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ENVIRONMENTAL REGULATION AND USE OF ECONOMIC INSTRUMENTS FOR ENVIRONMENTAL PLANNING AND MANAGEMENT : AN OVERVIEW

by

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FOREWORD

Identification, measurement and valuation of environmental impacts represent a first step in dealing with the pressing environmental concerns of today. Ways and means of achieving that first step are discussed in a previous Discussion Paper in this series. In this fifteenth Discussion Paper Dr Meister deals with the next logical step in environmental management. This is the use of regulations and economic instruments to control activities and to induce decision making (by consumers and producers) to conform to socially desired goals in terms of environmental quality.

In the early 1970s, when government interventions were extended to include environmental protection, the authorities in most industrial countries turned to regulatory controls as a matter of course - either to create new laws and regulations or to adapt existing legislation. These regulations have in many situations served well and have considerably expanded over time. However, it has been recognised that in other situations regulations have achieved little and often at great cost. This recognition has led to the development of new approaches to environmental policies, based on a more 'economic' approach. The underlying basis of this approach is that for environmental resources to be allocated optimally, these resources should be priced properly (through charges or marketable permits) and not be 'free' resources.

In this Discussion Paper the three main approaches to environmental control - regulation, pollution charges (and subsidies) and marketable permits - are discussed. Also covered are pricing policies that prevent the production of pollutants, in contrast to just dealing with 'end-of-pipe' residuals. In the concluding section, the macroeconomic implications of environmental control, especially in terms of economic growth, are briefly discussed.

As in the previous Discussion Paper, there is a bias towards problems of developing countries, even though most of the policy examples are drawn from developed countries. The material in this Discussion Paper was put together for a series of lectures given by Dr Meister at workshops on Environmental Impact Assessment and Economic Analysis, organised by the United Nations Environment Programme (UNEP).

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CHAPTER I

1.0 ENVIRONMENTAL REGULATION

Environmental planning and management is essential in all countries because protection of the environment, disposal of waste, or prevention of environmental degradation does not occur automatically. It is as a recent article in The Economist stated, "markets cannot say useful things about disposing of waste." The same article continues by discussing why not, and discusses how Government has a role to play in achieving environmental control. It says,

> "No garage, selling you a new car, has reason to care where you dump it at the end of its life. But let the government impose a tax on new cars, refundable with interest when the car is scrapped (as in Sweden and Norway), and the garage may make money by offering to recycle old chassis. What is true for old bangers is true for the effluent from a chemical plant, or the fumes from a power station. Leave companies alone, and they will regard water and air as free dumping grounds. If they are to take account of the smell along the river or the fog over the town, governments will have to step in. Only the state can make the polluter pay the full cost of polluting" (The Economist, 1988).

Effective and efficient control requires in the first place good information on the cause and extent of environmental degradation. In a previous discussion paper (Meister, 1990) analytical techniques are discussed that enable the identification and measurement of environmental impacts. Environmental impact assessments, for example, identify effects and rank the impacts, Benefit Cost Analysis measures and evaluates the benefits and the costs associated with the impacts (and their control) and mathematical and econometric models (partial and general equilibrium) deal with the spatial and macro-economic aspects of these impacts and provide information for spatial investment and planning. All this, to get information on:

1) the extent of environmental impacts resulting from economic activities, development projects, or policies;
2) the social and economic consequences for the region's or nation's growth and standard of living; and
3) the cost of ways and means to minimize those impact.

The aim, therefore, is not just identification and measurement but control and implementation. The existence of environmental problems means that there is a need for social control, i.e. inducement to curtail or moderate the harmful impacts of activities or to enhance the beneficial ones. In this discussion paper ways and means to control activities

and to induce private decision making to conform to socially desired goals in terms of environmental quality, are discussed. This, of course is not something new. Control has been exercised in many countries for many years, and much has been learned about different control approaches, and much has been achieved in terms of environmental quality. But as Portney (1986) states, "now that the largest volumes and the most visible forms of pollution are under partial control, national environmental policy is beginning to address different needs, to accommodate new knowledge, and to adapt to changing views of governmental responsibility." Some of this is reflected in a renewed emphasis on the use of market instruments and adherence to the 'polluter-pays principle'. This will be discussed in more detailed in later sections of this paper.

Instruments for environmental control can be classified as follows (Baumol and Oates (1979):

Approaches to Environmental Policy

Part I: Policy Instruments

1. **Moral Suasion** (publicity, social pressure, etc.)
2. **Direct Controls**
   a. Regulations limiting the permissible levels of emissions
   b. Specification of mandatory processes or equipment
3. **Market Processes**
   a. Taxation of environmental damage
      (i) Tax rates based on evaluation of social damage
      (ii) Tax rates designed to achieve preset standards of environmental quality
   b. Subsidies
      (i) Specified payments per unit of reduction of waste emissions
      (ii) Subsidies to defray costs of damage-control equipment
   c. Issue of limited quantities of pollution "licenses"
      (i) Sale of licenses to the highest bidders
      (ii) Equal distribution of licenses with legalized resale
   d. Refundable deposits against environmental damage
   e. Allocation of property rights to give individuals a proprietary interest in improved environmental quality.
4. **Government Investment**
   a. Damage prevention facilities (e.g. municipal treatment plants)
   b. Regenerative activities (e.g. reforestation, slum clearances)
   c. Dissemination of information (e.g. pollution-control techniques, opportunities for profitable recycling)
   d. Research
   e. Education
      (i) Of the general public
      (ii) Of the professional specialists (ecologists, urban planners, etc.)

Part II: Administrative Mechanisms

1. **Administering Unit**
   a. National agency
   b. Local agency
2. **Financing**
   a. Payment by those who cause the damage
   b. Payment by those who benefit from improvements
   c. General revenues
3. **Enforcement mechanism**
   a. Regulatory organisation or police
   b. Citizen suits (with or without sharing of fines)

Source: Baumol and Oates (1979, pgs 218-219)

Although the whole table has been reproduced here, not all of the techniques will be discussed in this paper. The ones to be discussed are:

1. direct control (or command-and-control policies),

2. market based policies such as:
   a. pricing policies (taxes, subsidies, deposits etc.), and
   b. tradable permits.

These approaches, which appear under a wide variety of different names, are not mutually exclusive as will become evident in later discussion. It will be seen then that often a mixture of instruments provides the most feasible, politically most acceptable, and economically the most efficient way to control environmental pollution.

After the discussion of principles and applications of these types of instruments, in the final sections of this discussion paper, there will also be a discussion of the macroeconomic impacts of environmental regulations, and the financial implications of different instruments. These later sections will be relatively brief because some of this material will be covered in the discussion of the individual instruments.

CHAPTER II

2.0 COMMAND-AND-CONTROL POLICIES

Around the world, environmental authorities have relied primarily on direct controls to regulate the polluting activities of industry and individuals, or as Bohm and Russell (1985) state after their brief discussion of the history of environmental control, "The fact remains, however, that over the long sweep of history direct regulations (prohibitions, specifications of behaviour, non marketable permits to discharge) have been the instruments of actual choice for dealing with pollution, whether from geese in village brooks or petroleum refineries on major rivers."

Under the system of direct control, each polluter must abide by rules, developed at various levels of government, that specify the allowable levels of emissions and/or the technology to be used at each source of pollution (e.g. best practicable control technology currently available, and best available technology economically achievable). The approach involves: a) direct regulation through a permit mechanism, where the permit includes conditions such as the specification of discharge limits, the specification of production processes (technology), the specification of the quality of input materials to production, the specification of performance in reducing discharges, e.g. 95% collection efficiency; b) a monitoring and enforcement programme to ensure that the sources are complying with the conditions specified in the permit; and c) various types of economic incentives. For example, a regulatory system in air quality management can be defined operationally as consisting of the following element.

1. development and promulgation of ambient air quality standards to be achieved - in the U.S., the National Ambient Air Quality Standards (NAAQS);
2. development of guidelines defining (a) "appropriate" levels of discharges of gaseous residuals for various types of activities; and (b) the various physical measures, e.g., input raw materials, production processes, residuals modification equipment, that would enable achieving those discharge levels;

3. grant of a permit in which the conditions the discharger is to meet are specified, e.g., in terms of raw material input specifications, discharge limits, process specifications, air pollution control equipment performance standards, and product standards;
4. development and promulgation of operational definitions of compliance and noncompliance, with respect to the conditions specified in the permit, e.g., procedural deficiencies, permit compliance schedule violations, and violations of standards, such as discharge, input quality, process, pollution control equipment performance, and product;
5. establishment of conditions for obtaining variances;
6. specification of the self-monitoring and reporting requirements imposed on the activity;
7. design and execution of the monitoring, inspection, sampling, and data analysis procedures of the regulatory agency; and
8. the availability, types, and modes of imposition of sanctions against noncomplying dischargers. (Hanf and Downing, 1983)

Examples of this type of approach can be found in most countries round the world, both in the control of point-source and non-point source pollution.
Thus water- and air- quality management in the U.S. is based on a permit system.

Example. Water pollution control in the U.S.
According to the 1972 Water Pollution Control Amendment the effluent standards were to be implemented in two stages. By 1977 industrial sources, as a conditions of their permit, were required to meet effluent limitations based on the "best practicable control technology currently available". In addition all publicly-owned waste treatment plants were to have achieved secondary treatment by 1977. By 1983 industrial sources were required to meet effluent limitations based on the presumably more stringent "best available technology economically achievable" while publicly-owned waste treatment plants were required to meet effluent limitations which depended upon the "best practicable waste treatment technology". This second prong in the two-pronged approach involved financial support for the construction of waste treatment plants.

In other countries, water pollution is achieved by receiving water standards. These are set and permits are issued to firms discharging their effluents in the waters. If the permits are not adequate for the firm's requirements, then it is up to the firm to put into place waste treatment facilities. For example, many meat slaughter houses, dairy factories and dairy farms in N.Z. cannot meet the standards set by the permits. Hence most of them have put into place effluent ponds (aerobic and anaerobic) and on land disposal (spraying) of effluents.

Air-quality policy is also based on a permit system in Europe and Japan. In the area of non-point pollution control examples are not as abundant. One area in particular, that of soil erosion, still depends very much on voluntary compliance. However, also here, command-and-control regulations are put into place. These regulations are of two kinds:
a) design standards that specify what actions must or must not be taken by landowners, such as prohibition of certain land uses on particularly erosive lands, specification of management practices that must be employed, or preparation of a sediment control plan with certain required management practices for certain land use combinations;
b) performance standards which, in contrast, would make no restrictions on land use, but would place limits on gross erosion or on the quality of sediment entering the water body.

Most examples of this type of regulation are found in the West, Oceania, and Japan (for examples in the agricultural sector see OECD, 1989). However also in Asia and on the African continent, institutions are put into place (often modelled after European and American examples) which manage and control the environment. In the countries where these legal and institutional frameworks exist, implementation of control is often beset with problems of ignorance, inadequate numbers of, and poorly trained, staff; poor inter-agency co-ordination; and low budgets. Notwithstanding all that, however, also in these countries there are successes that can be reported where control has had a significant influence on the management of environmental resources and the quality of the environment (Banks, 1988).

The advantage of the regulatory approach (or the command-and control approach) is seen in its ecological incidence. If the quality target is properly set and if private dischargers or emitters do not violate the relevant laws, then the quality target will be reached. This argument makes the regulatory approach very attractive to environmentalists. Also, there is evidence around that there has been improvement in ambient environmental quality where this source-by-source approach has been used. However, while having achieved the noted improvements, the command-and-control tool has also been severely criticised for being cumbersome and cost-ineffective and for inhibiting industrial development. It is these shortcoming of the command-and-control approach that has led to much intellectual effort into developing new approaches for environmental control. This development has led to greater emphasis on market instruments to change behaviour. These new instruments are seen as alternatives for control, either alone, or in combination with command-and-control approaches. Vos and Opschoor (1988) give three reasons why, especially OECD countries, have anew decided to look at economic instruments for environmental control. The reasons are:

1. In most countries scarce funds (government and society) and continuing environmental problems have put a new emphasis on the search for efficient and effective instruments for environmental control. Economic or market instruments have, at least in theory, the ability to do so.