Institutional Evolution Toward Water Trading

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Introduction

The basic premise of this paper is that the political acceptability of water trading evolves gradually over time, along a spectrum which includes several steps: (i) recognition that a serious scarcity problem exists. (The scarcity problem can be either of short- or long-duration, and it can refer to scarcity along either quantity or quality axes.) (ii) willingness to begin reforming the institutional structure of water management, opening up new possibilities to experiment with different policy approaches; (iii) recognition that economic incentives can help change the behaviour of water users; (iv) awareness that, in certain domains, the private sector may be able to offer solutions that the public sector cannot; and eventually (v) a willingness to consider full-fledged trading arrangements.

This paper considers the position of selected OECD countries in terms of each of these steps. It suggests that, although water trading is still not widely used in OECD countries, there is evidence of general institutional movement in this direction, even in countries where the trading option is not yet being officially contemplated. In effect, the groundwork is slowly being put in place that could see water trading expand significantly in coming years.

Three basic sources of information have been used in preparing the paper:

- A review of recent developments in OECD water pricing practices. This review emphasises agricultural, industrial, and household water price reforms over the past ten years (see OECD, 1987; OECD, 1999 (forthcoming) *a*,*b*,and *c*);
- A paper on water trading prepared for an OECD Conference on the Sustainable Use of Water in Agriculture (Athens, November 1997) (see Garrido in OECD, 1998); and
- Selected literature dealing with specific trading systems in individual OECD countries (especially Kraemer and Banholzer, forthcoming 1999; Anderson, this volume; and Landry, forthcoming 1999).

Scarcities

It is true that population and business demands on water resources are growing. But it is not true that this growth necessarily translates into an emerging "crisis" in world-wide water supplies, as is sometimes asserted. The more this

[1] The opinions expressed in this paper are those of the author, and do not necessarily reflect those of either the OECD Secretariat or of any individual OECD Member country.

"crisis" deepens, the more pressure there will be to stop water supply and demand practices that contribute to the problem in the first place. On the supply side, this means more pressure to reduce uneconomic (and resource-wasting) subsidies to infrastructure. On the demand side, it means increased pressure to allocate water to those who can make the most economic use of it (see Anderson, this volume).

Obviously, there will be extreme situations where human survival is threatened by the lack of adequate supplies of good quality water, but this will be the exception, rather than the rule, in most countries. Usually, the problem will be one of allocating the resource (in space or in time) to those users which can make the best use of it. In short, there is considerable room to reduce imbalances between water supply and water demand, using economic or environmental criteria, without necessarily compromising social objectives.

Evolution of institutional responses

Historically, water was seen to be "different" (largely because of its contribution to social objectives), with the result that the idea of "water as an economic good" was poorly accepted. It is clear that this view is now changing. At the international level, for example, the past ten years have witnessed the gradual expansion of the both the scope and the application of the Polluter Pays and the Users Pays principles. Economic ideas are also embedded in several recent international declarations related to water, notably the Dublin Statement, which asserted that ".... water has an economic value in all its competing uses, and should be recognised as an economic good." (see http://www.gwp.sida.se/gwp/dublin1.html).

Although governments have not yet generally accepted environmental objectives as a high priority in water management (i.e. in addition to social and economic ones), there is at least a growing recognition that complementarities between environmental, economic, and social goals (the three "pillars" of sustainable development) should be exploited wherever these may exist. For example, the UN General Assembly, meeting to discuss the 5th anniversary of the Rio Declaration, emphasised "... the gradual implementation of [water] pricing policies that are geared toward cost recovery and the equitable and efficient allocation of water, *including the promotion of water conservation*" (emphasis added) (United Nations, 1997).

At the national level, a small, but increasing, number of countries have set up independent economic regulators to regulate water pricing behaviour on an autonomous basis. Because this price regulation is usually under the responsibility of the Minister of Finance, or some other economic agent, the result is that decisions are less-often influenced by short-term political considerations, and subsides are either reduced or become more transparent. In effect, water comes to be treated just like any other commodity.

There is also evidence that the management of water services is becoming more decentralised in many countries -- particularly at the level of the river basin. The more decentralisation occurs, the more transparent will water allocation

problems will become, and the higher the premiums that will be placed on "efficient" management solutions (such as trading).

Involvement of the private sector

The introduction of pricing systems can facilitate the private sector playing a more important role in the development and utilisation of water resources. Over the long-term, privatisation can encourage (or deepen) the development of markets for water services. Deeper markets implies a more "fertile" atmosphere for water trading.

Some elements of public water infrastructure have recently been privatised in a few OECD countries (most notably in the UK, but also in some parts of the US), and are under active consideration in others (e.g. Czech Republic). The privatisation of the UK water industry took place in 1989, in order to tackle the need for additional sources of finance, and to improve the efficiency and quality of services

Even where the public water supply system remains publicly-owned, service management is increasingly being delegated to private operators. This approach seems particularly well-suited to decentralised systems, in which municipalities see delegation as a useful way of overcoming their own lack of technical expertise and/or financial resources. In France, and in a growing number of municipality-based systems, service providers are permitted to decide whether they want to manage the service themselves (direct management), or to delegate this management to a private operator.

Currently, "concessions" (i.e. the delegation of authority to private concerns) in France involve 75 per cent of public water supplies, but only about one-third of waste-water services. A variety of such systems have also been adopted in the Czech Republic, they are increasing rapidly in Spain (40 per cent of the population are already served by concessions), and they are under active consideration in Portugal, Hungary, and Poland.

More traditional forms of direct (municipal or supra-municipal) or delegated public management remain the norm in Austria, Belgium, Canada, Greece, South Korea, Sweden, and Italy (although changes may soon occur in Italy). In Ireland, Japan, and Luxembourg, local authorities still appear to be responsible for most water services. In Australia, a similar commercial approach to the "business" of water has been adopted, but so far without private shareholders. New Zealand has designated Local Authority Trading Enterprises (LATEs) to provide water services. In Finland, nearly half of all municipalities have already established (or are planning to establish) local authority-owned water companies, similar to those which have long existed in Germany.

As governments shift away from being the primary providers of all water services, to being the regulators of private operators, the degree of local autonomy increases, thereby creating new pressures for the different actors involved to "negotitate" solutions among themselves, for mutual benefit.

More "economic" water pricing practices

The water pricing policies of OECD countries also continue to evolve in the direction of a more "economic" approach. The following trends seem especially important:

- There is widening use of the principle of "full cost recovery" (FCR) in the management of water infrastructure. Efforts are intensifying to cover both the investment and operating costs of this infrastructure (even though it is true that there has been virtually no progress on covering the environmental externalities associated with water use in these costs). There is also more attention being paid to the use of widely accepted cost accounting principles in the management of this infrastructure.
- Both the level and the structure of water-based subsidies are changing, due to such factors as reduced government budgets, and increased recognition that subsidies can be distortionary for both the economy and the environment. There is a growing perception that it is more efficient to subsidise incomes directly than it is to subsidise activities that increase the inefficient use of water, as an indirect way of supplementing incomes. In general, the more it is accepted that the full costs of water services need to be included in prices, the more pressures will grow for trading of rights to use that water to be allowed.
- Higher levels of water price for most users. Progress on the reform of tariff structures has been rather slower, but there are some shifts going on even here. For example, there is evidence of:
    - Wider use of pollution charges, as well as of abstraction charges.
    - Increasing use of volumetric tariffs, and more use of increasing-block schedules at the household level.
    - More use of "forward-looking" marginal costs, rather than "backward-looking" historical costs, when calculating the volumetric portion of water rates.
    - More use of seasonal tariff structures.
    - Gradual increases in the use of metering.
    - More transparent separation of sewerage and sewage treatment charges from water supply ones.
    - More efforts to avoid "discriminatory" tariffs among customers, although many examples still exist of charging lower prices, based on "ability to pay" criteria.

Taken together, these changes point to more emphasis on transparency and accountability, along with increasing awareness of the need for water conservation. More cost recovery and transparency, combined with more decentralisation and private sector involvement, will contribute to the kinds of attitude changes needed for water trading to become a more politically acceptable option. Furthermore, the more use made of economic instruments, such as abstraction and pollution charges, the better prepared public opinion will be for the use of another type of economic instrument -- trading.

But are these changes actually being seen "on the ground" in OECD countries? It is to this question that the paper now turns.

Recent evolution in selected OECD countries

This section provides a brief description of recent developments in the water economies of a few OECD countries. Passages that are especially relevant to the evolution of these water economies in the direction of "trading-type" arrangements are highlighted.

Australia

Until the late 1980s, Australia's water sector was exhibiting many of the classic problems of "mature" water economies: (i) an inability to raise enough revenues to cover service costs and to replace depreciated capital; (ii) severe environmental degradation; (iii) strong dependence on government budgets to refurbish waterworks; (iv) **wide differences (both intra- and inter-sectoral) water productivity**; (v) strong involvement of government financing in projects, without much attention being paid to economic feasibility; (vi) a significant lack of transparency in service costs and charge collection systems among different users; and (vii) **an excessive degree of water over-allocation in critical basins**.

This situation led the Federal Government to promote deep water reforms under the powers of the Council of Australian Governments (COAG). The initial momentum for this reform, begun in 1992, resulted from pressure for general economic policy reforms, that set forth a general re-engineering of the Australian economy to **make it more market-oriented,** and to reduce the economy's reliance on subsidies.

By February 1994, the COAG had developed a strategic framework for the reform of Australia's water industry, and had made some progress in agreeing on guidelines that could be used by the States to implement such innovations as "full-cost recovery" water pricing. The framework had several other key objectives as well, such as explicitly **promoting opportunities for water trading**; increased transparency; improved institutional arrangements; identifying new evaluation criteria for project approvals; **the separation of land and water use rights**; deeper involvement of local management in water use decisions; and sounder environmental management of water ecosystems.

As early as 1990, **water entitlements in Victoria (in the form of licenses to abstract water for irrigation) had been convertible into tradable property rights**. Those farmers who did not generate enough net returns to pay the new (higher) water prices associated with local reforms were allowed to sell their entitlements. The gains for the agriculture sector resulted from four basic sources: (i) high-value crops expanded, using water made available for sale by growers of lower-value crops; (ii) farmers were persuaded that higher prices could be translated into better management of their **water rights**, and that better maintenance would result in better water supply security; (iii) better water management made better ecological performance possible; and (iv) the separation of water management responsibilities from regulatory tasks made each water supplier more accountable to their customers and other stakeholders. Experience with this system indicates that irrigators are reluctant to transfer long-term rights to water.

One of the key consequences of moving toward full-cost recovery pricing at the national level was that the experience in Victoria with water reallocation via **the trading of entitlements** was given a now given a central role as a means to generate efficiency gains nationally. Since each State had somewhat different pricing policies before the reforms were launched, the movement towards market pricing also required that some way found to reallocate water to more efficient users — **trading offered the obvious solution**.

In order to control saline discharges from various sources along the Hunter River (including electricity generation stations), the New South Wales EPA operates a **trading system** in which mining operations and electricity generators are the main market participants. Permits were originally issued to dischargers on the basis of a "merit formula". The system has not yet seen much trading, mainly because of dischargers' uncertainties about their future needs. Nevertheless, there is strong support for the system from industry, and the EPA is hopeful that the market will eventually develop.

Also in New South Wales, a scheme has been developed to reduce nutrient discharges (phosphorous and nitrogen) that are causing algal blooms in the Hawkesbury-Nepean River. All discharge sites are owned by the same company, so the system involves an **intra-firm "bubble"**. The scheme started only in 1996, so there is not yet enough experience with it to be able to report on its performance.

Among the lessons learned in the Australian reforms were that: (i) pricing policies can be reformed even in arid and semi-arid countries with a strong tradition of government intervention in the water sector; and (iii) water pricing reforms can be implemented in conjunction with other water policy strategies, such as **water trading**, environmental policy reforms, **abstraction caps**, and institutional reforms (e.g. separation of roles among different agencies or official bodies, etc.).

With respect to the trading option more specifically, some of the key political problems which have arisen in Australia include: (i) the need to place limits on the amount of transfers to other states which operate different subsidy regimes (competitiveness issue); (ii) the need to restrict transfers between different regions and/or sectors within the same state; and (iii) the problem of declining incomes in rural communities affected by the sales.

Canada

Traditionally, Canada's agricultural water has been supplied at heavily subsidised rates. Volumetric charges are rare, and flat rates have usually generated insufficient revenue to match either the increasing costs of O&M, or of replacing capital. Tighter government budgets, together with the inability to raise enough revenue, have therefore prompted pricing reforms. Although the provinces are in charge of setting agricultural water prices, only the driest ones (British Columbia, Alberta and Saskatchewan) were actually charging water rates to farmers by 1988. Excess demand, when it occurred, was dealt with by licences, water rights, and other sharing rules.

Some steps have recently been taken to implement **water markets** in Alberta, the province which comprises 70% of Canadian irrigated acreage.

Alberta's 1996 Water Act is unique within Canada, in that **water rights trading** has been given a key role in efforts to obtain efficiency gains, whereas the other provinces are relying completely on public pricing approaches (Horbulyk and Lo, 1998). Under this (yet to be implemented) system, water licensees will be allowed to trade their permits, subject to administrative control by the Provincial government.

Italy

A new programme currently being implemented in the southern Capitanata Region has three main components (Mastrorili, 1997). One seeks to improve the management of collective irrigation systems and extension services. The underlying objective here is to **compensate farmers for having their allotments standardised at (relatively low) levels**, by giving them broad advice on technical matters. A second objective is to institute a two-part charging system that discourages water use levels which exceed the critical water needs of individual crops. Besides penalising excessive consumption, those **farmers who consistently exceed indicative water use levels also risk having their allotments cancelled**. The third objective of the programme seeks to increase waste water recovery, as well as to re-use "unconventional" waters.

Japan

Farmers pay flat rates to their Land Improvement Districts (LIDs), in order to cover both O&M and investment costs. Water is allocated among farmers following strict equity criteria. Since water is so critical, the definition of water rights is assigned to provide minimum access to water, even when severe drought conditions exist (normally once every ten years). Although farmers' fees more than match O&M and repair costs, they do not cover capital and financing costs (Nakashima, 1997).

Three main policy strategy developments are anticipated for the future in Japan: (i) to preserve the consistency of water policies with agricultural structural reforms, and to make irrigation systems sufficiently flexible to accommodate changes in water use patterns expected to result from these new agricultural policies; (ii) **to promote within- and out-of-agriculture water transfers, seeking efficiency gains** and, occasionally, reducing the need for new water physical infrastructure; and (iii) to work toward improved environmental performance.

Japanese irrigation districts have demonstrated considerable ability to ration water under stressful conditions, without the intervention of external forces. In this context, not much emphasis is usually placed on the pricing option. On the other hand, the government at least moderately inclined to liberalise the **allocation of water rights**, thus drawing some advantages from the increasing willingness of urban suppliers to pay for water, and contributing new revenues for rehabilitating the old, inefficient, and very "atomised" water districts in Japan. Clearly, this approach is not aimed at reversing a situation which has existed for centuries, but at attracting non-rural capital in order to persuade water rights holders to accept **"in-kind" water trading**, without encroaching on their traditional rights or vested positions.

Mexico

When the government instituted a program to transfer management responsibility from the National Water Commission (CNA) to water users in 1990, a new approach to water irrigation management began to be implemented. In particular, the National Program for the Decentralisation of Irrigation Districts was generated. This programme established "irrigation modules" -- areas of 5-50,000 hectares, operated by user associations. In addition to this initial decentralisation initiative, the reforms also had the objective of insuring some degree of financial sustainability, thereby allowing the "modules" to maintain their production capacity. The second stage of the reforms involved the creation of Limited Responsibility Societies (LRSs), again made up of irrigation modules to take on the responsibility of supplying wholesale water services.

Under a 1992 law, it became **legal to sell concessions for water use** -- a practice which had already existed (illegally) for many years (Easter and Hearne, undated). In effect, the separation of land and water rights was recognised in law. Water concessions are made on a volumetric basis, are registered by the CNA, and are given for periods of 5-50 years. When issuing or renewing concessions, the CNA has the responsibility to consider overall supply and demand characteristics of the basin involved. The concessions permit the transfer of specific quantities of water among farmers **in the same district;** for sales to other districts, more significant constraints on the transfers have been envisaged.

By 1996, more than 86% of the 3.3 million hectares of publicly-irrigated land had already being transferred to joint management, and seven LRSs had already been created (Johnson, 1997). Although the reforms are proceeding as planned, a number of "second generation problems" have emerged. Among these are: (i) financial stress in drought conditions; (ii) salary costs of CNA employees involved in operational activities are still being paid by the government; (iii) **the new Water Law (1992) has failed to turn water rights into secure property rights, rendering the allocation process under stressful conditions still imprecise, and highly contestable**.

New Zealand

In 1988, the New Zealand government stopped subsidising community irrigation projects, and announced its intention to sell its existing interests in these facilities. This movement toward privatisation is anticipated to considerably improve the efficiency of irrigation over time, as well as to reduce water abstractions by the agriculture activities.

New Zealand's water economy is expected to experience difficulties in the future for three basic reasons. First, **not all claims over access to water rights have been resolved**. Second, most river flows have already been allocated to different users, and **any further change in the pattern of users will probably need to occur through water trading**. Third, both irrigated land and urban consumption are growing, adding further pressure on urban utilities, especially when unexpected water shortages occur. As a result of these and other factors, volumetric pricing is already being implemented on urban consumers, and is likely to soon be applied to farmers as well.

The **water trading option** has been on the agenda of some New Zealand commentators in recent years. For example, the first key conclusion of a 1995 report (New Zealand Business Round Table, 1995) was that greater use should be made of tradable permits for allocating water in water-short areas. however, trading has not yet been accepted as viable political objective for the country, partly because of the outstanding problem of property rights definitions for indigenous peoples, and partly because of general equity concerns.

Spain

The new (1985) Water Law implemented significant changes in the way water management had been performed under the old (1879) Water Law. Essentially, the 1985 Law attempts to deepen public involvement in the most important aspects of water management. Among the most significant changes were the conversion of all water resources into the public domain; the mandate to the government to approve a national water management plan; and the reinforcement of the role of the river basin authorities to take on responsibilities for flood control, water-works construction, the granting of water concessions (or licences), and the setting and collecting of water charges. **Water use rights were solidly connected to land use rights**. Although the Water Law established legal procedures that permit changes in the characteristics of the water use rights, **water markets were not permitted, and the process of transferring water rights continues to be quite cumbersome**.

On the other hand, Garrido reports (OECD, 1998) that this new rigidity has also opened up new opportunities for reform in the Spanish water economy. For one thing, the central government itself controls the reform process, which it can now envisage implementing on a rational basis through the river basin planning agencies. For another, the high degree of rigidity has led to the development of several sophisticated systems aimed confronting the **problem of variability in supplies**, and these systems should help to ease the transition to market approaches over time.

As one example, some farmers in Valencia have created private companies to pool capital for the construction of wells. Whenever pumped volumes from these wells exceed daily/weekly demands of the farmer-partners, **an auction of time-flow units is held**. Potential purchasers (whether in agriculture or not) can then bid on these excess supplies. This system only applies on groundwater resources, and only where the private companies involved have legal licenses to exploit the resource.

It should also be noted that the 1985 Water Law does *not* apply in the Canary Islands, where the ownership of water remains largely in private hands. Scarcity problems here have led to significant concerns about the "mining" of available groundwater resources. In this case, **water markets are frequently used by farmers, municipalities, and resort owners**.

United Kingdom

In general, farmers pay a charge when applying for a water abstraction licence, and an annual charge whose amount varies, depending on the location, on

the return flows generated by the specific irrigation technology, on the quality of river water, and on the season in which the abstraction is made.

The government is also currently considering the expanded use of economic instruments for pollution management, as well as their potential extension for the management of abstractions. It has recently issued consultation papers discussing the possibility of pollution charges and of **tradable permits** for both types of charges. At least on the pollution control side, it does not appear that the trading idea is being very well accepted so far, but it may be that the perceived problems are more technical (e.g. thinness of potential markets) than ideological (e.g. an aversion to trading *per se*). (ENDS REPORT, 1997).

United States

Before the Reclamation Act of 1902, land settlers obtained access to water resources through their individual investments. Water rights were chronologically assigned to farmers or miners who could show evidence of putting water resources to "beneficial use". Hence, **the seniority of water access was established by the dates at which farmers were able to convert their informal water use into legal water rights.**

The Reclamation Act also established the Bureau of Reclamation (BoR), which subsequently became very active in building irrigation projects. Although its role as a developer of irrigation acreage came to an end in the early 1980s, the BoR still serves as the water wholesaler for about 25% of the West's irrigated acreage. Presently, the West's water sector is facing an array of problems, among which the most important are: (i) the need to comply with increasingly stringent environmental and natural habitat restoration regulations; (ii) **the need to increase urban water supply to meet urban growth needs**; (iii) **the need to improve the economic efficiency of water used in the agricultural sector; (iv) the need to raise more revenue from users in order to recover a larger proportion of water subsidies to irrigators** (Wahl, 1989).

The implementation of irrigation water pricing seems to be out of the question in most US States. Instead, regions such as the Western US are attempting to exploit other types of market or incentive mechanisms, such as water banks or **"in-kind" water trading arrangements**, in order to provide appropriate signals about water scarcities.

Water institutions in the US West are particularly complex, due to several factors. First, historical priority rights for water, which are considered private property, co-exist with water users who operate in irrigation districts supplied by Federal or State water agencies. Second, **water trading** (both through spot or permanent rights transactions), is common and is publicly-promoted in many Western States. Third, while it is clear that irrigation water subsidisation is the source of water use conflicts in many western States, any effort to reduce these subsidies is challenged by the fact that the subsidised rates have already been capitalised into land prices. Reducing the subsidy would therefore generate a capital loss for the farmer involved. Fourth, water rights are solidly established in law, with the result that any effort by governments to alter these rights will face considerable difficulties.

The California Water Bank was also developed in 1991 to ease the impacts of the four-year drought that had brought the State's water reserves to levels unable to meet water needs of important urban and agricultural areas, as well as of natural wildlife habitats in the Southern areas of the State. This system allowed entities with high-valued water uses to buy 'banked' water that would otherwise have been applied to lower-valued uses. This approach helped to avert the most severe consequences of the drought. It was sufficient to encourage the **exchange of more than 700 million cubic metres of water** in just a few months.

The US has also been active in developing applications of water trading to water quality problems. Among these applications are:

- *Fox River, Wisconsin* -- 15 pulp mills and 6 towns were included in a 1981 "bubble" focusing on organic pollutants. Restrictions on trading, coupled with the small number of participants in the market, combined to render this early experiment less than a complete success.

- *Tar-Pamlico Basin (North Carolina); Dillon Reservoir (Colorado); Cherry Creek (Colorado).*Each of these programmes involve nutrient trading, and each involves some activity between point and non-point sources.

- Recently, there has also wider use of water trading to achieve instream flow objectives, usually for fisheries purposes, but occasionally for recreational or other goals. This experience has been largely confined to the *western states*, but it is expanding rapidly. The federal government (Bureau of Reclamation, US Fish and Wildlife Service), the State governments (generally the wildlife services), and the private sector (environmental groups) are combining forces to create a healthy market in a wide range of transfer forms (see Landry, forthcoming 1999).

Conclusions

1. The "climate for water trading is clearly improving. This improvement is being seen at the institutional level -- many countries are reforming their water institutions because it is clear that there are serious management problem in this sector that need to be addressed. It is also being seen at the ethical level -- there is a clear move in the direction of more "rational use of water (in both economic and environmental terms) in some countries. It is also being seen at the practical level -- water trading is actually expanding "on the ground".
2. Trading may have a role to play even in those countries which have a strong tradition of state intervention in the water sector. There are ways of resolving some of the public interest issues associated with water trading, so that both markets and states can get what they need from the trading system. In particular, it is possible to imagine management solutions involving trading, where social goals are also simultaneously achieved.
3. Water trading seems to be easier to implement when it is implemented as part of broader policy reforms affecting the water sector as a whole. In this

regard, transition strategies toward the implementation of trading may be as important as the market systems themselves.

4. It is not likely that the permanent trading of water property rights will be widely accepted in most OECD countries for some time. However, the trading of water use rights, especially for short durations, as a way of avoiding seasonal or climate-induced shortages, does seem to have a role to play in OECD water policies over the near term.

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