



FINANCING PUBLIC WATER MANAGEMENT: DEALING WITH ECONOMIC COSTS OF WATER USE

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ABSTRACT

Today, many scientists and policy makers underline the importance of internalizing all social and economic costs in charges and prices for water use. Ideally, all service and environmental costs should be recovered in conformity with "polluter pays" and "user pays" principles, using the water system (or river basin) approach to detect these costs. Attempts in The Netherlands to implement these principles however, show that it is not always easy to deduct just charges and prices from hydrological cause-effect relations. Such charges and prices do not always provide adequate signals to users and polluters. The institutional framework and the social, economic and political context determine where and how these financing principles can be implemented. The focus should therefore shift from "blind" charges on pollution and abstraction to (self-)imposed efforts made to measure. © 1998 IAWQ. Published by Elsevier Science Ltd. All rights reserved

KEYWORDS

Economic cost recovery; addressing polluters and users; financing Dutch water management.

INTRODUCTION

The question how to use water in a sustainable and responsible way is faced by many authorities in many countries. The scarcity of the water resource is recognized increasingly, as it becomes noticeable difficult to find water for all needs in society permanently. On a local and regional scale conflicts between different users - farmers, industries, thirsty cities and the environment - have become more common. And also on the international level several disputes concerning the availability of fresh water can be observed.

The reverse side of human interaction with the hydrological cycle has been set out and explained almost exhaustively. And there is also no lack of policy goals and good intentions. But practice appears to be more unruly than theory. The pressure on fresh water resources still increases as a consequence of the growth of the population and its economic activities. And most governments find it difficult to bear the increasing capital, operating, and maintenance costs. As public funds are often limited, economic aspects have become a very important dimension of the decision-making process.

This paper focuses on economic aspects of water management. The theoretical concept of "full economic cost recovery" is confronted with current debates on financing measures to achieve water objectives in The

Netherlands. The issues put forward are subject of research in the project *Kostelijk Water* of Twente University in co-operation with several institutions in the field of regional water management in the eastern part of The Netherlands.

FULL ECONOMIC COST RECOVERY

Many scientists and policy-makers agree on the fact that the failure to consider water as a scarce (economic) commodity lies at the heart of the water-problem. Under-pricing of the use of water has caused - and still causes - waste and pollution, which manifests itself in limitations and damage to the environment. Therefore, the solution of the problem lies in finding mechanisms that provide more adequate signals to suppliers and users of water. Such mechanisms should expose relevant information about the *real* costs of supply, such as environmental costs, costs of provision, opportunity cost (the value of water in alternative uses) and costs of depletion (Randall, 1987; Winpenny, 1994). This also means that "polluter pays" and "user pays" principles should be applied more consequentially.

The basic, theoretical assumption of this approach is that by improving the working of the price-mechanism the social, economic and environmental preferences and needs are translated effectively and efficiently in to an optimal service level. In theory, this optimal service level is achieved when the marginal unit of water for each user has the same value. Otherwise an increase of total welfare could be achieved by a redistribution of using possibilities. By forcing individuals and companies to reveal their preferences on real prices, the use of water will be confined to where it is really valuable. Moreover, a close relation between interest, payment and services would link up best with most people's sense of justice (Wolfson, 1988; Van Ast, 1989).

"Polluter pays"

We can find the recommendation of a greater use of economic instruments in many international and national policy documents. According to the Dublin Statement 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 (ICWE, 1992). The World Bank also supports the idea that "proper pricing" not only leads the available water to its most valuable use, but also provides incentives to improve performance and efficiency (Serageldin, 1994).

The European Commission recently stated in a proposal for a *Framework Directive Water* that prices and charges of water should reflect all economic costs on society and the economy. Next to costs for necessary services, prices and charges should also reflect environmental costs and resource depletion costs. Sufficient high charges and prices would have both an *incentive* and a *financing* function: they are a way of reinforcing "effective demand management", and will also help provide the necessary funding for the water sector. According to the European Commission, an appropriate application of these principles requires insight in to costs and benefits on the water system (or river basin) level. For this is the level where effects on the environment and on other members of society can be most completely understood.

In The Netherlands "polluter pays" and "user pays" are guiding principles in water management. Since the *Surface Water Pollution Act* (1970) came into operation a charge on pollution is imposed to finance water quality management, while in water quantity management there is a long tradition of relating levies to the interest of stakeholders. At present, however, the implementation of these principles encounters several difficulties.

THE DUTCH WATER PROBLEM

The Netherlands is a country with a large area of surface water, fresh as well as salty, and a shallow groundwater table in major parts of the country. More than 50% of the country is situated below sea level. The lower part of the country consists entirely of *polders*, where water levels are controlled artificially. Almost the entire country lies in the delta areas of three large rivers, the Rhine, Meuse, and Scheldt. This

means that for its fresh water supply the country is partly depending on other countries (Garritsen, 1993; Saeijs, 1995).

Integrated water management

For a long period in history water management in The Netherlands meant mainly "keeping our feet dry" and serving economic interests such as agriculture, industry and shipping. In the early seventies, with the acceptance of the *Surface Water Pollution Act* (1970), water quality also became a subject of public attention. The *Third National Water Policy Document* (1990) introduced the concept of *integrated water management*. A number of side-effects of the water management of that time were acknowledged, such as point-source and diffuse pollution, groundwater depletion, and the ecological decline of nature reserves and natural elements in the landscape. In the future, water management should focus on *all* dependent (also noneconomic) interests. With the ultimate goal "to have and maintain a safe and habitable country and to develop and maintain healthy water systems which guarantee sustainable use by man and by nature".

Eight years later, some progress has been made while other problems are still manifest. The water management is fairly well attuned to the human use functions. The volume of many emissions has been reduced, particularly in the case of industrial and municipal wastewater sources. However, the water quality of most rivers, lakes, regional waters and estuaries is still far from meeting the water quality objections (Ministry of Transport and Public Works, 1996a). In particular, pollution by diffuse sources such as nutrients, pesticides, traffic emission, atmospheric deposition and aquatic soils is problematic. Next to this, a large area of land is still suffering from groundwater depletion, which is mainly caused by drainage and the increased abstractions of groundwater for mains supplies, industry and agriculture.

Tasks and competencies

As in most western countries, several institutions play a role in water management. The national government is responsible for the management of the large rivers, territorial waters and estuaries. The regional surface waters and the groundwater are managed by water boards and provinces respectively. Sewage is collected and transported by municipalities, while water boards again are responsible for sewage treatment. Relatively independent public utilities take care of the production and supply of drinking water.

On a regional level, water boards play a crucial role in water management. Originally these institutions mainly focused on serving agricultural interests by flood-control and drainage. Today, water boards are expected to take all interests into account equally. The following (overlapping) categories of stakeholders are represented in the water boards and are taxable: inhabitants, owners and renters of unbuilt areas (farmers, stewards of nature reserves), owners and users of buildings (households, companies). To enable water boards to manage water in an integrated way on a regional water system level, the small water boards at present are forced to merge.

Financing the ambitions

To achieve all human use and ecosystem objectives these institutions have to invest in the improvement of sewage collection and treatment, remove polluted aquatic soils, reduce agricultural and industrial discharges and to accomplish hydraulic design and habitat restoration. The Ministry of Transport and Public Works (1996a) calculated that to achieve all national and regional objectives, the total budget would need to increase from 8 billion guilders in 1995 (approx. \$ 4.2 billion) to an annual 34 billion guilders (\$ 17.9 billion) in 2015. For instance, this would mean that domestic charges for water use in the year 2015 would come to 1000 guilders per person, which means an annual cost raise of 10%. For certain companies and industrial sectors the increase of taxes would exceed the economic growth of the sector.

But current policy already leads to a firm rise of prices, charges and levies. During the period 1988-1998 charges and levies for water quality and water quantity management have risen by an estimated 108% and 54%, respectively (Unie van Waterschappen, 1996). These numbers have to be placed within the context of

rising local taxes on a broad field, which encounters increasing opposition in society. In particular, lower income groups find it hard to bear these costs.

Table 1. Average level of domestic charges in 1996

Charge	DFL	Dollar
Levy for water quantity management	fl. 79,-	\$ 42,-
Levy for sewage collection	fl. 168,-	\$ 88,-
Charge for water quality management (includes sewage treatment)	fl. 253,-	\$ 133,-
Drinking water price	fl. 347,-	\$ 183,-

Source: *Local Tax Policy Document, Finance Department, 1996.*

FINANCIAL FRAMEWORK AND DEBATES

The increased financial pressure on the public water sector has caused debates about both the tariffs and the distribution of costs. These debates are now illuminated.

Water quality management

Both the national government and water boards finance their water quality tasks on the basis of "polluter pays" principle. This means that the costs of preventing pollution, measures to improve water quality, and sewage treatment are recovered with the proceeds of pollution charges. Water boards are free to charge any polluter, while the national government has to stick to the standards of the *Surface Water Pollution Act*. Once connected to the sewage system, households and companies pay a levy for sewage collection to municipalities on the basis of imputed use, and a charge for water quality management - including sewage treatment - to the water boards on basis of imputed pollution.

Research shows that the success of the reduction of point-source pollution is mainly due to charging waste water discharges (Bressers, 1983; Schuurman, 1988). However, only discharges of oxygen-consuming pollutants and some heavy metals are charged. This means that only a limited group of current industrial polluters and households bear most of the costs of the attempts to meet water quality standards. The economic and environmental damage caused by diffuse pollution (agriculture, traffic, shipping, building materials) are not charged to the polluter, neither by the national government nor by most of the water boards. Also leakages from the sewerage system, sewage disposals and transboundary loads are not, or only partly charged. So in practice, there appears to be a weak relation between *pollution* and *payment* for services and environmental damage. As a consequence, costs are passed on to other groups in society. Public utilities for instance have to purify polluted ground- or surface water to produce drinking-water. Farmers face the loss of crops or even cattle because of the bad water quality. Recreation, tourism and fisheries also suffer economic losses. And the healthy functioning of aquatic ecosystems is still impeded by eutrophication, the water quality, and polluted aquatic soils.

The weak relation between pollution and payment in practice seems to be caused by a number of factors. First, it is often hard to designate the *real* originator of costs, because the source is diffuse or the pollution took place in the past. Second, administrative and political motives play a role in deciding whether or not a group or company is addressed financially. For instance, in current policy debates the question is raised whether farmers should be charged for pollution by nutrients and pesticides. However, such a charge "should not stymie current policies on fertilizers, minerals and pesticides" (Ministry of Transport and Public Works, 1996b). At present, several measures are imposed on farmers to reduce pollution.

Third, companies have found a way to avoid high water quality charges by pre-cleaning discharges before delivering it to sewage purification plants, or use the purification facilities of public utilities. As a consequence, water boards are more or less forced to raise the charge for households, in order to finance the fixed operational and maintenance costs of sewage purification (Havekes, 1996). This also means that some industries indeed exert themselves to reduce pollution, but contribute less or nothing to the general service costs for preventing pollution and recovery measures. Today, approximately 68% of the costs of regional water quality management is paid by households, and 32% by industries (Stevens, 1997).

Water quantity management

The costs of the quantity management of national rivers, estuaries and seas are paid for by the national government out of general tax revenues. Water boards impose a levy for the management of regional waters to everybody in who's *interest* they act. All five categories of stakeholders (mentioned previously) are addressed separately.

As a result of both the concentration and the environmental tasks of water boards, the relation between their *activities* and the *direct interest* by those activities has become diffuse. No single stakeholder for instance has a direct interest in a hydraulic redesign to restore wetlands, or in the creation of vegetated banks. In particular farmers are sometimes unwilling to accept a tax raise due to environmental tasks, and in some water boards are still politically able to block such a raise (Lommerse, 1996; Unie van Waterschappen, 1996). Therefore, subsidies from the national government are needed to encourage hydraulic redesign and regional restoration projects.

Groundwater management

Provinces charge abstractors of groundwater to recover the costs of groundwater management. Irrigation and other small abstractions are almost everywhere exempt from this charge. In many provinces there is a tendency to use the groundwater charge not only for "cost recovery" purposes (research, monitoring), but also to compensate for some environmental damage. The province also *authorizes* almost all abstractions of groundwater; costs for granting permission are charged to the licensee separately. In addition, any damage caused by the abstraction also has to be compensated by the licensee.

Next to this provincial charge, since 1994 the national government has raised a general - and much higher - tax on large abstractions of groundwater. Like in many other European countries the government tries to unburden labour as a tax base to serve employment purposes, and looks for other (environmental) tax bases. The main goal of the new environmental taxes is to obtain revenues for general state purposes, and serving environmental interests is an intended side-effect. The increased tax levels have proved to work as an incentive for drinking water companies to switch from the use of groundwater to surface water, and for industries to reduce abstractions and consider the re-use of waste water (province Overijssel, 1996).

REFLECTION

The attempts in The Netherlands to implement "polluter pays" and "user pays" principles show that charging for water use has considerably reduces waste and pollution. However, it can be questioned whether or not for water management useful and sustainable financing principles are found when these are related to hydrological cause-effect relations. In practice, the relation between the *effects* of water use (benefits, damage) and *payments* often is artificial and/or controversial. Moreover, it is not always possible to address the polluter or user because of an inadequate institutional framework. And finally, charges work as an incentive, and therefore do not provide governments with stable revenues.

Is charging an "adequate" signal?

A number of measures, such as habitat restoration measures, hydraulic (re)design, groundwater sanitation, and aquatic soil removal, concern the restoration of damage caused by pollution or water use in the past. The originator of these costs is often hard to trace, and therefore hard to address. It is possible to charge

current polluters and users for these costs, but this is often experienced as "unfair". Next, *if* the polluter can be traced, a charge sometimes doesn't seem to be an adequate signal. The agricultural sector could for instance be held responsible for diffuse pollution and groundwater depletion. Fact is though that - with the financial support of the government - for years farmers have been stimulated to develop in a way which today is addressed as "polluting" and "damaging". So the question actually is: who's to blame? A charge on diffuse pollution is experienced by farmers as an unjustified judgement of the past by today's standards. Moreover, the stringent policy on fertilizers and minerals already brings much effort and trouble. What would a charge add to this?

A similar question arises with respect to the abstractions of groundwater. Abstractions by industries and drinking water utilities are all authorized by the provinces. Their policy is to reduce these abstractions to a "sustainable" level, and to let abstractors compensate any damage directly. Abstractors therefore have to apply economic techniques, are stimulated to re-use waste water and sometimes even are forced to end the abstraction at a specific location. Companies and utilities criticize charges on the abstractions to finance habitat restoration measures or feed the general government budget, because they already make efforts to reduce these abstractions. And why should public services like social welfare, health care or environmental policy be financed out of a tax on "sustainable" groundwater abstractions?

Whether or not an imposed payment is experienced as "fair" not only depends on the efforts that farmers, households or industries already undertake to reduce pollution and waste. There's a limit to the level of taxes, charges and prices that is socially accepted. People must be *able* and *willing* to bear the costs. Politics appears to be very sensitive to complaints about the (local) tax level, in particular with respect to the position of lower income groups. Moreover, limiting the level of regional and national taxes has become an important political way to create favourable settlement terms for companies and households. So the urge to implement "cost recovery prices" might be felt in the water sector, but not always in the rest of society. It is important to recognize that, in general, achieving water goals does not have a high public and political priority. Only when in society a "sense of urgency" is present, does the government appear to be *able* or *willing* to overcome financial or administrative restraints (Van Hijum, 1995).

What is a "proper" price?

One question is whether a charge on pollution or abstraction always provides an adequate signal to water users, especially when users already accept their responsibility and have started to change behavior. These changes can either be imposed by government policy or originate from users' own free will. Households, farmers and companies themselves bear the costs of these changes, or - if a third party bears these costs - pay a price or levy for water services like sewage transport and treatment.

A second dilemma is: should these prices and levies reflect only the costs of the individual efforts, or also include all costs for pollution prevention, control and compensation of damage? The concept of "full cost recovery" suggests the latter. An adequate charge for the remaining pollution then should provide some information about the effects and damage caused by a discharge on the water system. The harmful effect of a waste water discharge however depends not just on the *amount* and type of pollutants, but also - and perhaps even more - on the *location* of the discharge, and its specific effect on the possibilities for economic and environmental use. The crucial question arises whether a satisfactory monetary value can be put on the damage caused to other (potential) users. For then the opportunity costs of the water use would be made clear. This might perhaps be possible for large waste water discharges, but seems extremely difficult for diffuse pollution, where only the *cumulative* effect causes damage.

Institutional framework

For both reasons of fairness and technical accountability it is not very easy to deduct "just" charges from hydrological cause-effect relations. Next to this, institutional limitations play a role in whether or not these principles can be implemented. In the case of the Netherlands the institutional framework for instance fails to deal with transboundary pollution and other kinds of damage. Neighbour countries do not contribute to

costs for removing polluted aquatic soils, improving water quality, and preventing river-floods, which origin are from their part of the river basin. This aspect can only be changed by creating redistributive mechanisms on an international river basin or at a European level.

The incentive function conflicts with the financing function

Finally, sufficient high charges for water use would have both an *incentive* and a *financing* function. In practice however, the financing function appears to be constantly under pressure because of the incentive working of charges. When polluters or abstractors react to charges by decreasing pollution or waste, this means for governments diminishing returns and subsequently induces the need to raise tariffs to obtain the same revenues. The result is that socially desired behaviour is punished financially, which (again) cannot be considered an *adequate* signal to users.

CONCLUSION

The merit of the concept of "full economic cost recovery" is that it forces us to focus on the origin of costs and therefore on the basis of the water problem. By demanding that all service and environmental costs of water use should be internalized in charges and prices, the concept tries to guard against the abdication of responsibilities. The principle expresses the wish to make "the right people" pay. Moreover, charging for water use has proved to work as an incentive to reduce pollution and waste. A first conclusion therefore is that charges can play an important role in making society conscious of the scarcity of the water resource, and in changing behavior in response to this recognition.

However, for several reasons it is questioned whether tracing and valuing hydrological cause-effect relations provides the public water sector with useful and sustainable financing principles. The Dutch case shows that it is quite difficult to deduct "just" charges and levies from the general principle. The right people must pay, but it's not always clear who they are. Polluters and users are addressed in a reality of institutional limitations, political motives and notions of "right" and "wrong" in society. In this reality, a general correction of the price of water use by the application of economic instruments (charges) does not always provide an adequate signal to users and polluters, mainly because individual efforts and circumstances are not taken into account. The concept of "full economic cost recovery" only *can* and *will* provide an adequate signal when the following conditions are met:

1. There is a clear relationship between the water use (abstraction, pollution) on one hand, and the costs for providing the necessary services and environmental cost on the other, and it is possible to put a monetary value on these costs;
2. The institutional framework enables governments to charge the polluter or the user, and there is a political "willingness to charge", which again depends strongly on the social and economic context and the public "willingness to pay".

To achieve a sustainable management of the water resource in the 21st century it is important to shift the focus from "blind" charges on pollution and abstraction to efforts made to measure. For in the end it is not the question how to feed the public water sector, but how to change behavior and use water in a more sustainable way. Households, industries, farmers and other stakeholders all have an interest in that, and all have a moral obligation to contribute. It is the challenge for governments to reach agreements on the contributions of all parties involved, based on a shared conception of the water problem and a recognition of responsibilities and possibilities.

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