

# 1. Introduction<sup>1</sup>

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The economic literature commonly identifies economic instruments (EIs) as a 'better' way to achieve environmental goals than specified quantity and technological standards commonly known as command-and-control mechanisms (CACs). However, the choice of an appropriate economic instrument is theoretically complex; and the experiences with their application are full of controversy about their effectiveness in accomplishing desired environmental targets.

Environmental regulators usually apply two different kinds of individual standards to induce agents to conform to environmental or resource management goals. One type specifies emission rates or levels, as well as permissible rates of resource (water) use. The other kind of standard is technologically defined, requiring for example a specific kind of pollution control technology. Overall ambient standards also are set to identify the aggregate environmental performance targets in, for example, a watershed. Theoretically, individual technology or performance standards would be set in order to make agents achieve, in aggregate, the ambient standards.

If instead of complying with a uniform individual standard, pollution or resource use levels were charged, each agent's control or use level would be different. Agents with lower costs will control more than agents with higher costs (and agents with higher demand responsiveness for the water resource will reduce consumption less, for a given charge, than those with a lower demand responsiveness). With a uniform pollution charge, all private agents will choose between paying the charge and reducing the effluent to the point where they have the same marginal cost of control. In this situation, control will then follow the least-cost path among agents for a given reduction in aggregate pollution loading. In other words the reduction in aggregate loading will be cost-effective.

Equity issues also can become more interesting than with a single standard for everyone. Since each source's control level will be

determined by the point that the pollution or use price equals marginal control cost, by definition all controlled units will cost less than the charged price whereas pollution and use level not controlled will be charged at this pollution/use price.

In addition to that, charging all units of pollution and use will create a stronger dynamic incentive for eco-friendly technological change (resource conservation, pollution prevention or treatment), since all remaining units of pollution or water use will incur a cost, not just those required to achieve compliance status. In most cases, however, the ambient environmental consequences of the loading reduction from a uniform pollution charge will depend on where the reductions occur as well as by how much.

While a uniform charge will yield cost-effectiveness gains compared to the same reduction in loading through uniform individual standards, the environmental performance of such pricing mechanisms depends on whatever ambient environmental standards the charge system seeks to achieve. If these underlying environmental standards are weak or fail to capture all relevant ecological dimensions, then the pricing mechanisms also will be limited in their environmental consequences. Nevertheless pricing with these limitations may still offer the least-cost approach to total pollution reduction when compared to standards with the same ecological restrictions. As already noted, the overall environmental performance of both charges and standards can depend on where the reductions occur, as well as on how much. The more homogeneous the effects of pollution from different sources on ambient conditions, the less important this consideration will be.

Although theoretically pricing instruments promise cost-effectiveness relative to control instruments, the potential cost savings with economic instruments will depend on the degree of control of cost heterogeneity among polluters and users, which depends in turn on size, technology, information, managerial skills and other factors. If marginal costs of control are not too different, then the cost savings from the charge system will be more modest. The overall cost-effectiveness of a charge system also depends on the costs of obtaining all the required information and to set up the charging and monitoring basis. The system may have high transaction costs that could dissipate the expected cost savings. Therefore regulators must have in mind that control cost savings must be balanced against implementation costs including staffing and monitoring facilities.

Seroa da Motta et al. (1999) first presented a comprehensive survey

of Latin America and the Caribbean's EI experiences in the mid-1990s. They concluded that there is a wide range of application of EIs in the region and that they have closely followed the OECD pattern with revenue-raising aims. Water charges have been the most advanced case. They have, however, showed problems in design and implementation issues, such as:

- weak targeting and performance monitoring of environmental goals
- lack of sound pricing criteria
- poor performance on revenue collection

Among experiences in developed countries, the French river basin system has been seen as a paradigm for Latin America experiences. This was mostly due to the fact that the French system was created by governmental decision quite recently and implemented in a reasonable time with immediate results. Praising of this experience has obscured the identification of its main difficulties and constraints that, once recognized could be of great value for followers, particularly when countries in the region are already struggling to initiate or improve the implementation of their systems.

Based on this diagnostic, after presenting a summary review of the literature, this volume reviews water charge experiences in France, Mexico and Brazil. These country reviews were undertaken by local experts and, despite differences in emphasis, each country evaluation is organized along the same guidelines covering topics of relevance for the application of a policy instrument, namely:

1. Policy analysis phase: the policy setting in which the water EI was introduced as a mean of achieving policy goals.
2. Instrument design phase: the theoretical, institutional and legal basis on which the EI was conceived.
3. Instrument implementation phase: successes and failures of the EI application and its review process.

## 1.1 COUNTRY CASES

The 1964 Water Act profoundly modified the French water management system and its apparent success later set a new paradigm for water policies across the world, particularly in Latin America.

The new approach in France was based on two general principles: decentralization and planning. Decentralization is based on the idea that water management organization should reflect the physical unity of water bodies in order to account for the potential sources of conflicts. To handle the externality problems linked to water pollution and conflicts of use as an integrated approach, the river basin is defined as the basic administrative unit rather than addressing uses differently and water management centrally with one set of unified performance standards. Planning is intended to provide consistent decisions at the river basin level and to introduce a medium-term perspective on water management.

The decentralization principle is put into practice by the creation of Water Agencies and River Basin Committees in each of the six French river basins. While the former are intended to perform executive functions, River Basin Committees act as consultative bodies. To carry this on, two new instruments were adopted: five-year management plans and water charges.

Implementation of water charges was gradual and it worked very well to generate revenues for water-related investments, with much of the revenue transferred back towards water charge payers. However, no major role for price incentives has been found at the prevailing water charge levels to induce changed water use patterns. Moreover the special treatment to agricultural users through exemptions has led to the sacrifice of noticeable environmental gains.

Close to the French approach, Mexico has adopted water charges since the 1980s. The water use charge from federal water bodies has been in place since 1986 and the wastewater charge since 1991. A central agency in charge of the use of federal water resources, the National Water Commission (CNA), was created in 1989. The CNA is the sole authority for federal water management and is responsible for the promotion and execution of federal infrastructure and the necessary services for the preservation of water quality. The most recent regulation is the 1992 National Water Law that is the backbone of the federal water system.

The CNA is attached to the Ministry of Environment and Natural Resources. The federal water management system encompasses 13 administrative regions defined by the CNA, following hydrographic criteria. Each region comprises one or more basins, thus basins and not states are the basic division of the Mexican water management system. In total the system includes 26 Basin Councils. Following the French

principles, the objective of the councils is to promote participation in the management process of the basin. Pricing criteria of water charges are, however, set by a federal law revised every year. These councils moreover have not been fully implemented and their capability has not been completely developed in order that they may be fully evaluated.

Water pollution charges in Mexico perform the role of a non-compliance charge since polluters only pay for units above the discharge standard. However, the implementation of the water charges has not been very successful since national coverage of the vast country's water system has required monitoring resources and enforcement capability beyond the CNA institutional capacity. In addition to that, CNA institutional power has been more concerned with infrastructure development than pursuing environmental targets. The reduced scope for private and public participation, associated with lack of information based on careful analysis of expected impacts from charge incidence has created polluters' opposition on competitiveness and distributive grounds.

As a consequence of these institutional barriers, revenue generation has been very low and no changes in water use pattern have occurred. A project law entitled Ley de Cuencas y Aguas Nacionales (Basin and National Water Law) and at least two other projects of reform to the current law are being analysed by the Congress. Although they are still in the discussion phase, it is worth mentioning that they all propose giving more autonomy to the river basin institutions. While the autonomy proposed might not go as far as it could, the undeniable goal of every proposal is to strengthen the institutional capacity of the participatory institutions.

The Brazilian experience is quite different. Following the approval of the Federal Water Law (Law 9433 of 1997), Brazil has recently implemented a wide-ranging water sector reform, including the introduction of environmental water charges. The Brazilian legal framework for water resources management is based on the constitutional distinction between federal and state waters. Federal waters are those that flow across state boundaries or along the boundaries between two or more states or a foreign country. State waters are those situated entirely within the territory of a single state.

The new water management system adopted the same French principles of management by Water Basin Committees and Agencies where water charges are associated with River Basin Management Plans that identify environmental targets to be accomplished with a set of

water-related investments and financed with water charge revenues. However, pricing criteria for the setting of charges have no general structure and committees have more autonomy in this matter than in France.

The creation of River Basin Committees is also less centralized. It depends on the users' initiatives to form a committee that must fulfil some managerial requirements and then must seek approval of the National Council of Water Resources. So the river basin national grid will be gradually implemented. The National Council of Water Resources also deals with inter-basin and inter-state disputes. Supervising and assisting basin water agencies is the National Water Agency.

The first implementation of water charges in federal rivers is due to begin in March 2003 in the Paraíba do Sul river basin, where a single low charge will be levied on users for only a small number of pollutants. In this initial phase, the aim is to collect enough charge revenue to entitle the basin to compete for federal funds oriented toward water clean-up projects.

At state levels, almost all states have their own water policy based on the principles adopted in the national framework. Ceará already has water use charges and São Paulo is also near to implementing its charge system very similar to the one adopted for the Paraíba do Sul river basin.

There is no doubt that, so far, Brazilian experiences have followed revenue-raising aims as in France and the participatory process through River Basin Committees was also not able to introduce clear price incentives for changes in water use patterns.

## 1.2 MAIN CONCLUSIONS

Water charges have been introduced as instruments for an integrated water policy approach. This approach has been primarily concerned with (1) the need to plan and decentralize water management in order to accommodate multiple conflicting uses and excesses over assimilative and support capacities of the country's water systems, and (2) the need to raise revenue.

Despite the fact that the primary goal of water charges has been in principle to assign an economic value for water, in all cases charges were in place mainly to support the achievement of CAC instruments, such as discharge permits and standards.

Decentralization was planned in two ways: (1) water management

goals and targets differentiated by river basins, and (2) conflicts among users dealt with through a participatory process. The main institutional bases has been the River Basin Committees that define management targets to be executed by their Water Agencies.

To accommodate economic and social conflicts, water charges in practice are financing mechanisms for investment solutions for water management, including pollution control investments.

Apart from administrative costs, the major share of water charge revenues goes to infrastructure investments and direct transfer for users to finance their pollution abatement actions. Such transfers are thought of as the cornerstone for political acceptance and users' commitment to the charge system since sectoral interests reduce the possibility of fully applied water charges.

The need for a participatory process to accommodate users' conflicts and to increase acceptance reduces the potential benefits of a water charge system. That is, participation may solve revenue-related conflicts but it does not necessarily create incentives for a charge system that will significantly change water pattern uses.

It is also recognized that the lack of a continuous evaluation process to analyse the effects of the charge system on use levels and on environment quality has delayed improvements in the system and in the allocation of the water charge revenues.

### 1.3 RECOMMENDATIONS

Recommendations can be summarized as follows:

- Revenue-raising goals should be explicitly acknowledged and achieving environmental goals has to be planned. But it is important to make explicit the environmental consequences of charge application to allow for gradual incorporation of environmental criteria in the charge system.
- Autonomy of river basin authorities must be tailored to maximize institutional capacity by facilitating political acceptance, reducing information gaps and reducing administrative costs.
- Also the water management framework must be integrated with other policy frameworks to increase monitoring and enforcement capacities.
- Continuous environmental evaluation of the river basin should be

undertaken incorporating economic models that identify water use changes related to charge impacts. And cost–benefit analytical tools should be developed for projects to be financed with charge revenues to maximize the social value of the investment actions.

- Public opinion should be brought into the debate on water management issues with data release and technical arguments to consolidate river basin management and the role of water charges.

## NOTE

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