Full privatisation of stand-alone enterprises (so long as the bidding process is open and competitive). Where competitive markets exist, pricing structures generally need to rise to cover costs in order for the enterprise to remain viable.*
- *Partial privatisation of stand-alone enterprises through initial public offerings of stock, and the associated adoption of required oversight and accounting procedures. These approaches can often achieve much of the benefit of full privatisation; the key issue is whether the remaining government involvement is hands-off, allowing economics to drive decisions, rather than political.*
- *Institute payment of natural resource royalties.*
- *Institute payment of excise taxes on natural resource removal.*

For converting windfalls into long-term sustainable wealth:

- *Establishment of carefully controlled and independent trust fund to receive some portion of windfall gains. These funds have conservative investment criteria for investment portfolio and diversification, independent governance, transparent financial records, and high barriers for modifying these protections by elected officials.*

2C. Compensation for Environmental Damage (Environmental Externalities/Financial Assurance)

Many industrial and extractive activities cause pollution or other resource damage. A set of economic instruments aims to accomplish four objectives:

- *Force the environmental costs into current prices;*
- *Set up financial mechanisms that protect the public from cleanup costs should the original firm/government fail to do so; and to*

- *Provide a legal mechanism to sue firms or governments retroactively for the damage their activities have caused.*
- *Establish informational regimes (e.g., mandatory emissions reporting) leverage market forces by exposing below-par performance to customers and neighbours, and by establishing a record of past performance that can support legal action should there be violations.*

a. Varieties of Compensation

Time. Some economic instruments spur reductions in the environmental risks associated with current activities; others attempt to recover costs of past damages; and still others help mitigate future environmental risks.

Phase in. As with most economic instruments, instruments can be phased in over time to reduce the transitional dislocations.

Polluter Pays Principle. There are degrees to how closely the entity paying is the one who polluted. It can be the firm, the industry, the region, or all taxpayers. The closer the payments are to the ones causing the problem, the better the price signals will be.

Degree of Risk Control. Protection against future risks is often done through insurance. Governments can make this tool more effective by allowing only financially strong insurers into the market, and by instituting reinsurance requirements where appropriate. Reinsurers absorb a portion of the potential risks associated with a policy, establishing increased diversification for the insurance market. However, they too must be monitored for financial solvency.

Border Adjustments Surcharges can be added to competing products coming into the country to offset any competitive disadvantage due to environmental regulation.

b. Examples

Addressing risks of current activities:

- *Pollution taxes/permits*

Recovering damages associated with past activities:

- *Civil and criminal penalties for natural resource damages.*

Addressing risks of future activities:

- *Required liability or environmental insurance*
- *Performance bonds for proper site remediation/closure. Bonds can be issued for environmental performance, land reclamation bonds, waste delivery bonds, environmental accident bonds, forest management bonds.*
- *Deposit/refund systems for proper product return*

3. Subsidizing Transition to Sustainable Alternatives

New technologies or alternative resource management practices may have demonstrated environmental benefits relative to current practice. Economic instruments that subsidize these alternatives can benefit environmental quality by accelerating a market shift to these preferable approaches.

Once subsidies are available, however, many groups will seek to obtain them; not all will be justified. Care and attention are needed to ensure that the subsidies flow narrowly to the desired recipients if the original objectives of the policies are to be achieved.

a. Varieties of Subsidies

Point of Support. Subsidies can support activities linked to desired practices (research into wind power), or they can be paid only when the desired practices are actually applied in the market place (tax credit for each delivered kWh of wind power). Rewarding only successful innovation is generally much more cost efficient and productive, and much of the development and marketing risk remains in the private sector.

Magnitude of Support. Subsidy levels can range from 100 per cent (grants) to much smaller levels associated with economic instruments such as revolving funds (small interest rate subsidies). Efficiently providing only what is needed to make a technology economic, but no more, allows limited public funds to have a much greater impact. Renewable Energy Portfolio standards, for example, force clean energy providers to compete against each other for the minimum level of subsidy at which they can provide clean energy. This type of an approach helps make subsidies both more efficient and more dynamic over time.

b. Examples

Grant-based subsidies:

- *Soft loans,*
- *Direct funding,*
- *Provision of hard currency at below market rates.*

Financing-based subsidies:

- *Soft loans,*
- *Revolving funds,*
- *Sectoral funds,*
- *Green funds,*
- *Public interest rate subsidies or*
- *Loan guarantees.*

Tax-based subsidies:

- *Tax credits,*
- *Tax breaks,*
- *Tax exemptions,*
- *Tax differentiation,*
- *Accelerated write-offs.*

Risk-based subsidies:

- *Subsidized insurance or reinsurance,*
- *Liability caps,*
- *Public sector indemnification.*

Impacts of Economic Instruments on Incentives of Firms and Individuals³

This Annex provides a table summarising the impacts of economic instruments on incentives of firms and individuals. The table lists the effects that economic instruments can have in the following fields: establishing property rights, recovering costs for environmental services, receiving compensation for the sale of public assets, accounting for environmental harm, and transitioning to sustainable alternatives. Examples of related applications of economic instruments are given in the second column, and the third column lists factors relevant in the application of the instruments.

³ Adapted from UNEP (2004). This annex follows the same structure and numbering as Annex II – A Primer on Economic Instruments. Annex II and III can be used in conjunction.

Annex III Impacts of Economic Instruments on Incentives of Firms and Individuals

Functional Impact of Economic Instruments	Examples	Factors in application
1. Establish, clarify, or improve property rights: creating markets for unpriced resources and environmental services to provide incentives for sustainable management and use; establish clear rules for resource access to control overuse.		
- Invest for the long term. Clear property rights enable owners to benefit from longer-term investment and management of a resource. - Curb tragedy of the commons. In many cases, property rights approaches eliminate the “tragedy of the commons” problem, in which unlimited access destroys the common resource base. - Incentive to control as much as possible. In the case of pollution permits, the rights enable people to profit from reducing pollution more than required under current laws. - Manage for future owners. So long as rights can be sold, owners have an incentive to continue to manage the property carefully in order to attain a high resale value. This also provides some incentive to avoid accidents and post-closure contamination. - Independent enforcement. Ability to enforce rights through litigation can ensure that rights regimes become more effective without needing central government intervention.	- Granting formal harvest rights to indigenous populations or allowing transfer of existing rights. - Establishing and requiring tradable permits or licenses for parameters of concern (e.g., plant emissions, fishing access). - Allowing farmers to sell existing water rights to urban areas. - Establishing or enforcing rights to sue parties (including the government) for violation of existing property rights.	- Granting property rights is meaningless unless there is a fair court system to enforce them. - Where courts are strong, granting of authority/right to sue to third parties can overcome weak administrative ministries. - Monitoring of many rights regimes (e.g., fisheries, emissions) can be complicated and substantial. - How initial rights are to be distributed is often controversial, and can generate windfalls to existing producers that may be viewed as inequitable or that put small business at a competitive disadvantage. - Ensuring that rights are transferable is important in establishing a strong incentive for long-term management. A secondary market in rights ensures regular repricing of rights and continued efforts to reduce permits needed if prices are high.

Functional Impact of Economic Instruments	Examples	Factors in application
2A. Recover direct costs of environmental services or oversight provided by public agencies from the beneficiaries: policies ensure that users see realistic costs for the publicly-provided services they are using.		
- Self-sustaining revenues. Charging for services earns important revenues enabling the continued provision of critical municipal services without having to fully privatise the functions. - Incentive to conserve. These charges also send more accurate price signals to consumers that help conserve resources such as energy and water, and allow existing infrastructure capacity to last longer as demand falls. - Costs borne by sub-groups responsible. Ensuring that higher-cost user groups (high peak demands; high requirements for government oversight; more complex discharges for treatment plant; higher distribution costs; etc.) pay more refines price signals further.	- Recover full costs of municipal energy, water, sewerage, solid waste services from customers. This must include real cost of financing construction. - Charge higher rates to higher cost customers. - Narrow consumption subsidies to target only the poorest users of the product or service. - Sell government owned enterprises to the private sector to correct pricing problems. - Ensure continued service to poor via direct subsidies or regulatory oversight.	- Many countries face political barriers to implementing and enforcing equitable user charges. - Privatisation can be one solution to overcome this problem, but is not possible without rule of law. In addition, states must be careful to avoid privately-owned monopoly providers by ensuring there are multiple vendors. - Recovery of aggregate costs will not be efficient if certain user groups receive crosssubsidies from others in the rate structure. - Enterprises must be able to retain receipts for reinvestment (rather than remitting to the Treasury) if the Economic Instruments are to help ensure the enterprise's continued existence.

Functional Impact of Economic Instruments	Examples	Factors in application
2B. Receive just compensation for sale of publicly owned assets to private sector entities: policies ensure that taxpayers are fairly treated in purchases, and that purchasing entities make resource development/consumption decisions based on realistic prices.		
- Tap revenues for general society. Economic Instruments that create markets and transparency for the sale of publicly owned assets ensure that the returns from these sales go to the general population rather than to political or military elites. - Reduce opportunities for corruption. Transparent procedures can also help reduce or eliminate the ability for corruption to flourish. - Rational development path. Because political and military power for individuals is often short-lived, individuals may rush natural resource extraction to maximize diversions to personal wealth. Transparent markets encourage a more rational development path.	- Elimination of all resource giveaways above a certain size. Registration and tracking for small subsistence extraction. - Natural resource auctions open to all bidders, including international firms or non users such as environmental groups who wish to remove resource from production. - Establish three part fee structure: bounties to cover initial rights; rental to cover holding cost of resource access; and royalties to share returns on extracted resources. - Open bidding on any infrastructure privatisation efforts.	- In countries with high corruption, much of the returns on both public resource deposits and cash flows from nationalized industries are diverted to finance political interests. As such, reforms can be difficult. - However, pressure from outside funders or investors can play a positive role in ensuring some of this change occurs. - Some portion of receipts should support continued environmental management.

Functional Impact of Economic Instruments	Examples	Factors in application
2C. Establish financial charges and accountability for environmental harm: policies internalize the cost of environmental damages and the risk of potential damages.		
- Polluter pays more than under Command and Control (CAC). In many CAC systems, at least a portion of the pollution is granted to corporations for free (the amount from zero up to the statutory limit). Charges and financial accountability force more of the social and environmental costs of polluting activities to be reflected in the price of the associated products, increasing the incentive to develop cleaner products. - Incentive to leave site in good condition. Performance bonds and other mechanisms establish financial responsibility for clean-up prior to the beginning of a project, greatly reducing the public sector risk from negligence. - Responsible for natural resource damage/noncompliance. Legal controls can create a “market” in compliance enforcement, empowering third parties to bring suit for environmental non-compliance.	Current activity - Pollution taxes/permits <i>Past activity</i> - Civil and criminal penalties for natural resource damages <i>Future activity</i> - Required liability or environmental insurance - Performance bonds for proper site remediation/closure - Deposit/refund systems for proper product returns.	- Pollution taxes are often difficult to set at appropriate levels, and require an effective bureaucracy to monitor. - Care is needed to avoid “hot spots” where the local environment and/or populace are subject to excessively high emissions as a result of the trading or charge schemes. - Financial assurance and deposit/refund systems require enforcement of rules in order to work. This may not be possible in high corruption environments. - Care is needed to identify and monitor the credit quality of providers of financial assurance. - Governments may need to stipulate the required terms of coverage in order for financial assurance mechanisms to be effective. - Third-party legal suits can be abused.

Functional Impact of Economic Instruments	Examples	Factors in application
3. Subsidize transition to, or investment in, more sustainable alternatives: policies promote mechanisms that can accelerate the development and adoption of cleaner technologies using both direct funding and government programmes.		
- Cleaner products faster. Can accelerate the development and/or market adoption of improved products or production methods. - Reduced burden of transition. Can reduce transition costs for private parties to invest in new production methods. Functional Impact of Economic Instruments - Poverty amelioration. Where the poor will be adversely affected by the change, subsidies can help cushion the pain from the shift. - Pay private stewards of important global resources. Can compensate parties or countries for foregoing private gain in order to steward resources with high social values (e.g., biodiversity).	- Fiscal subsidies including grants, loans, loan guarantees, indemnification, or tax breaks. - Forgiveness of environmental fees, taxes, royalties, penalties in return for investments in environmental improvement. - Differential tax rates depending on environmental impact of the product.	- Everybody wants subsidies and can make some claim to justify why they need it. Care is needed to provide a much narrowed conceptualisation of the market segments requiring public subsidy. - Where subsidies are provided, they must be transparent and tractable. They should also phase out automatically after a pre-specified period of time. - Where transitional subsidies are to be paid as a political price for accepting policy changes, these must be evaluated carefully to curb excesses and confirm there are no alternatives.

Source: UNEP (2004)

Detailed Case Studies⁴



This annex provides four detailed case studies. They are:

- Grassland pricing reforms in the Philippines
- ITQs for fisheries resources in South Africa
- Fishery ITQs in Chile
- Strengthening user rights for biodiversity conservation and sustainable use: Mankote Mangrove in St Lucia

⁴ The case studies in this Annex are based on UNEP (2004).

Detailed Case Study 1

Grassland Pricing Reform in the Philippines

Title	Grassland pricing reform in the Philippines
Country	Philippines
Problem Definition	
Environmental impacts	Ranchers are provided with 25 year Pasture Lease Agreements (PLA), renewable for another 25 years, at very low grazing fees (approximately US\$ 0.30/hectare/year). As a result, a relatively small group of people has gained control over much of the public grasslands for the 50-year leases. The ability to shift cattle to new pastures they control has also reduced the incentive for sound management of the pastureland, and led to resource degradation in many parts of the country.
Social impacts	Policies seem likely to result in over-concentration in access to grazing rights. However, they probably do encourage human settlement in some more remote, less hospitable areas.
Solution Implemented	
	Existing grazing fees were increased from PhP15 per hectare/year to PhP200/ ha/yr. Original efforts to have higher fees on better land classes were shelved. While more than 10 times higher than the prior charge, the rates are still believed to be only slightly more than half the lowest economically-justifiable rent on the land. In addition, the charge had a five-year phase-in period. To support the transition, the policy included increased technical assistance as well as fee reductions for sound land management.
Summary Analysis	
Efficacy of existing policy at solving problem	Although there is clear agreement that more accurate pricing, coupled with enforcement of operating and management plans, would greatly improve both access to and management of public grasslands, political reality has precluded this solution. As a result, ranchers continue to have low cost, long-term access to public grazing lands with little incentive for proper land management. The Department of Environment and Natural Resources (DENR) continues to have poor ability to enforce management standards. The Ecosystem Research Development Board (ERDB) has increased responsibilities for technical outreach, but no effective plan on how to do so yet. To obtain reduced grazing fees associated with sound land management, ranchers must initiate review by DENR and have pasture management plans approved. With cost savings so large, there is a potential of corruption that is of concern.
	A number of ranchers have refused to pay the higher fee. As a result, DENR ends up collecting nothing from them and has little capability to carry out full enforcement. Furthermore, during a trip to the region in early 2002, a top government official promised to reduce the fee substantially (to PhP40 from PhP200) "to encourage breeding and create 60,000 jobs" (Luzon Bulletin, 1/6/02). This statement undermined current efforts to collect the higher fees, and led DENR to suspend its collection pending formal clarification on how to proceed. Personnel pointed out that decades of grazing fees at 15 PhP had not spurred investment in the cattle industry, so it was not clear how PhP 40 would do so.

Title	Grassland pricing reform in the Philippines
Country	Philippines
Rationale for success/failure	- Fees remain too low, and politically difficult to adjust. Ranching interests remain extremely strong and oppose any shifts to more market-oriented rates. Groups who may be negatively affected by the current leasing arrangements do not seem mobilized. - Fees that are collected are remitted to the Treasury rather than retained to support the land management programme. - Lease terms remain very long and holding costs very low, allowing high concentration of access to pasturelands to continue. - Political resistance prevented the use of market auctions to allocate grazing rights, an approach that could have removed the government from the role of having to set grazing rates. - While DENR has sometimes revoked leases, this has normally been done due to abandonment or use for non-grazing purposes. There is little evidence of revocation due to improper or destructive grazing practices.
Unanswered questions	
Institutional Baseline Conditions in Country	
Legal	
Fiscal	The Philippines already has an infrastructure in place for collecting fees from ranchers.
Government institutions	
Environmental	DENR has lacked resources to oversee management plans. Internationally funded efforts going back to 1990 have attempted to build capacity within DENR related to natural resource accounting, technical standards, and grasslands pricing reforms.
Detail on Policy Process	
History of response	PLAs have been used since the 1950s. Fees were first imposed in 1961 at an average rate of less than US \$0.01/hectare per year. Fees were not increased until 20 years later, reaching only US \$0.02/hectare per year; then again in 1991 to the current rate of US \$0.30. Compliance with the fees has generally been quite high, which is not surprising given the very low rate. To exert some control over grazing processes, the Department of Environment and Natural Resources (DENR) requires annual operating plans, and a management plan every eighth year. However, there is virtually no follow-up monitoring to ensure plans are actually being implemented. This is the result of insufficient funding as well as difficult terrain to oversee. There is common recognition that fees are too low. To address the problem, DENR's Ecosystems Research Development Board evaluated what the true economic rent should be, the cost of various measures to rehabilitate existing damages, and the economics of alternative land uses. They did not evaluate options for auctioning, rather than giving grazing rights to the ranchers. The economic rents were determined to be far higher than the current levels, though the ERDB proposed allowing 80% of the incremental payment be used to fix damage on the existing grasslands.
Evaluation of past on success/failure	Past efforts to charge for access and to ensure appropriate land management existing leases have been plagued by the exact same problems that have prevented the most recent effort from obtaining more reasonable lease

Title	Grassland pricing reform in the Philippines
Country	Philippines
Rationale for using Economic Instruments	Economic Instruments, through user fees, have been in effect for nearly 50 years. While collection levels were high, fee rates were far too low to cover either programme costs or provide proper incentives for sound land management. Fee reforms were chosen over lease auctions due to political resistance.
Legal basis for 1961. Economic Instruments	Original basis for grazing fees was through Administrative Order 08 in The initial fee increase was authorized in the Forest Land Grazing Lease Agreement of 1982. The most current fee adjustment was authorized by Department Administrative Order 2001-05, which took effect in August 2001.
Stakeholder involvement	There have been a series of public hearings run by ERDB to discuss existing and proposed grazing fees. Ranchers were already well organized as a stakeholder group, and strongly opposed rate increases. They argued that the government should view their presence on the land as a benefit in that it curbed squatting by migrants. They also mobilized strong political actions against the ERDB and DENR to oppose the rate increases.
Lead agencies	Ecosystems Research Development Board (ERDB) and the Department of Environment and Natural Resources (DENR)
Key barriers addressed	Key barriers have not successfully been addressed: existing damage is not addressed being addressed by the current policy, nor are grazing rights at levels that would encourage more appropriate resource use.
Detail on Policy Response	
Allocation of initial with rights	There has been no effort to auction grazing rights. Rights have continued existing holders, with the price of those rights (through an annual rental fee) set by statute. The price of the rights does not adjust automatically for inflation, and is far below appropriate market levels. Government assessments suggest grazing rights should be divided into three classes, with annual rentals ranging from PhP358 to PhP542, between 24 and 36 times the current levels.
On-going monitoring process	DENR has not been able to generate an effective monitoring and enforcement process.
Current successes	Grazing fees have risen somewhat, but still remain far below market prices. Public research efforts have yielded useful results on economic fee rates and costs to recover damaged lands.
Remaining gaps/risks	There has been strong political resistance to market-based grazing fees. Current rates are not set in a dynamic, market-oriented way, and remain very much subject to political pressures. The regulating agency has not been able to supplement its fiscal policies with credible monitoring oversight to prevent land degradation.
Source(s)	Case study compiled by Herminia Francisco. Additional sources include: Personal Communication with Luzon Bulletin, January 6, 2002. See also UNEP (2004).

Detailed Case Study 2

ITQs for Fisheries Resources in South Africa

Title	ITQs for fisheries resources in South Africa
Country	South Africa
Problem Definition	Environmental impacts Over-fishing leading to increasing decline in fish catches and sustainability of the fisheries. Some shortages evident in the 1960s, as key stocks faced sharp declines. By mid-1970s, declines in hake, pilchards, and anchovy were evident. This was the result of over-fishing by both domestic and international fleets.
Social Impacts	Fisheries in question comprise 1% of GDP, provide 35,000 direct jobs and 100,000 indirect ones. Fishing rights (as of 1996) were 90% allocated to large commercial companies; black fishing communities had less than 1% of the total allowable catch (TAC).
Solution Implemented	
	Since 1997, the country has moved towards use of Individual Transferable Quotas (ITQs) under the Marine Living Resources Bill of 1997. A portion of the ITQs are withheld to support black-owned businesses and coastal communities, to offset the heavy concentration of fishing rights in white-only businesses that had previously existed. Access control supplements the ITQs: total and seasonal closures protect specific fishery areas; strict monitoring of 200 mile exclusion zones prevents poaching of stocks by foreign vessels.
Summary Analysis	
Efficacy of existing policy at solving problem	There is no detailed assessment of the success of the ITQ yet. Quota revenues, rather than being used to support resource management, are directed to the general treasury. There is a small levy that goes to the Seas Fisheries Fund to support research. The approach does seem to have increased market share for domestic fleets relative to foreign, and to small communities and black-owned businesses relative to white-only businesses. Although ITQs improve the efficiency of Total Allowable Catch (TAC) allocation, intense political pressure to increase the TACs themselves remain. This pressure has also been exhibited through efforts to reduce the monitoring and enforcement capability of the country, critical programme elements if the ITQs are to be effective. Evidence suggests that illegal fishing by those without a quota remains a problem.
Rationale for success/failure	Strong success models from adoption of ITQs in other countries greatly increased likelihood of implementation. Inadequate monitoring and enforcement risks all potential gains from the ITQ approach. Diversion of quota revenues to the general Treasury weakens the ability of the Environment Ministry to build a strong programme. However, transfer of authority to the Environment Ministry from the Industry Ministry in the early 1980s helped shift the overall policy focus from resource extraction to resource management.

Title	ITQs for fisheries resources in South Africa
Country	South Africa
Unanswered questions	- Is there a strong technical basis for setting quota limits today? - Has there been an increase in the mutual monitoring of fleets by permit holders?
Institutional Baseline Conditions in Country	
Legal	
Fiscal	
Government institutions	2001 Corruption Perceptions Index (38 of 91) ⁵
Environmental	2002 ESI: 48.7 (rank 77 of 142) ⁶ Relevant component rankings: Environmental Governance (33 of 142); Reducing Ecosystem Stress (47 of 142); Environmental Systems (91 of 142)
Detail on Policy Process	
History of response	Early control efforts focused on reducing access to fisheries by implementation of a 200 nautical mile fishing zone to keep out foreign fleets and increasing the minimum required mesh size in nets to reduce depletion of immature fish. Catch limits, in the form of a Total Allowable Catch, was set for at least some fish species (e.g., hake) beginning in the late 1970s. This was supplemented by efforts to reduce the number of vessels and the closure of critical areas (mainly where pelagic fish are targeted). Exclusion of foreign commercial vessels was implemented in 1983, along with a conservative management strategy. Research has also been conducted to identify the benefits of long-lining rather than netting on the overall health of the hake fishery. Quotas to allocate the TAC were set initially set by the Minister of Economic Affairs, Industries, and Agriculture, upon advice from officials in the capital. In 1983, general management of the Sea Fisheries Act was transferred to the Ministry of Environment Affairs. Criticisms of the Minister-allocated quota system led to a transfer of quota setting authority to a statutory board in 1986, a more formal Quota Board in 1988 (which became effective only in 1990). During the 1990s, political considerations led to efforts to increase the quotas flowing to black communities and companies. Foreign-owned vessels still have very limited access to key fisheries. Since 1997, reliance on the market to allocate TACs, through the ITQs, has grown.
Evaluation of past success/failure	CAC approaches did contribute to some recovery of catch rates, such as in the core hake fishery.
Rationale for using Economic Instruments	Fishery depletion remained a concern, and created a strong need for information to support a more scientific basis for fisheries and catch management. ITQs would provide a more flexible and less biased mechanism to allocate TAC than would the Quota Board, and provide individual fishermen with a more direct stake in effective long term fisheries management.
Legal basis for Economic	Instruments Basic involvement in fisheries management originates with the Sea Fisheries Act of 1940, plus superseding Acts in 1973 and 1988. Direct authority for the use of ITQs comes under the Marine Living Resources Bill of 1997.

⁵ This means that in 2001, 37 countries had less corruption problems than South Africa. 2005 South Africa ranked 46/159. Source: www.transparency.org.

⁶ This means that in 2001, 76 countries ranked better than South Africa on the Environmental Sustainability Index. In 2005, South Africa ranked 93/146. Source: www.yale.edu/esi/

Title	ITQs for fisheries resources in South Africa
Country	South Africa
Stakeholder involvement	Extensive public consultations, including much education on the application of ITQs in other parts of the world. Local communities, scientists, and other resource users are organized and actively involved in the management of ocean resources.
Lead agencies	Ministry of Environment Affairs
Key barriers addressed	
Detail on Policy Response	
Allocation of initial rights	Information reviewed suggested that ITQs were initially allocated for free, and somewhat arbitrarily.
On-going monitoring process	Appears to be weak and under-funded. Influenced by political lobbying to increase overall TAC and to reduce the capability of the State to curb illegal fishing.
Current successes	
Remaining gaps/risks	Proposed reforms attempt to replace giving away fishing rights with risks auctions, and earmarking fees/royalties from these rights back to the fishery oversight function.
Source(s)	Summarized by Herminia Francisco based on Jaap Arntzen. 1999. Economic Instruments and the Southern African Environment: Synthesis of Experiences of Five SADC Countries. See also UNEP (2004).

Detailed Case Study 3

Fishery ITQs in Chile

Title	Fishery ITQs in Chile
Country	Chile
Problem Definition	
Environmental impacts	Fish stocks were increasingly depleted under the increasing privatisation of the fishing industry that has occurred since 1973. Increasing fishing pressures especially on the pelagic fisheries drove catches higher, until they peaked in 1986.
Social impacts	Two concerns dominated the initial implementation of ITQs. The first involved artisanal fisherman. The concern was that under an ITQ system, they would be excluded from the market and lose their livelihoods. As a result, they continue to fish without an ITQ system. The second involved competition between northern and southern fishery corporations, with each trying to influence the allocation and bidding structures to their advantages, rather than to the advantage of long-term fisheries management.
Solution Implemented	
	The regulatory solution has varied depending on the type of fishery. For fisheries with low exploitation and primarily fished by artisanal fishermen (who use small boats and tend to stay close to shore), an open access system remains in effect. ITQs have been implemented for standard fisheries, with separate subclasses for fisheries in recovery and emerging fisheries (defined as less than 10% of TAC) is being utilized. The application is limited to industrial/commercial fishers, and only for mono/single species case. Efforts to incorporate artisanal fishermen into the ITQ approach will likely add a fourth category of ITQs. Artisanal fishermen use small boats, take short trips, and stay close to shore. For standard fisheries, 100% of the TAC is auctioned in the first year the fishery goes into the ITQ system. 10% of the purchased license divests each year, hindering long-term control of the catch rights and facilitating more frequent market repricing of the rights. Single owners cannot purchase more than 50% of the TAC either, to control market concentration. Owners can reassign portions of their quota they are not using for a particular year, also through the auction system. While international fishery interests may bid on ITQs, fish can only be landed by Chilean vessels. This effectively restricts market access to domestic fleets. Total TAC for fisheries under full exploitation is divided into long-term and annual licenses. The long-term licenses comprise 50% of TAC, last ten years, and were initially auctioned to the highest eligible bidder. Licenses depreciate 10% per year, with the capacity being reaucted on an annual basis. This helps ensure long-term licenses expire gradually each year, and allows regular repricing. Single-year licenses comprise the remaining 50%, and are renewable, but only to established fisheries and to new comers. Public auctions of ITQs are limited to 5% of the TAC for that year. No single party can own more than 50% of the TAC.

Title	Fishery ITQs in Chile
Country	Chile
	ITQ holders must accept the presence of scientific observers, and processing plants must provide information about the catch. In addition, all industrial fishing vessels regulated under any of the regimes must have a satellite global positioning system on board to allow the government to track vessel location. The ITQ usage remains experimental. More than 90% of the catch remains under the “Full Exploitation System,” governed by standard command and control techniques. These include restricting access to fisheries to new agents, prohibitions on adding new fishing capacity, temporary or permanent closure of fishing areas, pre-set minimum sizes and weights for fish species, and gear restrictions. Catch quotas are also set for each vessel based on a percentage of historical catch levels. These are not transferable or divisible, and viewed as a transitory control mechanism until ITQs can be applied more broadly. Despite their usage for most of the annual catch, there is some evidence (Pena-Torres, 273) that they are ineffective.
Summary Analysis	
Efficacy of (existing policy at solving problem)	Success of the programme is not clear. Current applications combined black hake, orange roughy, squat lobster, and yellow prawn) make up only 1% of the total Chilean landings. While useful as a test of the ITQs, the affected sectors are far too small to affect overall fishery health at this point. - Final structuring of the ITQ policy seems to have protected Northern fishing interests, but reduced the potential benefits of the market-based quotas. For example, ITQs have thus far been applied to shrimp and cod fisheries, but not to the more heavily exploited pelagic fisheries more often under the full exploitation status. - There have been some indications, especially in the hake fishery, of collusion among ITQ holders, as well as of weak monitoring and enforcement of the quotas. In the black hake fishery, quota prices are low and there is a suspicion that weak enforcement (allowing unregulated fishing) is the reason. - Enforcement remains a concern, though the number of violations has supposedly declined since ships were required to put GPS systems on vessels in 1999. However, use of an ITQ approach requires accurate and regularly- updated information on fishery health in order to accurately set TAC. Information in Chile is not considered reliable. On-board inspections are extremely limited. - Funds collected are remitted to the Treasury. While there is some indication this has increased funding support for fisheries oversight somewhat, this is not necessarily a permanent situation.
Rationale for success/failure	Where ITQs are applied, fisheries do seem to have an improved incentive to manage fisheries for the long-term. Better management, and ability to time catch to highest market values, has increased returns to the fishermen. - Confidence in the efficacy is undermined somewhat by concerns that the TAC limits are not scientifically based and need improvement. - The small percentage of total catch currently covered suggests the ITQs are not yet addressing the broader goal of protecting Chilean fisheries. Exemptions for artisanal fishermen also need to be addressed. Open access to this sector may be one reason for an explosion in the number of vessels, with the sector growing 27% between 1994 and 1998. (Borregaard et al., 2001, p. 13).

Title	Fishery ITQs in Chile
Country	Chile
Unanswered questions	- Impact of high market concentration on the ability of the ITQs to work. - Have the ITQs led to removal of capacity in the fishing fleet? - Cost of oversight is unknown.
Institutional Baseline Conditions in Country	
Legal	Constitution includes an article on the right of citizens to live in a clean environment, and this has been used to support many environmental lawsuits. The Environmental Framework Law also establishes a framework for responsibility for environmental damage (with burden of proof on the damaged). Property rights are enforced by the Constitution as well.
Fiscal and economic	Chile has functioning and generally observed tax, financial reporting/auditing, and insurance markets. There is even an insurance system that provides coverage for many environmental risks. Prices are relatively stable, and the level of taxation relatively low (10-40% for individuals, 30-40% for companies). Efforts are made to keep the tax system simple.
Government institutions	Most powers rest with the national (as opposed to regional) institutions. Provincial authorities are appointed by the head of government rather than elected. In general, there is no bribe taking. Institutions are encouraged to work together through the use of coordinating institutions (see below).
Environmental	The Environmental Framework Law provides the basic structure for environmental concerns in the country. The National Commission on Environment is a Coordinating Institution, not a Ministry. As such, it has extremely limited financial resources and its Director is considered a second-tier civil servant as compared to Ministers.
Detail on Policy Process	
History of response	Limited access to fisheries was first established in the 1960s in an effort to control the total allowable catch. In the 1970s, these policies came under criticism for preventing competition between potential investor groups during an era of high growth and widespread privatisation. Law 2442 resulted, allowing free access to fisheries and accepting all fishing permit applications. Prior to the late 1980s, fishery laws were loosely defined and rarely enforced. In the late 1980s, a series of legal reforms were initiated to enforce more stringent quota policies for common-pool fish stocks. Authority for quotas fell under the regulatory body of SUBPESCA, and monitoring was assigned to SERNAP. However, these reforms failed due to insufficient information on the fisheries, and to conflict between affected groups and lobbying pressure from organized interest groups. Both regulatory instruments and fish stock monitoring were applied inconsistently. Furthermore, not enough was known about the behaviour of the fish stocks of concern to establish an appropriate TAC. The Merino Law of 1989 defined fisheries in full exploitation (e.g., the Northern and Southern Pelagic fisheries) from remaining ones with continuing free access. The Law sought to use transferable quotas as a replacement of freezing a fleet's haul capacity as the method of choice to control catch. Challenged by Northern fishing firms concerned that the initial allocation of quotas would disadvantage them, portions of the Law were declared unconstitutional.

Title	Fishery ITQs in Chile
Country	Chile
	The lack of standardized application of regulations frustrated private firms, and led to the establishment of seasonal closures (which were easy to apply to everybody), which became the primary mechanism of fish stock regulation. Northern fishing companies lobbied successfully against subsequent efforts to enforce TACs, and each time succeeded in raising annual quotas, despite the lack of technical basis for what these quotas should be. The 1991 General Law of Fisheries and Aquaculture (FAGA) finally brought a stronger framework for curbing fish depletion. FAGA contained a mechanism for protecting endangered fisheries by closing them entirely, for promoting underutilised fisheries, and for using ITQs as an allocation mechanism for fishing rights.
Evaluation of past success/failure	Regulatory efforts were applied inconsistently. Catch limits did not have a technical basis, and were successively increased due to industry lobbying alone. Enforcement was extremely weak, with not a single violator fined between 1982 and 1986.
Rationale for using Economic Instruments	The failure of regulatory approaches to protect the fisheries spurred interest in economic instruments. There was no discussion of which instrument to choose: ITQs were chosen from the outset. The goal was to control access and overfishing by establishing transferable private fishing rights.
Legal basis for Economic Instruments	The current ITQ policy is the result of the 1991 fisheries law. That law was a compromise between an earlier law under the military government based only on ITQs, and a more mixed approach (mix of instruments, differentiation of various social and cultural aspects of sub-populations, incorporate reality of weak enforcement capability) advocated by the democratic government. Zonal Fisheries Councils have some regulatory power under the Fisheries Law of 1991. However, the councils are comprised of representatives from different interest groups involved in the fishing industry (as opposed to environmental interests). Thus, the Council's objectives may not match the societal optimum.
Stakeholder involvement	There has not been wide support for, or consensus regarding, the introduction of ITQs. NGOs and the academic sector were mostly absent from the political debate around the fishery law in 1991. Lobbying efforts delayed the passage of the Merino law based on challenging the government's authority to limit access and sell property rights to fish stock. Explaining the benefits of the ITQ approach to various stakeholders has been a difficult and continuous process. Artisanal fishermen (small boats) opposed ITQs in general, fearing they would be outbid for rights by commercial enterprises and locked out of their profession.

Title	Fishery ITQs in Chile
Country	Chile
Lead agencies	The Subsecretary of Fishery (SUBPESCA) was a main party in developing the ITQs, defines broader fishery policies, and issues the annual catch quotas or calls for auction for ITQs. The National Fishery Service (SERNAP) is the controlling authority, responsible for collecting data on the catches, landings, and boat registries. SERNAP is also in charge of enforcing national fishing regulations and inspecting fish quality and processing installations. The Chilean Navy monitors GPS data on vessel location. The National Commission of Environment has played virtually no role in the development or implementation of the fishery regulations, and is not represented on the fishery boards where decisions about catch quotas, resource policy, and regulations are made.
Key barriers addressed	
Detail on Policy Response	
Allocation of initial rights	The initial distribution of ITQs in the pelagic fisheries was to be based on individual firms' percentage share of global catches in the previous three years. This created conflicts between the northern and southern fishing fleets, as it made it more difficult for the northern fishing industry to migrate southward. Finally, an allocation based on auctions was used.
On-going monitoring process	Monitoring and enforcement of SUBPECA and SERNAP have some additional funding and improved processes in recent years. However, sources suggest that the monitoring remains limited, making it difficult to confirm actual compliance with the quotas. Enforcement remains weak as well. Under the ITQ program, there have been only 100 infractions reported, and not a single resultant fine or conviction. Market monitoring is also weak: there is no central, transparent and efficient working public registry of transactions and their prices. This normally increases the risk of fraud.
Current successes	Some of the affected fisheries have undergone stock recoveries since the ITQs were implemented. Operators also say that they have been able to significantly improve the quality of their final products, and by better planning and operations, to re-build markets and diminish social conflict with their workers.
Remaining gaps/risks	Fisheries, especially in the North, remain highly concentrated: the largest group controls 55-65% of the total northern harvest, with the second group controlling 20-25%. This creates severe risks for lobbying and political interference that promotes the fishing interests over the long-term protection of the fisheries. In all markets, there are a relatively limited number of market participants. In the case of black hake, there have been no new entrants in over 8 years.
Source(s)	Compiled by Nicola Borregaard. Analysis based on McKee, C. 2001. A Review of the Individual Transferable Quotas (ITQ) in Fisheries; http://www.colby.edu/personal/t/thtieten/ch-fish.html and Nicola Borregaard, "ITQs in Chile - Moving from a Marginal System to a Key Policy Tool;" and Nicola Borregaard, Frank Convery, Paloma Gonzales, and Karen Gauer. Transferable Fishing Quotas In Chile - Case Study in the Design and Use of Market Based Instruments for Resource Policy (Draft), CIMPA, October 2001; Nicola Borregard, personal communication to Doug Koplow, February 2002. See also UNEP (2004).

Detailed Case Study 4

Mankote Mangrove in St Lucia

Title	Strengthening user rights for biodiversity conservation and sustainable use: Mankote Mangrove in St Lucia
Country	St Lucia
Problem Definition	
Environmental impacts	The Mankote Mangrove comprises the largest contiguous tract of mangrove in St. Lucia, and 20% of the total mangrove area in the country. Widespread and uncontrolled charcoal harvesting from the trees put the mangroves into severe environmental decline. The loss posed a significant threat to the many ecosystem services mangroves provide, including maintaining coastal stability and water quality, serving as a fish breeding and nursery ground, trapping silt, and providing important bird habitat.
Social impacts	Charcoal was harvested by local subsistence populations. These people were extremely poor and had no legal right to any use of the publicly owned mangrove resources. They did not have obvious alternative employment should their access to the mangroves be cut off due to resource depletion or degradation.
Solution Implemented	
	Subsistence users were organized into an informal cooperative and given communal legal and exclusive rights to harvest the charcoal. They became involved with a joint monitoring programme with a regional NGO, the Caribbean Natural Resources Institute (CANARI), to obtain accurate and timely information on the overall health of the mangrove resource. Flanking measures to increase the supply of wood outside of the mangrove reserves, and to create alternative job options for charcoal harvesters were also implemented. Tourism has been one important alternative.
Summary Analysis	
Efficacy of existing policy at solving problem	The programme has halted and reversed the decline in the Mankote mangroves. The density and size of trees have both increased. Charcoal harvests have been more or less maintained, and the range of employment options for this population subgroup have increased somewhat.
Rationale for success/failure	- Early tacit approval by government for CANARI to work with the charcoal extractors in an innovative and then-controversial endeavour. - Formal recognition of property rights for subsistence charcoal extractors was a key element in ensuring commitment to, and ability to enforce, sustainable harvest practices. Long delays in this recognition made the effort somewhat less effective than it could have been. - Provision of group tenure, encouraging integrated management of the entire resource base and monitoring of cutting patterns by other members of the cooperative. - Establishment of cooperatives for the extractors, to provide a management unit for organizing and overseeing cutting rights; and formalization of rules of extraction that help protect resource base.

Title	Strengthening user rights for biodiversity conservation and sustainable use: Mankote Mangrove in St Lucia
Country	St Lucia
Rationale for success/failure	- Strong and continuous assessment programme to evaluate overall health of the resource base. - Protections against other threats to mangrove health, such as development, at least for now.
Unanswered questions	- Quality of continued management. - Degree to which development remains a long-term threat, as well as increased pressure from crabbing and fishing within Mankote. - Are the exclusive cutting rights (granted by a letter from the Deputy Chief Fisheries Officer) supportable should there be legal action at some future date? - Ability of existing members of cooperatives to sell rights to others, and implications of this on long-term viability of the approach.
Institutional Baseline Conditions in Country	
Legal	Widespread self-monitoring of cutting by different members of the cooperative (each protecting their individual interests) has made enforcement of the agreement both easier and less expensive.
Fiscal	
Government institutions	
Environmental	St. Lucia's natural resource management agencies are perpetually under funded. Involvement of CANARI made the change in resource management possible.
Detail on Policy Process	
History of response	St. Lucia's Forest, Soil and Water Conservation Ordinance of 1946 and its Wildlife Production Act of 1980 both gave the government a legal framework for regulating harvesting activities on public lands. However, little was actually done to regulate or control the harvesting of charcoal using mangrove wood. In 1986, the area was declared a marine reserve, helping to reduce the risk of the grove being developed. Subsistence charcoal producers did implement a number of positive practices on their own. They cut on a rotational basis, allowing time for the trees to regenerate before returning. Species that did not make good charcoal were also left to provide cover and impede evaporation of the swamp. Following the formation of the Aupicon Charcoal and Agricultural Producers Group (ACAPG), the group committed to a set of rules for sustainable use of the mangrove. These included a ban on cutting any trees that lined the waterways, the preservation of large trees, and cutting on a slant to preserve the tree's stump. Cutting rights were also organized, with each charcoal producer getting access to one area for a season, and rotating to a different area the next season. Cutting areas are well known to avoid conflicts between cutters and encourage monitoring of compliance behaviour by other members of the cooperative. However, these rules were not formalized until 1996, when ACAPG was granted exclusive rights to the timber in the Mankote reserve.

Title	Strengthening user rights for biodiversity conservation and sustainable use: Mankote Mangrove in St Lucia
Country	St Lucia
Evaluation of past success/failure	Prior to the establishment of ACAPG and institution of joint monitoring of the resource base, there was no effective control at all on charcoal production, leading to widespread degradation of the resource base.
Rationale for using Economic Instruments	This is a property rights approach that clarifies use rights in the form of charcoal harvesting rights. The approach made sense because the subsistence harvesters were the primary cause of the problem. Yet, with no formal rights to the resource, they had little incentive to invest in longer term resource management.
Legal basis for Economic instruments	Development activity in Mankote was prevented through the 1986 designation of the land as a marine reserve. In 1996, the Department of Fisheries, which oversees the reserve, formalized the long-standing de facto agreement under which ACAPG member got exclusive rights to the use of timber resources from within the grove.
Stakeholder involvement	Extensive involvement with ACAPG, the charcoal producers cooperative.
Lead agencies	Caribbean Natural Resources Institute (CANARI, a regional NGO); Aupicon Charcoal and Agricultural Producers Group (ACAPG), the cooperative of charcoal producers established during this initiative.
Key barriers addressed	
Detail on Policy Response	
Allocation of initial rights	Initial rights were given for free to members of ACAPG, the charcoal harvesters cooperative. They are subsistence harvesters, and securing their tenure increased their interest in sustainable management of the resource. It is not clear from available sources how these rights are transferred among parties.
On-going monitoring process	Regular monitoring of the mangrove resource remains an important activity. We have no information on how frequently it is being done, or who pays for it.
Current successes	By most metrics, including forest health, diversification of job base, and earnings of subsistence population, the policy response has been successful.
Remaining gaps/risks	Mankote and surrounding land remains a target for large-scale development, especially for resort and golf courses. Continued vigilance is needed to protect the mangrove from these threats. Efforts to shift from mangrove to hardwood from plantations near Mankote have had limited success. This is in part due to the lack of experience the producers have with agriculture and marketing.

Title	Strengthening user rights for biodiversity conservation and sustainable use: Mankote Mangrove in St Lucia
Country	St Lucia
Source(s)	Case material compiled by Markus Lehmann based on the following sources: De Beauville-Scott, S. 2000: A preliminary assessment of the basin of the Mankote Mangrove, Saint Lucia, West Indies. Natural Resource Management Programme. Department of Natural Resource Management. Faculty of Science and Technology, Cave Hill, Barbados. (mimeo) Geoghegan, T. and A. H. Smith. 1998: Conservation and sustainable Livelihoods: Collaborative Management of the Mankote Mangrove, St. Lucia. Community Participation in Forest Management. CANARI. Portecop, J. and E. Benito-Espinal. 1985: The mangroves of St. Lucia; a preliminary survey. CANARI technical Report no. 45. Smith, A. H. and F. Berkes. 1993: "Community-based use of mangrove resources in St. Lucia". Intern. J. Environmental Studies, vol. 43, pp. 123-131. St. Lucia, Ministry of Agriculture, Forestry and Fisheries, the Permanent Secretary 2002: Incentive Measures. Case Studies and Best Practices on Incentive Measures and Their Implementation. Submission by the Government of St. Lucia to the Secretariat of the Convention on Biological Diversity. http://www.biodiv.org/programmes/socio-eco/incentives/case-studies.asp. World Resource Institute 2000: "Managing Mankote Mangrove". World Resources Institute 2000-2001. People and Ecosystems. The Fraying Web of Life. World Resource Institute, Washington D.D., pp. 176-177. See also UNEP (2004)

Template for Assessing Important Factors Affecting Instrument Choice⁷



Annex V is a template for assessing important factors affecting instrument choice. It walks the policy planner through the most important steps that need to be taken when analysing an existing environmental problem for which a policy response is to be found. Clarifying questions that help the analyst cover the various aspects of the problem are provided, and implications on policy choice corresponding to these questions are given.

⁷ Adapted from UNEP (2004).

Annex V Template for Assessing Important Factors Affecting Instrument Choice

Issue	Clarifying questions	Implications on policy choice and application of Economic Instruments (EIs)
A. Assessing the problem		
What is the damaged resource?	- Are there human health considerations? - Are pollutant emissions of concern? - Does it cause ecosystem degradation or destruction? - Is there a lack of control over resource use / the depletion path?	- Exposure to particular emissions of concern would require more detailed assessment of the sources of emissions to assess appropriate control strategy. - Ecosystem degradation can often be addressed through property-rights approaches that generate an economic interest in long-term resource management. - Gaining control of development path may require a mix of increased transparency, adequate cost recovery on government provided goods and services, and third party rights to sue.
What is the anticipated severity of damage?	- Are dangers acute and severe, or less severe but persistent? - Are the damages irreversible?	- The more acute the potential damage, the more important a rapid response is needed. This would argue for mandated controls quickly. Even if the initial controls cause some peripheral economic losses, the avoidance of the acute risks (e.g., ecosystem collapse, large and widespread human health damage) makes the choice a prudent one.
What does the government hope to accomplish?	- Do emissions need to be reduced or stopped entirely? - Are resource pressures to be reduced quickly or slowly? - What social, political, or economic constraints is the government likely to face in meeting its goals?	- EIs are most appropriate for longer-term, gradual controls for emissions. However, property rights regimes can place quite rapid constraints on the rate of exploitation. - Where non-environmental constraints are substantial, early analysis and exploitation stakeholder meetings should provide sufficient attention to this area.

Issue	Clarifying questions	Implications on policy choice and application of Economic Instruments (EIs)
Pollutant characteristics (where control target is pollutant-based)	- Pollutant name, toxicity, dispersion profile (e.g., to air, land, water). - Separable from other waste streams (treatment options)? - Is it measurable? Is it possible to monitor? - Are there Potential reuse markets?	- Highly toxic agents require tighter controls. EIs, such as rebates, can be used if target wastes are discrete and separable agents. If they are part of general emissions, command and control (CAC) approaches such as bans or severe restrictions are warranted. - Reuse markets increase the economic viability of recovering and reusing the constituents of concern, and suggest that advance deposits or take-back programmes could be effective.
	- Are product markets price sensitive?	- More price sensitive products (i.e., commodities) will often be unable to pass increased emissions control costs through to customers by raising prices. Political resistance to any controls is likely to be higher in these types of product markets.
Resources at risk (where control target is resource area)	- What is (are) the resource(s) being exploited? - What peripheral natural assets are threatened? - Is exploitation threatening a widespread collapse of the ecosystem? - Is the potential damage irreversible? - Is the resource of primary value to the local community or to a more global set of beneficiaries (e.g., biodiversity)? - Are resource owners (including the taxpayer) adequately compensated for the current/planned resource exploitation?	- Over-exploitation can often be addressed through the granting/clarification of property rights. Where widespread or irreversible collapse is imminent, extreme action may be needed to curb exploitation immediately (e.g., fishing bans). During an interim period, more flexible licensing/permit approaches can be developed. - Ecosystem-wide view is generally needed to ensure that the entire basket of resources are appropriately addressed by the policy. - Where resources under threat benefit regional, national, or international interests much more than local extractors, financial payments from the beneficiaries to protect the resources are often warranted. - Ensuring appropriate pricing of access can have the double benefit of reducing development pressure and raising some revenues to support ongoing management.

Issue	Clarifying questions	Implications on policy choice and application of Economic Instruments (EIs)
1. Understanding the source of the environmental threat Profile of emissions source (industry/ household/government/mobile source)	- Is emissions source comprised of a small number of large firms or is it a cottage industry? - Do international firms comprise a large percentage of domestic production? - What are the firm's incentives for being in the host country? - How large is the market share of government owned entities? - What is the ownership structure of mobile source threats (e.g., individual cars vs. fleet-owned trucks)?	- Concentrated industries have power to resist wide range of environmental controls. EIs such as marketable permits are one way around this, so long as the government can set a realistic cap on allowable permits. - For specialized pollutants with only a handful of sources, direct regulation using a CAC approach may be most beneficial. - Fragmented and/or impoverished sources generally require more outreach and transitional strategies. - International firms are the most sensitive to informational approaches that can harm their brand image globally. However, firm location may be due to lax environmental or fiscal oversight. - Government owned entities are often not subject to strict financial performance. It is difficult to modify behaviour using EIs, though political resistance to CACs also is likely to be high.
Cause of overuse of existing resource base	- Is overuse the result of activities by large corporations, or by large numbers of subsistence extractors? - Does the public receive market-value for resources extracted/sold? - Are extractive firms financially liable for damages they cause to natural resources in the course of their activities? - Is domestic industry under pressure from unfair competition (subsidized, unregulated) from abroad?	- Exploitation by subsistence extractors can be addressed through the granting of property rights (often communal), subject to proper land management. - For all extractors, ensuring appropriate fees for activities helps encourage appropriate exploitation rates. In countries where these funds are diverted as kickbacks, policies to improve financial transparency (e.g., independent auditors) can help. - Financial assurance mechanisms, such as performance bonds, provide marketbased leverage to ensure proper site management and cleanup. - Litigation tools, such as citizen suits, can take the profit out of poor environmental management, though there is some potential risk of too much litigation resulting.

Issue	Clarifying questions	Implications on policy choice and application of Economic Instruments (EIs)
2. Government institutions		
Which government institutions have an interest in the exploitation or regulation of the issue of concern?	- Environmental ministries are often in charge of overseeing whatever control method is chosen. - Are international firms from major powers part of the problem? - Are products associated with the resource damage exported internationally for hard currency? - If there will be revenues raised (through the sale of permits, implementation of pollution taxes, or charges for government-provided goods and services), who will get them?	- Environmental ministries may have a limited mandate over the definition of acceptable control methods and the deployment of collected revenues. - Where international firms are involved in the market, environmental controls may be undermined by foreign-government lobbying efforts. Ample use of publicity in these circumstances can provide leverage. - Where domestic export earnings may be affected, expect intervention from trade and finance ministries. Pollution permits or taxes, by providing increased flexibility and lower costs, can be advantageous here.
Linkage to public infrastructure	Does the sector rely on public infrastructure (water, wastewater treatment, electricity, roads)? Which ones, and in what way?	Can provide important information on possible leverage points for user charges, permit modifications, etc.
3. Employees		
	- Does the affected sector employ large numbers of subsistence workers? - Does it produce products on which the poor rely? - Are the affected industries unionised?	- Careful planning on transition strategies is needed if changes to resource access threatens large numbers of jobs. Where population pressure is not too large, property rights regimes can concurrently encourage improved natural resource extraction and improve employment prospects. - Unionised workforces may resist change by either CAC or EIs. To the extent that EIs allow less expensive compliance by firms, it may be preferable to unions, as job losses may be lower.
	- Does the proposed change open up significant new employment opportunities?	- Government owned enterprises in many countries are stagnant and corrupt. Privatisation can eliminate kickback schemes and spur new innovation and employment opportunities. Expect strong political resistance, and ensure the privatisation process is transparent and competitive to avoid the privatisation itself transferring massive wealth through corruption.

Issue	Clarifying questions	Implications on policy choice and application of Economic Instruments (EIs)
C. Overview of public sector institutions: Structure and strength		
1. General		
	- Professional civil service? - Widespread bribe taking? - At what level of government (national, provincial, local) does the operational power reside? - Are institutions fragmented or capable of working together?	- Poorly-trained, corrupt, or fragmented civil service imply that greater reliance on decentralized oversight would be necessary. - Conflicts between the government level issuing a policy and the one with power increases the likelihood of being over-ruled. - International metrics, such as by Transparency International, can highlight these issues. They should be supported by private assessments as well.
2. Legal institutions		
Legal: Rule of Law	- Does the legal system enforce laws on the books generally? - Do citizens have legal recourse for damages they incur at the hands of private or municipal corporations?	Without the rule of law generally applied, the chance of succeeding with any type of environmental instrument (EI or CAC) is likely to be small.
Legal: Scope of Authority	- What legal platform will support EI programmes? Are there any known barriers? - Is the polluter pays principle or other methods that hold polluters responsible for environmental harm within the existing legal system?	Understanding the scope of legal authority is important in order to make realistic decisions about what types of policy actions will be possible without difficult-to-obtain changes in legal mandates or in the national constitution.
Legal: Enforcement of Property Rights	- Does the legal system specifically enforce property rights?	Without property rights, there can be no use of marketable permits, and firms/other entities will have little incentive to invest large sums in pollution-control plant and equipment.
Legal: Right to sue violators	- Can third parties (e.g., individuals, environmental groups, other firms) sue companies that are violating environmental laws already on the books? - Can suits be brought for general damages to natural resources?	Litigation can leverage the oversight power of governments by allowing other parties to take action as well. It can serve as a useful check and balance for other policies to make them more effective, be they CAC or EI.

Issue	Clarifying questions	Implications on policy choice and application of Economic Instruments (EIs)
3. Fiscal/economic institutions		
Fiscal: Functioning tax and financial reporting/audit system	- Are general taxes levied by the central authority and paid by the private sector? - Is there general confidence in the financial representations of private and municipal corporations? - Are the incentives provided by the current fiscal regime supportive or antagonistic to the new EI instrument?	- If nobody pays regular taxes, there is little chance they will pay environmental taxes. - Widespread perverse incentives will undermine the effectiveness of many EI (or CAC) approaches. - If the information presented by firms is inaccurate and subject to no penalties, only very centralized environmental policies would work (e.g., product fees, technology mandates).
Fiscal: Functioning insurance markets	- Can insurance be purchased at reasonable rates for a wide range of common business risks? - Is there any environmental risk coverage at all?	Functioning insurance markets can help reduce the need for direct-government oversight. Performance bonds, environmental liability policies, etc., can provide decentralized control methods.
Economic: Macroeconomic conditions of concern	- Is there hyperinflation? - Are poverty levels high? - Is there high unemployment? - Do resource sales provide critical foreign exchange earnings? - Is there a high national debt level?	- Any of these factors tend to diminish the relative importance of environmental issues. Because poverty and unemployment may also result from widespread corruption and poor governance, there may be ways to incorporate environmental EIs in a broad-scale reform package. - Natural resource sales are often a large source of foreign exchange, and production facilities are often owned by the government. This makes environmental controls of any kind very difficult to institute.

Issue	Clarifying questions	Implications on policy choice and application of Economic Instruments (EIs)
4. Environmental	- Is there a centralized authority with direct power and direct voice to the head of government? - Are there existing laws on the books? - Are these adequately enforced? - Is information on ambient environmental conditions, resource consumption, environmental permits, and enterprise emissions generally available to the public? - Is there a functioning monitoring and reporting system for measurement of baseline environmental data?	- Fragmentation of oversight amongst multiple agencies (e.g., environmental impact of agriculture, forestry, or mining managed elsewhere) greatly weakens the power to bring about environmental change. - A direct voice to the head of state is also important to increase the leverage to initiate sometimes-difficult changes. - Where there are extensive existing environmental laws that are not enforced, these same problems with authority are likely to plague any new efforts (whether EI or CAC). - Lack of information will impair the ability to implement or oversee a wide range of environmental policies, and will prevent many third-party enforcement approaches.

Common Applications of Economic Instruments by Resource Area⁸

Annex VI presents data on many economic instruments applications gathered from multi-country surveys. The instruments are grouped in a matrix that combines their functional objective with the resource areas being protected. The number of areas to which economic instruments have been applied is quite extensive, underscoring the flexibility of these policy approaches to meet a wide range of important needs.

Depending on the point of the matrix, different aspects of policy and institutional structures dominate. For example, to control access to resources, the economic instruments often focus on licensing or auctioning of rights. How these initial rights are distributed and maintained is of great importance in the type of behaviours that will then emerge. Enforcing terms of contract relies heavily on a functioning judicial system, whereas efforts to encourage efficient use of resources and infrastructure via user fees require financial institutions within a country to operate effectively. Policy applications tend to be fairly similar within a functional area (i.e., down a column). In contrast, there are few linking factors within a single resource area that cut across multiple functional areas (i.e., across a row).

One crucial point to highlight is that the efficacy of economic instruments in all of the five functional areas is reduced when there are baseline subsidies to environmentally harmful activities or behaviour. These subsidies counteract the positive effects of economic instruments and should be phased out whenever possible.

⁸ Adapted from UNEP (2004).

Annex VI Common Applications of Economic Instruments by Resource Area

Resource Area	Functional Area	Recover direct costs plus fair return	Curb emissions	Enforce contract terms	Subsidize preferred behaviour
Description					
	Control extraction/use rates at locations, so resource is not depleted haphazardly.	Recover direct costs of goods/services provided from beneficiaries; obtain fair return on sale of public resources/assets.	Force beneficiaries to pay for their use of land, water, and air quality.	Provide financial incentives to insure contract terms, especially with regard to clean-ups and accident prevention.	Provide financial assistance to encourage a shift to preferred products or productive methods.
Resource Area					
Minerals and Energy	- Licensing, auctions - Tenure reform	- Rents, royalties, bonus payments - Excise fees	- Pollution taxes - Marketable permits - Effluent charges	- Reclamation bonding - Litigation - Decommissioning or waste management fees	- Tax breaks for pollution controls - Government-financed health, safety, environmental functions - Subsidized access to energy for the poor

Resource Area	Functional Area	Recover direct costs plus fair return	Curb emissions	Enforce contract terms	Subsidize preferred behaviour
Water	- Licensing withdrawals - Municipal control of fresh water flows - Marketable withdrawal rights	- User fees, for water and wastewater treatment - Privatisation of infrastructure construction, operation	- Effluent charges, varying by volume or constituents of discharge - Fees on non-consumptive water withdrawals - Permitting of dischargers	- Fines and litigation - Environmental liability insurance	- Tax breaks for installation of pollution control equipment - Subsidized access to water for the poor
Timber	- Licensing, auctions - Tenure reform	- Cutting fees - Access charges		- Reforestation bonding - Fines and litigation for improper cutting, reforestation	- Tax breaks for reforestation - Reduced property taxes on timberlands - Subsidies for watershed protection during timbering - Subsidies to protect urban greenery
Fisheries	- Marketable quotas - Regulatory access controls - Terminate subsidies to fleet construction	- Purchase and rental costs of ITQs - Fishery landing fees - Fishery permit fees	- Petrol fees for water pollution cleanup - Fisheries management revolving funds	- Fines and litigation for non-compliance with fishing permits	- Public payments for fishing fleet retirement - Municipal development of efficient fish processing capabilities
Transport	- Toll roads, sometimes with peak rates - Access fees	- Tolls - Gasoline taxes - Vehicle weight charges	- Gas guzzler taxes on inefficient vehicles - Regulation/ inspection regimes for vehicle efficiency, emissions	- Liability insurance requirements for accidental spills - Environmental fines, litigation for accidents	- Excise tax reductions/exemptions for preferred fuels (leadfree petrol; biofuels; renewable energy)

Resource Area	Functional Area	Recover direct costs plus fair return	Curb emissions	Enforce contract terms	Subsidize preferred behaviour
Agriculture and Grazing	- Permitting, licensing for grazing on public lands - Tenure reform - Auctioning of grazing rights - Fees for development of agricultural land	- Implement full cost recovery for public sector agricultural support, insurance programmes	- Excise taxes on fertilizers, chemicals - Regulation of discharges to air and water - Discharge fees on manure		- Public funding of soil conservation, sustainable farming practices; training - Subsidies to protect biodiversity, particular cropping methods
Habitat/Biodiversity Protection	- Regulation/restrictions on development in certain regions - Tenure reform - Taxes on destructive activities (e.g., gravel extraction)	- Fees on recreational access or individual extractive activities (e.g., sport fishing, hunting) - Fees on ski lifts	- Tradable development permits allowing rights to be used in less sensitive ecosystems	- Environmental fines, litigation - Tax breaks for donation of development rights to a land bank	- Subsidies for maintaining high water levels
Air Quality	- Licensing or regulation of air discharges often forms baseline control	- Recovery of government regulatory costs via user charges	- Targeted pollution charges - Purchased pollution permits (may or may not be transferable)		
Nuisance (e.g. noise)	- Higher fees for particular airports encourage fleet redeployment	- Earmarking of fees for noise abatement programmes in affected community	- Noise charges	- Performance bonds	

Resource Area	Functional Area	Recover direct costs plus fair return	Curb emissions	Enforce contract terms	Subsidize preferred behaviour
Waste management	- Licensing/privatizing waste management sites	- Collection fees for waste pickup - Tipping fees at municipal dumps - Waste taxes per unit of hazardous waste managed	- Taxes on nuisance products (tires, batteries, motor oil) to finance recovery system - Rates often higher on more toxic items - Deposit/refund systems (cans, bottles, car hulks) to encourage diversion, recovery - "Pay-as-you-throw" charges per bag, encouraging participation in recycling programmes	- Trust funds for closure and post-closure management of dump sites - Environmental liability insurance - Environmental fines, litigation	- Disposal fees often cross-subsidize recycling and household hazardous waste diversion - Basic trash pickup often free due to health concerns

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