

3.03.04

Water as an economic good – points of interest for policy

Gerdien Meijerink
Arjan Ruijs

Projectcode 62804

February 2003

Report

LEI, The Hague

LEI is involved in a broad area of research that can be divided into several domains. This report falls into the domain of:

- Legal and service related tasks
- Business development and competition
- Natural resources and environment
- Spatial economics
- Chains
- Policy
- Institutions, people and perception
- Models and data

Official Dutch Version:

Water als een economic good - aandachtspunten voor beleid

Meijerink, Gardien, Arjan Ruijs

Den Haag, LEI, 2003

Rapport [nummer via studio]; ISBN 90-5242- ; Prijs € [via studio] (inclusief 6% BTW)
[aantal] p., fig., tab.

This report describes what the principle ‘water as an economic good’ means and what consequences it has for policy. Although there are discussions around this topic, the report states that water can be seen as a normal economic good. It uses economic theory to clarify several debated issues. The report concludes that economic theory provides an elegant framework, but that the application to water issues runs into several practical problems. The report offers several recommendations for policy and further research.

To order the official Dutch version:

Telephone: 070-3358330

Telefax: 070-3615624

E-mail: publicatie@lei.wag-ur.nl

Information:

Telephone: 070-3358330

Telefax: 070-3615624

E-mail: informatie@lei.wag-ur.nl

© LEI, 2003

Reproduction or copying information:

- allowed with clear reference
- not allowed



To all our research commissions the general stipulations of the DLO (Algemene Voorwaarden van de Dienst Landbouwkundig Onderzoek (DLO-NL)) are applicable. These have been deposited at the Kamer van Koophandel Midden-Gelderland te Arnhem.

Table of Contents

	Page
Preface	1
Summary	3
1. Background	7
2. Water as a normal economic good	9
3. Water market imperfections	12
4. Private versus public water supply	14
5. The way forward - concluding remarks	16
References	18
Annex 1: List of participants	20
Annex 2: List of Definitions	23

Preface

This policy brief has resulted from a workshop that was held at the Agricultural Economics Research Institute in The Hague on 15 January 2003. There were several reasons that led the organisers to come up with idea to organise a workshop on water as an economic good.

As water becomes an important theme globally, as emerges from the upcoming Third World Water Forum, but also from the conclusions of the World Sustainable Development Conference in Johannesburg in 2002, especially economic aspects have received much attention. Because The Netherlands have much expertise and knowledge on water, Dutch water experts can play an important role in other parts of the world. The organisers wondered what kind of expertise on water economics was available in The Netherlands and this was one of the reasons to organise a workshop. Although the organisers found the Dutch expertise to be considerable, they also found knowledge to be quite fragmented over different institutes—institutes that engage in water research usually have only a few economists, if any working for them. And institutes that focus more broadly on environmental economics issues focus only marginally on water.

They observed that the issue of water of an economic good is much discussed, but that there seems at the same time a persistent confusion about what it means and what it implies. The issue is not just of academic interest, it very much relates to policy as well. What does it imply for policy? What kind of research is needed to support policy? They felt that a workshop with economists could contribute to answering these questions, and possibly clarifying some of the confusion.

The organisers would like to acknowledge a grant from the North-South Programme from the Ministry of Agriculture, Nature management and Fisheries that made possible this workshop.

Prof.dr.ir. L.C. Zachariasse
General Director LEI B.V.

Abstract

Justification

Since the formulation of the Fourth Principle of Dublin in 1992 that water should be considered as an economic good, much discussion and concern has risen about its meaning and implications. The past years much attention has been given to water pricing and the design of economic instruments for cost recovery. Discussion has also arisen in the area of market liberation and allowing the private sector in water management. The discussions seem limited to a financial-economic approach of the Dublin Principle, and this seems to be the cause of resistance against this principle. Many point for instance at the fact that affordable water should be accessible to all. There seems to be confusion over what the principle 'water as an economic good' actually means and what consequences this will have for policy.

Water as an economic good is becoming more important, as was demonstrated during the Second World Water Forum held in 2000 in The Hague and policy statements such as the European Water Framework Directive. The Netherlands have much expertise in the area of water management, but to what extent this applies to water economics was not clear to the writers of this report. This is why first an inventory was made of which institutes and people are engaged in water economics, who were then invited to a workshop during which the concept 'water as an economic good' was discussed. The report contains an address list of these people.

Objective

The objective of this report is to clarify the concept of water as an economic good, from the viewpoint of economic theory. It will be explained what the concept means and what it entails for policy. To make clear the discussion, terms and concepts will be described precisely.

Water as an economic good

Although some maintain that water is not an economic good because of its specific characteristics, economic theory states that water should be considered as a normal economic good. This can be concluded from the fact that water is a (relatively or absolutely) scarce good, and therefore an economic good. Economics studies human behaviour as a relationship between ends and scarce means that have alternative uses. Welfare economics postulates that economic goods should be allocated in such a way that the highest level of welfare is attained. This criterion is called *economic efficiency* and entails an implicit allocation mechanism for water, which touches the heart of the discussion. Usually economic measures are used to evaluate economic efficiency. However, because these monetary measures depend on income levels, the value or utility expressed in monetary units can discriminate against poor income groups, and can ignore the value of future generations. It seems therefore there is a gap between the theoretical foundation of the economic efficiency criterion for water issues and its practical

application. Although economic efficiency is an elegant criterion to found allocation decisions on, many choices cannot be measures in monetary terms.

There are two additional criteria necessary to arrive at a fair allocation and to avoid negative environmental effects. These two criteria are social equitability and environmental sustainability. It must be said that many economists seem to ignore these practical shortfalls and persist in using economic efficiency as the only allocation criteria. This runs the risk that economic efficiency is translated into narrow financial criteria that are measurable. To base an allocation on trade-off analysis of economic efficiency, social equitability and environmental sustainability will not completely solve the problem of practical applicability. In fact, allocation issues are studded with problems of applicability, but it is important to underline that in the discussion about 'water as an economic good', *all three* criteria are taken into account.

With respect to values, it is important to clarify the differences between values, price and cost price because in many debates about water these are often confused. The incorporation of externalities (unintentional effects on third parties) into water prices is another important issues because of the specific characteristics of water, externalities can play an important role. To what extent externalities should be taken into account is open for debate. According to economic theory all externalities should be incorporated, but again the translation to reality runs into various difficulties. Some of these are tackled by determining values through the application of economic valuation methods. Although much progress has been made the past decades in the area of economic (environmental) valuation, it is far from complete. This is why in many cases cost-effectiveness analysis is more appropriate than a full fledged cost-benefit analysis. And decision-support methods such as stakeholder platforms and multi-criteria analyses should be applied to take into account as many values as possible.

Imperfect water markets

To function well, a market has to fulfil several prerequisites. There are still few well-functioning markets and this is caused by various reasons. The report delves more deeply into some important reasons.

Firstly, water can be better described as a complex system than a homogeneous good because of its specific characteristics. This implies that only within certain segments, where water is more or less a homogeneous good, a well functioning market is possible.

Secondly, water use is often associated with various externalities. These are difficult to take into account because of the mentioned problems of valuation. Solutions might include defining clear property or user rights, because externalities often occur when property rights have not been assigned. However, in view of the complex nature of water, this can be problematic.

Thirdly, a well functioning market is characterised by the absence of transaction costs. Transaction costs are those costs that have to be made by potential buyers and sellers to come to an agreement (i.e. transaction). For water these can be rather substantial because for the transport of water, high investment costs in infrastructure are needed.

Private versus public water supply

Although there are several barriers to a well functioning market, many (including especially economists) argue that markets should play a bigger role. There are also many critics who fear

for far-reaching privatisation of water. This report suggests a more differentiated line of attack that takes a more *institutional* approach. Within this, an institution is considered in broad terms as the ‘rules of the game’. The debate about privatisation and water markets should not be in terms of ‘either private or public’ but much more in terms of a continuum of different institutional arrangements, from a pure private to a pure public arrangement. Which arrangement fits best is specific to a certain situation and depends on a host of factors. It should also be said that a well functioning market needs a strong government that established and upholds the rules. Also, an institution, and especially a market-based one, does not necessarily lead to reduced transaction costs, but may even increase them.

The government has an important role to play in institutions whereby four instruments can be distinguished:

- Legislative/administrative instruments. Also called the command-and-control approach, using measures that are imperative and leave no choice.
- Financial (price/fiscal) instruments, referring to all kinds of financial incentives implemented by the government to induce behavioural reactions that are environmental benign.
- Private regulatory instruments. By stimulating private regulation, the government merely creates the conditions for the actions of individuals or groups and promotes direct agreements or negotiations between them. Unlike the legislative/administrative instruments, they give the economic actors the choice of how to make arrangements.
- Social instruments cannot directly influence any change in behaviour, but they can persuade individuals, communities or corporations to behave in a certain manner, e.g. through extension, or information.

Concluding remarks

- Because water in fact is a complex system and water is interrelated, an integrated approach is necessary, also when water is seen as an economic good. However, although this notion is rather obvious to for instance hydrologists who work at catchment level, it is not so obvious to economists, who usually work at administrative level, and economic data at catchment level is difficult to obtain.
- Related to this is the need for a more integrated approach of multifunctional water use and multifunctional use of space. This is important because water as an important spatial dimension. An integrated approach will take into account economic efficiency, social equitability and environmental sustainability, and needs there the combined input of technological, ecological, social and economic scientists.
- More knowledge is needed concerning the way different institutional arrangements fit with different water management options. Much more needs to be known about the conditions of institutions—under which conditions do they function and when don’t they function well. Institutions also need to meet the three criteria: institutions need to be efficient, equitable and need to promote sustainable water use. But institutions also need to safeguard different interests, promote co-operation and accountability.
- More knowledge is especially needed about more market-based institutions before definite steps are made towards privatisation of water markets. Many studies on this subject are still

rather general and more specific studies are needed on focused and well-timed privatisation, the allocation of costs and benefits, to what extent water is a natural monopoly and on the kind and extent of transaction costs that are linked to more market-based institutions.

- Finally, economists are partly to blame for the confusion about the principle of water as an economic good. Economic theory provides an elegant theoretical framework to analyse water issues. Nevertheless, many theoretical economic concepts are difficult to translate to practical instruments to use in real world situations. Often a practical, but rather limited financial-economic approach is chosen that does not do justice to the underlying economic principles.

1. Background

Since the formulation of the fourth Dublin principles in January 1992 that water should be treated as an economic good (ICWE, 1992), much discussion and apprehension has developed about its meaning and implications (see e.g. Perry et al., 1997; Hellegers, 2002; Rogers et al., 2002; Savenije, 2002; Ward et al., 2002; Chakravorty & Swanson, 2002). Many authors especially focus on problems related to water pricing and the design of instruments to arrive at full cost recovery of water allocation (e.g. Perry et al., 1997; Johansson et al., 2002). Opinions about pricing differ from prices serving principally for the purpose of financial-cost recovery (Savenije and van der Zaag, 2002) to prices having to match operational, opportunity and externality costs (Rogers et al., 2002). Authors also differ in the instruments to be used to arrive at an efficient allocation of water and the desired amount of market involvement. Ward et al. (2002) points at the signalling function of prices in properly functioning markets, whereas Savenije (2002) argues that water has such special characteristics that it can not be treated as a normal economic good, which can be traded on a market.¹ Most authors observe that necessary and sufficient conditions for market tools are not yet in place (e.g. Perry et al., 1997). However, hardly any author satisfactorily explains the reasons behind this failure or how conditions can be put in place. Furthermore, the discussion on market involvement focuses primarily on water being supplied by either the public sector or the private sector. More combined public/private approaches are not discussed and more importantly, an integrated approach to *all* water uses is also lacking. Irrigation and drinking water receive most attention, while other uses are neglected. To answer allocation questions, all water uses need to be considered.

We feel that much of the discussion seems to be fuelled by a misapprehension of economic concepts. One of the reasons may lie in the fact that water issues have long been the domain of non-economists, who seem to find it difficult to come to grips with economic thinking, while economists do not understand their confusion. Another reason may be that the discussion on water as an economic good seems to be focusing primarily on cost recovery of water supply, which rather oversimplifies the issues involved. The need for cost recovery was explicitly stated in the Dublin Principle, and has been reiterated during the Second World Water Forum in 2000, at the two sessions on Water and Economics (Bhatia, 2001): “Water has an economic value in all forms of competing use and should be recognised as an economic good. (...) It is important to estimate the value of water and full costs of supply (including economic and environmental externalities). However, these should form the basis of pricing decisions and setting of pricing should reflect social concerns and sustainability issues.” Also the European Union has

¹ Many other authors focus on characteristics of water that should explain why water can not be treated as an economic good. Savenije (2002) argues that water is different from other goods because it has a number of characteristics that individually are not restrictive but in combination make water a special good: water is essential, scarce, fugitive, bulky, non-substitutable, has high mobilization costs and is non-homogenous. However, we feel that this limits the debate.

underlined the need for cost recovery in its Water Framework Directive or WFD (European Commission, 2000).

The debate about “water as an economic good” threatens to focus too much on cost recovery. It is not surprising that this rather narrow financial-economic approach to water management is meeting a growing resistance. Many fear that treating water in this narrow sense will put at risk the principle that access to water is a basic human right too. The NGO and Trade Union Major Group did not accept the report of the World Water Commission during the World Water Forum in 2000 for these reasons (see Morley, 2000). In some places where the government has tried to introduce water costs, users who were used to free access, refused to pay (Visscher et al., 1999). Also within the EU there was resistance against the principle of full cost recovery within its WFD. Whereas some countries have a long tradition of charging for water others do not. Ireland, for example, supplies domestic water free and recovers the cost through taxation. In order to accommodate these variations, provision was made for deviations in the WFD from full cost recovery. For example it was accepted that it was permissible to provide a subsidised drinking water supply and wastewater services for low-income households (Kaïka & Page, 2000).

In order to lessen the above mentioned misunderstandings, this paper will give an economists’ view on the meaning of treating water as an economic good. A clear explanation of the economic way of reasoning and a clear definition of economic terms may help clarify much of the confusion and will hopefully take away part of the resistance against it. In this paper we will reason that water is a normal economic good. We will go beyond narrow financial-economic notions and discuss the issues that arise when water is treated like a normal economic good and its implications for policy. We adopt an integrated approach to water use and do not concentrate on one type of water use. Furthermore, we specifically look at the gap between economic theory and its practical application for water. We show under which circumstances market involvement is tenuous and point out the importance of a continuing public involvement in water allocation decisions. Finally, we set an agenda for future research that is perceived to be necessary for a more efficient, equitable, and sustainable use of water.

2. Water as a normal economic good

For economists, the Dublin Principle brings nothing new. In economics, water is considered to be a normal economic good. This follows directly from the economic definition that water is a “scarce good” and therefore an “economic good”. In common economic understanding, a good is said to be scarce if it carries opportunity costs. In order to obtain one additional unit of the good, one needs to give up something else - some amount of another good, or an opportunity to do or not do something, or pay a monetary price. This means that “scarcity” is defined in relative terms. Where scarcity concerns a non-substitutable means for the satisfaction of an elementary need and cannot be levied by additional production, one may speak of absolute scarcity (Baumgartner, 2002). In most cases, water is a scarce good in relative terms and in some cases, it is a scarce good in absolute terms, for instance in a situation of severe drought. This induced Perry et al. (1997) to state that in these cases water ceases to be an economic good.

Robbins (1932) has stated that economics studies human behaviour as a relationship between ends and scarce means that have alternative uses. Translating this to water, it means that economics considers the relationship between various purposes (demand) for water and the scarce availability of water, which has different alternative uses. Welfare economics postulates that economic goods should be allocated in such a way that the highest level of welfare is reached. Welfare reflects the social desirability of alternative arrangements of economic activities and allocations of resources. The significance of the welfare concept is that it provides a criterion for choosing between different states. An important choice criterion is *economic efficiency*². An allocation is economically efficient if resources are allocated to the use with the highest value or utility. This entails an implicit allocation mechanism that suggests that this value or utility is known and can be measured. Usually monetary measures are used to evaluate this (e.g. through the consumers’ surplus). However, because these monetary measurements usually depend on income levels, values or utility expressed as monetary values may discriminate against poor groups in society, and do not take into account the values of future generations³.

There is apparently a gap between the theoretical basis of the economic efficiency criterion for water issues and its practical application. Although economic efficiency is an elegant criterion on which to base allocation decisions, many choice elements can not be measured in monetary

² Three categories can be distinguished: *productive efficiency*, in which the output of the economy is being produced at the lowest cost. The second is *allocative efficiency*, in which resources are being allocated to the production of the goods and services the society most values. The third is *distributional efficiency*, in which output is distributed in such a way that consumers would not wish, given their disposable income and market prices, to spend these incomes in any different way (Bannock et al., 1998).

³ Economic theory has provided several solutions to the problem of income dependence, such as the Neo-Paretian criterion or Hicks and Kaldor compensation criterion that states that an activity is desirable if the gainers could hypothetically compensate the losers. Also, the theory on (environmental) valuation methodology has developed rapidly in recent years, but faces similar difficulties with the income factor in valuation studies.

terms. For that reason they are often not considered in allocation decisions. Therefore, to make well-founded allocation decisions, two other criteria, that are in principle part of economic efficiency, have to be considered explicitly as well: social equitability and ecological sustainability (see also Pearce and Turner, 1990). Social equitability suggests that the use of resources by one group should not foreclose options for other groups, either now or in the future. Ecological sustainability can be defined as ensuring that resource use does not irreversibly degrade natural resources within a given ecosystem. It must be said that many economists seem to ignore these practical shortfalls and persist in using economic efficiency as the only allocation criteria. This runs the risk that economic efficiency is translated into narrow financial criteria that are measurable.

Basing allocation on a trade off analysis of economic efficiency, social equitability and ecological sustainability does not completely solve the problems of practical applicability. In fact, allocation issues are riddled with practical problems, but it is important to stress that in the discussion on ‘treating water as an economic good’ it is important to make clear that it implies taking account of *all three* criteria.

The question of allocation leads to questions of values: what is the value of water in its different uses, and whose values are taken into account? About the concept of value, we must be absolutely clear again, because it is often confused with related concepts such as cost and price, especially in the debate on water allocation, where much attention is given to full cost pricing of water supply. Two concepts of value can be distinguished: a demand-related value (determined by the utility it gives a consumer: high utility, high value) and the supply-related value (determined by the cost of producing the commodity: high cost, high value). In economic theory, price is the point where these two values meet. If goods are traded on a perfectly competitive market⁴, prices are such that marginal costs of supplying one extra unit equal the marginal benefits for the consumers, or for society⁵. Prices serve as a means of rationing limited supplies among consumers, and signal to producers where money is to be made and thus what they ought to be producing (Bannock et al., 1998). These rationing and signalling functions of prices make it important that prices reflect the full costs that use of the good entails. It is necessary to realise that in the case of water, this does not only include operating and maintenance costs and capital charges. Ideally, opportunity costs and economic and environmental externalities should also be included (Hellegers, 2002). Externalities arise when the use of a good affects another person's well-being and the relevant costs and benefits are not internalised in market prices. For example, for water, negative externalities are negative effects such as river pollution. Positive externalities can also arise, although they are less common.

In applying these theoretical concepts, we again run into practical problems, and this was brought out extensively during the workshop. We will highlight a few. Although economics has

⁴ See below for some characteristics of a perfectly competitive market.

⁵ Bannock et al (1998) emphasize this by explaining the paradox of value. Certain items that are very valuable to mankind (such as water) are very cheap to buy; while other less useful items (such as diamonds) are expensive. Water or oxygen may be very important, but if there is a lot of it, it does not have to be highly priced. This is to repeat the conclusion that prices are set by the marginal value of an item - the value of consuming yet more of it - not by the value of consuming it at all. If we had to give up all consumption of either diamonds or water, we would clearly choose to give up diamonds.

made much headway in developing valuation methodology to be able to at least list, if not also express in monetary terms different values, it is far from perfect, and probably never will be. Especially demand-related values (i.e. utility) turn out to be elusive and difficult to capture in a cost-benefit analysis. Supply-related values (i.e. the cost of producing a good) are usually simpler to measure. Therefore, participants in the workshop suggested the use of cost-effectiveness analyses in combination with other decision-support tools where allocation issues are concerned, especially in cases where water has important environmental functions. Examples of decision-support tools are stakeholder platforms and multi-criteria analyses.

Furthermore, although correctly pricing water may solve to a certain extent allocation issues within a sector, allocation between sectors has to be based on more criteria. For instance, allocation of water resources between households for drinking water, recreation, industry or agriculture may be socially and economically inefficient if allocation were based on a comparison of prices only. Problems arise when (financial) economic analyses demonstrate a higher pay-off of water for instance in industry than in agriculture, when at the same time it is recognised that agriculture plays a vital role in providing food, employment and rural livelihoods. It was therefore suggested that allocation issues between sectors is a public decision i.e. in the hands of government.

Thirdly, many economists have argued (and some still do) that allocation of scarce resources will take place efficiently if left to market forces of supply and demand. This is essentially the idea of the “invisible hand” promoted by Adam Smith, by which the price system allocates resources through rationing limited supplies among consumers, and signalling to producers what they ought to be producing. Some of the requirements, necessary to guarantee that a free market will result in an efficient allocation, are the following (see e.g. Perman et al., 1999).

- ◇ Markets exist for all goods and services exchanged;
- ◇ All markets are perfectly competitive, implying that all firms are price takers, homogeneous product, free entry and exit, free mobility of resources, and perfect information;
- ◇ No externalities exist;
- ◇ Property rights are fully assigned;
- ◇ All goods and services are private goods; there are no public goods;
- ◇ Transaction costs are zero.

Again, economic theory runs into practical problems, it is easy to imagine that in reality, these circumstances exist rarely at the same time and the same place.

3. Water market imperfections

Due to problems with the above mentioned perfect market conditions, in many cases water allocations can at present not be left to the market. Before considering more private sector involvement, it must be known whether these conditions are typical for water or whether they can be transformed in such a way that market influences may lead to increased efficiency. Below, some of the conditions are discussed in more detail.

First, and most important, water is not a *homogeneous good*. Ward et al. (2002) distinguish four dimensions of water: quantity, quality, location and timing of supply. These apply to the different types of natural fresh water i.e. surface water (e.g. rainwater, river water, irrigation water) or groundwater⁶, and different types of “processed water”, i.e. waste water such as sewage, drain water, industrial water and purified water (through water treatment installations). Each type has different levels of quantity and quality and is available at a different location and time and the requirements will diverge for the purposes of different sectors (domestic use, agriculture, industry, nature/recreation). This has implications for the costs of water supply and marginal productivity per sector.

Water used within a sector probably better fulfils the definition of a homogeneous good than ‘water’ in general. This begs the question whether it is possible and desirable to define intra-sector water-markets with different prices per sector.⁷ This leads to the issue of how to decide on the allocation of the total amount of available water over the different sectors. The water system is a ‘complex system where several processes (infiltration, surface runoff, recharge, seepage, re-infiltration, and moisture recycling) are interconnected and interdependent with only one direction of flow: downstream’ (Savenije, 2002). The largest part of water subtracted from the water system returns into the same system, but at a different place, in a different quantity, from a different quality, and at a different moment. As a result, a market change in one intra-sector water market affects the water markets in the other sectors as well.

Secondly, as we mentioned above, water extraction may entail *externalities* that will not be taken into account by the market. Most are negative externalities, entailing welfare losses for those who are affected. Next to the difficulty of valuing externalities, water prices hardly ever account for externalities for two other reasons. First, imposing taxes to internalise externalities may initially engender resistance by water users. Secondly, those who suffer from the externalities often do not have the possibility to defend themselves. This refers to the difficulty to properly assign *property rights* to water (use). When it is clearly defined who owns or may use the water, and when these rights can easily be defended, no one is forced to accept negative externalities beyond the standard acceptable to the community. When the right is invaded, the courts are able

⁶ For the purpose of this paper, salt seawater is not considered.

⁷ This partly corresponds with the current situation in which the price for drinking water differs from the charges for groundwater pumped by farmers.

to defend that right. When these water rights are transferable, each owner has an incentive to good stewardship: preservation of the owner's wealth (the value of his or her property) depends on good stewardship. Environmental problems (such as the “tragedy of the commons”) stem from the absence or incompleteness of these characteristics of property rights (Stroup, 2002).

Furthermore, *transaction costs* may be high in the water sector. These refer to the costs potential buyers and sellers have to make to conclude deals. These costs result from activities like searching for trading partners and information on e.g. prices, negotiating deals, legally effecting deals (enforcement and monitoring), delivering the product from seller to buyer (implementation), etc (see also Carey et al., 2002). When there are no institutions (such as a market) taking care of these activities, they have to be taken on by potential buyers and sellers. However, even when markets exist, transaction costs may be still high, as we will explain later. For drinking water this may especially be an issue as transport of water involves large investments in infrastructure that can hardly be borne by private water companies. But also legally effecting deals, which are linked to the assignment of property rights may be very complex and costly (e.g. in the case of groundwater see Howe, 2002).

4. Private versus public water supply

If theory shows that liberalising the water market is difficult at present, why then have so many economists been promoting more room for market forces and the private sector, and less “command and control” or less government involvement? The discussion about more market mechanisms and more private sector involvement in water issues is an important but contentious issue. The debates about this issue are often polarised into “either or” discussions between pro-market advocates and anti-market critics. The call for more market forces and greater private sector involvement may stem from the 1990s when many public bodies such as the national railways, or the national electricity companies were privatised. In many cases, however, this has not led to the greater efficiency that was hoped for, and a reassessment of the role of the government can be detected.

The participants in the workshop took a more balanced approach to this discussion. They championed an “and and” approach and they pointed out the costs associated with more market based organisation forms. The key is taking an institutional perspective. We shall first define the concept by using Nobel laureate Douglass North’s well-known definition: “Institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction. ... In the jargon of the economist, institutions define and limit the set of choices of individuals.” (North,1990:3-4). He distinguishes two types: formal ones (constitutional, property-rights rules, and contracts) and informal ones (norms and customs). Hoff et al (1993, p. 1) define economic institutions as “a public system of rules that define the kinds of exchange that can occur among individuals and that structure their incentives in exchange. (...) Economic institutions include markets and property rights, systems of land (...) tenure, and other systems of exchange that are determined by implicit contracts [formal] or social norms [informal]”. So a water market is an institution, a system in which farmers are assigned property rights to ground water is also an institution, forms of community water management whereby the community has developed rules about who gets how much irrigation water when and for how long is another form of an institution. They all consist of rules that define the exchange of water.

The discussion on privatisation and markets should not be on either private or public. Instead, a continuum of institutional arrangements can be distinguished; from a purely public arrangement of water management to a purely market-based arrangement. Which one is the most suitable is very situation specific and depends on a range of factors. However, it is important to note that a free market arrangement is not a kind of “wild west”. On the contrary, to function well, markets need to have several institutional arrangements in place as we have identified above. In the workshop it was underlined that a free market cannot exist without a strong government that can enforce the “rules of the game”. This implies that in a situation with a weak government, which

may exist in some developing countries, the introduction of more market-based institutions may not be sensible.

Another conclusion that was drawn by the participants is that more market-based options can lead to an increase in transaction costs for governments, water companies, and consumers. For instance, in the case of liberalising the drinking water sector, the government has to adapt legislation, clearly define water property rights, set up instruments to deal with externalities, safeguard social equitability and ecological sustainability of water allocation, monitor water companies, etc.. Water companies have to make huge investments in information costs (e.g. advertisements, reporting shareholders, customer services, etc.) and maintenance costs. Also consumers have to invest in collecting and comparing information about different prices, quality of water, services supplied, etc.. For many consumers this may be difficult. As one participant put it” when I open the tap, I just want water”. These increased transaction costs can easily outweigh the efficiency gains from privatisation. An important question that needs to be answered is whether efficiency gains are greater than transactions costs! However, there is not enough information at the moment to answer this question satisfactorily.

Public policy has several roles to play in the water management issues. In line with what has been concluded in the previous sections, the role of government in establishing institutions that promote efficient, equitable and sustainable water management is crucial. Governments have various policy instruments to set “the rules of the game”, or to shape institutions, depending on the goal and the specific circumstances (see NAR, 1992):

- ◇ Legislative/administrative instruments. Also called the command-and-control approach, using measures that are imperative and leave no choice.
- ◇ Financial (price/fiscal) instruments, referring to all kinds of financial incentives implemented by the government to induce behavioural reactions that are environmental benign.
- ◇ Private regulatory instruments. By stimulating private regulation, the government merely creates the conditions for the actions of individuals or groups and promotes direct agreements or negotiations between them. Unlike the legislative/administrative instruments, they give the economic actors the choice of how to make arrangements.
- ◇ Social instruments cannot directly influence any change in behaviour, but they can persuade individuals, communities or corporations to behave in a certain manner, e.g. through extension, or information.

5. The way forward - concluding remarks

If we treat water as a normal economic good, with all the implications sketched above, then how do we proceed from here? What do we need to know, and what do we need to do? We propose three topics that require attention from policy-makers and researchers and suggest directions.

First, the water system is a “complex system where several processes are interconnected and interdependent” (Savenije, 2002). The largest part of water subtracted from the water system returns into the same system, but at a different place, in a different quantity, from a different quality, and at a different moment. In the Water Framework Directive, the importance of integrated water management is stressed. However, although this notion may be self-evident to for instance hydrologists, who work at watershed level, it is certainly not for economists who usually work at an administrative level. The effect of these interrelations on water markets on water allocation decisions are unknown. Analyses are hampered by the fact that economic data is difficult to obtain at a watershed level. Related to this issue is the need for more integrated approaches at the level of multi-functional water use and multi-functional use of space. This is important as water has an important spatial dimension. For instance in , there is not so much a lack of water but a lack of space. An integrated approach takes into account economic efficiency, social equitability and environmental sustainability and therefore requires technological, environmental, social and economic sciences to link up. Especially in studies that examine different trade-offs linked with allocation options all three criteria should be taken into account. This may require conformity of social-cultural and ecological values.

A second major issue we need to know more about are which institutional arrangements fit different water management options. We need to stop thinking in simple terms of “either public or private”. Much more needs to be known about the conditions of institutions—when do they work and when don’t they. Institutions should reflect the three criteria: they should be efficient, equitable and promote sustainable water management. Institutions should also safeguard interests, promote co-operation and accountability. In particular, we need to know more about market-based institutional arrangements before we start privatising water markets. Many studies about this topic are quite general in nature and more focused studies are needed on targeted and well-timed privatisation, the distribution of costs and benefits, to what extent water is a natural monopoly, on the type and extent of transaction costs linked to more market based institutional arrangements. For such studies, however, data is often lacking.

Thirdly, to conclude, economists themselves are partly to blame for the confusion over the principle of water as an economic good. Economic theory provides an elegant conceptual framework to analyse water issues. However, as we have seen, many of the economic theoretical concepts are not easily translated into practical tools that can be used in real-world situations. For instance, how do we use economic efficiency as an allocation mechanism, and how do we

accurately measure marginal value? Still, many economists routinely refer to these theoretical concepts whilst using more practical, but restricted financial-economic tools that do not do justice to the wider implications of economic theory. Values are translated into prices based on the supply cost of water, whilst social and environmental externalities are ignored. They refer to the theoretical efficiency of markets and advocate privatisation, instead of considering which institutional arrangement is most suited to the specific circumstances. We hope that this paper has outlined how water fits into economic theory, but at the same time explains where solutions have to be found when theory cannot be easily translated into real-world applications.

References

- Adams, G., G. Rausser, and L. Simon (1996), Modelling Multilateral Negotiations: An Application to California Water Policy. *Journal of Economic Behavior and Organisation*, 30, p. 97-111.
- Bannock, G., R. E. Baxter, E. Davis (eds) (1998), *The Penguin Dictionary of Economics*. Penguin UK.
- Baumgärtner, S. (2002), Thermodynamics and the economics of absolute scarcity: Why and how thermodynamics is relevant for ecological, environmental and resource economics. Contribution to the panel session on Ecological Economics: Ecology, Entropy, Epistemology and Ethics at the 2nd World Congress of Environmental and Resource Economists, June 24-27, 2002, Monterey, CA, USA.
- Bhatia (2001) Water and economics. Conference report. *Water policy* 3. Pp. S185-S187.
- Bond, P. (2001), Valuing Water Beyond 'Just Price it'; Costs and Benefits for Water for Basic Human and Environmental Needs, Paper presented to the Council of Canadians Conference "Water for People and Nature". University of British Columbia, Vancouver, 7 July 2001.
- Briscoe, J. (1997), Managing water as an economic good: rules for reformers. Keynote paper to the Int'l Committee on Irrigation and Drainage Conference on Water as an Economic Good. Oxford.
- Carey, J., D. Sunding, D. Zilberman (2002), Transaction costs and trading behavior in an immature water market. *Environment and Development Economics* 7: 733-750.
- Chakravorty, U. and T. Swanson (2002), The economics of water: environment and development. Introduction to the special issue. *Environment and Development Economics*, 7, p. 733-750.
- Dijkgraaf, E. R. de Jong, E. van de Mortel, A. Nentjes, M. Varkevisser, and D. Wiersma (1997), Mogelijkheid tot marktwerking in the Nederlandse Watersector. *Onderzoeksreeks Directie marktwerking*. Ministerie van Economische Zaken.
- Dinar, A. and A. Wolf (1997), Economic and Political Considerations in Regional Cooperation Models. *Agricultural and Resource Economics Review*, 26, p. 7-22.
- European Commission (2000), Directive 2000/60/EC of the European Parliament and of the Council of 23rd October 2000 establishing a framework for Community action in the field of water policy, Official Journal 22nd December 2000 L 327/1, European Commission, Brussels
- Hellegers, P. (2002), Treating water in Irrigated Agriculture as an Economic Good. Paper presented at the conference on Irrigation water policies, Agadir, Morocco, 15-17 June, 2002.
- Howe, C. (2002), Policy issues and institutional impediments in the management of groundwater: lessons from case-studies. *Environment and Development Economics*, 7, p. 733-750.

- Kaïka, M and B. Page (2002), The making of the EU Water Framework Directive: shifting choreographies of governance and the effectiveness of environmental lobbying. School of Geography and the Environment, Oxford University, Mansfield Road, Oxford OX1 3TB, UK.
- Kilgour, D.M. and A. Dinar (2001), Flexible Water Sharing within an International River Basin. *Environmental and Resource Economics*, 18, p. 43-60.
- Morley, D. (2000), Perspectives on Freshwater – Issues and recommendations of NGO's. Presented at the Second World Water Forum. Den Haag.
- Nar (1992), Advies milieu: een mondiale zorg. Naar een politiek van duurzame ontwikkeling. NAR advies 101. Ministerie van Buitenlandse Zaken, Den Haag.
- North, D. C. (1990), *Institutions, Institutional Change and Economic Performance*, Cambridge: Cambridge University Press.
- Pearce, D.W. and Turner, R.K. (1990), *Economics of Natural Resources and the Environment*. Harvester Wheatsheaf,
- OECD (2002), *Transition to Full-Cost Pricing of Irrigation Water for Agriculture in OECD Countries*, OECD, Paris.
- Perman, R., Y. Ma, J. McGilvray and M. Common (1999), *Natural Resource & Environmental Economics*, 2nd Edition, Pearson Education Ltd., Essex, England.
- Perry, C., M. Rock, and D. Seckler (1997), *Water as an economic good: a solution or a problem?* IWMI Research Report 14. IWMI, Colombo.
- Robbins, L. (1932), *An Essay on the Nature and Significance of Economic Science*. Macmillan, London.
- Rogers, P. R. de Silva, and R. Bhatia (2002), Water is an economic good: how to use prices to promote equity, efficiency and sustainability. *Water Policy*, 4, p. 1-17
- Savenije, H. G. (2002), Why water is not an ordinary economic good, or why the girl is special, *Physics and Chemistry of the Earth, Parts A/B/C, Volume 27, Issues 11-22*, p 741-744
- Stroup, R. (2002), *Environmentalism, Free-Market*. Concise Encyclopaedia of Economics. At: The library of Economics and liberty. <http://www.econlib.org/index.html>
- Vermillion, D.L. (2002), Property rights and collective action in the devolution of irrigation system management. In: *Collective Action, Property Rights and Devolution of Natural Resource Management: Exchange of Knowledge and Implications for Policy Proceedings of the International Conference Edited by Ruth Meinzen-Dick, Anna Knox, Monica Di Gregorio Puerto Azul, the Philippines. 21-25 June, 1999* Published by Deutsche Stiftung für Internationale Entwicklung/ Zentralstelle für Ernährung und Landwirtschaft (DSE/ZEL), Feldafing, Germany.
- Visscher, J.T, P. Bury, T. Gould, P. Moriarty (1999), *Integrated water resource management in water and sanitation projects. Lessons from projects in Africa, Asia and South America*. IRC International Water and Sanitation Centre. Delft, .
- Ward, F., A. Michelsen (2002), The economic value of water in agriculture: concepts and policy applications. *Water policy*, 4, p. 423-446

Annex 1: List of participants

Bommel Karel Van k.h.m.vanbommel@lei.wag-ur.nl

LEI

Burgemeester Patijnlaan 19

2585 BE Den Haag

Postbus 29703

2502 LS Den Haag

+31 70 33 58153

Boot Sander

boot@fsw.eur.nl

Erasmus Universiteit Rotterdam

Postbus 1738

3000 DR Rotterdam

Dalhuisen Jasper

J.M.Dalhuisen@N.agro.nl

Ministerie Van LNV, Directie Natuurbeheer

Bezuidenhoutseweg 73

Postbus 20401

Kmr. 3516

2500 EK Den Haag

+31 70-3785640

Dijk Meine Pieter Van

m.vandijk@ihs.nl

IHE

P.O. Box 3015

2601 DA Delft

Gaaff Aris

a.gaaff@lei.wag-ur.nl

LEI

Burgemeester Patijnlaan 19

2585 Be Den Haag

Postbus 29703

2502 LS Den Haag

+ 31 70 33 58330

Hellegers Petra

p.j.g.j.hellegers@lei.wag-ur.nl

LEI

Burgemeester Patijnlaan 19

2585 BE Den Haag

Postbus 29703

2502 LS Den Haag

+ 31 70 33 58330

Hirsch Danielle

fusion21@cistron.nl

Fusion21

Weteringschans 108
1017 XS Amsterdam

Huntjens Patrick
Water Support Unit
DGIS
Ministerie Van Buitenlandse Zaken
Postbus 20061
2594 AC Den Haag
+31 70 3484689

patrick.huntjens@minbuza.nl

Klop Piet
Ecorys-Nei
Postbus 4175
3006 AD Rotterdam
+31 10 453 8800

piet.klop@ecorys.com

Leeuwen Eveline Van
Department Of Spatial Economics,
Vrije Universiteit Amsterdam
De Boelelaan 1105
1081 HV Amsterdam
+31 20 4446029

Eleeuwen@feweb.vu.nl

Lise Wietze
Institute For Environmental Studies
Faculty Of Earth And Life Sciences
Vrije Universiteit, De Boelelaan 1087,
1081 HV Amsterdam
+31 20 4449503

wietze.lise@ivm.vu.nl

Meijerink, Gerdien
LEI
Burgemeester Patijnlaan 19
2585 BE Den Haag
Postbus 29703
2502 LS Den Haag
+ 31 70 3358243

g.w.meijerink@lei.wag-ur.nl

Oltmer Kartin
LEI
Burgemeester Patijnlaan 19
2585 BE Den Haag
Postbus 29703
2502 Ls Den Haag
+ 31 70 33 58330

k.oltmer@lei.wag-ur.nl

Rijnhard Stijn
LEI
Burgemeester Patijnlaan 19
2585 BE Den Haag
Postbus 29703
2502 LS Den Haag
+ 31 70 33 58210

a.j.reinhard@lei.wag-ur.nl

Ruijs Arjan
Vakgroep Milieu Economie Wur
Bode 129
Postbus 8130
6700 EW Wageningen
+ 31 317 4 83318

Arjan.Ruijs@wur.nl

Savenije Huub
IHE
P.O. Box 3015
2601 DA Delft

hsa@ihe.nl

Schrevel Aart
ILRI-Alterra
Building 425
Lawickse Allee 11
6701 AN Wageningen
+ 31 317 4 95549

A.Schrevel@Alterra.wag-ur.nl

Veeran Rob Van Der
RIZA
Postbus 17
8200 AA Lelystad

R.vdVeeran@riza.rws.minvenw.nl

Wijk Christine Van
IRC International Water And Sanitation
Centre
P.O. Box 2869
2601 CW Delft
+ 31-73-599 4234/+ 31-15-219
2939(General)/47(Direct)

wijk@irc.nl

Annex 2: List of Definitions

4 th Dublin Principe	“Water has an economic value in all its competing uses and should be recognized as an economic good”
Ecological sustainability	Ecological sustainability can be defined as ensuring that resource use does not irreversibly degrade natural resources within a given ecosystem.
Economic efficiency	An important choice criterion is economic efficiency. An allocation is economically efficient if resources are allocated to the use with the highest value or utility. Three categories can be distinguished: <ol style="list-style-type: none"> 1. <i>productive efficiency</i>, in which the output of the economy is being produced at the lowest cost. 2. <i>allocative efficiency</i>, in which resources are being allocated to the production of the goods and services the society most values. 3. <i>distributional efficiency</i>, in which output is distributed in such a way that consumers would not wish, given their disposable income and market prices, to spend these incomes in any different way (Bannock et al., 1998).
Economic good	See scarce good.
Economics	Economics studies human behaviour as a relationship between ends and scarce means that have alternative uses.
Externalities	Externalities emerge when the use of a good affects the welfare of someone else and related costs and benefits are not internalised in market prices. Externalities can be positive or negative.
Institutions	“Institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction. ... In the jargon of the economist, institutions define and limit the set of choices of individuals.” (North, 1990:3-4). He distinguishes two types: <ol style="list-style-type: none"> 1. formal ones (constitutional, property-rights rules, and contracts) and 2. informal ones (norms and customs).
Opportunity costs	In order to obtain one additional unit of the good, one needs to give up something else - some amount of another good, or an opportunity to do or not do something, or pay a monetary price (Bannock et al., 1998).
Perfect market	The three characteristics that apply to a perfect market are: <ol style="list-style-type: none"> 1. The price is equal to the marginal costs (or returns equal marginal costs) 2. There are no excessive profits (average costs are equal to average returns) 3. Production is at the lowest cost (Bannock et al., 1998). Perman et al (1999) have described the conditions under which a perfect market can function.
Price	The price is where demand and supply meet. If goods are traded on a perfect market, prices will be at a level that the marginal cost of supplying one additional unit will be equal to the marginal benefits for consumer, or society. Prices function as a means to allocate scarce resources among consumers and signal to producers with which money is to be made and thus what they should produce (Bannock et al., 1998).
Scarce good (absolute)	Where scarcity concerns a non-substitutable means for the satisfaction of an elementary need and cannot be levied by additional production, one may speak of absolute scarcity (Baumgartner, 2002).
Scarce good (relative)	In common economic understanding, a good is said to be scarce if it carries opportunity costs. In order to obtain one additional unit of the good, one

Social equitability	<p>needs to give up something else - some amount of another good, or an opportunity to do or not do something, or pay a monetary price. This means that “scarcity” is defined in relative terms.</p> <p>Social equitability suggests that the use of resources by one group should not foreclose options for other groups, either now or in the future.</p>
Value	<p>Two concepts of value can be distinguished:</p> <ol style="list-style-type: none"> <li data-bbox="560 378 1406 430">1. a demand-related value (determined by the utility it gives a consumer: high utility, high value) <li data-bbox="560 436 1406 493">2. supply-related value (determined by the cost of producing the commodity: high cost, high value).
Welfare economics	<p>Welfare economics postulates that economic goods should be allocated in such a way that the highest level of welfare is reached. Welfare reflects the social desirability of alternative arrangements of economic activities and allocations of resources. The significance of the welfare concept is that it provides a criterion for choosing between different states.</p>