Water Pricing in the EU

A Review

by Eva Roth,

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Foreword

Stefan Scheuer, EEB Water Campaign Co-ordinator

Finally after a decade of political struggles the EU-Parliament and Council adopted September 2000 a new water legislation: the Water Framework Directive. No doubt that this new frame for EU-water legislation is a quite complex package of objectives, instruments and obligations.

Two of the main and important goals of the Water Framework Directive are the protection and improvement of our aquatic environment and the contribution to sustainable, balanced and equitable water use. Therefore novel tools and instruments are introduced into EU water policy to protect and improve all EU-waters: ecological water assessment; river basin planning; strategy for elimination of pollution by dangerous substances; public information and consultation and finally financial instruments.

Despite of these major improvements in EU water policies a number of problems are emerging from the text. They have to be dealt with in the coming years in order to achieve clear results.

The success will therefore strongly depend on the political will and further hard work, on the full participation of all stakeholders, as well as on the exploitation of synergies of the different tools, which are provided in the WFD.

For the first time financial instruments are introduced in EU-water policy. Environmental NGOs have continuously supported the introduction of financial instruments into environmental policies. But this has not been an easy task and during the legislative process of the WFD opposition especially from Member States where the potential of financial instruments is the largest, hindered EU-wide binding obligations on water pricing. The political hurdle for financial instruments in EU water policy is high.

This is also one of the reasons why the European Commission released a Communication on water pricing in July 2000, with the aim to better promote and explain the rationale of water pricing. It should lead to guidelines for the implementation of the financial instruments of the WFD.

Ecological and holistic oriented water status objectives, strategies against pollution by dangerous substances, river basin management and public participation – these are the main tools and objectives, which provide the frame for water pricing.

We believe that within this frame water pricing can substantially support the efficient use of water and therefore help leading to relaxation of water stress situations. On the other hand water quality and quantity cannot be managed separately and water pricing therefore has to consider the polluter pays and precautionary principle. This requires therefore the internalisation of environmental costs. In this respect cost recovery could be a powerful tool not only to increase the effectiveness and efficiency of water systems and to move from supply to demand management, but to help preventing deterioration, enhancing and protecting the status of our waters and finally achieving sustainable water use in quantitative and qualitative terms. The main and important goals of EU water policy are the protection and improvement of our aquatic environment and the contribution to sustainable, balanced and equitable water use.

Water Pricing is one in the series of possible tools beside others to help to achieve these goals.

EEB's former stagiaire Eva Roth has prepared a background paper, which provides a basis for further discussion and assessments of water pricing policies. We would like to thank her very much for her helpful work.

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Thank you so much for your kind help.

Eva Roth

Content

1 Introduction

This paper aims to provide a basis for discussion on water pricing. It does not claim to be complete. Nonetheless the attempt has been undertaken to raise all the major issues that need to be considered when talking about water pricing.

The use of economic instruments is of growing importance for environmental policy. One of the key priorities of the Community Fifth Environmental Action Programme is the broadening of the range of environmental policy instruments and Community institutions ask the Commission and the Member States to make use of new policy instruments, particularly financial ones.

With rising water scarcity and pollution problems it is worth thinking about a financial approach also in the water sector. Nowadays water is used excessively. 60% of European cities overexploit their groundwater resources. Along the coastlines in Southern Europe and on many islands, seawater is already intruding into the depleted underground aquifers, making them unusable as drinking water. The main causes apart from city supply for this unsustainable use are irrigation and tourism. The water exploitation index in Southern Europe has not improved since 1980 and the irrigated area has increased by 20% since 1985. As a consequence of excessive water use, groundwater levels drop and wetlands fall dry. Ecosystems of rivers and oceans are endangered and the infrastructure required for water supply and treatment (dikes, dams, etc.) destroys even areas that are not directly related to water courses. As water is essential to human existence this creates severe problems that need to be addressed. In Spain for example even hunger strikes take place in order to draw attention to social problems arising from water scarcity.

A significant percentage of distributed water never reaches the final user but is lost due to leakage. Average leakage rates for Public Water Supply (PWS) range from 10% in Austria and Denmark to 33% in the Czech Republic (OECD 1999). Incentives for more efficient water use and supply are therefore urgently needed.

So far these problems have mostly been addressed by ‘supply side ‘ approaches like water transfers. But this is not a sustainable solution as it only shifts the problem, locally, from one area to another, as well as in time from one generation to the next.

The recently adopted EU Water Framework Directive includes water pricing as a possible instrument to solve these problems. It requires Member States to ensure that water pricing policies provide adequate incentives for users to use water more efficiently and it requires that the environmental objectives of the Directive are supported.

But how must a water pricing policy be devised if this aim is to be achieved?

How can water use be reduced to the necessary minimum in order to protect wetlands, to avoid lack of water in certain regions, to reduce pollution, in brief to achieve a sustainable level of water use?

Is it possible at all to reach such objectives by using financial instruments?

The following paper will try to give some answers to these questions from an environmental point of view.

It starts with an explanation of the concept of Full Cost Recovery water pricing, followed by an analysis of the actual situation of water pricing policies in the EU together with their impact. Factors that can influence water pricing policies and their outcome are considered and finally a suggestion is made for how water pricing should be shaped in order to be efficient and effective.

2 Definition of Full Cost Recovery (FCR)

Talking about water pricing the concept of Full Cost Recovery has to be considered. Trying to find a suitable definition for FCR one will quickly find out that this is a challenging task. Numerous authors have tried to define the term, but obviously a universal definition is not available. Depending on the underlying ideas in each case the focus of the definitions varies widely and none of the definitions is really complete. The definition indicated by article 9 of the Water Framework Directive (WFD), for example, does not include environmental costs, whereas other attempts to design a concept of FCR leave out the aspect of capital costs. This text tries therefore to gather all the different kinds of costs a complete definition of Full Cost Recovery could possibly contain. These are:

I) Operation and maintenance costs

II) Capital Costs

III) Opportunity Costs

IV) Resource Costs

V) Social Costs

VI) Environmental damage costs

VII) Long Run Marginal Costs (LRMC)

Using an approach of Full Cost Recovery including all these elements would mean that account is taken of the costs arising from the everyday operation of water utilities (transport, distribution, collection, treatment) (I), as well as all the costs that result from the need to raise loans for investment in infrastructure (II). The direct costs for interests as well as opportunity costs, taking into consideration the difference of return of capital investment between the investment in water affairs and the average of the economy (III) (see Definition in Annex). Furthermore the costs arising if water is economically scarce (IV) would be taken into account and the fact that a certain use may impose costs on other users (such as social costs) (V).

In addition to these economic considerations FCR could include the fact that environmental damage costs arise if water is used (VI).

The concept of Long Run Marginal Costs makes sure that a forward-looking element is included in the water price as far as investment cost and environmental damage costs are concerned (VII).

It is obvious that putting into practise Full Cost Recovery in this complete way, as defined here, brings about some difficulties. But at this stage the intention was only to present possible components of Full Cost Recovery. Thoughts on the possibilities to realise the concept will follow in the next chapter.

3 Is FCR useful from an environmental point of view?

In the EC-Treaty the main principles of EU environmental policy are mentioned. These include the Precautionary Principle and the Polluter Pays Principle (PPP) (Art. 174.2). Furthermore the aim to achieve sustainable development is listed (Art. 2).

The Precautionary Principle promotes the prevention of pollution, which also includes the use of substitutes or bans, rather than the use of end of pipe solutions. In order to support this principle it is necessary to make water users pay for any pollution they might create, so that they are given an incentive to avoid the output of polluting substances. To reach this objective, it is thus necessary to put into practice the PPP.

The Polluter Pays Principle as well as the related User Pays Principle is based on the idea that pollution prevention and control costs as well as the costs of environmental damage should be borne by those who cause them. This implies the internalisation of negative externalities (see 'definitions'). In its strictest sense this means that rather the polluter himself will have to pay for any environmental damage occurring due to his activities than society at large. Talking about water this implies that if a price below Full Cost Recovery is put on water uses, society at large will bear the costs of water pollution and excessive water use. Therefore polluters do not have to take more sustainable solutions into consideration.

Especially for the water sector the Polluter Pays Principle has been recognised not only by the EU but also by a broad range of organisations/conferences. For example the Rio Declaration on Environment and Development recommended that: *'National authorities should endeavour to promote the internalisation of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment.'* (United Nations 1992).

By helping to put into practice the Polluter Pays Principle and the Precautionary Principle, FCR would logically also contribute to the achievement of sustainable development. More reasonable water use and the prevention of pollution make sure that Europe's water resources will still be available in sufficient quality and quantity to satisfy the needs of future generations.

Without making the full costs of water use clear to the users by integrating them into the water price, any water pricing policy is thus in breach with the main principles supposed to underlie EU environmental policy.

In 1992 the International Conference on Water and the Environment in Dublin agreed that: '*Managing water as an economic good is an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources.'*

That Full Cost Recovery is desirable from an environmental point of view is therefore quite clear, the remaining question though is to what extent it is possible to implement it. To answer this question one has to consider a variety of issues.

Water is not an economic good like any other. P. Arrojo suggests that the concept of water should be one of an 'eco-social asset', pointing to the fact that in contrast to pure economic goods such as cars it has, besides its function as a productive input, also got environmental and social functions. (Arrojo 1999)

Referring to the ‘eco’-part of this concept it is clear that water does have environmental functions, which are essential for human life. Water provides us with ecosystem services (see ‘definitions’) such as plain water supply, but also supply of fish and other seafood and supply of recreational activities (swimming, boating etc.). Its ecosystem services are difficult to price however and are not marketed. Their value is actually only clear to us when we lose them. Before, we very often just take them for granted. If one would ask Germans today whether they’ve lost a value since they can no longer swim in their rivers they would probably say yes. But when they were still able to enjoy this ‘ecosystem service’ it was not clear to them what was at stake while pollution increased.

One can say that in the end the calculation of Full Cost Recovery including environmental costs is very sophisticated. Ideas to calculate environmental costs do exist, but they are apparently not largely in use and it is not clear how to identify all possible damages. Even those damages identified can’t always be quantified and those quantified can’t always be transformed into a price. How could one calculate the cost of no longer being able to swim in a river?

Additionally there are always irreversible effects involved in environmental damages like for example the loss of species. To include these into the water price is not feasible. Pricing systems alone can thus never be sufficient to reach the desired environmental objectives.

As far as the ‘social’ part of the concept of water as an ‘eco-social asset’ is concerned, water is a good that is necessary for the pure existence of man. Therefore a certain volume of water in sufficient quality should be accessible to everybody. A vast majority of water users have a concept of fairness in distribution in mind when thinking about water and not the picture of an economic good with cost recovery problems.

A further difference between water and economic goods is that there are no possible substitutes. It is thus not subject to standard market forces. As a matter of fact the deposits of mineral oil will be used up in only a few decades but people are working on solutions for maintaining our standard of living even without fuel by substituting it by solar energy for example. Water however is the absolute and irreplaceable prerequisite for any form of life on earth.

All this makes it of course difficult to apply the usual economic models and ways to remedy these problems have hardly been worked out so far and if so they are not yet applied.

Further criticism is expressed on the concept of marginal costs. Not only is it hardly possible to calculate environmental costs, but it is also extremely expensive to realise 100% metering in all sectors as would be necessary to apply this concept. This seems to be especially true for irrigation agriculture.

But even if it were theoretically possible to include all kinds of costs into the water price, the feasibility of the implementation of such a price would need further consideration.

Not only that this might lead to social problems, this could be worked out in an appropriate pricing scheme, but the inclusion of environmental externalities would lead to immense regional variations in price levels. Depending on how fragile and valuable the respective ecosystem is, farmers who have their irrigation fields e. g. close to wetlands would have to face considerably higher prices than farmers in less sensitive areas. From an exclusively environmental point of view this might still make sense. But as soon as one considers the social and economic implications of such a development it gets clear, that conflicts are going to emerge with equity problems and market distortions arising.

Before trying to elaborate a possible solution for water pricing, the actual situation of water pricing in the EU will be presented and the extent of realisation of Full Cost Recovery examined.

4 Actual situation in the EU

The considerations on the actual situation of water pricing in EU countries begins with a paragraph analysing the elements of existing water pricing schemes. Three elements are examined: tariff structures and levels, charges and subsidies. The rest of the chapter deals with the application of these elements in the three sectors households, industry and agriculture.

4.1 Elements of water pricing in the EU Member States

4.1.1 Tariff structures and levels

Generally it can be observed that tariff structures in the EU are mostly created to prevent the risk of revenue variation in times of low demand. Only few examples are existent of tariff structures designed for demand management so the opportunity of achieving environmental objectives by introducing appropriate pricing schemes is so far not used to the desirable extent.

Water can either be charged according to the volume actually used or a fixed charge can be set. This fixed charge (also called flat fee) is normally equalised for each customer (e.g. within a given customer class or particular geographical location) or linked to some other customer characteristics (e.g. the size of supply pipe, number of water-using appliances, lot size, etc.). For setting a volumetric rate, metering of water consumption is of course a necessary requirement. Often minimum charges are included into the pricing scheme meaning that a certain minimum volume of the services will be paid for each period, whether or not this amount has really been consumed in order to protect the utility's finances. If metering takes place a wide variety of different pricing schemes is available. For example an Increasing Block schedule (IB schedule) can be set. This means that rates rise consistently as a larger volume of water is consumed. A rate is a unit price typically measured in either money or volume units. A user consuming little water will therefore pay less per litre of consumption than somebody will with high consumption. A further possibility of volumetric charging is to set prices that vary according to seasons. Thus in summer for example when consumption generally goes up, the price for water is higher in order to even out demand peaks that put the supply infrastructure under pressure.

The level of the water price in EU countries is generally lower than the cost recovery level.

As compared to tariff structure, tariff levels seem to play a minor role in achieving the desired environmental objectives of water pricing. It should be kept in mind that a price level as such does not tell much without consideration of the circumstances such as income levels etc. Introducing the same price level in Germany and in The Czech Republic for example would have a completely different meaning to the water users in the respective countries. Nonetheless the level of the water price does of course play a role in achieving environmental objectives in so far as a price close to zero or a price that is totally irrelevant to users cannot help conveying a conservation message, no matter how well its structure is worked out.

For the comparison of price level data it would be desirable to accompany data with attributes like water quality etc. Since this data is at the moment not available, any comparison will have deficits

4.1.2 Charges

In contrast to tariffs, where merely the public water supply system is considered, charges deal with direct abstractions and direct discharges, where the public system is not always involved. Sewerage and sewage disposal and the pollution side of water use must be considered in addition to abstractions.

An **abstraction charge** is the amount of money charged for the direct abstraction of water from ground or surface water. Abstraction charges exist in all three sectors (households, industry, agriculture) to a varying extent depending on the different countries. Mostly though they are important for industry and agriculture. These charges can have an explicit environmental purpose and the proceeds can therefore be turned over to environmental agencies or environmental funds (e.g. in Belgium, France, Hungary and The Netherlands). By enhancing these charges, cost-recovery can be increased. Furthermore costs for the water supplier can be reduced due to demand responses by the users and reduction of leakage.

Regional variations have been introduced in many countries in order to manage water resources according to their relative scarcity. In some countries trade with abstraction permits is allowed in order to better organise water resource management, for example in southern countries in some irrigation districts such arrangements are in place.

The case of abstraction charges therefore shows that some countries do think about possibilities to use financial instruments to achieve environmental objectives and a further application of these charges should be welcomed.

The problem with charges on sewerage and sewage disposal is that pricing schemes are not always clear because sewerage and sewage treatment are sometimes the responsibility of different agencies or companies, each with their own charging systems.

A **pollution charge** is a charge on discharges according to their quality. Pollution charges are in place in seven EU countries and are under discussion in three others. Still there is generally no full recovery of the cost of the damage caused by the pollution. However, these charges can be an important step towards the realisation of the Polluter Pays Principle.

For example in Germany a scheme has been developed to explicitly provide incentives for users to improve the quality of their discharges. Certain conditions are agreed on and if they are not met, charges rise to a significant extent.

4.1.3 Subsidies

According to an OECD study on water pricing (OECD, The price of water, 1999), subsidies can be defined as the difference between actual costs underlying calculations of the water price and full costs. Thus subsidies can on the one hand be direct payments by the state to certain water users, like for example EU Funds. But on the other hand, the definition also includes indirect subsidies like prices below Full Cost Recovery or loan reductions for the investment in water and waste water treatment plants. Tax deductions for industry are another form of indirect subsidy. Additionally cross-subsidies (see ‘definitions’) are in place such as lower tariffs for users with low income. There are also subsidies from industry to households or vice versa because of higher volumetric rates for one user group or the other. Furthermore environmental subsidies (see definitions) always exist since the environmental damage costs are not included in the water price. So if for example

plants and animals die due to water pollution society at large ”pays” in one way or the other for this loss of natural resources and the polluting activity is subsidised by society. It can thus be seen that the full costs are always paid for in some way, if not financially by inclusion into the price of water, then by some other means.

And the biggest problem with these subsidies, direct or indirect, is apparently that they are not made transparent. Even in an ‘Ecologic’ study comparing water prices in Europe, only estimated figures are used. Thus for Spain an estimated 50% of the costs for infrastructure are covered by subsidies. According to the same study in Italy an estimated 3 billion ECU of subsidies or low interest loans have been available in the 1980s. (Ecologic 1997)

After these considerations on the three major elements of water pricing policies in the EU, we will now focus on the use of these elements in the three sectors households, industry and agriculture.

4.2 The household sector

Prices for water have increased considerably in real terms over the past decade. The reasons for this can on the one hand be found in the fact that the quality standards have risen for water supply as well as for wastewater treatment. On the other hand the supply of clean freshwater gets more and more difficult because of increasing pollution and overexploitation. There is a growing necessity to treat water before it is ready for human consumption and water must be transferred from further and further away because of scarcity. The objective of FCR is to avoid overexploitation and pollution, the main cost-drivers for water supply.

A move to better recovery of total costs can be observed and of the three sectors households are apparently the closest to Full Cost Recovery. But still price levels are generally below a FCR level.

The general trend for tariff structures is marked by an increase in metering. This makes it possible to move from fixed charges towards prices based on volumetric rates which implies a move to more efficient charging systems and is from an environmental point of view a very positive development.

Furthermore the proportion of minimum charges in the water price declines, which also indicates the rising importance of the volumetric proportion.

Having a closer look on three categories of European countries, north western, southern and central and eastern European countries (CEEC), (see ‘definitions’) one finds out that whereas in the CEEC and the north western countries a constant volumetric rate is prevailing, in the southern countries an increasing-block schedule (IB schedule) is the most widely used tariff structure.

This outlines the fact that in the southern countries social concerns are more important as far as water pricing is concerned than in the other countries as IB schedules are said to address equity problems arising from the allocation of a price to water.

One of the few outstanding examples for demand management oriented tariff systems is Barcelona (Spain). In 1983 the system was changed from a minimum-charge without blocks or fixed charge into one with a fixed charge and two blocks. Encouraged by a drought in 1998 a third block was introduced with a much higher price for high consumption, giving bigger users an incentive to reduce their consumption. For equity reasons the fixed charge is calculated according to characteristics of the house and the limits of the second block are adjusted to the household size. The outcome of this change in tariff structure was a reduction of nine per cent of household water consumption per capita between 1991 and 1996. (OECD 1999)

Domestic charges for sewerage and sewage disposal are in most cases closely related to volumes supplied by public water suppliers. This is so because the inputs of water are usually a close approximation for the volume of sewage generated. It should be marked that this is true only for households. The situation for industry is a completely different one and will be discussed later.

Therefore domestic users do usually not pay for their sewage according to a marginal cost principle. This means that there are no incentives given to them to avoid for example especially polluting effluents.

A possibility to overcome this problem is pollution charges, which have been explained above.

4.3 The industry sector

The public water supply system only plays a minor role for industry, as ¾ of the water is not drawn from the public system. For the water drawn from the public water supply system, the metering penetration is close to 100%. Special tariff arrangements are very common; they exist for example in Germany and France. Since the terms of the contracts are mostly not made public, there is a lack of public information on the structure of industrial water tariffs. A low degree of transparency is a general problem for environmental policy and we will come across this issue several times in this paper. In some countries like Belgium and France lower prices are granted to large users, which is contradictory to any environmental objectives set for water pricing.

An analysis of the different categories of European countries shows that in the north the water price covers operating expenditure, depreciation and a return on capital employment in almost all countries. In contrast, in the southern countries revenues do not even cover these costs, which is from an environmental point of view very problematic (see Chapter 5.1).

For industry, unlike households, it is not true that supply volumes are a good approximation for sewerage and sewage disposal costs. The separate and explicit identification of sewage is therefore very important. The emphasis on cost recovery and incentives for sustainable water use is apparently growing. Still there are several countries, for example Ireland and Poland, where sewage services are simply calculated as a percentage of the water bill. The value of these services is therefore hidden from the user and a rational response in terms of reduction of polluting effluents cannot be expected. If prices for sewage services provided by the public system rise, industrial users tend to think over if it is not better for them to self-treat and/or reuse their effluents instead of using the public system. For direct discharges a permit is usually required. The quality of water, which can be directly discharged, is regulated in most countries and breaking the quality standards leads to the imposition of fines. But these systems can often not be enforced in a comprehensive manner. Action can only be taken after a certain level of pollution was detected instead of avoiding pollution in the first place. The trend leads towards the introduction of formal discharge charge regimes. In the Netherlands for example charges on discharges into state-owned watercourses are based on pollution loads which for smaller polluters are estimated according to input-output models. For the largest polluters the quality and quantity of effluents is metered.

This system is from an environmental point of view significantly better than the imposition of fines on excessive pollution that must be detected and proven in the first place.

Obviously due to the lack of transparency mentioned above, very little information can be found on price levels for industry. As stated above, direct and indirect subsidies to industry for water and

waste water treatment seem to be considerable. E.g. EU funds play a major role for industry. For example in Greece, Hungary and Portugal they contribute to water and waste water projects.

The level of cost recovery seems to be lower than the level for households but still better than the cost recovery level for agriculture.

4.4 The agricultural sector

Agricultural water demands are especially heterogeneous. Without knowledge on important geographical characteristics, water prices do not convey much information about water's relative scarcity. Efforts to compare agricultural water pricing across different countries will according to A. Garrido be hindered if information on any of the non-cost attributes, like water quality or supply reliability, is missing. (Garrido 1999) Information on this sector is indeed not very complete.

First, some general observations are that there is mostly no metering of individual consumption. This of course limits the range of possible tariff structures considerably, which makes a demand management approach to water pricing difficult.

The tariffs are far from covering the full costs. If at all, they only cover the operation and maintenance costs, sometimes to a varying extent also the capital replacement costs.

A major difference between northern and southern EU countries is the basis of tariffs.

In the south equity considerations are (just as in the household sector) of major importance and water use is often charged per surface of irrigated area. In the north on the contrary, water use is never charged per surface area but almost always per volume. Especially in the South, where water scarcity is a severe problem and some 80% of the total water consumption go to agriculture, irrigation water is thus not priced in a way that encourages water users to save water. We will have a closer look on this in the paragraph on 'direct effects'.

Generally, price increases do not occur as quickly as in the household or industry sector and compared to these sectors, the price level remains significantly lower These observations lead to the conclusion that Full Cost Recovery is even less realised than in the household sector.

Even within countries there are considerable variations in price levels. The reasons for this are for example different characteristics of basins or the relative accessibility to the water source, which determine the costs for required infrastructure.

The issue of irrigation run-off seems not to be considered by the authorities. Although this run-off can be very polluting (for example due to leaching of minerals) there are generally no facilities in place to fight this pollution. The logic consequence of this is that charges simply do not exist, which constitutes an indirect environmental subsidy. It must be admitted though that putting into place such a charge is difficult. The problem of calculating environmental damage costs has already been pointed out. Furthermore it would be hard to calculate or even measure the volume of run-off.

Nevertheless it is of major importance to find ways of addressing the problem of agricultural run-off, as agriculture is in many regions of Europe responsible for more than 50% of the total nutrient load borne by water. A lack of any financial compensation for this from the side of the farmers is contradictory to the Polluter Pays Principle.

As far as subsidies are concerned, cross-subsidies seem especially worth mentioning. In Denmark for example the general taxpayer, in contradiction to the Polluter Pays Principle, has to pay for

pollution by pesticides. Thus not the polluter pays for the environmental damage he causes but the people who already ‘pay’ in terms of health problems and loss of nature have to make additional financial payments.

To conclude this chapter on the actual situation of water pricing in the EU one can say that there is a severe lack of information on tariff structures and levels as well as on subsidies (which has already been pointed out above). This information would urgently be needed in order to enable satisfying assessments of the water pricing situation to be made. This would of course be a prerequisite for serious and feasible considerations on effective improvements of the prevailing situation.

5 Effects of water pricing policies

The considerations on the possible outcome of water pricing policies start with a chapter on merely direct effects. A wider scope of outcomes is presented afterwards in three paragraphs on indirect effects of water pricing policies, which are divided into effects on society, economy and the environment. Indirect effects are a concomitant of direct effects. For example decreasing water demand is a possible direct effect of water pricing and a decreasing need for infrastructure for water supply is an indirect effect resulting from it.

5.1 Direct effects of water pricing policies

First of all water tariffs and charges convey a signal to water users on the value of water. As long as water and waste water treatment do not cost anything or the price is negligibly low or charges are included into general taxes, the notion of water as a public good that must be accessible to everybody in whatever amount one may want to use will persist. But if the water user can see that for example using freshwater for gardening in summer makes the bill go up significantly he will start reconsidering whether a fresh-green lawn is really a must during the hottest summer months. This change in consumers' state of mind is urgently needed, as water is unfortunately scarce, environmentally damaged and is not economically cheap.

Explicitly, incentives for water conservation are given by metering, volumetric charges, increasing block-tariffs and a move towards Full Cost Recovery as these instruments lead to a better reflection of marginal costs in water prices.

The same is true for pollution charges. The reduction of discharges of polluting substances is rewarded by lower prices. If these charges are increased, pollution damage is reduced and/or those who are harmed by discharges are compensated.

Minimum charges, significant fixed elements, flat fee tariffs and prices below cost recovery on the other hand may prevent water users from getting a signal on the value of water. Also the coverage of water costs through general taxation revenues (as is the case in Ireland) and charging of irrigation water per surface (as is practised in the southern countries of the EU) act as disincentives. They water down the conservation message pricing can convey because unnecessary consumption is not reflected in the water bill. Such methods can even promote high consumption. This is like having paid for a huge 'all you can eat' buffet and then only eating a slice of dry bread. Hardly anybody would do that but everybody would try to get as much food as possible for his money.

For example the calculation of prices for irrigation water in Spain in proportion to the hectares irrigated together with the very low prices paid acts as a disincentive for any improvement in efficiency, such as for example the installation of new irrigation technology which is of course linked to investment.

But what is astounding is the fact that big changes in the way farmers produce their crops may not even be necessary to reach a certain gain in efficiency. Considerable amounts of irrigation water are lost due to evaporation because of the time of day chosen for irrigation. There is thus a waste of water occurring just because water users are not aware of the fact that water has a value. This waste would immediately stop after the introduction of a feasible price for irrigation water because only minor changes in management and technology would be necessary to reach a big change for the

environment. Nothing would even have to change for the farmers or for society.

Apparently it is thus possible for farmers to react to the introduction of a comprehensive pricing scheme with a reduction in water demand without even changing their crop patterns or production method left alone giving up their business. Just by increasing efficiency and avoiding leakage they can keep their water bills from going up. This valuable opportunity for water saving without far-reaching changes in the existing system should not be squandered. [Interview with Pierre Strosser, DG Environment, EU Commission]

Domestic water consumption can also be directed in the right way by water pricing schemes. For the CEEC countries considerable increases in real prices are reported after dramatic reductions of subsidies and this is proven to have significant effects on domestic per capita water consumption. For example in Hungary consumption has fallen between 1986 and 1997 from 154 lhd to 102 lhd (lhd= litre per head per day) after large real price increases. (OECD 1999)

Available data also shows that domestic water consumption decreases after introduction of metering. However a certain threshold can be determined up to which price increases do not affect consumption levels. The best responsiveness of household water demand is reported for 'peak-pricing' practises, meaning that there are temporal variations in the price, according for example to general higher consumption in the summer. Unfortunately this possibility is hardly ever used. There are reported cases though, such as in New York where the imposition of a premium summer seasonal tariff was able to reduce the peak day ratio by 14 %. (Herrington 1999)

It need not only be up to the final domestic water user to make water use more efficient. A considerable increase in efficiency could be reached by simply reducing leakage from supply systems. This would be supported by abstraction charges. As already pointed out in the introduction, leakage from the public water supply system reaches up to 33%.

There is evidence of demand elasticity also for industrial water demand, but here the range of possible alternatives seems to play a major role. Certain sectors (e.g. chemicals, pulp and paper) seem to be especially sensitive to changes in the water price, as they are able to make use of water saving technologies. For example in France after the introduction of levies on discharges these were reduced by 37% between 1975 and 1987. Reductions were most significant in the pulp and paper and the chemical industry. (Andersen 1999)

A possibility to avoid overuse of water in all three sectors is the reuse of water. Waste water, after having undergone simplified treatment could meet basic quality standards and can then be used for example for golf courses. This opportunity is hardly ever taken and could well be encouraged by the introduction of cost recovery water prices. However an in depth analysis of long term effects of reuse of waste water would still be necessary and is not yet available.

As shown above the question whether a perceived signal is in the end transformed into a different behaviour in water use depends on different factors that would still need further examination.

The two possible direct effects of a comprehensive water pricing scheme are thus a signal that water users get and their response to it, a decrease in water demand as real demand is sorted out from pure water need (see 'definitions'). It should be obvious that a well worked-out water pricing scheme can in deed have very positive effects on demand levels which is naturally a desirable development as far as the environment is concerned.

5.2 Indirect effects

After having considered the direct effects of water pricing which are mainly a signal to water users on the value of water and the resulting decrease in water demand and water pollution, now the indirect effects are examined. This means primarily secondary effects resulting for example from demand responses of users to water prices. This can be for instance the conservation of wetlands or the possibility to avoid the construction of new infrastructure. The considerations are divided into three paragraphs dealing with society, economy and the environment.

5.2.1 Indirect effects on society

There are always two sides to everything, so it should not be surprising that one can think of negative effects of water pricing on society.

As already mentioned above, the attempt to create a cost covering water price might lead to equity problems. As man needs a certain volume of water for sheer survival, the increase of water prices above a certain level can mean severe hardship for the less well-off. Nonetheless a really adequate pricing policy can solve these possible problems, as it will combine the achievement of environmental objectives with an increase in social equity. How this can be achieved will be assessed in the chapter on 'factors influencing water pricing policies'.

Regional differences in the water price due to the internalisation of environmental externalities represent another inequality. These differences have been described in the chapter 'is Full Cost Recovery necessary...' and they can as well be overcome if water pricing policies are thoroughly worked out.

Thus equity can be affected by Full Cost Recovery pricing, but this is not really a problem of the principle itself but more of the way of its implementation.

There are voices saying that there is another possible negative effect of water pricing on society. As water prices rise, certain enterprises (industrial as well as agricultural) especially smaller ones might face profitability problems. While bigger firms can even out losses by installing technology to save water or avoid polluting effluents some say that these technologies will not be affordable for some of the smaller enterprises. Especially in the agricultural sector in the southern EU Member States it is claimed that this can cause high losses to society as smaller farms are often family owned which gives them considerable social value. This argument is not unchallenged though. It is usually not the smaller irrigation farmers that overuse water on a large scale, but a few immense producers. So the question of modernisation of technology might not be as urgent for smaller irrigators as it is for the really big ones. What is more, as with affordability problems of water, the pricing scheme would need to take into account possible conflicts. Why should it not be possible to create derogations for smaller farmers in order to avoid social problems? The whole issue might need further examination in order to clearly understand the implications.

In any case the positive impact of water pricing on society is considerable.

Even if jobs would be lost due to profitability problems as described above, the rising demand for water saving technology will drive innovation and the creation of new jobs. This might not be an immediate solution for rural areas. In the long run it might solve the problem though.

What is more, the shift to an adequate pricing policy will make sure that any economic gains from allocating water more efficiently will accrue to society as a whole. This will lead to a significant

gain in equity, which probably outweighs possible affordability concerns. So far agriculture has in great parts of Europe used large volumes of water to grow its crops. Now that the availability of water resources is declining this will lead to growing social opposition that has to be met.

Finally the social costs accruing generally from end-of pipe solutions for pollution problems have to be considered. The investment necessary for the construction of waste water treatment plants burdens society with costs that could be reduced if pollution would be met at the source.

Striking evidence for this is provided by a study on economic instruments for environmental policy in four European countries. (Andersen 1999) From 1976 to 1987 the connection of population to sewage plants rose from 75 to 95% in Denmark and from 35 to 90 % in The Netherlands. In Denmark this resulted in costs of US$ 114 per capita, while in The Netherlands only in costs of US$ 71 per capita. Sewer networks were excluded from the data so the difference in population density cannot play a role. Denmark invested almost twice as much to increase its capacity by less than half of the increase in The Netherlands. The author explains this with the fact that in The Netherlands economic instruments were in place in order to reduce water pollution, while in Denmark no such instruments were implemented.

5.2.2 Indirect effects on the economy

To date the usual policy is to allow ever growing demand by continuously expanding supply. The resource water is often used inefficiently, which, as outlined above, constitutes a loss to society. Progressive water pricing policy however leads to the best allocation of the existing supply-volume. Thus it assures the best possible social welfare.

Water users have to make sure they do not waste any water or create more than minimal pollution, as they would otherwise face high costs.

Thus for example factories and irrigators have to find ways to modernise their equipment. Innovation in the branches making the necessary technology available will be a consequence and will involve the creation of new jobs.

Another positive economical aspect of water pricing can be the reduction of budgetary pressures on the state for example where capital for large new infrastructure projects is not readily available. Huge amounts of money could be saved not only because new projects for the building of infrastructure would be superfluous due to more efficient water use. Where they are necessary, these kinds of projects would simply no longer be subsidised by the state. Money would be available for other purposes, which could again be an advantage for environmental policies.

In a study on the macro-economic impact of sustainable agriculture in Bulgaria, Romania and Hungary, it could be shown that large-scale conversion of arable land to sustainable agriculture results in a satisfying production value. What is interesting is the fact that economic benefits were found out to be even greater if environmental externalities were internalised into the price of the produce. This is an indication that internalisation of externalities can indeed have advantages not only for the environment but also for economy and society. (Kieft 2000)

To be fair one must admit that there are also possible negative consequences. Increased water prices and charges for sewage treatment can cause industry to calculate the profitability of self-supply or self-treatment. If industrial enterprises leave the public system, its use will become considerably more expensive for the remaining users, namely households. This is because fewer users have to pay for the same costs of infrastructure. On the other hand cross-subsidies from households to

industry often exist while industry still uses the public system. It should thus first be assessed in further detail to what extent domestic water users would have to encounter financial losses.

Besides this possible influence on the water price, a consequence of industry leaving the public system is that transparency in the field of industrial water supply and the treatment of industrial sewage decreases. Control and influence on these processes would decrease respectively. It should be possible though to find other ways to improve transparency than letting industry use water without efficiency concerns. Moreover direct abstractions and discharges can be handled by a range of charges outlined in detail above.

5.2.3 Indirect effects on the environment

The decrease in transparency described above is of course a possible obstacle for environmental objectives since pressure to improve efficiency in certain fields can only be exerted if the inefficiencies are known.

A rigorous cut of subsidies can also be one of the negative effects of water pricing on the environment. At least in so far as in some countries compliance with existing environmental standards as the EU Directive on Urban Waste Water Treatment is not possible without subsidies. This is proven to be the case at least in Spain and in the Czech Republic. The implied costs of huge investments in necessary infrastructure can not fully be put on the shoulders of water users. Water prices would rise too steeply to be accepted and social hardship in all the possible ways described above would be the consequence. Thus water pricing policies if not designed carefully enough might even lead to a deterioration in water quality by hindering the realisation of projects like waste water treatment plants. But if subsidies are granted this should be done in a way that the whole process of subsidisation is made transparent. This is the only possibility to keep subsidies at the minimum level and to avoid major disturbance of environmental policy objectives as described above. Once more the problem lies not in water pricing as such but in the way the pricing scheme is conceived.

In the agricultural sector another negative consequence of putting a price on water is possible.

As already raised above, a higher price for irrigation water leads to the need of modernisation. As a consequence, farmers will seek to concentrate their plots because otherwise the installation of modern water saving technology is not viable. The concentration of plots however, besides possible social consequences already mentioned, leads to a further loss of natural habitat as for example hedges and trees that are very important for the linkage of remaining natural habitats must be removed. This deterioration in habitat quality will lead to a further decrease in biodiversity. Ongoing overexploitation of resources on the other hand is at least as unacceptable from an environmental point of view. It might thus be necessary to swallow the bitter pill of plot concentration in order to gain a huge increase in efficiency. But what was mentioned before should also not be forgotten: The efficiency of irrigation water use can already be increased without such structural changes.

Anyway the positive impacts of an adequate pricing policy on the environment are by far more important. As mentioned above, the realisation of the Polluter Pays Principle and the User Pays Principle leads to a more sustainable use of water.

The described efforts for more efficient water use will put an end to the over-exploitation of aquifers and the entailed destruction of wetlands. Problems of eutrophication and pollution with

hazardous substances could be addressed preventively. The turn from end-of-pipe solutions to preventive measures would bring about a whole range of possible positive effects on the environment.

As less water would be used, less infrastructure for water supply would be needed. Especially new infrastructure would be superfluous; projects like the construction of dams with fatal consequences for the environment could be avoided. Furthermore there would no longer be a necessity for water transfers from one region to another due to excessive water use in certain areas, mainly for irrigation purposes. These water transfers are from an environmental point of view not viable if they put the ecosystem of the area the water is drawn from under pressure. Moreover they are of course in contradiction to the EU's aim of sustainable development, as they only constitute a shift of problems.

By restricting water use to the limit that is really necessary, water pricing policies moreover prevent the further degradation of wetlands and forests that depend on so far over–exploited water sources. Thus the water storage capacity of the areas in question is assured. It could be lost if wetlands disappeared, e.g. due to excessive irrigation activities, and this would lead to a speed up of water run-off and water through-put hence increasing flood-levels and reducing self-cleaning capacities of aquatic systems.

As far as irrigation is concerned, water pricing can help to take pressure from the affected ecosystems to a considerable degree. Not only due to decreasing water consumption and the possible effects described above, but also by reducing the area of land that is used for irrigation. Cost benefit analyses for new irrigation projects will no longer be as easily in favour of such projects as before.

Thus water pricing can be a powerful tool to ensure a sustainable use of water and to help make Europe's waters cleaner again. However, to fully understand the issue, it is necessary to take into account basic factors that might play a role in achieving the desired environmental objectives.

6 Factors influencing water pricing policies

6.1 Regional characteristics

The consideration of regional characteristics is of major importance for the elaboration of efficient water pricing policies in the EU. The factors that need to be taken into account are different levels of infrastructure development, different natural settings and a different institutional and regulatory background.

Infrastructure

The need to build new infrastructure is connected to investment. As periods of investment put a system of real Full Cost Recovery water pricing under pressure, the different levels of infrastructure development, varying from one country to another need to be taken into account when thinking about ways how to reach Full Cost Recovery. Especially in the CEEC, but also in Cohesion Fund countries the coverage with wastewater treatment plants is very poor. While in northern countries more than 90% of the population are connected to waste water treatment plants, the percentage in southern countries varies from 50% to 80%. For complying with EU legislation (91/271 Urban Wastewater Treatment Directive) immense investments will therefore be necessary in the near future in the respective countries (an estimated 300 EUR per capita for waste water treatment and collecting systems; EEA 1999). Applying a marginal cost pricing scheme could lead to significantly increased water prices depending on interest rates or depreciation. In any case a step by step introduction of higher prices and a gradual reduction of subsidies are necessary. As indicated before a basic level of subsidies might always be necessary but should at least be transparent to the public.

A similar problem exists for water supply infrastructure in countries where the supply rates are rather low. This is above all a problem in Cohesion Fund countries. There the supply rates range between 80 and 90 per cent whereas in most other EU countries access rates are higher than 95%. Since the linkage to the network of users living in remote areas is especially costly and these are the users usually composing the percentage of missing access, the problem of investment grows even bigger.

Geological and climatic factors

On top of these infrastructure factors there are certain given circumstances that vary from one region to another that can have an important influence on the feasibility of water pricing policies. The geological and climatic conditions determine whether or not floods and droughts occur which is of course very important for water management and the determination of resource costs or the decision whether or not money has got to be raised for infrastructure to remedy these hardships (e.g. dams/dikes). Droughts will disrupt the collection of volumetric charges and provisions for this need to be made, but of course only in certain areas. The Netherlands will definitely not pay much attention to the collection of money in order to prevent financial risks of water utilities due to droughts as they rather have too much water.

An issue closely linked to the geological and climatic conditions is **resources availability**. Whether water needs to be drawn from deep wells or is rather easily accessible makes a major difference as far as the costs of water supply are concerned because more or less expensive infrastructure is necessary. This already implies that the **origin of the water** used has also got to be considered as it has an influence on how water pricing policies must be conceived to be effective. For Spanish agricultural water use for example the management scenarios differ largely depending on whether ground- or surface water is used. Surface water for irrigation is highly subsidised, whereas in the management of groundwater cost recovery is a lot better and the farmers have to pay the costs of amortisation of infrastructure investments, pumping and management.

That this has got indeed a considerable influence on the achievement of environmental objectives can be deducted from a Spanish example.

"The fact that subterranean water is used to irrigate no less then one third of the irrigated areas that currently exist in Spain, using only one fifth of the total amount of water needed for irrigation and generating almost 50% of production, is proof that the criteria of "Full Cost Recovery" […] has been, at the very least, one of the motivating factors that have given rise to the most efficient and productive use of irrigation in the country." (Arrojo 1999, p. 23)

Importance of irrigation/ economic productivity of water

Since, as discovered above, the agricultural sector is the furthest away from Full Cost Recovery, it is of course especially important to consider possible problems and important issues for water pricing policies for this sector.

From one region to another the importance of agriculture differs a lot. With it alters the impact of changes in policies like water pricing that have an effect on agriculture. The role that irrigation plays for the agricultural sector of a country is closely related to climatic and geological conditions that determine the possible productivity of water in the region.

In the south the climate makes irrigated agriculture much more productive than dry-land agriculture, whereas in Northern France, Northern Italy and the UK irrigated agriculture is used primarily to reduce possible risks. In the remaining EU countries, including the Czech Republic and Poland, irrigated agriculture only plays a negligible role or is generally limited to horticultural productions in the summer. According to this productivity prediction, irrigation is much more common in the south than in the north, which can be proven for example by having a look at the percentage of water used for this purpose. Irrigation accounts for about 80% of total water demand in Greece, 60% in Spain, 52 % in Portugal and 50% in Italy while the average figure for northern Europe is 10% (EEA, 1999), where the greater part of water is used for industry and power stations, especially in the CEEC. When developing water pricing policies these differences should always be kept in mind in order to avoid fierce opposition or social hardship.

The influence of the relative importance of irrigation for the pricing of water services can easily be deducted by the findings on tariff structures (see Chapter 4.1.1) where it could be shown that there is indeed variation between north and south. Further proof can be given for Portugal and Greece. There, water pricing policies are designed to actively encourage agriculture and rural development. In the same line of argumentation one can put the assumption that the application of efficiency-based pricing policies in the agricultural sector are only practical if the country in question has progressed beyond the stage of expansion of irrigation.

There is still more to the **productivity of water** than just the relative importance of irrigation in a region. The more productive water is for a farmer, the more inelastic is his water demand. This means that if it is possible for a farmer to make considerably more profit with than without irrigation then price increases need to be considerable as well in order to make this farmer think over his production method.

This is of course not only true for agriculture but for each and every water user. But the importance of this issue should be seen in the right proportions, as the possibility for an increase in efficiency without major changes for production that was explained in detail above is still valid as well.

Institutional and regulatory framework

A very important factor influencing water pricing policies that varies from country to country is the institutional and regulatory framework.

Whether water services are publicly or privately run can make a huge difference. Privatisation can for example encourage the development of water markets, making it easier for marginal social costs to be incorporated into the water price. On the other hand water supply competition can lead to the introduction of lower prices for large users, which is not desirable at all for the objective of sustainable water use. Further to that a recent study, released by the Umweltbundesamt, expects largely negative impacts on health and environment protection of a liberalisation of the public water supply in Germany. (UBA Germany 2000)

In a study comparing 4 European countries (Denmark, France, Germany and The Netherlands) between 1970 and 1990 it could be shown that the institutional background plays a significant role in the design and operation of market-based instruments. (Andersen 1999) Water pollution control policies have been examined in all 4 countries and the outcome of the study was that similar instruments led to different outcomes.

In The Netherlands, France and Germany economic instruments had been introduced in order to fight pollution. The basic setting of the countries can be considered as more or less similar, they all faced a high level of pollution, they all had water legislation and all countries are similarly rich. The Netherlands were found to be relatively more successful and three factors are made responsible for this.

The first factor is the institutionalised system of the water management by the water boards.

Second, in The Netherlands water levies are high.

And thirdly, the earmarking of revenues. Dutch levies are an instrument to raise funds to support effective co-operation between firms and water pollution experts. Apparently this has had a major influence on the success of water levies as a means to reduce pressure on water.

Neither in Germany nor in France the combination of all this factors applies. In Germany water management is the responsibility of municipalities and they seem to be more inclined to support local industries. Unlike authorities operating on hydrological principles (like the water boards) they are more concerned with employment than with social costs created downstream. Water levies are lower in France and Germany and no comparable earmarking of revenues is in place.

Thus a water pricing policy as such without respect to the framework described above tells little about chances for success.

Another issue to consider when thinking about regional characteristics that have an influence on water pricing policies is the question of the state of development of the already existing environmental policies.

As the basic cost-drivers for water are environmental and health protection and the need to cope with environmental degradation, this is a very important thing to consider. In countries with a high standard of environmental protection the water prices will probably already cover a good deal of the costs. But in other countries with lower standards a move to Full Cost Recovery might be a lot more painful. Prove for this can be found in Cohesion Found countries, where predictions are that the water prices would have to rise significantly more than in other countries if Full Cost Recovery was made compulsory.

6.2 EU Policies

Talking about water pricing in the EU, it is not sufficient to take the regulatory framework of each Member State into account. Working out feasible water pricing policies is not possible without taking into account the surrounding EU-policies that might enhance or hinder policy outcomes.

6.2.1 CAP (Common Agricultural Policy)

An EU policy that is especially important in this context is the Common Agricultural Policy (CAP). This is due to the immense importance of agriculture for EU water affairs, which has already been described in this text.

Although the principle of integration is established firmly in the Amsterdam Treaty, the integration of environmental concerns into agricultural policy has not yet taken place.

Especially in the case of water demand this would be very important though. Recently a study has been carried out on the evolution of water demand induced by CAP in one of the largest irrigation systems in Spain, the *Riegos del Alto Aragón* in the Ebro basin. An increase in the average net requirements per hectare of 28% between1989 and 1992 could be shown and it was found that this is due to incentives given by Reformed CAP to cultivate crops that are more intensive in their water demands (e.g. maize and alfalfa). Therefore Common Agricultural Policy, without having it as an objective of course, could give rise to significant increases in the demand for irrigation water.

Not only in Spain but also in other countries the possible effects of increased water prices are reduced by CAP subsidies as these reward those farmers more generously who have installed irrigation equipment than those without it.

In a case study on Aquifer 23 in Spain it could be shown that Common Agricultural Policy has maintained and promoted the expansion of irrigation in the corresponding area and has thus contributed to the overexploitation of the aquifer and to serious environmental problems affecting the wetlands supplied by this aquifer, which are a protected area. In a study working out different scenarios for different future approaches to water management in the area it became clear that current policies do not make efficient use of public finances. Moreover it has been found out that reducing the difference between subsidies to dry-land and irrigated agriculture leads to considerable reductions in water use and to significant savings in public expenditure. (Sumpsi 2000)

6.2.2 Structural Funds/Cohesion Funds

But Common Agricultural Policy is not the only EU policy, giving rise to inefficient and unnecessary water use.

Environmental NGOs keep arguing that Structural Funds and Cohesion Funds support biodiversity loss and resource depletion. This assessment is not surprising, as one of the objectives of the Structural Funds is to accelerate the adjustment of agricultural structures in the framework of reformed CAP. The fact that CAP contributes to environmental problems has been outlined above (see Chapter 6.2.1).

Once again agricultural activities are supported that are totally incompatible with the sustainability and carrying capacity of the areas in question. Subsidised water supply and water use leads to an over-intensive exploitation and as a result the exhaustion of the resources. The funds support land use and a distribution of economy and population in areas lacking sufficient water resources. This implies further installation of infrastructure (e.g. for water transfer) and further resource depletion. The financial cost of changing the siting or nature of projects is usually so high that such considerations are said to be infeasible. Such calculations cannot be in favour of environmental objectives as long as the external environmental costs are not taken into account.

It should thus be clear that without further integration of environmental objectives into other EU policies, the environmental objectives of water pricing are hardly going to be reached.

6.3 Information

There are three different possibilities of how a lack of information can influence water pricing.

First of all information on the price itself is vital. Water users must fully understand the reasons behind price increases otherwise they will oppose them. Apparently it is neither always clear to consumers what their waste water is going to do to the environment, nor do they know that water is abstracted excessively and what consequences this has for the environment. Only if water users fully understand the charging scheme they have the chance to react rationally to it. This means that they will try to use water more efficiently.

Whether or not they succeed in doing so is largely dependent on their knowledge on technology making it possible to use water more efficiently. If information on such possibilities is not available to water users, they will not know how to react best to the incentives given by progressive pricing schemes. This is true for all three sectors, households, industry and agriculture. Providing information and training therefore is a vital part of the implementation of water pricing policies.

There is another side to information though apart from the information directly related to charging schemes. Information on the water resources as such is usually not available. But how should a price be put on something as complex as water when not even the most basic things like the impact of groundwater abstractions on wetlands are fully understood. On top of that, data is usually not available on withdrawals and use patterns. The attempt to determine opportunity costs/the optimal allocation of resources under these circumstances is deemed to be a failure. An improvement of the dialogue between all stakeholders would be vital for overcoming those shortcomings.

6.4 Public participation

Talking of a dialogue between **all** stakeholders, one comes across the issue of public participation.

As the UK example shows, consumers' participation in the process of water pricing can have positive effects. There, independent customer bodies are working together with the regulator, the water industry and government. They help to devise and implement water pricing policies that are acceptable to customers, promote sustainable water use and deliver benefits for the water environment that environmental NGOs keep asking for.

Similar experience is reported from 3 urban areas in Spain (Madrid, Barcelona, Seville) where regional price commissions serve as a forum to debate major concerns of managers and consumers. (Maestu 1999)

A necessary basis for public participation is as always transparency. As already stated several times before in this text, for example the exact situation of subsidies granted to any of the three sectors (households, industry, agriculture) needs to be available if inefficiencies are to be stopped.

Social Objectives

As was already pointed out in the text above, social issues play a major role for water pricing. Domestic access to public water supply is reported to be high in most EU countries. The dimension of access still to consider is therefore affordability.

There are different basic ideas to solve the problem of granting access to a minimum volume of water to everybody. The solution that is so far mostly in place is a general low price for everybody. From what has until here been pointed out it should be clear that this is not a solution which leads to efficient water use.

It is therefore necessary to create appropriate pricing schemes in order to ensure that although prices give incentives for water conservation, also less well-off people can afford their basic water needs. One possible solution is the introduction of Increasing Block-schedules. Thus customers who use more water pay higher rates. But this still creates injustice. Large households with low income would pay higher rates than small households with high income. It is possible however to relate either the fixed charge element of the tariff or one or more characteristics of the cheap block (size, price) to the needs of low-income households of average size. This is practised in Flanders where a free allowance is granted. Free allowances have so far often been criticised due to equity concerns because they were granted per household. In the Flanders region however the allowance is granted per person. Equity is clearly enhanced and what is more, the marginal price for every consumer is now closer to the marginal social price of provision. (Van Humbeeck 1999)

7 Necessary elements of a framework for EU water pricing policy

To conclude this paper on water pricing, important elements that should be included into an EU water pricing policy are listed and explained again in short. A detailed explanation of the advantages of these elements was already given in the preceding text.

After what has been said in the paragraphs above, an EU water pricing policy, in order to make water use more sustainable, should obviously contain the following essential elements:

® **Public awareness and participation**

Acceptance of water pricing schemes by the general public has to be increased. Investments are necessary to develop and implement strategies, which should focus on explaining to users why they have to pay more for their water use and how they can reduce their bills through more efficient practices.

Public participation in the design and implementation of River Basin Management Plans is a general obligation for Member States under the WFD. It is the proper right of EU-citizens and has to be fully assured for the development of the water pricing schemes.

Public participation will help to support the integration of different policies and the acceptability of higher water bills.

® **Full cost recovery has to include the costs for environmental damages**

The polluter pays and precautionary principle can only be put into practice by inclusion of environmental damage or resource costs in the water price. The internalisation of these costs is therefore necessary to ensure sustainable water use not just “efficient use”.

® **Metering and volumetric pricing schemes**

It could be shown that the notion of water as a public good that must be accessible to everybody in whatever amount one may want to use must be changed. It could also be shown that in order to reach this objective, metering and volumetric pricing schemes are basic requirements. In the long run a high percentage of metering must be the goal not only for households but also for the other sectors. A situation like the one in southern Member States where irrigation water is neither metered nor priced per volume is no longer acceptable.

® **IB schedules with blocks adjusted to social needs**

It can be seen that equity can be affected by Full Cost Recovery pricing, but only if it is not implemented in a comprehensive manner. The Flanders example, where a daily allowance of

120 l per person is guaranteed, seems to be a good possible solution for such equity problems.

The advantages of IB schedules as such have also been pointed out in detail in the text above. High water consumption should no longer be rewarded by the charging system.

® **Seasonal variations where appropriate**

As mentioned above, ‘peak pricing’ like for example higher prices in summer has the potential of reducing water consumption significantly. In periods of general high consumption this is especially important as it reduces the need for additional infrastructure to meet these extraordinary demands.

® **Earmarking of water charges**

As it could be shown above, earmarking of revenues can improve chances for the success of economic instruments in the water sector significantly. Comparing France, Germany and The Netherlands, earmarking was found out to be a major reason for the relatively more successful Dutch levies in terms of taking pressure from waters.

® **Only a minimum of fixed and minimum charges**

Where significant fixed or minimum charges are in place, unnecessary consumption is not reflected in the water bill. Such pricing schemes can even promote high consumption. As was already mentioned above, this situation is comparable to making people pay for a huge ‘all you can eat’ buffet and then expecting them to only eat a slice of dry bread. Most people would agree that this is a very unrealistic expectation.

® **Information for water users**

It was already explained in this text that in order to make people use their water more efficiently one must make water users fully understand the reasons behind price increases. Apparently it is neither always clear to consumers what their waste water is going to do to the environment, nor do they know that water is abstracted excessively and what consequences this has for their environment.

Furthermore, detailed information on possibilities for saving water must be available for everybody in order to make rational and efficient responses to the water price possible.

® **An understandable water bill**

In the same line of argumentation it is clear that water users will only accept a higher water bill and show the desired reaction to it if they really understand what it is that they have to pay for.

® **Transparency**

Lack of information on subsidies, water abstractions, water quality or for example the terms of contracts between industry and water services could be shown to be a considerable problem for the registration of shortcomings of existing water pricing policies. As a consequence the lack of transparency is also an obstacle in the way of new and more efficient pricing schemes.

® **A gradual transition to the new pricing scheme**

In order to avoid opposition by water users, necessary price increases must be introduced in acceptable steps. Moreover the imposition of new pricing schemes has to be adjusted to the actual situation. As it was shown for the CEEC and Cohesion Fund countries, a marginal cost pricing scheme not introduced carefully enough will even lead to a deterioration in water quality due to the present lack of infrastructure such as waste water treatment plants.

8 Conclusion

Obviously it is possible to address water scarcity and water pollution problems with economic instruments. These need to be very carefully designed though, especially if they are supposed to be in force in the whole EU. As it could be shown in this text considerable problems will be faced because of the vast regional differences in the water sector.

Far more information is necessary, especially on the industry sector. In general more information would be desirable on CEEC and on subsidies to water supply and water treatment. Clear and universal definitions of the technical terms used in this field would ensure a more straightforward and fruitful dialogue between different stakeholders.

Experience will show, maybe with the implementation of the upcoming Water Framework Directive, whether these problems can be met and whether use can be made of the obviously powerful instrument of water pricing to move towards a more sustainable water use.

9 Definitions

For all the definitions it must be stated that a universal definition is usually not existent and that the author chose those definitions that seemed most appropriate to her.

Abstraction charges
Amount of money charged for direct abstraction of water from ground or surface water

Block charge
Different volumetric rates are attached to different blocks of consumption.

Categories of European countries
For the analysis of the actual situation of water pricing in Europe at the moment it seems to be useful to divide the EU countries into three categories, according to the trends observed.
CEEC (Central and Eastern European Countries): the Czech Republic, Hungary, Poland (Estonia, Cyprus, Slovenia; Latvia, Lithuania, Slovakia, Romania, Bulgaria)
North western countries: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Luxembourg, The Netherlands, Sweden, The United Kingdom
Southern countries: Greece, Italy, Portugal, Spain
Reasons for this division are among other factors based on regional characteristics (see there)
This division involves some problems as France and Italy can not under all circumstances be put in one of the categories as different regions of these countries actually belong to different categories.

Charge
Measured in money/time units

Cross-subsidy
Cross subsidies are subsidies provided by one group of consumers to another, or from some other economic group (e.g. producers) to another (e.g. consumers). For example if lower prices are granted to less well-off, the people who pay the normal price are said to subsidise the less well. (OECD 1999)

Decreasing-block schedule
Rates fall consistently as more volume is consumed.

Discharge charge
Charge on direct discharges into water courses. It can either be based on the quality and/or the quantity of the effluent.

Ecosystem services
Life support functions of water (cleansing, recycling, renewal, cultural benefits).

Environmental subsidy
'Given that water users rarely pay for either the opportunity costs of the water they use, or for the pollution they generate, these users may be said to be subsidised by society-at-large.'

(OECD 1999)

Flat fee (Fixed charge)
It is normally equalised for each costumer (e.g. within a given costumer class or particular geographical location) or linked to some other costumer characteristics (e.g. the size of supply pipe, number of water-using appliances, lot size, etc.)

Increasing-block schedule
Rates rise consistently as more volume is consumed.

Minimum charge
A certain minimum volume of the services will be paid for each period, whether or not this amount has really been consumed. This protects the utility's finances.

Negative externality / external cost
An external cost exists when the following two conditions prevail:
1. An activity by one agent causes a loss of welfare to another agent
2. The loss of welfare is not compensated

For example if an industry discharges waste to a river that causes a loss of fish stock in the river, anglers downstream the river face a financial or recreational loss.
(Pearce / Turner 1990)

Operation and maintenance costs
Costs for transport, distribution, collection, treatment of supplied water/waste water.

Opportunity cost
Relates to the fact that water should be allocated to its highest value uses in order to maximise social welfare. A necessary and sufficient condition for such a welfare improvement is that property rights are assigned and that a market for water rights can be created or exists.

Pollution charge
Charge on discharges according to their quality.

Price
Prices=Costs-Subsidies+Appropriation of Surplus+Taxes and Charges

Price elasticity
The responsiveness of water demands to price levels and/or price structures.

Rate
Unit price, typically measured in either money or volume units.
Sewerage charge/sewage treatment charge
Charges for sewage treatment services provided by the public system.

Subsidy
' When the principle of 'full cost recovery' is not completely implemented, a wedge may develop between full and actual costs. This wedge is sometimes referred to as a 'subsidy'.

(OECD 1999)

Trade effluent charge
Pollution charge, often specific to industrial users and is used to recover costs from any extra capacity built to treat industrial waste.

User Fee
Covers the costs of a service.

Volumetric rate
When multiplied by the volume(s) of water consumed in a charging period gives rise to the volumetric charge for that period.

Water demand
Is measured as the willingness to pay (WTP) of each user for having marginal additions to water endowment.
Water demand is therefore an economic term that should never be confused with water need.

Water need
Is an undisputed necessity that must be satisfied in any case.

Water Use / Water Service
1. abstraction, distribution and consumption, or use in any economic activity of surface water or groundwater.
2. emissions of pollutants, waste water collection, treatment and discharge or
3. any other activity identified as having a significant impact on water.
   1 + 2 = water services. 1 + 2 + 3 = water uses

10 List of abbreviations

CAP: Common Agricultural Policy

CEEC: Central and Eastern European Countries

FCR: full cost recovery

IB: increasing-block

LRMC: Long run marginal costs

NGO: Non Governmental Organisation

O&M: operation and maintenance

PPP: Polluter Pays Principle

PWS: Public water supply

WFD: Water Framework Directive

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