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Why water is not an ordinary economic good

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Abstract

Water is not a normal economic good. It has a large number of characteristics that distinguish it from other goods. Individually, these characteristics may not be unique, but their combination makes water a special economic good. Economists maintain that water professionals fail to see the larger picture because they are inhibited by their detailed knowledge of the subject. Much like the father who refuses to see that his daughter is just a girl. The metaphor about the girl refers to the fact that people always consider something which is close to their heart as special. One could also blame water professionals for not seeing that water is just a normal economic good. The paper argues that there are good arguments to consider water is a special economic good. As a result, the application of regular economic theories to water resources management is not very efficient.

1. Introduction

Water is an economic good. Since the Dublin Conference on Water and the Environment in 1992, this notion has been widely accepted among water resources managers. Besides being directly consumed by humans, water is an important production factor, in the broadest sense, and it is scarce. Hence it is an economic good. The difference of opinion does not lie in this fact, but in the interpretation. Some people, mostly water professionals, claim that water is special, others, mostly economists, claim that water is not different form any other economic good: "There is a demand for it, there are operators that make it available (supply), it has a value. The price should reflect the value in order to achieve efficient use of the resource. A water market is an effective instrument to reach efficiency of allocation". Water professionals maintain that it is not that simple (e.g. Perry *et al*., 1997; McNeill, 1998). Economists maintain that water professionals fail to see the larger picture because they are inhibited by their detailed knowledge of the subject. Much like the father who refuses to see that his daughter is just a girl.

One can distinguish two schools of thought (Van der Zaag and Savenije, 2000, p.51). The first school maintains that water should be priced at its economic value. The market will then ensure that the water is allocated to its best uses. By and large, this point of view is advocated by the World Bank (e.g. Briscoe, 1966). The second school interprets 'water as an economic good' to mean the process of integrated decision making on the allocation of scarce resources, which does not necessarily involve financial transactions at all (McNeill, 1998). In fact, the concept of water as an economic good implies that decisions on the allocation and use of water should be based on a multi-sectoral, multi-interest and multi-objective analysis in a broad societal context, involving social, economic, environmental and ethic considerations.

This approach corresponds with the view of Green (2000) who posits that economics is about “the application of reason to choice”. In other words: making the right choices about the allocation and use of water resources, on the basis of an integrated analysis of all the advantages and disadvantages (costs and benefits in a broad sense) of alternative options.

In this paper an effort is made to present an overview of the arguments why water is not just another economic good, or why the girl is special. The paper is meant to open a dialogue. It is not meant to be provocative or overconfident, rather it is meant to explore ways of bringing water professionals and economists together and to find a way through the misunderstandings that appear to exist. As a water resources manager discussing economics, I may use different terminology than is usual in economics, or use somewhat different definitions. I hope the reader can see through these discrepancies and does not hesitate to correct me where I'm wrong.

2. Why the girl is special

Water has a combination of characteristics that make it different from any other good. Individually, these characteristics may not be restrictive, but in combination they show that water has to be dealt with in a very special way. The following characteristics are relevant in this context, several of which have been mentioned as well by Grimble (1999):

- **Water is essential**

There is no life without water, no economic production, no environment. There is no human activity that does not depend on water. It is a vital resource. This maybe makes water special, but not unique. The same can be said about air, land, fuel and food (see Table 1).

Table 1. Aspects of water and how they apply to other goods

	water	air	land	fuel	food	observations
essential, vital	+	+	+	+	+	
scarce, finite	+	0	+	+	+	finite, high demand
fugitive,	+	0	0	0	0	fluxes versus stock
indivisible	+	0	0	0	0	it is a system
bulky	+	+	+	0	0	virtual water trade
non-substitutable	+	+	+	0	0	
public good	+	+	0	0	0	
location bound	+	0	+	0	0	
high mobilisation costs	+	0	0	0	0	
non-homogeneous market	+	+	+	0	0	
prone to market failure	+	+	0	0	0	
merit value	+	+	+	0	0	health, beauty, culture

- **Water is scarce**

The amount of water available is limited by the amount of water that circulates through the atmosphere on an annual basis. All the water stems from the rainfall. The amount of rainfall that falls on the continents is finite. But not all that water can be used. It is unequally spread in space and time and large parts of the world experience shortages during certain periods of time.

- **Water is fugitive**

Until now, water is not yet special compared to other goods. A good that is scarce and essential is the perfect example of an economic good. However, water is fugitive. The water flows under gravity. If we don't capture it, it's gone. The availability of the water varies over time, and so does the demand for water. It flows through our fingers unless we store it. Water is different from air and land, because these goods don't need to be stored: they are stocks, whereas water is essentially a flux. There are of course also stocks of water: groundwater aquifers and natural lakes. But these lakes and aquifers only can be used sustainably if they are replenished by the flux. The stock is small compared to the flux. Of course we can store water artificially, but also then, the stock is

small compared to the flux. You need annual recharge to make the water available. It is not like fossil fuel where stocks are huge compared to the annual flux.

- **Water is a system**

The annual water cycle from rainfall to runoff is a complex system where several processes (infiltration, surface runoff, recharge, seepage, re-infiltration, moisture recycling) are interconnected and interdependent with only one direction of flow: downstream. If you interfere upstream, there are downstream implications, externalities and third party effects. If you withdraw groundwater from an aquifer, further down in the cycle, at some later point in time, there will be less water in the river, for reliant uses. If you discharge waste at some point, damage is incurred somewhere downstream. A catchment is one single system and not the sum of a large number of subsystems, that can be added-up or optimised in a regular economic model.

- **Water is bulky**

Now all of the above would not be a problem if we could transport the water easily from one place to another as we do with fuel or food. Then we could move water from an area of access (the mine) to an area of shortage (the user). This process could cater for fluctuating water needs that vary both over time and space. We could also transport water from downstream to upstream, as we do with normal economic goods. A water market could deal with this efficiently and effectively. But besides exceptional cases, this is not done. Why? Water is too bulky. A domestic or industrial water user is willing to pay about 1$/m^3. A farmer is seldom able or willing to pay more than a small fraction of that amount. Other economic goods are much more expensive than that. Fuel costs about 100$/m^3 and food in the order of 200$/m^3. A factor of 100 more than the value of domestic water and at least a factor of 1000 more than the agricultural value of water. Unfortunately there are no ways to condense water, as is done with orange juice, for instance. To transport orange juice, producers first make a juice concentrate, which after transport is again diluted with water.

- **Water is non-substitutable**

What we do with orange juice can not be done with water. Water can only be diluted with water to turn it into water. Although other economic goods have alternatives, water has none. For fuel, one can choose between oil, gas, coal, wood, hydropower or solar power. For food one can choose between bread, pasta, rice, or maize. But what alternatives are there for water: rainwater, groundwater, surface water, …? It's all the same water from the same system, from the same source. There is no alternative, there is no choice.

- **Water is not freely tradable**

Hence we are looking at a good that is essential, but too bulky to be traded over large distances. The consequence is that we should use it when and where it is available. There is no other economic good that has this complicated combination of characteristics (see Table 1), that makes it difficult to be traded freely (except in exceptional cases, such as with bottled water, or when two neighbouring parties can make use of the same water intake). Water markets can only function if they are very localised and take account of the fact that water flows downstream (e.g. in a micro-catchment or within a subsystem, such as an irrigation project). World-wide, water is traded in the form of its products: grains, timber, meat, fodder, fruits, flowers, etc. This is called the

trade of "virtual water", where one kg of produce roughly corresponds with one m^3 of water (a condensation of a factor of 1000). It is easy to show that it is more attractive to trade the products than the water. This applies to the international situation, but also nationally and within a river basin. To minimise the need for transport of water, food should be grown in places where land and water (particularly rainfall) are abundant. It is only for political reasons that food is grown in water scarce areas. Hence it is more useful to think about a free and open food market rather than a free water market.

- **Water is complex**

Although the above conclusion that water is not freely tradable is the most important argument to give water a special treatment, there are a number of additional aspects that make water complex with regard to other economic goods. Economists would say that all of these aspects can be dealt with, but the fact that there are so many complications makes water at least very special.

1. Water is a public good. Water can not be owned privately for its low excludability and the societal dependency on water is high. This is a consequence of water being essential and non-substitutable. It is the responsibility of governments to make sure that there is safe access to water (for domestic and other economic uses) and that society is protected from water related hazards. It is of course not the responsibility of governments to provide water related services for free, a misinterpretation often made.
2. Although water is moving (being fugitive), it is bound by its location of origin and its natural conveyance system. Most of the world's water resources are part of international river systems, and even if they are national, they cross provincial or state borders. As a result there are different authorities that are responsible for the supply and demand of these waters, which is always a complicating political factor.
3. There are high production and transaction costs involved, even when gravity is used to transport water. For water re-allocation one requires diversion structures, pumps, boreholes, canals, pipelines, dams, reservoirs, etc. These structures are expensive to build, maintain and operate. Metering and billing is complex. This aspect is related to the bulky character of the water.
4. The market for water is not homogeneous. Some users have a high willingness to pay, consuming small amounts of water (domestic users, industries), others have a low willingness (and ability) to pay and use large amounts of water (farmers), yet others have no ability to pay (environment, poor people). They can not be merged into one market. Although the water is the same, the character of the demand is different in terms of quality, reliability and the quantities involved. Trade-offs between these different user categories should be made through political priority setting, not through the market. Within one of these categories economic principles can be used to determine a proper water price, but between sectors this is not useful.
5. There are macro-economic interdependencies between water using activities. Water use in agriculture affects industry, services, etc. Since water affects all economic activities, the relations are complex. This can be dealt with, but it is a complicating factor.
6. There is always the threat of market failures in water supply. Partly this is caused by the fact that water is bulky. To reach economies of scale, large investments are required, which lead to natural monopolies in virtually all water services: hydropower supply, drinking water supply, irrigation, drainage, sewerage, flood protection, navigation, etc. Water works have the character of public infrastructure, where there is a choice

between a state monopoly or a private monopoly. Only for urban water supply are there examples of successful privatisation processes, but these are also complex and highly demanding in human capacity for control.

7. Water has a high merit value, often not expressed in monetary terms. Water relates to our perception of beauty, wellbeing and health. People like to live in the proximity of water, which should be clean and aesthetic.

3. The drinking water bias

Why is this message so difficult to convey? I fear that much of the confusion about the economics of water stems from the fact that people assume that the water issue is merely about drinking water, and particularly about urban water supply. The booming bottled water industry is clearly an indication that this type of water is an ordinary economic good that can be traded efficiently (and lucratively) on the market. However, the bottled water market is clearly a minor and up-market component of the potable water market, and extremely small compared to the entire water resources sector. The drinking water sub-sector is often confused with the much larger and much more complex water resources sector. We also see this in the media. If we want to draw the attention of the public to water issues, we use the image of a child or a woman near a water point. Although the drinking water and sanitation issue is one of the largest societal challenges of the next century, it is a minor issue with regard to global water scarcity. The main issues in terms of water resources allocation are water for food, water for nature, sustainable use of water resources, closing water and nutrient cycles, water resources management in mega-cities, options for non-water borne sanitation, flood management, etc. These issues are of high societal importance, requiring substantial investments. And hence they are essential parts of economic planning. Yet they have nothing to do with the classical interpretation of water as an economic good. It is this (urban) drinking water bias which leads people to believe that water is just another economic good.

4. Conclusion

Water is an economic good, but it is not a normal economic good. It is not merely because we are so close to the girl that we think she is special. A large number of aspects of water have been mentioned that form the motivation of this statement (see Table 1). Although individually these aspects may not be exceptional, their combination makes water a very special good. This implies that in the allocation and the use of the water we have to take a complex set of economic interests into account. These are multi-sectoral, multi-objective and often non-monetary. The character of water is unique. It does not allow the application of market theory to the allocation of water between sub-sectors and different water using categories. Within a sub-system, or even within a sub-sector economic pricing may be a useful tool to reach efficiency, but allocation efficiency at that scale is only a minor problem in view of the major global issues that the water sector is facing. Water markets are not useful beyond the very localised scale of a micro-catchment, an aquifer or an irrigation system. Water is too bulky (too costly in relation to its price) to be traded over large distances or against the force of gravity.

In this paper, I hope to have shown that within the urban water supply sub-sector the classical interpretation of water as an economic good may be useful, particularly if there is ability to pay. However, as soon as we zoom out to the wider field of water resources management the concept needs to be interpreted much more widely. Saying that water is an economic good does not necessarily imply that a market price needs to be paid for it to make the allocation efficient. In fact, it doesn't mean that it should be paid for at all.

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