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What is water? A normative perspective

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Abstract

In the modernist era, water is discussed as a single substance which has multiple uses. I argue that from a normative perspective water should be discussed in the plural term ('waters'), as they constitute a variety of 'things' with a similar chemical composition. Waters are composed of multiple 'needs', which are uses with a normative rationale, and of 'wants', which are desires that should be seen as economic demands. Moreover, waters should also be differentiated by source: natural, recycled or produced. This new language of water has direct policy implications. Needs, differentiated into direct human needs, spiritual needs, environmental needs and community needs, which may be prioritized, should be supplied regardless of cost considerations. 'Wants' and produced water should be priced at the full social cost of supply. Hence, while the rates at which needs are supplied should be determined by affordability, regardless of spatial differentiation in supply cost, the pricing of water supplied for 'wants' will vary over space. Thus water which is supplied through the same pipe to the same house may be subject to different pricing logics. However, there are many nuances to these generalizations, which have still to be fleshed out.

Keywords: Desalination; Economic demand; Environment; Needs; Religion

Introduction

Water is largely discussed from a physical or a normative perspective. From a physical perspective, discussions are usually limited only to the terrestrial part of the hydraulic cycle, comprised of blue water, green water and gray water[1]. Much of the discussion focuses on blue water, differentiating between surface water and groundwater. Most discussions of water thus focus on less than 3% of the total

[1] Blue water consists of all the liquid water that originates in runoff, whether in rivers, lakes or aquifers. Green water is water from precipitation that ends in soil moisture and returns to the atmosphere through evapotranspiration (see Falkenmark & Rockstrom (2006) for elaboration on the relationships between these). Gray water is water that has been polluted as a result of human use.

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water of the hydrosphere (Shiklomanov, 1993). Yet, while these discussions are couched in technical terms, they reflect deeper societal issues, pertaining to values and norms. Hence, it should not be surprising that in these discussions different actors espouse different views of water (Linton, 2010). Many view water as a natural resource (Falkenmark & Lindh, 1974; Clarke, 1993; Glieck, 1993; Postel, 1997, for example). Others (mostly economists) argue that it should be viewed as a commodity or a factor of production (Winpenny, 1994; Rogers *et al*., 2002). However, water is first and foremost a source of life. Thus it has been argued that water should be considered as a basic need, and therefore it constitutes a right to which people are entitled (Glieck, 1998). Proponents of bio-centric approaches have argued that similar entitlements should also be extended to other species (Merchant, 1997; Breckenbridge, 2005).

These conflicting normative views of water have practical ramifications, as each is associated with a different management approach. Thus, the often acrid arguments between these views are closely intertwined with conflicts over concrete policy measures (Bakker, 2007). A common feature in these normative discussions is their view of water as a unitary substance. That is, participants refer to all the (usually blue) water as 'water'. Yet, this has not always been the case. The view that water is a single substance, due to its chemical composition, is modern (Linton, 2010). In the past, water was viewed in the plural term, 'waters', constituting a variety of wet cool substances such as light water, standing water, clear water etc. (Hamlin, 2000). While the fact that water has a common chemical composition is not contested, it is possible to ask whether all the liquids composed of H_2O should indeed be treated equally. If the answer is negative, as I propose here, then it is possible perhaps to resolve some of the differences in normative views of water by suggesting that attitudes towards water need not subscribe to one normative view, as different views may pertain to different waters.

If water can be differentiated, two immediate questions arise: According to which criteria should water be differentiated? How can this differentiation affect policies? This paper attempts to answer these questions. To this end, I first discuss the use of water, beginning with the question of what are the basic needs and hence rights of humans. Then I look at the needs of nature, before coming back to humans. In the third section, I discuss the role of water in human spirituality and as a factor in maintaining communities as such. In the fourth and fifth sections, I look at the questions of water for the production of food and at other water uses, arguing that these uses should be viewed as economic demands, rather than normative needs. After discussing the policy and pricing implications of the differentiation between waters on the basis of use, I go on to ask whether waters should also be differentiated according to source. Answering in the affirmative, I suggest a normative differentiation of water based on both use and source.

The human need for water

Water is necessary for human survival. This well-recognized fact is the basis for the emerging view of basic human water needs as a human right to water (Glieck, 1998; Cunha, 2009). But human rights are about more than survival. They include dignity for, as Hiskes (2009, p. 27) states: 'Human dignity … is both producer and product of moral rights, in the sense that morality is impossible without them'. Human dignity also underlies the Millennium Development Goals' (MDG) premise that extreme poverty is unacceptable because it does not allow for dignified living. But the water-related

goals stated in the MDG pertain only to access to clean water and sanitation, without specifying what is meant by access (Marin *et al*., 2009), or the amounts to which humans are entitled. The unanswered question is thus: How much water constitutes the amount that is sufficient to assure human dignity[2]?

There is a wide variance of estimates of basic needs, not all of them relating to the concept of dignity. Thus, while Peter Glieck (1996) argues that 50 liters per capita per day (L/c/d) (or 18.25 m^3 per capita per year (m^3/c/yr)) constitute the basic need for humans (including drinking, sanitation, bathing and food preparation), Falkenmark (1986), for example, suggests that 274 L/c/d (about 100 m^3/c/yr) are needed for a good standard of living (based on the Israeli domestic consumption at the time).

Chenoweth (2008), who reviewed the literature on basic water needs, identified two approaches for estimating minimum water needs. The first is based on specific quantities required for basic domestic functions. This is the approach used by Glieck (1996, 1998), as well as many others. The second is based on observations of the amount of water used by prudent societies that enjoy a high level of development. This is the approach used by Falkenmark (1986) and Shuval (1992). While the first approach tries to identify the basic minimal water needs, but does not tackle the question of dignity analytically, the second approach begins by identifying societies that do offer a dignified level of living, searching for the minimum threshold of water usage that is required to sustain a high level of human development. Chenoweth (2008) termed this second approach the development-efficiency approach, whilst he termed the first a sectoral approach. Both approaches implicitly assume all people behave similarly. However, societal and climatic differences may lead to variances in the quantity of water used for various activities (for example the amount of water used for food preparation may be affected by the extent to which people eat at home or out of home), and different countries have different non-agricultural economies, and hence water use patterns.

Based on these approaches, Chenoweth (2008) finds that a country can meet its domestic water requirements and maintain a non-agricultural economy that is capable of sustaining a high level of development with as little as 120 L/c/d. Adding low (but not excessively so) losses in the water system to this, he came to the conclusion that 135 L/c/d, which is akin to 50 m^3/c/yr, can be viewed as the minimal threshold required for social and economic development that permits the achievement of high human development.

Taking Chenoweth's figures as a base, and following a workshop in which leading experts discussed the issue, Feitelson *et al*. (2011) suggested that in the Middle East, due to the greater aridity and perhaps slightly higher water losses, a figure of 60 m^3/c/yr should be considered as a normative domestic water need (including municipal use). Taking into account the variations in domestic use noted above, it seems that the quantity of water that can be considered as a normative need, and hence a basis for establishing a human right for water that allows for a dignified level of living, can be capped at 60 m^3/c/yr. This quantity is significantly lower than the quantities Falkenmark (1986) and Shuval (1992) quoted on the basis of the Israeli experience, but also significantly higher than the basic needs defined by Glieck (1996, 1998).

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[2] Additional dimensions of the human right to water are the quality of water and affordability of supply. All the definitions of human needs invariably refer to 'clean' water. In this paper, I assume accordingly that all references are to clean water, without entering the discussion of what constitutes 'clean' water. The issue of affordability is taken up later in this paper.

Water for nature

The relationship between humanity and natural systems is discussed in the Bible, in the book of Genesis. However, different views are expressed within Genesis (Cohen, 1985). In the first chapter, Man is viewed as supreme, and thereby allowed to subdue the earth, and to dominate the fauna and flora for his benefit (particularly, Genesis 1:28). In the second chapter, a different normative approach is advanced, whereby Man is a steward of nature, who should take care of it (Genesis 2:15). This second normative position is the basis for the evolving ethic whereby humans have a moral obligation to sustain natural ecosystems and hence to retain water in streams, rivers, aquifers and lakes for this purpose (an obligation recognized in Chapter 18, Part C of Agenda 21). This ethic may be couched in the language of stewardship, such as Postel's (1997) water ethic, or Falkenmark & Folke's (2010) ecohydrosolidarity; in a bio-centric ethic, whereby humans are only the first among equals (Merchant, 1997; Breckenbridge, 2005); or in a view of sustainability and inter-generational ethics, whereby the environmental rights are part of a human right for a green future (Hiskes, 2009).

The quantities of water that should, normatively, be allocated for nature are more difficult to define than the human needs discussed above (Glieck, 1996). Clearly, any use of water by humans that is based on the abstraction of water from natural courses or aquifers affects the environment (Sophocleous, 2003). Hence, the amount of water that should be retained in nature is not the same as the amount that was there in a pristine state. Rather, the focal point should be on the quantities and chemical composition of water that is necessary for the natural systems to survive. From an ethical perspective these quantities can be seen as similar to the basic needs of humans discussed above. In rivers, this minimal threshold may be referred to as the minimal environmental flow that should be retained in the river, or returned to it[3].

However, the quantity and quality of water needed to maintain ecosystems are highly variable across space and time, as a function of environmental, ecological and climatic variables, as well as of human perceptions and attitudes (Covich, 1993). Moreover, ecosystems are dynamic and feedback mechanisms produce non-linear results (Holling & Sanderson, 1996). Thus, while clear thresholds exist, it is very difficult to identify them in advance (Anderson *et al*., 2006). Moreover, due to the spatiality of water–ecology–environment dynamics, it is impossible to come up with definite globally-applicable thresholds as was attempted with regard to human needs (Poff & Zimmerman, 2010). Rather, all that can be said is that there is water that should be viewed, normatively, as water that is necessary for the maintenance of healthy and viable ecosystems. But the quantity and quality of this water has to be determined on a case by case basis, taking into account both local and regional perturbations (Covich, 1993).

It should be noted that in the case of nature, it is insufficient to define the water needed to maintain a healthy and viable ecosystem in terms of quantity and chemical composition, as the rates of water flow may be no less important (Anderson *et al*., 2006). Thus, in the case of water for the environment, the pattern of water flows should be included as an additional dimension (King & Brown, 2006). Still, the

[3] Environmental flows are, however, ultimately social constructs, whose definition and determination is a function of societal decisions (Dyson *et al*., 2008). Hence, I discuss the factors that affect the determination of minimal flows (sometimes also referred to as in-stream flows), rather than whether these should be indeed termed as environmental flows.

minimal flows do not supply the full array of environmental services that aquatic ecosystems may supply. But additional water, beyond the minimal requirements, will have to be balanced against other demands. To this end the various valuation techniques developed to value the environmental services of water in monetary terms may be used[4].

The unique needs of humans

In addition to their greater capability to manipulate water, humans differ from all other species in the variety of their needs. Beyond physical needs, discussed above, humans have spiritual and social needs for water[5]. These should also be accounted for in normative discussions of what constitutes water.

The spiritual needs of humans

Water has symbolic properties in many cultures (Linton, 2010). In many religious tracts, water is viewed as cleansing not only the body but also the soul, as well as being seen as a symbol of purity. As a result, water is used in a variety of religious and cultural ceremonies and traditions for ritual washing or immersion, as well as for cleansing the dead or certain parts of the body (Schelwald-van der Kley & Reierkerk, 2009). In some cases, specific water bodies, such as the Jordan River, the Ganges and various springs, are viewed as holy or as deities (Linton, 2010).

The quantity of water used in religious ceremonies or traditions is usually miniscule. However, there may be other attributes of water which are important, such as cleanliness, clarity, or its natural flow. In the case of water bodies imbued with holiness, the continuous flow of water in them has a spiritual meaning for believers. From a normative perspective, this water use is fundamentally different from all other water uses, as it is not related to the physical well-being of people. Hence, it should be regarded as a different kind of water, regardless of the quantities used or the exact rate of flow in holy water bodies.

Human social needs

Humans are social creatures. We live in communities. Some thinkers have elevated the community to the level of an ideal (e.g. Kropotkin, 1898; Etzioni, 1997). The community scale has also been advanced as a normatively-desirable scale of water management (Feitelson & Fischhendler, 2009; Trawick, 2010). Thus, if water is a requisite for maintaining a community, it is, arguably, a different human need than all those noted above.

The question, in this case, is under which circumstances is water necessary to maintain a viable community? In much of the arid and semi-arid developing world, access to secure water for irrigation is seen as a key tool for addressing the social roots of instability (Moench, 2002). Hence, it can be assumed that such water should be found only in communities based on subsistence farming (or freshwater fishing).

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[4] For a recent review and example of the use of such techniques, see Birol *et al.* (2006).

[5] While it can be argued that certain species also need water to maintain their social structure, this need is not conceptually different from that subsumed under the ‘water for nature’ rubric above.

But the idea of a community as a central building block of society is not limited to societies whose economies are based on subsistence agriculture. Actually, such ideals are derived from Kropotkin's (1898) image of advanced Swiss villages. Thus, it should be asked whether water may also constitute a basis for communities in more advanced economies.

Feitelson *et al*. (2011), in an attempt to define water needs for the Israeli–Palestinian case, suggest that water should be considered as a need in the case of 'peripheral' agriculture. Peripheral agriculture is defined by them as agriculture on which communities that are beyond commuting distance from major cities and towns are based. These are communities that have no alternative non-agricultural employment opportunities. Under these circumstances, water for farming is essential for the continued viability of the communities, even if the product is geared toward the market and is not limited to subsistence.

The principle of peripheral agriculture can clearly be extended to circumstances beyond the Israeli–Palestinian case. However, the specification of the quantity of water that should be considered as a social need in this case is likely to be contested. Essentially, the quantity that can be considered a need is the minimal quantity needed to keep farming viable in these communities. Any additional water that is used for farming in these communities should not be seen as any different from the water used to produce food elsewhere.

From a policy perspective, community needs for water are likely to be relevant mainly in arid and semi-arid environments, where farming is dependent on irrigation. In other environments where farming is largely based on green water (that is, farming is largely rain-fed), community needs for water, while existing, may be largely beyond the policy arena where water allocations are determined.

What about water for food production?

Water is often seen as essential for food security (Falkenmark & Lannerstad, 2010). But food is increasingly supplied through the global market. As a result, the main flows of water can be argued to be the flows of virtual water embedded in foodstuffs (Hoekstra & Hung, 2005). These flows of virtual water balance out the discrepancies between the concentrations of humanity and the distribution of land and of the water resources needed for food production. Thus, food security is meaningful today mostly at the global level, and not on a national or local level.

The implication of the reliance on global markets for food security is that the water used to produce food serves essentially as a factor of production, except for the cases noted above where communities rely on subsistence farming or have no alternative employment base. If the water used for food production is viewed as a factor of production it should be discussed in the realm of the market. In this sense it is no different than water used as a factor of production in other economic activities, such as tourism, power production or industry. Some qualifications may apply to this general assertion in cases where the purchasing power of a country is insufficient. However, the adaptations to such shortfalls go well beyond the questions of water allocation, as the most effective of these may be changes in diets toward less animal-based products (Falkenmark & Lannerstad, 2010).

Other uses of water

The demand for water by humans is greater than the total human needs defined above (including spiritual and social needs). This additional demand is normatively different from the needs identified

above. While the needs can be argued to be necessary for the dignified living of people, for maintaining viable ecosystems, for addressing peoples' spiritual needs and maintaining human communities as such, these additional demands constitute desires that people would like to satisfy. Such desires are certainly legitimate. But in essence they are no different from the desires to derive utility from various other goods and services. Thus the demand for these water services has to be balanced against the other desires of the households or municipalities, under their pecuniary budget constraints. In other words, the additional demand has to be treated as any other economic demand, and thus the water that is used to supply this additional demand should be viewed as a commodity.

The abstraction of water entails both direct costs and negative externalities. Thus, the prices that consumers will pay for the water services that constitute an economic demand should reflect the full social cost of supplying the water for this demand (Rogers *et al.*, 2002). That is, the price consumers pay should include both the direct cost and the cost of internalizing the externalities associated with the supply of water.

The requirement of water users to pay the full social cost for the water they use should be applied to all economic sectors that use water as an input, as well as to households. This requirement may prove particularly important in the case of tourism, as tourism uses abundant quantities of water in semi-arid and arid environments, and is often concentrated around particularly sensitive sites (Briassolis, 2002).

The pricing implications of differentiation by use

In the preceding sections, two basic types of water have been identified. The first are the normative needs which should be supplied, regardless of cost or ability to pay. These include human needs, environmental needs, spiritual needs, and the water needed to sustain agriculturally-based peripheral communities with no alternative sources of livelihood within a reasonable commute (hereby termed 'community needs' for sake of brevity). I suggest that these needs can be prioritized, with human needs receiving the top priority, spiritual needs and environmental needs a second priority, and community needs receiving a lower priority. However, as the needs are normatively based, their prioritization is also normative. Hence different people may prioritize the needs differently.

The second type of water is water that should be viewed normatively as a commodity (or factor of production). This water includes water that is used for food production (except in peripheral communities), water used in the industrial, service and tourism sectors, and water for additional domestic use.

The direct implication of this differentiation is that different drops of water entering the same house through the same pipe may be treated differently. While some of the water entering the households is a need (up to 60 m^3/c/yr), additional water should be viewed as a commodity. This differentiation has direct policy implications.

The water which is viewed as a need should be supplied regardless of the ability to pay. Thus, while it will not necessarily be supplied free of charge, the rates have to be low enough so that they do not prevent the household from utilizing the basic quantity of water that is viewed as a human need. Similarly, water that is used for spiritual needs should also be priced modestly, if at all. In contrast, the water that is viewed as a commodity should in principal be priced at the full social cost. This implies that a block-rate pricing system should be adopted, and that the difference between the basic rate applied to needs

and the rate applied to commoditized water will be high. All the needs merit subsidization, while additional quantities of water, beyond the needs identified above, should be fully priced (including externality costs).

The difference between the two rates has a spatial dimension. As the cost of supply and externalities vary over space, the upper rates should vary accordingly. In contrast, needs should be provided affordably regardless of spatial variation. Thus the pricing of the first 60 m^3/c/yr will not vary over space[6] (implying that the extent of subsidy needed to supply these human needs will vary as the difference between supply cost and the base rate will vary over space, due to the spatiality of supply cost). The price of commoditized water, the supply above 60 m^3/c/yr, will vary over space.

The pricing of environmental water may pose a particular problem, as there is no direct user. In essence it can be argued that water retained in nature should not be priced at all, as it is not 'supplied'. Indeed in many cases such water is not priced. However, water retained in nature is likely to have a positive shadow price. Hence, it can be argued that it should also be priced. In some countries, such as Israel, this rationale is implemented and nature protection authorities are charged by the water authority for water retained in streams or supplied to sustain ecosystems. But, in such cases, these costs should be subsidized from the general coffer (as they are in the Israeli case), or cross-subsidized from tourism-based revenues or taxes, where the water bodies are a tourist attraction.

The most difficult policy dilemmas are likely to arise with regard to the provision and pricing of the water necessary to sustain peripheral farming communities. In principle the provision and pricing of water for irrigation should be differentiated according to whether the water is considered a community need, as defined above, or as an input for the production of food in non-peripheral settings, or beyond what is needed to sustain the peripheral agriculture. However, as Molle & Berkoff (2007) show in a comprehensive mapping of the issues involved in the pricing of water for irrigation, the pricing of water for irrigation differs substantially from the pricing of water in the domestic sector, both theoretically and practically. Essentially, they argue that pricing is not a useful allocation mechanism under most circumstances and hence has been used primarily to finance the upkeep of irrigation systems. Even in this limited role water is often subsidized. The main policy issues in the agricultural sector are, therefore, the control of distribution and the allocation of water (Molle & Berkoff, 2007).

In those parts of the world where farming is the basis for community, it is necessary to support irrigation works. This is well recognized, and indeed irrigation is often subsidized. However, the differentiation between community water needs and the water inputs to food production made above cannot be applied only through pricing in this case, as full cost pricing of water for irrigation is unfeasible in most circumstances (Molle & Berkoff, 2007). Rather, irrigation water policies have to be discussed within the wider scope of farm and social policies. Yet, these are highly contested in most societies, not least because the differentiation between peripheral and non-peripheral farming is far from clear. Moreover, as Moench (2002) points out, these relationships are likely to change over time as rural economies diversify. But such diversification is a function of the policies implemented. Hence, the only differentiation that may be feasible is between irrigation by small farmers in remote areas and large-scale industrial food producers, which may leave many if not

[6] It is possible, however, that the price will vary across households because of affordability considerations.

most of the farmers in the middle between these two groups. Thus, the practical implications of the differentiation between water used for sustaining communities based on peripheral agriculture and water used as an input for food production may have more limited practical policy implications than in the domestic sector.

Are all water sources equal?

The discussion so far has largely focused on blue water. But, as was noted at the outset, blue water is but a small fraction of the total water on the planet. With the advent of large-scale desalination and the improvement in wastewater treatment and recycling technologies, a normative discussion of water should be widened to include these additional sources. This raises the question of whether these additional sources of water should be treated in the same manner as blue water.

The main difference between desalinated seawater, and to some extent treated wastewater, and blue water is that the former are essentially humanly produced. In other words, it can be argued that desalinated seawater is an industrial product, and not a natural resource. Indeed, the desalination of seawater alters the basic geography of water, as it does not flow to the sea, but rather from it, and the location of the source as well as the direction and location of the pipes through which they flow are an outcome of political and management decisions (Feitelson & Rosenthal, 2011).

The same is true, to a lesser extent, with treated wastewater, as the potential for their re-use is a function of the level to which they are treated, which in turn is a function of investments and technology. However, it can be argued that as the freshwater supplied to the domestic sector is treated, and often conveyed over a long distance and in some cases out of the natural basin, this feature of wastewater recycling is not substantially different from blue water. Still, the use of both desalinated seawater and recycled (gray) water is likely to differ substantially from blue water.

As desalinated seawater is produced it is inherently commoditized and marketized. Hence, while a government can purchase it and then supply it at a subsidized rate for a basic domestic need, it is likely to be used primarily to supply economic demands, whether in the domestic sector or in the tourism sector. Desalinated seawater, however, is not likely to be seen as a substitute for freshwater in addressing spiritual needs, and is not likely to be used for irrigation, particularly in economically weak peripheral areas. Hence, its only contribution to these needs is by its potential to substitute for freshwater in the domestic sector, thereby allowing more blue water to be used for these needs.

The use of gray water is likely to be constrained by societal concerns to municipal uses (such as irrigation of parks) and for irrigation (Bazza, 2003). As gray water emanates from the urban centers, the likelihood that it will be used to support peripheral agriculture is small (Feitelson & Rosenthal, 2011). Hence, its contribution to addressing the various needs is likely to be similar to that of desalinated seawater – by substituting for blue water that may be used for the various needs identified above.

Table 1 summarizes the relationship between the two types of typologies discussed above. The columns differentiate the waters according to use, while the rows differentiate the waters according to source. The entries in the cells defined by the rows and columns indicate whether the source is likely to supply the use and, if so, what are the policies under which it should be supplied.

As can be seen in Table 1, not all combinations of source and use are pertinent. Actually there is only a limited set of waters that comes out of this two-dimensional typology. The first is human needs supplied by blue water. This is the case discussed above, which justifies subsidization. This need can also

Table 1. Waters by type of use and source.

	Water use					
	Normative				Commodity	
Water source	Human	Environmental	Spiritual	Community	Food	Other uses
Blue	S	S	S	Priority allocation	(FC)[a]	FC
Green	–	+	–	+	+	+
Gray	–	S[b]	–	S[c]	(FC)[a]	FC
Produced (desalinated)	S[c]	–	–	–	–	FC

Key: +: Water source used but with no policy implications; –: Improbable; S: Supply merits subsidization; FC: Full cost pricing principles should apply;
[a:] Full-cost pricing is limited to large commercial farming, if at all;
[b:] Possible, mainly for stream rehabilitation;
[c:] Possible, but unlikely.

be satisfied by desalinated seawater (or desalinated brackish water). However, as the cost of desalinated seawater is usually substantially higher than freshwater, and as the domestic needs as defined in this paper merit subsidies, the reliance on desalinated seawater to supply domestic needs (in contrast to domestic economic demand) is unlikely, except in extreme cases such as in arid islands.

The second type of water is for environmental needs, which have to be based on blue water and green water. It is possible, however, to use recycled water in some cases to augment natural flows, particularly as part of river restoration schemes. Yet, this is likely to be of limited scope, as the availability of recyclable wastewater is a function of the existence of upstream human habitation, which is often not the case in natural settings.

The third need, the spiritual need of humans, will invariably be limited to blue water, and may have additional constraints placed on its supply (such as being supplied exclusively on gravity-based systems, or being restricted to particular natural courses).

These three types of water can be termed as meritorious water, as these merit subsidies and should be supplied regardless of affordability constraints.

The fourth type of water is water required for community needs (mostly for irrigation by peripheral communities). These needs are supplied by green water, and where green water is insufficient (mainly in arid and semi-arid regions) it can be augmented by blue water. While the supply of blue water for this need merits support, this support will not be limited to pricing. As most irrigation water is not fully priced for practical and socio-political reasons, the policies in this case have to focus on priorities in water allocations. Water for food production, beyond the community need, should be viewed as an economic input. But with the exception of large-scale commercial farming it is unlikely that full-cost pricing can be applied to it. The water sources for food production are green water (which cannot be priced, and hence is largely beyond the policy debates[7]), blue water and possibly gray water (as a function of level of treatment, crop type and societal attitudes).

[7] A possible caveat to this statement is the relationship between land management regimes, green water and blue water. In essence, vegetation cover and land management, which can be influenced by policies, affect the partitioning of precipitation into evapotranspiration (green water) and runoff (blue water) (Calder, 1999). However, these policies are beyond the scope of policies discussed in this paper.

The final type of water is the commoditized and/or marketized water used to supply other domestic needs, as well as inputs to other economic sectors. While much of this water is supplied by blue water, in closed basin situations in arid and semi-arid situations a growing part of them may be supplied by produced water, mainly through desalination. The policy question that should be at the center of attention with regard to this type of water is whether users are charged the full social cost of water, or whether they are implicitly subsidized at the expense of the environment (Rogers *et al*., 2002)[8].

Conclusions

Water has been regularly discussed in the last century as a single substance, which has multiple uses. In this paper I argue that from a normative perspective we should discuss water in the plural term 'waters', as they constitute a variety of 'things' with a similar chemical composition. In this sense it may seem a return to older times, before the modernist unitary view of water became hegemonic (Hamlin, 2000; Linton, 2010). But the meanings of the 'things' that constitute waters today are different from those that were considered in the pre-modernist era. Essentially, I suggest that waters are composed of various needs, those uses with a normative rationale, and 'wants', which constitute an economic demand, and are differentiated also by source – natural, recycled or produced. The needs have also to be differentiated into direct human needs, spiritual needs, environmental needs and community needs, which may be prioritized.

The differentiation by source and use has direct policy implications. In essence, the needs, most of which are to be addressed by blue or green water, should be provided regardless of cost considerations, while the 'wants' should be priced at full social cost, and may be supplied from produced water. Having said this, there are multiple nuances in the policy considerations, some of which have been noted here. Yet a full consideration of all the policy nuances still requires further work.

Regardless of the specific policy ramifications, the main outcome of the shift in view from water to waters is a new differentiation in the way that water should be discussed and analyzed. Rather than referring to domestic, industrial, environmental, agricultural and tourism uses or demands, discussions should refer to needs, wants, natural water, recycled water and produced water. In this paper the basic conceptual framework outlining this new water language is advanced. Such lingual shifts are likely to have widespread ramifications for the ways in which policy problems will be framed in the ever-changing policy arena. But fleshing out the full implications of these changes in the language of water will require further scrutiny and deliberations.

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[8] Other policy issues, such as the ownership of water or the institutionalization of water management are a reflection of societal norms, social structures and power. Hence, they do not pertain directly to the definitions of the nature of water *per se*, and hence are largely beyond the scope of this paper.

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