

# Instruments for Environmental Policy



# Foreword

In its work of contributing to environmentally sustainable development, Sida has attached considerable importance to environmental economics for many years, partly for analytical purposes and partly as a tool for change. This paper discusses the design of policy instruments, and describes how we can use them to overcome various environmental problems. It describes, for example, how environmental economics can be applied in practice to give us cleaner air or a more sustainable use of natural resources. It provides an insight into how environmental issues can be related to social and economic issues.

The author, Thomas Sterner, is professor of environmental economics at Gothenburg University in Sweden and a University Fellow of Resources for the Future, Washington DC. For more than a decade he has collaborated intensively with Sida on issues concerning environment, resources, poverty and development. He has recently published a book, *Policy Instruments for Environmental and Natural Resource Management*. The book is a co-publication of Resources for the Future, the World Bank, and the Swedish International Development Cooperation Agency (Sida). This paper can be seen as an independent summary of the book.

The book, which is one of the most comprehensive books available on the subject, will be used as a textbook in various educational contexts. For persons who, for one reason or another, do not want to study the extensive material in the book, this paper can hopefully provide some quick insights into the character of some environmental problems and can stimulate ideas on how the problems can be solved. Policy instruments are necessary and need to be used much more extensively than they are today – we cannot allow unsustainable development to continue.

Mats Segnestam  
*Head of Sida's Environment Policy Division*

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Author: Thomas Sterner, Gothenburg University

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assume information is freely available to everyone. Information is costly and lack of information stops the market from operating perfectly. Understanding information asymmetries not only helps us design policy instruments to deal with monitoring difficulties, it goes to the heart of our most essential dilemma: how to promote social goals such as equity without destroying the incentives for work and efficiency. Because we do not have reliable data on, for instance, pollution damages and abatement costs we cannot design policies that are both efficient in resource allocation and fair when it comes to sharing the burdens of all the costs involved. To get the co-operation of those who have inside information we must accept that they get something in return.



ever, if they are poor and live close to the absolute margin of survival, they may not be able to bear the risk of a bad harvest. This can result in unsustainable behaviour: They may not dare to invest in new productive and sustainable methods but continue to use methods that are damaging to the ecosystem. These practices, although unsustainable, may be individually rational if markets or institutions for savings and insurance simply do not exist. This again shows the harmful effects of a market failure.

### **Conflicting aims**

The income and equity aspects of environmental issues and policy instrument design are often crucial. Charging taxes to reduce herds, fishing or traffic may solve congestion and over-utilization problems but are still often resisted, since they leave the users with less welfare if the taxes collected are used for purposes seen as unproductive for the local users (such as central bureaucracies). In these cases we must build instruments that give the local users a price signal that internalises externalities without transferring the money out of the local community. There are numerous ways of doing this – one may be through permits allocated freely only to local users. Another may be through charges rather than taxes, using the fees collected for local environmental or resource funds that may be allocated in numerous ways decided on locally. Many environmental fees in developing countries operate in this way.

### **Information policy**

In many cases the technology and ecology may be so complex that individual permits are bound to be part of the policy package. This may imply the risk of ‘regulatory capture’: when polluters dominate (and maybe corrupt) the regulators. The polluters have more information and typically greater resources at their disposal. In these circumstances, informational policy instruments may be an important first step. By collecting and spreading information, the agency can achieve several important goals:

- It creates a baseline for future action.
- It encourages transparency, making it difficult for individual inspectors to secretly agree to unreasonable emissions.
- Finally it opens the way for pressure from customers, workers, investors, neighbours and other groups concerned.





which is specially created for environmental or natural resource management. In an international context these are often referred to as international offset systems. An important addition, which is relevant at the very local level, is the operation of Common Property resource management schemes.

Under the heading of Regulation, we have Standards, Bans and (non-tradable) Permits or Quotas. We might add licenses as well as liability rules, which brings in a large area of law and the politics of enforcement. Instruments such as liability or performance bonds and penalties are part of the arsenal. Regulations may vary over time or between regions as in the case of zoning. So-called voluntary agreements, may also be seen as a form of regulation.

The last category, 'Engaging the public', includes such policies as information provision, labelling and community participation in management of water resources or waste disposal. In this category we can also include dialogue and collaboration between the EPA (environment protection agency), the public and the polluters.

Environmental auditing and certification, is a related policy instrument used mainly at company level (often used together with the labelling and information provision).

### **Stock of experiences**

There is by now a large variety of policy instruments specifically designed for environmental and natural resource issues. In addition, most other policies are highly relevant for resource management, ranging from the definition and enforcement of property rights, through the efficiency of the court system, to macro-economic variables such as the rate of interest and the exchange rate. Market-based policy instruments can be designed in many ways — environment taxes and tradable permits are just two archetypes. There are many interesting cases involving the use of taxes, charges, deposit refund systems and other two-part instruments in Northern Europe, including the formerly planned economies such as Poland or the Baltic republic of Estonia, and in developing countries like China, Malaysia and Columbia.

Tradable permit schemes are used for pollution abatement not only in the US but also in many other countries, and with particular success for fishery management. Information access, labelling, liability and many other schemes broaden the menu of policies currently being used.

Sometimes policies such as energy taxes and subsidies are 'accidental' environmental instruments: They were not formulated with environmental goals primarily in mind. In spite of economists' recommendations to have one instrument for each goal, actual policies are shaped from complex bargaining processes and reflect many goals, some of them contradictory. They are seldom purely 'textbook' environmental policies but the same goes for policies aimed at furthering democracy, participation, equity and other goals. In spite of this, energy taxes provide a good illustration of the way environmental charges work. In other cases, physical licensing and control are predominant instruments. This should not upset economists since, according to economic theory, there are many cases when it is appropriate to use physical regulations. In some cases, even prohibition may be the most 'economic' instrument.

## Selecting instruments

To select and design instruments, we need to consider these experiences systematically in the light of theoretical models. The choice will depend crucially on the *criteria* that are most important for policy selection and on the various *conditions* that characterize a particular problem.

## Criteria

Economists generally assume that what is most important for society is welfare maximization and that welfare can be measured as a function of individual utilities. The utility and welfare functions may however be too complicated to be really operational and it is common to have a number of separate sub-goals. The most prominent sub-goals are cost-effectiveness, efficiency, sustainability, incentive compatibility and equity or fairness in the distribution of costs, and finally, administrative feasibility and flexibility. These terms are not perfectly clear nor are they completely separable and the political process is often a struggle in which different groups have different emphasis and interpretations of the various criteria.

- Cost-effectiveness means that if the instrument operates as planned, it would achieve the environmental goals at lowest cost.
- Efficiency is a more ambitious concept that includes the optimality of the goal (i.e. the level of abatement or of resource stock).
- Sustainability refers to long-term feasibility and fairness.
- Incentive compatibility means that the agents involved, (particularly the polluters, but also regulators, victims and others) have an incentive to provide information and undertake adequate abatement.
- Distributional and equity concerns mean that the distribution of costs should be seen as fair.
- Administrative feasibility includes the avoiding of excessive financial or informational costs for the operation of the instrument.

Naturally these criteria interact, since for example polluters who think a particular distribution of costs is strongly unfair will try to resist and stop implementation. They will not have an incentive to collaborate and particularly if information or power is not shared equally, this will ultimately lead to inefficiency. There are many political, cultural and psychological dimensions to policy formulation and implementation. So it is important to respect and follow the traditional rules for decision making, sometimes referred to as ‘due process’ — without, however, naïvely opening up opportunities for corruptive lobbying. Given the sometimes rapid changes in technology, ecology or of our understanding of the technical and ecological situation, there is also a need for flexibility in the chosen policy.

## Conditions

The *criteria* also turn out to be of varying importance depending on the *conditions* that characterize each particular issue. In an economy with an even distribution of income, and when dealing with environmental problems with moderate abatement costs, equity issues are less important. On the other hand, when dealing with major issues that affect

health and ultimately life, in countries with large income gaps, distributional concerns may be seen as equally or more important than cost-effectiveness. When dealing with markets characterized by powerful monopolies or serious information inequality the issues of incentive compatibility may well be most important. In other words, we need an instrument that will make the powerful polluters co-operate.

The factors that will influence the choice of instruments the most will vary strongly from case to case. If abatement *costs* vary considerably then *efficiency* dictates that market mechanisms such as taxes or tradable permits be used. This is the classic argument for the superiority of the market and if total costs are high it will be a very important factor. If on the other hand the damage costs are sufficiently diverse then more physical, quantitative instruments may be called for such as zoning or differentiated regulations and licenses. If there are important information inequalities then policy instruments need to be *self-revealing* such as deposit refund schemes. Pure research and dissemination of information may also be crucial. In the face of some technical or ecological complexities, *flexibility* may be of paramount importance. This is a great advantage for policy instruments such as the tradable quotas used in fishing since decisions concerning the absolute level of catch are separated from distribution issues. The separation of these two aspects implies that the catch level can be delegated to expert bodies that can make rapid decisions based on scientific evidence without having to consider or renegotiate all the political complexities of the distribution of costs and rights. This may be a model worth considering in other areas such as climate change too.

### **Institutional resources**

One of the most common factors that hamper policy making in many countries (particularly the poorer ones) is the weakness and lack of resources in the environmental protection agencies or ministries in charge of designing policies. This lack may include not only fiscal resources but also lack of staff, training, laboratory and other facilities. Experience has shown that it is important to prioritise and concentrate on a limited number of important issues and on the worst polluters. It is also important to build up institutions that are knowledgeable and obviously free from nepotism or corruption. To be successful, these institutions should build partnerships with the various stakeholders and to be seen not only as a policeman but also as a source of technology and know-how in modern sustainable technology.

Information and technology dissemination, research support and extension services are very important tasks in addition to the inevitable control function of the EPA. The setting of fees is a difficult and sensitive issue. In some cases, low fees that are earmarked for abatement, research and control may be a very useful instrument. Creating environmental funds in which the polluters have influence may help build political acceptance among regional or sectoral stakeholders who need to be involved rather than alienated. Effective environmental work often builds on functional partnerships in which it is important to clarify the respective roles and rights of each party.

In many cases the power of the polluters is considerable in relation to

the relative weakness of the environmental protection agencies. This means that such instruments as environmental taxes are impossible to enforce while tradable permits allow the planner to fine-tune the allocation of rights and distribution of costs to make a policy politically acceptable. Similarly charges that are differentiated and refunded or paid into environmental funds may be used to secure acceptance from important polluters and at the same time to strengthen the funding of the public agencies themselves.

Evidence shows that real policy making is seldom the neutral search for the optimal instrument to maximize global welfare. It is often a battle between different lobby groups striving either for survival, personal benefit, power or perhaps for environmental goals. It is crucial to respect transparent, democratic and bureaucratically feasible processes for decision making. The parties affected by legislation must be given the opportunity to influence it for the sake of legitimacy and because they are the best sources of information. The process must therefore be designed so they have an incentive to reveal at least part of this information. On the other hand, the parties can obviously not be given too much influence if this means that effective instruments are ruled out. To understand the politics of policy design, careful attention must be paid not only to the way the instruments work but also to the distribution of costs that they imply, between the polluters and others in society.









ment or reduced exploitation is possible. This may be important in some cases but is likely to be insufficient and will not replace international negotiation on concerted action.

### **Property rights**

There are many cases when the provision of public goods is essential for the environment. Sometimes however, the public goods are not pure. They may be mixed or local public goods or have uses that make them closer to common pool resources. The appropriate policy instruments will vary with the circumstances. In many cases the reform or clarification of property rights is an important prerequisite for other policies. In the case of the common pool resources (marginal lands, mangroves, fishing sites, water sources) that are particularly important for many of the poorest, common property regimes are often the most appropriate. This is shown by numerous examples in water management, forestry, fisheries and wildlife management alluded to above. It is however not easy to create new common property resources. These social institutions work through reputation and social structure that create trust and reciprocity and such structures take time to build. In some cases it may still be useful to emulate or mimic some of the mechanisms of CPR management as in the example of industrial pollution management in Gujarat below.

### **Lack of resources**

Frequently countries embarking on ambitious environmental programs find themselves limited by lack of knowledge, organization, technical, financial and human resources. Sophisticated instruments might appear to be completely out of their reach. There is however much common ground in all environmental control. They all require monitoring, reporting, verification and control. Physical 'command and control' instruments are not necessarily easy to administer. They too require control plus a system of penalties and enforcement that needs to be sufficiently severe to act as a deterrent but still not so severe that it becomes unenforceable in practice. For this reason informational, legal or market instruments may sometimes be preferable. The instrument may need to be designed specifically to deal with the EPA's lack of resources. The use of product charges rather than emission or effluent charges is one example that saves administrative resources (although it reduces allocative efficiency). Earmarking fees can also provide resources for the EPAs.













There is a wealth of instruments at hand to be employed in environmental policy making, reaching from enforcement to encouragement and enlightenment. In this overview of policy instruments, Professor Thomas Sterner discusses pros and cons of different instruments and criteria and conditions for their use.

Professor Thomas Sterner, of Gothenburg University, is also the author of "Policy Instruments for Environmental and Natural Resource Management" in which he goes into depth with instrument design and employment in a wider context of economic theory and political practice.

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SWEDISH INTERNATIONAL  
DEVELOPMENT COOPERATION AGENCY

SE-105 25 Stockholm Sweden  
Phone: +46 (0)8 698 50 00  
Fax: +46 (0)8 698 56 15  
info@sida.se, www.sida.se