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Evolution of water tariffs in Spain and present debates

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SUMMARY - This paper describes the water funding needs in Spain and the role of water tariffs in a mature water system. It looks at the evolution of the water tariffs from a highly subsidised system designed to increase farmers rents with economic development objectives in mind, to the present compensatory system. It shows how in Spain, under present conditions of water stress, we might be moving beyond, to design a system of tariffs aimed at further improving efficiency in water use.
I present some of the debates that are taking place in Spain today around the issue of making water tariffs part of a water savings strategy. These debates range from the economists views about marginal cost pricing and the liberalization of water markets, to those who see that water is not only an economic resource and argue that private appropriation of water has led to the displacement of natural communities and other non economic uses. In between these views we find useful ideas about how the effectiveness of pricing is linked to the existence of institutional and technological preconditions. Each of these raises some important considerations, specially for arid and semi arid countries.

INTRODUCTION

In this paper I want to give a brief overall picture of the water funding needs in Spain and the role of water tariffs in the context of our mature water system and increasing pollution.

I then present some of the debates in Spain about water tariffs and their role beyond compensating government for expenses. I will talk about tariffs forfurther rationalizing water use. I present the views of economists about the role of marginal cost pricing and the liberalization of water markets to rationalise water use. I also present the views of those that argue for the need of government intervention because water is not only an economic resource and private appropriation of water has led to the displacement of natural communities and other non economic uses. I finally present more practical analysis about the consequences of increased prices to

irrigation farmers and about how the effectiveness of pricing might be linked to the existence of institutional and technological preconditions.

I hope to draw some lessons from this discussion that may be useful to other countries, especially those with arid and semi arid climates.

THE CLEAN WATER BILL IN SPAIN

The Strategic Importance of Water in Semi-Arid Countries and the Cost of Maintaining our Hydraulic Legacy.

Water in Spain as in other arid and semi arid countries is a major limiting factor. An important part of our history has been linked to the problem of water imbalance and scarcity and the need to control the devastating consequences of our hydrological cycle.

Thanks to human intervention water has been made into a positive resource for development. In a country were we would naturally only have naturally regulated 10% of our water resources, we have available around 40%. This is thanks to the public and private investment efforts and the development of engineering solutions. The creation and growth of many of our cities and the proliferation and maintenance of extended irrigation projects have been possible thanks to these efforts. There is some impressive data to prove this. We have today nearly 1,000 dams and 500,000 wells. There are 3.4 million hectares of irrigated land which use up around 24,250 hm3 per year of water (80% of total final water uses as compared to 20% in France). Water is transfer from water rich to water poor areas in Spain. Desalinization of sea and underground water has became a real alternative in the driest areas.

This important legacy means major expenses not only to maintain and manage but to renovate. The average expenditure in the water sector have been calculated to be around $4,166 million per year (Directorate for Water Quality, 1994). This includes annual capital and current expenditure.

Building new capacity and the clean water bill

The National Hydrological Plan plans for investments in the next 20 years of between 33,000 and 55,000 million dollars (under different alternatives of investments for prevention of water loses). Around 2/3 would be invested by the Ministry of Public Works.

These would include not only investment on prevention of water loses and rationalization of irrigation projects, but new water transfers, new regulation; new irrigation projects; replacement and conservation; environmental protection and improvement; research and development and sanitation and wastewater treatment.

An important part of the clean water bill is investments in improving and protecting water quality. The very development facilitated by our hydraulic history is now polluting and limiting our access to water resources. The deterioration of water quality have an important effect on irrigation productivity (salts), on crop survival (pathogens or contaminants toxic to plants) and more importantly on health withstanding the effect on marketability of products in an increasingly selective export and internal market. The improvement of water quality is most important for irrigation farming.

We have some important deficits in treatment of waste water, problems of uncontrolled industrial discharges, and pollution generated by farming practices. Our dependence on dammed water also means water quality problems. A high number of them present eutrofization problems (41%). The necessary investments in waste water treatment alone has been valued at around $16,600 million pesetas (Directorate for Water Quality, 1994).

FUNDING CLEAN WATER- THE ROLE OF WATER TARIFFS

The Differences In Tariffs Paid By Farmers:

There are important differences in tariffs paid by farmers. Some interesting examples of the variability of tariffs paid are:

- In Almeria, the production of produce under plastic watered by drip irrigation pay around 16 pts m3 (an average of $740 per Hectare per year) This is paid directly to the irrigation cooperative which finances costs of operation and maintenance. Here there are two annual crops of produce using around 5,500 m3 per Hectare.

- The Tariff for the Transfer of water Tajo-Segura is around 13 pts m3 (an average of $750 per hectare per year). Farmers can pay up to 30% more in the final water bill form the irrigation cooperative.

- The average, however, is much lower and the tariffs charged to the irrigation cooperatives are approx. in average 1 pts m3 (around $60 per Hectare per year).

These differences can be explained by looking at the tariffs and how they are applied. They reflect not only the need for more expensive regulation in arid Spain but also the energy costs associated with water use.

The types of tariffs

The present economic regime of water is relatively simple. It has two tariffs designed to compensate the government for publicly financed waterworks and for their maintenance and running costs. These are:

The regulation tariff (or regulation tax) and the Tariff for water use which the Basin Authorities charge annually to the beneficiaries of waterworks:

The beneficiaries pay 4% of the initial investment costs (of either general regulation works amortized in 50 years or specific transfers, etc. amortised in 25 years) increased annually by the inflation rate. Conceptually this is like a rental charge or the opportunity costs of public money if it had been lent to other potential users, at a preferential rate. The 4% is applied, for example, in the Tajo Segura major water transfer to 60% (only part in service) of the 250 million dollars that it cost when it was built which has been actualized to 500 million dollars today.

Basin Confederations also add up a charge to cover their average running costs. The water tariffs used to be calculated on the basis of past average costs. Today it is calculated using the future budget of the Basin Authorities. This is then divided among users. Irrigation farmers or irrigation cooperatives can be charged either on the basis of irrigated area or by volume in new irrigation projects where there is metering. In the former tariffs are calculated on the basis of a normal expected allocation of water per Hectare and there are often subject of debate.

Both the regulation tariff and the tariff for water use include capital and current expenditure but their difference is that they are applied respectively to major regulation works or minor water infrastructure built and managed by the Basin Confederations.

The final tariff paid/ cost of water to farmers include, however, the charges of the irrigation cooperatives, and or the private costs of regulation, pumping, etc. In cases such as the one in Almeria above much of the total bill is not due to the Basin Confederation but to the irrigation cooperative as we will see later.

The public system of tariffs in place today has meant breaking away, in part, with the previous highly subsidized system. Subsidies used to range from 60% to 100% of waterworks with a 1.5% interest rate charged on a loan to cover the residual investment needs, if any. This responded to a system designed to promotethe development of irrigation farming as part of economic development policy.

There are other two tariffs. These are:

- Tariff for use or occupation of the water public domain. The charge is 4% of the value of the land used and it is normally charged to gravel companies, etc.. that use the resources in the river bed, etc..

- The discharge charge to internalize environmental costs. In practice it is calculated for each polluter (industry or municipal sanitation system) multiplying the volume of discharge by a variable coefficient according to the characteristics of the discharge and its level of treatment. These charges were designed to be imposed on the basis of the pollution content of the discharges of the different users.

Farmers have been exempt from paying discharge charges. It is generally accepted to be too difficult to apply the "polluter pays principle" to agricultural production. A better way is by using incentives. These would include financial support to those farmers who comply with the requirements of good agricultural practice, respecting minimum environmental protection requirements. Other instruments might be the imposition of taxes on mineral fertilizers and pesticides and taking away existing subsidies.

Income from tariffs is insufficient for paying the clean water bill.

The total charged from the different tariffs have been around 1,189 million dollars in 8 years but the amount collected is even lower.

Annually this has meant around 140-152 million dollars. The income is insufficient to cover the annual current water bill of central government alone (of around 190 million dollars including the costs of Basin Confederations).

This is explained, in part, because the compensatory character of the existing tariff system means that only pay for water those benefited by waterworks. This means, for example, that as much as 50% of the irrigation farmers are exempted from paying, sometimes because irrigation infrastructure might be already amortised so those farmers cannot be charged for water under a system based on a compensatory philosophy. Secondly, Basin Confederations find it difficult with their highly participated structure to charge beyond covering administration and running costs. Maintenance and conservation tend to be delayed and included in the investment budget as replacements.

Towards a recognition of water as an important economic and environmental resource. The national hydrological plan

The important investment needs in the National Hydrological Plan (1993) and covering expenditures of public water management requires a different tariff system. In addition water saving has became a major priority of government and tariffs can have an important role in this. Changes in water tariffs studied in the National Hydrological Plan (1993) move a step further the present compensatory system and proposes for debate :

- A general basic tariff for all users so that everybody pay for the costs of management, monitoring, maintenance and conservation of the water public domain.

- In addition, as today, those that benefit from waterworks and those that deteriorate water quality should pay accordingly as it is designed in the present system.

- The Plan proposes the introduction of correction coefficients to promote water savings.

MAIN DEBATES ON WATER TARIFFS IN SPAIN TODAY

There is a growing consensus that increases and generalization of water tariffs in agriculture will be necessary. Tariff increases would provide further signals to all farmers about the relative water scarcity, bring about water savings and help reduce water loses. Some of the "socially" produced scarcity of water would be then liberated before further increases in supply are necessary. Adding to this Basin Authorities will be able to better finance maintenance and replacement which will contribute to minimizing water loses.

An important part of the debates in Spain have been about what should be the extent of the increases, whether the level should be set at an economic or at a social optimum and what are the institutional and technological preconditions for tariffs to have the desired effect.

The present drought which has lasted now four years, has meant that debates about tariffs have jumped from the professional, academic spheres and user participation institutions, to the front pages of the newspapers. It has became in this sense an open political and social debate....

Some of the major debates and questions raised in water pricing are discussed ahead under three headings:

Should water be allocated by treating it as an economic resource, attempting to achieve an economic optimum or should it be allocated according to social objectives?

The market view

Economists, (often not specialist in water in Spain) argue that water allocation would improve through efficient pricing based on marginal costs. They look at how most major waterworks have been funded through general funds, and 80% of available water is used in agriculture, at relatively low prices and in many cases with low returns. It is obvious to them that a sector which only contributes to 5% of the

Gross National Product and consumes 80% of water in a country with high water problems does not need to be subsidised. It scandalises them that farmers obtain economic rents from a resource which is paid by all. The generalization of pricing to farmers based on marginal cost, they argue, will bring a more efficient use of water (Terceiro, 1995).

The proponents of this view argue that the possibilities for further regulation in some areas is limited so, where water is very scarce in relation to demand, water markets can make it possible to improve efficiency in water use. They give examples of water markets to explain the usefulness of the system. Examples such as that in the Canary Islands where farmers sell water to each other and the Tourist Industry: or Valencia where low return farmers sell water to other farmers with higher returns, etc. (P. Schwarth 1995). Another interesting example quoted is the irrigation cooperative of the Ebro Delta which sold the surplus of their water rights (thanks to the improvement in irrigation technology) to a corporation, who has used it to improve supply to industries and to the city of Tarragona (Cimadevilla, 1995).

For the market alternative to work the marginal productivity in alternative uses must be very different. The idea is that prices need to reflect the scarcity value of water for society (Garrido, 1994).

Alternative views

There are alternative views to the increasingly influential claims about the need to deregulate water and let market forces work.

The proponents of water allocation according to social objectives are different from those from the first half of the century. Those who argued the need to subsidize, ergo introduce artificially low irrigation tariffs to make irrigation farming viable and increase agrarian income, on the basis of national interest to promote economic development.

Today these arguments focus on the need to consider the physical interconnections between the economy, water and the environment, where the monetary estimations are insufficient: "The non accounted for externalities might be more than simply a footnote as the appear in many calculations of costs" (F. Aguilera, 1994).

Moreover, they argue that water should not be seen only as an economic resource. The process of economic growth means the loss of environmental functions of water and are a loss to other users of the resource. It is not either possible to talk about economic expansion or economic growth when the resources deteriorate and in some cases the deterioration is not reversible, for example with over exploitation leading to salinization of aquifers. In this context the definition of water rights and the decisions about water use and allocation should be made according to the law because the competition between the economic uses and the environmental activities that need water must be regulated. Water is a social asset and not only an economic asset, and the state defines its sustainable use to insure its maintenance as a renewable resource.

They argue that the idea of an economic optimum is a fallacy and that there are different optimums according to different institutional systems. They reinterpret the evidence of markets in Spain in the Canary Islands to say that markets must exist under predefined water rights and they use the same examples above about water markets in Spain to conclude that over exploitation and salinization of aquifers occurs because of market failure.

From this perspective tariffs are important mostly to signal the value of the resource but the criteria should not be excessively complicated because the price elasticity of demand is limited. Reduction of water use will only happen if water prices increase substantially and this is not recommendable (see OECD, 1987 and debates ahead). Water saving is possible through "institutional measures" and the question is to have tariffs that incentivate behavior compatible with sustainable development.

More concrete and useful debates focus on whether prices should be increased to better reflect social costs of the resource or is it important to deal with some questions raised about the ability of farmers to pay and the impact of increased tariffs on irrigation farming.

These are important questions because in Spain irrigation farming is the most important "consumer" of water It uses 24.250 cubic Hm of water per year. This is around 80% of total uses. The irrigated land is around 3.4 million Has (15% of the total) and produces more than 50% of the total final agrarian production.

In arid countries water scarcity is a disadvantage for production. The natural ability to use water in Spain is only 10% of total whiles in the North of Europe is more like 40%. This means that non irrigated production in Northern Europe (with precipitation of 800 mm) have yields of cereals similar to those of irrigation farming in Spain. The possibility of competition obviously depends on water costs.

In principle, looking at aggregate figures, there seems to be room for increasing prices in agriculture because the total costs of water for farmers today of (approx. 141 million dollars) is only between 1 and 2% of their total income.

The average figures do hide an important reality. That is that some irrigation farms do not pay for water, others pay a high price (water transfers) and others have important energy costs to pump water in their farms. The 1,184 million dollars in energy consumed annually in agriculture has been attributed to be in a major part due to water use. This is 8% of total income from irrigation farming (with direct water prices it adds up to 10%). Combining direct and energy costs of water availability it is clear how in aggregate water costs is an important consideration.

Some sensibility analyses have been done about the behavior of farmers under different assumed levels of tariffs (50% subsidy and 1.5% interest rate; 40% subsidy and 4% interest rate and no subsidy and 4% interest rate) and including the energy costs of elevation (Sumpsi Viñas, 1994).

Farmers producing cereals and oleaginous will find it difficult to survive sudden water price increases and this will affect mostly farming in Castilla Leon (with 60% of the total irrigation area dedicated to these products). The ability of farmers producing fruit and vegetables to absorb water price increases will depend on the evolution of the prices in the market of their products. Increases in water prices will make them more vulnerable. This is the case in Murcia, Pais Valenciano and the Valley of the Ebro. Interestingly the most arid regions in Spain, Andalucia, and which is more specialised in industrial products (cotton, beet root and tobacco) might find it easier to cope with price increases.

The conclusions of such studies are that the objective of incentivating the rational use of water must be paramount. It is not an accident that the higher consumption per hectare of water is in traditional irrigation farms and lower in new ones with higher water costs. But they recommend that increases in prices should be gradual to allow farmers to change their practices and products. Otherwise we will end up with farmers abandoning irrigation projects which we have subsidised in the past.

Some professionals challenge the assumption of water prices per se bringing about greater efficiency. They do so through mainly empirical studies which draw lessons about technical and institutional prerequisites to change water usage and allocation.

The case of Almeria

The case of Almeria has been studied (Naredo, Lopez Galvez and Molina Herrera, 1993 and Naredo and Lopez Galvez, 1994) to look for explanations for improved efficiency in water use and the possible role of pricing. Water usage has gone from an average of 7,000 m3 per Hectare per year in 1982 to 5,500 today. This is important because this, the most arid basin in Spain, is the one with less average usage of water per Hectare in spite of the high loss of water in evapotranspiration.

In Almeria rainfall rarely goes beyond 100 mm. In addition the quality of soil is poor and there are strong winds. Other characteristics such as mild temperatures and sun have been used to the advantage of one of the most intensive and profitable farming areas of Spain with high efficiency in water use, as discussed. There are today more than 23,000 Has of plastic greenhouses. Most of them in an area of 10 by 30 Km. They have transformed problems into advantages. The wind ventilates the greenhouses and the permeability of the soils save on drainage costs. Water is a problem because they need to have flexibility of application. To do this they use small water reservoirs to make possible programming of water application. This is a system which is intensive in capital (approx. $3,333 million for the 23,000 Hectares) and expensive to run. Farmer consumption is metered and they pay 16 pts per m3 to the irrigation cooperative (this is about $730 per Hectare per year). This is put into paying the expenses for operation and maintenance. The modernization of the irrigation systems, and the flexibility for applying light and frequent irrigation by dripping has brought about benefits to

farmers. It meant two annual crops with a use of water that is under around 5,500 m3/Ha. Prices paid for water represent no more than 5% of the total income because of the high value added of produce and commercialization by the cooperatives.

Both funding and technical assistance by the local rural bank has been key to understanding present efficiency.

There are some lessons drawn from this type of success stories:

1. The existence of efficient funding mechanisms are of interest to farmers. The low prices paid are no incentive either for the farmer or the basin administration to follow up the use of the funds and their reinvestment on their water infrastructure. The result is of a partial decay of the systems, and water looses.

2. The understanding of the production functions of the farmers and the ways they use water is important in setting water tariffs and measuring their impacts on water use. The farmer must gain financially by saving water (see Almeria doubling production). The profit made saving water must be at least equal to the costs associated in obtaining water savings (labor force to oversee watering, adequate preparation of soil, etc..) (Naredo and Lopez Galvez, 1994; Losada Villasante, 1994; Murillo, 1993).

3. Charging by volume consumed is important. More efficient use of water takes place in areas where there is a charge by volume. Where the charge is on the basis of the area, consumption is higher (8,870 m3/Ha) than in the others with a two part tariff (6,407 m3 Ha). Although the latter are located in more modern areas, of greater scarcity and better equipment (Garcia Canton et al, 1993).

4. Water in irrigation is not easy to measure. Gravity systems make it difficult to measure water and here charging by volume will require changes in irrigation management. Changes discussed in Spain may include metering volume supplied to the irrigation cooperatives, which later are more easily able to charge their members on a per Hectare basis (Sumpsi Viñas, 1994) without compromising efficiency in water use. Cooperatives would have to control water usage and the technology used for watering of each of their members. The efficiency of water pricing here depends on the ability of cooperatives to monitor this.

5. Technology has a lot to do with water efficiency use. The irrigation systems that give freedom and flexibility to the farmer are those that are better for water saving. The rigidity of procedures by which water is supplied today to irrigation systems make little attractive the introduction of better practices for water saving. They impose a logic of infrequent, discontinuous abundant irrigation.

The use of Drip irrigation technology in Almeria was important. Continuos, light irrigation kept humidity of the soil constant. The spectacular response of products sensible to water stress was clear. Warranting continuos flow was possible thanks to the infrastructure built by the irrigation cooperative and paid through higher tariffs which were worth it to farmers.

CONCLUSIONS

I hope to have shown how in Spain we are moving away from a highly subsidized system, designed early this century, where water tariffs were set with economic development objectives in mind. The 1985 Law changed to a more compensatory model of water tariffs and provided a clear framework for tariffs to reflect that those that benefit should pay for the full cost of capital and current expenditure. Avoiding social unbalances and smoothing the transition, in a sector where water negotiations and user participation is highly institutionalized, has resulted in newly built infrastructure receiving interim subsidization.

On the other hand the debates have shown how today we are rethinking the present system again to make it not a solely compensatory system but one in which tariffs provide and incentive for saving and valuing our water resources. This might be reflected in the generalization of water tariffs to all users and not only to those benefited by public regulation waterworks. The debates point out to be cautious in the application of new tariffs. Although

tariffs can be an important element of a water saving strategy there might be technical and institutional preconditions to them having the desired effect. In this context irrigation cooperatives (of which there are more than a 1,000 in Spain because the 1866 water law prescribed that irrigation farmers need to be organised in cooperatives) might be fundamental instruments of policy.

In the process I have discussed some special characteristics of Spain as a semi-arid country. Present debates have helped me to illustrate that in arid and semi arid countries the choice of funding mechanisms and the role of pricing may have different and in cases more important consequences than in water abundant countries. In spite of an increasingly influential wave supporting privatization, it might be difficult to think of deregulation as a sufficient answer in this type of climate. It calls for a subtle use of tariffs to both encourage efficient economic use of water and avoid displacement of other "users".

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