

1.04 Water as an Economic Good: Old and New Concepts and Implications for Analysis and Implementation

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1.04.1 Introduction

This chapter addresses two conceptual and operational challenges which are of major importance for the management and development of water resources. Challenge one relates to the economic impact of large water infrastructure projects and suggests, first, that conventional economic analytic tools are of little value and, second, that newly emerging tools can be of substantial practical use. Challenge two relates to management and describes both fallacies and emerging approaches for ensuring that the economic productivity of water is maximized.

1.04.2 Challenge One: Revisiting the Old Issue of the Indirect Effects of Investments in Major Water Projects

During the era of rapid economic growth, the political leaders of now-rich countries invested heavily in much major water (and other) infrastructure because they believed that these investments would transform the regional economies in which the projects – such as the Tennessee Valley Authority (TVA), Hoover Dam, and Grand Coulee projects in the United States – were located.

Decades after these projects were completed (and delivered these large indirect benefits), the US Office of Management and Budget in the 1950s declared that under conditions believed to be prevailing in the United States (full employment and mobile factors of production) these indirect benefits should not be taken into account in investment decisions. As described in detail elsewhere (Briscoe, 2008), this was greeted with incredulity by political leaders who asked “if we had followed this advice, what infrastructure would ever have been built?” (with the implicit answer “very little”). Although this issue faded from the sight of politicians, as most of the major infrastructure in the US had already been built, it did not fade from the bible of economists and was incorporated into conventional economic wisdom and standard appraisal practices of institutions such as the World Bank.

A recent set of detailed analyses (Bhatia *et al.*, 2008) of the Bhakra Dam in northwest India, the Sao Francisco dams in Brazil, and Aswan Dam in Egypt confirm similar findings from earlier studies – namely that such projects have major backward linkages (for inputs into agriculture) and forward linkages (for processing of agricultural products, for instance). In all cases, not only the indirect effects were as large as the direct effects (as had been demonstrated in other analyses of the Muda projects in Malaysia and Grand Coulee in the United States) but also these projects had stimulated precisely the regional development which politicians had hoped for (and which economists now said, “don’t count”). Equally important, where the data were available (as in the Bhakra case; Bhatia *et al.*, 2008) it turned out that the biggest proportional beneficiaries were not the landlords but the landless, as a result of the sharp increase in the demand for labor.

For decision makers in the real world, the conclusion is that these indirect impacts are large, and that such projects can, indeed, be the basis for regional development. It is true, nevertheless, that there is a serious analytic challenge and an even more serious practical challenge. The analytic challenge is that these studies are all *ex post*. There is no reliable *ex ante* method for assessing the indirect impacts. The practical challenge is that there is no established methodology for deciding on what packages of complementary public investments are needed in order to maximize the likelihood that the unquantifiable-but-very-important indirect benefits do, in fact, materialize.

On the latter, there is a ray of light, from the original work of Harvard economist Ricardo (e.g., Hausmann and Klinger, 2008) on development patterns as defined by the ‘product space’. This work represents a major intellectual departure from the normative and mechanical work embodied in classic cost-benefit analysis. The approach starts not with principles, but with the collection of data and the use of network approaches to describe revealed patterns of economic development paths in hundreds of economies over time. In the case of major water projects, this would mean the following. First, planners would describe “where the region is” (in our case,

after the building of the major infrastructure, the emergence of new configurations of energy generation, agriculture, industry, and transport). Second, taking account of the new regional reality, assess the opportunities this starting point affords by examining development paths which have evolved from similar endowments, thus identifying the paths that are most promising (and those which are no more than pie-in-the-sky fantasies). Armed with this X-ray (for the example of Pakistan, see [Hausmann and Klinger \(2008\)](#)), planners of large water infrastructure can then decide in a systematic and informed way on what complementary investments are needed to maximize the likelihood that multipliers will develop. The development of such a methodology is a high priority for developing countries (and there are many), who are in the early stages of investing in major water infrastructure, and offers an escape from what have become ritualistic and uninformative standard cost-benefit procedures.

1.04.3 Challenge Two: Managing Water as a Scarce Resource

Many countries face multiple concerns regarding the growing scarcity of water, the associated conflicts among users, and ways of transferring water from low-value to high-value uses. Prominent and well-informed commentators often state that having users pay the full cost of water would solve these problems (recent examples include the CEO of Nestle ([Brabeck-Letmathe, 2008](#)) and [The Economist \(2008\)](#)). Experience has shown that the situation is considerably more complex and nuanced, and that it is not enough to just extol the virtues of pricing. This chapter outlines a different approach – one of principled pragmatism. Principled because economic principles such as ensuring that users take financial and resource costs into account when using water are very important; and pragmatism because solutions need to be tailored to specific, widely varying natural, cultural, economic, and political circumstances, in which the art of reform is the art of the possible. The general arguments are illustrated by focusing on two major users – farmers and cities. Here, four issues are addressed. This chapter draws on the World Bank's Water Resources Sector Strategy ([World Bank, 2003](#)):

1. the quite different economic environments that pertain to these two sectors;
2. the crucial distinctions between the perspective of economists and the perspective of users on what constitutes appropriate pricing, and some of the implications of these distinctions for practice;
3. the critical distinction between the financial cost of providing a service and the opportunity cost of the resource itself, and the implications of this distinction; and
4. a review of some good practice developments, and the implications for a country-specific, practical, sequenced approach to dealing with these crucial issues.

1.04.3.1 Issue One: The Radically Different Markets in which Irrigation and Urban Water Operate

The first, fundamental distinction is between the markets in which urban water supply and irrigation operate.

In the case of urban water supply, the product can largely be considered as a local, nontradable good. The price charged for water in Helsinki is entirely immaterial to the price charged in Timbuktu. More specifically, if Helsinki chooses to subsidize its water users, that is of no relevance to water users in Timbuktu.

In the case of irrigation, where the end products are agricultural goods that trade on a global market, the situation is radically different. If the government of a developed country chooses to subsidize water (and other inputs and outputs) of its farmers, this has an impact on world prices, and thus a direct impact on producers in developing countries. As the magnitude of the agricultural subsidies from OECD countries (OECD, Organization for Economic Cooperation and Development) is huge (about \$350 billion/year, to the detriment of consumers in developed countries and producers in developing countries), this has a major impact on the prices of agricultural products in developing countries and on the economic returns from farming. These distortions reinforce the demands of farmers in developing countries with regard to subsidies for water, energy, and other inputs, usually causing further harm to both the economy and the environment.

This crucial fact makes the political economy of water pricing reform especially complex (in both theory and practice) for irrigation. Experience suggests that the appropriate approach is to acknowledge the need for subsidies and to document the existing levels. Then it is possible – for example, as has been done in Mexico ([Gonzalez, 1997](#)) – for the government and farmers to agree upon a subsidy-neutral transformation from a package of perverse subsidies (of fertilizers, pesticides, and water, for instance) to a package of virtuous subsidies (such as for improving land quality and for more efficient technology).

1.04.3.2 Issue Two: How Appropriate Pricing Is Understood by Economists and by Users and the Implications for Practice

Economists have long had a sound theoretical basis for assessing the resource implications of pricing, namely charging users for the marginal cost of producing the next unit of input. This rule is clear and correct, because that is the signal which will cause users to take into account the cost of the next unit of production when they consider using another unit of the resource. Unfortunately, even sound theory does not always translate into rules that can easily be understood and applied in practice.

The first reason for this is that ordinary users understand a price as a payment for a service rendered. When the supplier is a monopoly (and prices are set outside of the market), this means that the legitimate price in the eyes of users is that which it costs an efficient producer (usually a public utility) to produce the service. In economic terms, this means that users consider average, not marginal, cost to be legitimate.

Two more questions arise from this: What is included in cost and what happens if the service provider is not efficient? Costs that users consider legitimate certainly include, in all cases, the costs of operating and maintaining the existing infrastructure. Moreover, with some explanation and communication, experience ([Langford et al. \(1999\)](#)) describe the

Australian case) shows that users see the costs of replacement as legitimate costs. However, even under the most advantageous of settings, users vigorously resist the notion that they should pay for sunk costs which, in their eyes, have already been paid for by taxes or other assessments.

The issue of the efficiency and accountability of the service provider is critical. "Why should I pay the costs of the Water Department when it is overstaffed, corrupt, and does not maintain our systems?" is a frequent and legitimate complaint from consumers and farmers. An illustration of the lower bound of these inefficiencies comes from the state of Victoria in Australia. Before reform, irrigation services were provided by a government department with well-trained and well-performing staff, and there was little corruption. When reform took place, and farmers had to pay the full costs of operation and maintenance, increased scrutiny of the supply agency led to a 40% reduction in these costs. In most developing countries, the inefficiency is much greater and the users' resistance to paying for these services is correspondingly higher. Exhortations to increase cost recovery without addressing these fundamental accountability questions are a major part of the reason why cost recovery has been so poor in many countries. A review by the World Bank's [Operations Evaluation Department \(2003\)](#) shows that, despite the fact that the World Bank has been by far the most constant and insistent advocate of cost recovery for decades, "there is no evidence of better cost recovery or of covenant compliance either."

The bottom line, then, is that in most urban and irrigation systems cost recovery is critical for the supply of good services. The road to cost recovery does not lie in conditionalities imposed by aid agencies, however, but in realigning the institutional arrangements so that suppliers are accountable to users, and so that charges become a principal tool used for ensuring the mutual obligations of suppliers and users.

1.04.3.3 Issue Three: The Crucial Distinction between Financial Costs and Opportunity Costs, and the Implications for Practice

User payments for the financial costs of services rendered is a fundamental requirement for any financially sustainable water supply system – this is very important. However, the claims for pricing typically go beyond that of maintaining and operating infrastructure, and suggest that if "the prices are right, allocation will be optimal."

Proceeding from the viewpoint of users (as one must when considering political economy of reform rather than theoretical elegance), it is vital to distinguish between two radically different types of costs. First, there are the costs that any user can understand, namely the financial costs associated with pumps, treatment plants, and pipes. Second is the far more subtle concept of the opportunity cost of the resource itself. There have been many proposals for doing sophisticated calculations of this opportunity cost, and charging users for this "to ensure appropriate resource allocation." This has not worked in practice for three fundamental reasons: first, because it is impossible to explain to the general public (let alone to angry farmers) why they should pay for something that does not cost anything to produce; second, because opportunity costs vary widely by place and time and could not be

accurately calculated by even the most sophisticated of regulatory agencies; and, third, because those who have implicit or explicit rights to use of the resource (correctly) argue that they have already paid for the (implicit or explicit) rights and argue (appropriately) such proposals to be the confiscation of property.

An added, and highly relevant, factor is that the ratio between financial and opportunity costs is often radically different for different sectors ([Briscoe, 1996](#)). Although everything in water (like politics) is local, there are two broad patterns. It costs a lot (per unit of water) to operate the dams, water and wastewater treatment plants, and pumps and pipes that provide households with the modest amount of water they use (and the sewage that is removed). Alongside these large financial costs, the opportunity cost of the resource itself (as measured by the value of the raw water in its next best use, often irrigation) is typically quite low. For municipal and industrial water, therefore, financial costs generally dominate opportunity costs.

For irrigation, the situation is almost exactly the opposite. It costs relatively little (per unit of water) to build, operate, and maintain the usual gravity systems that provide very large quantities of water. However, the opportunity cost of the water (for cities and, increasingly, for high-value agricultural uses) is, in situations of scarcity, often much higher (typically at least an order of magnitude higher) than the financial cost of supplying the water.

These numbers (remembering, of course, that every place is different) have profound implications. They mean that, from the point of view of ensuring that users take into account the cost of the resources they are using, the emphasis must be on financial costs for municipal supplies, and on opportunity costs for irrigation. (It is worth emphasizing that this does not mean that cost recovery does not matter for irrigation. Cost recovery for irrigation remains very important for infrastructure sustainability, but not for efficiency in the allocation or use of water.)

The great challenge for irrigation, in light of these theoretical and practical realities, is how to have farmers take account of the opportunity cost of water.

In most parts of the world where water is scarce, informal water markets have arisen, in which those who have (implicit) rights sell water to those who need it. In some cases, the practice has existed for hundreds of years and has been formalized (as in the Water Court of Valencia, Spain, which has managed transfers among users for a 1000 years). In many other cases (such as western India; [Shah, 1993](#)), these markets are extensive, sophisticated, and illegal. Throughout the arid western United States, water rights have long been legal property and, under different rules in different states, allowed for approved transfers between willing buyers and willing sellers.

As other parts of the world have experienced scarcity, a number of countries facing water stress have turned toward formal, legal, managed water markets. This took place in recent decades in Chile, Australia, and Mexico. The Australian case shows the benefits – the adverse impact of water reductions on the regional economy – are reduced by two-thirds when there is both intra- and interstate water trading ([Productivity Commission, 2004](#)).

From the perspective of the present discussion on how to ensure that users take account of opportunity costs, these market-based arrangements have a unique virtue. Once users have clear, transferable property rights, then they automatically consider whether they wish to forego a particular use of water in exchange for compensation from another user who may place a higher value on the water. Reallocating water then becomes a matter of voluntary and mutually beneficial agreements between willing buyers and willing sellers, and not a matter of confiscation or an endless search for new sources of supply.

This is not to suggest that the establishment of water markets is simple or a panacea. The operation of such systems is demanding in terms of rules for establishing initial rights (including those for the environment and informal customary rights); the plumbing required to measure and move water; the regulatory institutions that are essential to protect the rights of other water users and the environment and to ensure that the public interest is represented; and the information and management systems. Many consider these prerequisites so onerous that they cannot be made to work in most developing countries. In addition, many point to early problems that all countries have faced in making such changes. Without in any way minimizing these challenges, three observations are germane. First, the prerequisites are really prerequisites for any form of well-managed allocation system and the absence of such prerequisites is a problem for all allocation systems, including the administrative allocation systems practiced in most countries. (As with everything in water management, the choice is not between the first and the second best, but between imperfect and even more imperfect.) Second, one of the many virtues of a market-based system is that, once started, there is a strong demand for better measurement, transparency, regulation and information. Third, all such established systems are working, often after initial adjustments, reasonably well. In none of the countries that have adopted such systems is there any thought to reverting to the previous allocation procedures.

1.04.3.4 Issue Four: The Political Economy of Change

The implications for practitioners are clear. First, from the point of view of financial cost recovery, the key is an institutional framework whereby service providers are accountable and efficient. When this materializes, and when users see that their payments are being used to improve the quantity and quality of services, they can and will pay. Here (as discussed earlier), watchwords are competition, regulation, transparency, benchmarking, and accountability. In the urban water supply and energy sectors, these ideas are now accepted in most parts of the world. In the irrigation sector, there is a gradual, albeit still far too slow, acceptance of these principles. Building on the historic experiences in countries such as Spain and the United States, a number of countries (including Australia, Chile, Mexico, and, more recently, the provinces of Punjab in Pakistan (Government of Punjab, Pakistan, 2008) and Maharashtra in India (Government of Maharashtra, 2003)) have moved toward systems which (1) charge irrigators for the cost incurred in providing services and (2) have clarified and made transparent water entitlements which will,

slowly and inexorably, lead to trading and the revelation of opportunity costs.

In all settings, a critical element of this approach is to develop innovative mechanisms for breaking out of the typical low-level equilibrium, in which services are poor, users will not pay, service quality declines, etc. In one good example of such innovation, the World Bank helped the government of Guinea Conakry break the circle by guaranteeing a new, accountable operator a declining proportion of reasonable costs over a 5-year period (World Bank, 1993). In the first year, then, the operator had sufficient revenues (mostly from the International Development Association (IDA) credit, but some from users) to improve the operation of the system. As the level of service improved, users were informed that they would be charged for the new, improved service and that, eventually, they would pay the full costs of the service.

The art of reform is less one of articulating a vision than of tracing a path for making improvements, for applying generic principles in a way that takes account of the very widely varying historical, cultural, natural, social, and economic conditions which govern water management (Briscoe, 1997). An analysis of experiences of successful reforms suggests that this means, *inter alia*: “picking the low-hanging fruit first,” for instance, by starting with temporary trading in well-defined systems where good infrastructure is in place; “not making the best the enemy of the good,” by having a well-defined, sequenced, prioritized, and patient approach for moving toward improvement, not seeking to attain perfection in one fell swoop; and “keeping one’s eyes peeled,” by understanding that it is broader reforms outside of the water sector (often relating to overall economic liberalization and fiscal and political reform) which will provide the preconditions for making the critical first steps. Recent reviews of water reforms in Pakistan and India (Briscoe and Qamar, 2007; Briscoe and Malik, 2006) describe, in considerable detail, what the application of these principles might be in practice.

1.04.4 Conclusions

There is growing understanding that there are broad benefits – for the economy, users, and for the environment – if water is developed and managed as an economic good and a growing search for a new set of analytic and operational tools.

In recent years, there has been a subtle but important change in discussion of economic policy. The landmark *Growth Commission* (Spence *et al.*, 2008), written by several Nobel prize laureates and many eminent development practitioners, draws lessons from the history of successful growth experiences. The Commission discarded the rigid prescriptions so often advocated, and noted that there were a wide variety of different, successful, experiences. What they did conclude was that there were some common elements – for example, a disciplined examination of, and adherence to, comparative advantage – and then application of economic principles in a sequenced, nuanced manner appropriate to particular cultural and economic circumstances.

Application of this less rigid approach has major implications for water.

In terms of the development of infrastructure, it means getting away from what have become uninformative, formulaic analyses of internal rates of return, to an approach which uses new tools to identify critical supplementary investments needed to maximize the multiplier effects of major investments.

In terms of management, it means moving away from the tired phrase of 'get the prices right' (and everything will be okay) that has been repeated for years, with little impact on the ground. It means paying much more attention to incentives and to opportunity costs, and to creating an enabling environment in which users will make much better use of limited water, or transfer the right to use that water to others who can use it more productively.

Finally, it also means giving greater attention to the political economy of change. This chapter advocates (as does the 2003 World Bank Water Resources Strategy) a path of principled pragmatism – in which the principles of sound economic management are well defined and respected, but in which they are applied in a pragmatic and sequenced way which takes account of local circumstances and political economy, and in which the focus is on moving in the right direction, and on the art of the possible.

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