Institutional Instruments for Water Pollution Control

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Abstract: This paper focuses on the articulation of policies in the interface between economic production and water quality. One problem is the introduction, at this production-ecologic interface, of unwanted water-borne residuals by firms and municipalities. The policy objective is to absorb the social cost of environmental degradation into the production function within the two constraints of efficiency in the allocation of resources and the protection of property rights. The efficient allocation of environmental resources (in such a way as to maximize human welfare) has long been recognized as a basic objective in resource management. Equally important is the consideration of environmental rights and responsibilities in a society where property power and the institution of property is a dominant characteristic. Since the manner in which the property owner acts may affect the environment of his neighbours, it is important that policy instruments inform the holder of the property rights of the ill-effects of his actions upon others and induce him to take action to remedy the situation.

The question of water quality management options requires urgent consideration for two reasons. Firstly, the cost of water pollution control is already considerable and is likely to increase even more sharply as the growing number of urban centres put greater pressure on the water resource for waste dilution and assimilation and other competing uses such as municipal demands, heat dissipation, recreation and wildlife protection. Secondly, the institutional mechanisms for dealing with this problem seem to be inadequate and ineffective. It is true that subsidies and grants have encouraged the building of more municipal waste treatment plants while regulation and court action have reduced some of the worst abuses.

Subsidies and grants may be inefficient policy choices because they encourage hardware solutions even when other less expensive solutions are possible. In addition, they fail to inform the polluters of the ill-effects of their action; and the general public has to shoulder the burden in the form of increased taxation. Regulation and court action are cumbersome, sporadic and time-consuming.

Effluent standards could be made flexible as a policy instrument if they afforded the polluter the opportunity to choose either to install in-plant controls or to pay the "fine" or to combine both these choices in any way that minimized his costs. This would combine the policy instrument of the effluent standard with the policy instrument of an effluent (or user) charge. The charges could be set either to reflect marginal pollution damages or the marginal cost of maintaining a given ambient standard. In other words the inferred marginal damage of pollution is equal to the marginal cost of treatment up to some desired level thus ensuring that the desired amount of waste load be reduced at least cost. Pricing and transferable effluent permits serve the same purpose.
Managing Water Quality

The degradation of water, air and soil may be considered as the other side of the coin of the production and consumption of goods and services. However, this direct relationship between the level of material consumption and environmental quality is not fixed and the statement unduly dichotomizes the choice between material economic growth and environmental quality and health. It could be argued that increased levels of material consumption and well-being might be compatible with lower levels of resources depletion and ecosystem degradation. However, inadequate institutional arrangements have allowed producers (and consumers) to disregard the costs of natural resource depletion and waste disposal borne by others indirectly depaid for through market mechanisms. These costs are known as "technological externalities"; one example is the emission of pollutants into water bodies. A number of economic-legal-institutional mechanisms1) are available for placing a price on the use of natural resources, where the traditional market mechanism has failed to discourage the overuse and misuse of natural resources held in common such as rivers, lakes, coastal zones, and ground water.

These mechanisms, or policy instruments, include prohibition, regulation (for example, emission standards), effluent and user charges, subsidies and grants, liability for compensation payments, demand management (for example, the use of marginal cost pricing instead of average cost pricing), and transferable discharge permits. Tab 1 lists some of the opportunities for applying these institutional mechanisms at the various stages of the production-consumption process. Conversely, there are policy instruments that tacitly encourage or at least do not prevent indiscriminate dumping of wastes.

The emphasis in this paper is on the practical application of policy instruments designed to reduce water pollution problems. As Stephenson (1977) argues, much has been written about the theoretical aspects of this topic (Baumol and Oates, 1974; Dewees et al., 1974) but less attention has been devoted to the practical problems faced by political jurisdictions which might wish to consider the application of legal-economic-institutional mechanisms to control water pollution. In fact these mechanisms remain largely untried and society has relied upon persuasion, education, regulation and the engineering options to protect water quality. So far there has been a general disregard of the fact that clean air and water are truly scarce resources like labour and raw materials. Rather than making clean water free to use, society should put a price on the use of the assimilative capacity of water in order to create an incentive for developing pollution-abatement techniques and hence reduce the abuse of community-held resources.

Characteristics of Policy Instruments

Water bodies can hardly avoid pollution completely in an economy characterized by industrial and intensive agricultural activities. Some forms and levels of water pollution are more tolerable than others because the pollution-generating activity produces far more utility (satisfaction or dollars or employment, etc.) than the disutility of the pollution it causes. Thus the first assumption that underlies this discussion is that the type and level of pollution are at least tolerable. In another paper (Grima, 1980), I have listed five other "reasonable" assumptions:

- that the market mechanism is working sufficiently well so that the reduction of externalities would improve the efficient production and consumption of goods and services;
- that the aquatic bio-geo-chemical system is still viable and/or capable of rehabilitation;
- that the best available production methods are used in the industry causing pollution;
- that the individuals and the community can choose between options at least in an ordinal sense;
- that the distribution of wealth and income is generally acceptable to the community.

1) The institutional-economic-legal mechanisms may be contrasted with the engineering structures that control water pollution such as sewage treatment plants, pipelines, dams and so on.