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Weighing economic values against societal needs: questioning the roles of valuing water in practice

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Abstract

The increasing policy interest in valuing water raises questions about practical roles or applications. Is valuing water intended, for example, to inform public policy and businesses, guide resource allocation, support a multi-stakeholder process, manage conflicts of interest, or to inform realistic pricing systems and support investment decisions? Decisions affecting water often fail, however, to consider ecosystem needs and social objectives and impacts in other geographical areas. This paper reflects on the essence of valuing water in practice. The paper concludes that in practice, valuing water is indeed useful in decision-making, not solely in the sense of it contributing to the value determination (as values are typically disputed, partial, incommensurable and imperfect), but more in offering a structured and transparent mechanism that supports an inclusive stakeholder water resources management process. Water valuation can play a key role in making explicit the trade-offs intrinsic to decision-making and priority setting, especially when it concerns societal needs such as food security and stability, which are not revealed in the marketplace. As such, valuing water may be a key tool in water diplomacy, whereby its value lies not so much in its numerical assessment as in the process it offers to engage stakeholders across different perspectives and interests in water use.

Keywords: Making trade-offs explicit; Multi-stakeholder process; Valuing water; Water allocation

Introduction

Too often decisions about water allocation, water use and water-related investments fail to take into account ecosystem needs, societal needs and impacts across geographical scales. The opposite of taking water for granted is to value it in all its dimensions. Valuing water requires recognition of the full range

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of direct and indirect benefits and associated risks. These may be cultural, spiritual, emotional, economic, environmental or social.

Valuing water is gaining policy interest. Policymakers regard water valuation as a means to shape water-related policy and developments, enabling them to set targets (e.g. highest value) and criteria (economic, food security and environmental), and weigh them (seek optimisation) in decision-making. A premise behind valuing water is that economies are likely to be more resilient to climate, food, and energy shocks if water resource management and water supply and treatment infrastructure are designed to protect and extend the value of the resource, thereby fully accounting for current and future pressures (Australian Water Partnership, 2016).

To better understand how valuing water has evolved over time, a brief historical overview of initiatives in international water valuation is provided below. The historical overview aims to show how the ideas and methods of water valuation have changed over time, and what this means in terms of how effective water valuation is as a tool in policymaking. The overview highlights that the societal concerns around water allocation and use are myriad and that the way in which values should be assessed has changed over time. The latter is not so much concerned with the direct economically beneficial use of water, but in particular with the manner in which costs to society are assessed. The historical overview below reflects the struggle of dealing with changing perspectives.

Since the adoption of the fourth Dublin Principle in 1992 at the International Conference on Water and the Environment (ICWE, 1992), there has been a formal recognition that water should be considered as an economic good. According to this principle, water has an economic value and should be recognised as an economic good, taking into account affordability and equity criteria. Valuing water has long been the domain of economists who have developed various methods for quantifying the monetary value of water-related goods and services (Gibbons, 1986; Young & Loomis, 2014). The total economic value (TEV) concept, applied to water by Rogers *et al*. (1998), adopts a more theoretical and economics-based approach to valuation. The TEV focuses on the use of valuation techniques that convert non-use values into monetary values through methods such as contingent valuation. Since 2000, attention has shifted to methods that also address environmental (Dyson *et al*., 2003; Emerton & Bos, 2004) and social values. These developments represent gradual shifts in perspectives: from water as a scarce economic good that needs to be priced accordingly, to water as a societal good that has an intrinsic value and foregone benefits to society, to an environmental perspective with high intrinsic values and benefits to society (e.g. clean air, clean water, and coastal protection). These shifts lead to shifts in valorisations across shifting perspectives, across scales (local vs. society) and across economic domains (private vs. public), thus gradually complicating their commensuration into one value or a single valorisation frame.

Stakeholder-oriented approaches that place stakeholders more at the centre have gained attention since 2006 (FAO, 2006; Hermans *et al*., 2006). Such approaches widen the water valuation lens. Rather than merely putting a monetary value on water resources, stakeholder-oriented approaches can provide a structured and transparent mechanism through which those affected can express the values that water-related goods and services represent to them (FAO, 2006). This differs from classic economic valuation in that it is embedded in the water resources management process, of which it forms an intrinsic part. Stakeholder-oriented approaches can be used as a means for conflict resolution, decision-making, informing stakeholders, supporting communication and sharing insights. By combining expert knowledge and scientific methods with stakeholder judgements, they can facilitate joint agreement on priorities and specific actions to take, to secure the multiple values attributed to

water and measures to increase water values (e.g., guiding decisions on water allocation and distribution for the former, and informing measures to increase efficiency and efficacy of use for the latter) (FAO, 2006).

Since 2016 valuing water is one of the four lighthouse initiatives of the High Level Panel on Water (HLPW). The HLPW recognises that global action towards Sustainable Development Goal (SDG) 6, ensuring availability and sustainable management of water and sanitation for all, is critical and therefore aims to build momentum towards a common vision for better stewardship of this global resource (World Bank, 2017). Valuing water is an important part of that vision. The purpose of the HLPW initiative on valuing water is twofold. First, it seeks to build a common understanding and language around key principles to guide approaches to valuing water in three critical dimensions: (i) the social and cultural, (ii) the environmental and (iii) the economic. Second, it stimulates political leaders to move their government agencies to take proactive steps for better and sustainable water management, while galvanising businesses and civil society in the same direction. In February 2017, the HLPW gathered a group of experts who concluded that valuing water effectively would benefit from a set of guiding principles encapsulating its multiple values. This gathering also motivated the authors to reflect on valuing water principles against political and societal concerns and write this paper. The HLPW defined five principles (see Table 1) that aim to motivate and encourage governments, businesses and civil society to consider the multiple values that societies accord to water and its uses and to guide the explicit deliberate incorporation of these values into decision-making. Garrick *et al.* (2017) outlined in Bellagio four steps towards better valuation and management. Hellegers & Van Halsema (2018) are rather critical regarding this, as the highly political nature of valuing water is not made explicit, nor the linking of the larger-scale public benefits of water to local uses and impacts. Valuing water serves not to set priorities or resolve trade-off, but to make decisions about water management and allocation and their impacts explicit, deliberate and conscious. Hellegers & Van Halsema (2018) recommend a more politically explicit process, such as water diplomacy. In 2019, the valuing water initiative aims to develop four pillars of activity: establish a coalition of front runners, build a track record of water-based cases, develop the knowledge base around valuing water and communicate what has been learned.

Thus, valuing water is gaining policy interest to strengthen sustainable water management and water use. The HLPW valuing water initiative is providing a set of shared principles to motivate and encourage governments, businesses and civil society to consider water's multiple values and guide the transparent incorporation of these values into decision-making. This raises some questions, such as 'what kind of decisions can valuing water support', 'how comprehensive is valuing water' and 'what role can valuing water play in advancing a development strategy'. The aim of this paper is not to seek further improvements on analytical aspects of existing water valuation methodologies (see Young & Loomis (2014) for an overview of existing water valuation methodologies), but rather to reflect on the essence of valuing water in practice. This critical reflection is partly based on literature, policy documents and extensive experience of both authors. Three questions are addressed: What potential roles or applications does valuing water have in theory (section 'Potential roles of valuing water in theory')? What are the practical challenges and risks involved in valuing water (section 'Practical challenges of valuing water and the associated risks')? How can diverse values of water be factored into decision-making by various stakeholders, as different value systems intersect and overlap (section 'How diverse values can be factored into decision-making in practice')?

Table 1. Five high-level water principles to value water better (*Source:* HLPW 2017).

1. **Recognise and embrace water's multiple values** to different groups and interests in all decisions affecting water.
2. **Reconcile values and build trust** – conduct all processes to reconcile values in ways that are equitable, transparent and inclusive.
3. **Protect the sources**, including watersheds, rivers, aquifers, associated ecosystems, and used water flows for current and future generations.
4. **Educate to empower** – promote education and awareness among all stakeholders about the intrinsic value of water and its essential role in all aspects of life.
5. **Invest and innovate** – ensure adequate investment in institutions, infrastructure, information and innovation to realise the many benefits derived from water and reduce risks.

Potential roles of valuing water in theory

The general idea behind valuing water is to identify the value of water in its competing uses so that decision-makers can better understand and communicate values and trade-offs between different uses (Australian Water Partnership, 2016). Effective valuation also supports more transparent and better-informed decision-making on water allocations and uses, as this resource often possesses common-pool characteristics and confront-related issues of overuse and pollution (Ostrom, 1990). The wide variety of water uses and contexts shapes stakeholders' attitudes, which are often expressed as social and cultural values and assumptions. These values, in turn, determine preferences about how water can and may be used, and so they need to be understood.

Theoretically speaking, at least seven potential roles or applications can be envisaged for valuing water in different contexts:

- *Inform public policy formulation.* Public policy needs to reflect societal interests, such as poverty alleviation and water as a human right. Valuing water can reveal forgone benefits, for example, productivity losses, induced by pursuing specific public policy objectives, such as equity, domestic food security or food self-sufficiency. These often go unnoticed if not explicitly assessed.
- *Inform businesses*. For business communities, valuing water provides a lens for scrutinising longer-term interests, including sustainability. It could inform value-based decisions regarding business continuity, cost-effectiveness, risk management and enhanced reputation (WEF, 2014).
- *Guide resource allocation*. Valuing water can guide resource allocation, as it exposes the trade-offs involved in reallocating water among regions, users, sectors and generations. Valuing water can provide insights into distributional issues and alternative ways to balance efficiency, equity and sustainability. Such trade-off analyses can make the bargaining game more transparent; they can support negotiations and help build trust among stakeholders.
- *Support the multi-stakeholder process*. Through valuing water, stakeholders can express their values and jointly reach a certain level of agreement on the use and management of scarce water resources. Hermans *et al*. (2006) proposed a stakeholder-driven approach to valuing water, based on different indicators to produce a mosaic of values that support water resource management by local stakeholders. The general idea is to consider water's multiple values and guide the transparent incorporation of these values into decision-making by policymakers, communities and businesses.

- *Manage conflicts of interest*. Developing an understanding of the different values derived from or attributed to water by different stakeholders helps governments identify and manage potential conflicts between them. For particular stakeholders, valuing water enables them to assess and manage risks to their own activities (WEF, 2014).
- *Inform realistic pricing systems*. Insights into values are needed for pricing systems, such as cost recovery, and for effective implementation of incentives. For example, they can make users aware of the value of the resource as well as of the source and the importance of not wasting water. Pricing decisions can be easier to make with a fuller view of the trade-offs involved. Where tariffs or prices are used, safeguards are essential to ensure that access to water is available, equitable and affordable to all. For instance, according to Molle *et al*. (2008), demand for irrigation water is only responsive to price levels that are generally incompatible with equity considerations, as they would substantially reduce farmers' profits.
- *Support investment decisions*. Valuing water can support decisions regarding investments in institutions, infrastructure, information and innovation to realise the full potential and values of water. Choices sometimes have to be made involving allocation of water that is currently available and expansion of supplies through new infrastructure. When the value of water use exceeds the cost of its supply, supply-augmenting investments will pay off. Benefits and costs, however, are not always received and covered by the same actor; some investments would not be considered productive if one actor had to bear all costs. A classic example hereof is the public benefits derived from food security and cheap food for urban centres, which may substantially outweigh the private economic benefits of irrigation to farmers. The challenge for valuing water lies in providing a common structure and method in which such disparate values across scales and economies can be accommodated.

Although potentially very useful in theory, valuing water is complex and demanding in terms of the expertise, time and data required. This hinders its widespread application (FAO, 2004). As a result, some of the roles valuing water can play are still academic. To advance beyond this stage, there is a need to reflect on the main practical challenges and the risks associated with them.

Practical challenges of valuing water and the associated risks

This section discusses five main practical challenges of valuing water and the risks associated with them (Table 2). Practical challenges are not only derived from the literature, but also from practical experiences of the authors, for instance, experiences with respect to different conceptualisations of water productivity indicators (Hellegers *et al*., 2009), shifts in perspectives (Van Halsema & Vincent, 2012) and also experiences with respect to challenges regarding the comprehensiveness of valuation frameworks (Hermans *et al*., 2006). The political nature of commensuration to produce one overarching valorisation framework is described in Hellegers & van Halsema (2018). Consequences of not considering externalities in water reallocation reform decisions can be found in Hellegers & Leflaive (2015). Also, experiences with transboundary water management have informed this study. Work by Siderius *et al*. (2016) showed, for instance, that strengthening intra-basin cooperation in the Nile Basin via food trade seems to be a better strategy than the unilateral expansion of upstream irrigation, as the latter will reduce hydropower generation and relocate, rather than increase, food production. This is a typical weighing of economic values against societal needs at different geographical scales.

Table 2. Practical challenges of valuing water and the associated risks with some proposed ways of factoring values into decision-making.

Practical challenge	Risk	How to factor values into decision-making
Conceptualisation and shifting priorities	Decisions are based on disputed values and rapidly become out-dated as circumstances and priorities change	Introduce regimes that can be adjusted to shifting priorities and circumstances and to new negotiation outcomes
Comprehensiveness	Decisions are based on partial values	Use an inclusive valuation framework to support a political bargaining process
Commensurability	Decisions are based only on monetary values	Set priorities according to a development strategy and use an inclusive stakeholder process for dealing with intersecting and overlapping value systems
Externalities	Decisions are based on imperfect values	Limit the role of water pricing and water markets
Globalised economies	Decisions are dominated by agricultural and trade policy	Address globalisation challenges more holistically

Zwarts *et al*. (2005) also showed that dams in the Niger Basin have mixed effects. There are additional electricity and agricultural benefits, but the indirect loss in fisheries, livestock and biodiversity downstream dominate these direct revenues. The population of the Inner Delta experiences a significant decline in per capita income with an increase of the number of dams, whereas the per capita economic benefits of the Upper Niger population show an opposite relationship with the number of dams.

The first challenge is that undisputed values are hard to achieve and subject to change. Indeed, values of water are extremely context-specific, and circumstances and priorities shift. They vary by region, stakeholder and over time, and are difficult to quantify precisely because different stakeholders conceptualise and describe them differently (Morgan & Orr, 2015). In agriculture, for instance, the growing focus on water valuation has led to the development of various water productivity indicators to assess whether water is being used in a beneficial way. Outputs are typically expressed in terms of yield per unit of water or in a monetary value per unit of water. Social benefits of agricultural water use are also receiving increased attention, with indicators such as nutritional value per unit of water (OECD, 2015) and employment per unit of water (Hellegers *et al*., 2012). Many large-scale irrigation schemes have been established more to address food security and poverty targets than to pursue direct commercial returns per unit of water (Famine Commission, 1881; Plusquellec, 2002). Such differences in conceptualisations of beneficial water use explain disputes about values. This means that valuing water cannot be perceived as an objective or neutral way to put a value on water. Moreover, values are unstable, with variability due not only to shifting political priorities but also to changes in demand and availability, linked, for example, to climate change and economic development.

The second challenge is that valuations are invariably hampered in comprehensiveness. The productive value of water can often be expressed in monetary terms. This aspect generally receives the most political interest in many regions, as economic development is important, at the expense of environmental and social values. The risk is that water will be allocated to uses with the highest production values, bypassing other key criteria. The challenge is to foster equity in access and ensure that, in addition to productive values, non-monetary and non-economic values of water are considered. An inclusive valuation framework should be comprehensive and encompass problems of economy, ecology and society at different geographical scales. Valuation frameworks that recognise environmental

and social values as separate values alongside economic ones can be a worthwhile complement to economic valuation frameworks. As valuation frameworks are seldom comprehensive, multi-objective decision-making is often based on partial value estimates.

The third challenge is the commensurability of values. The values of water reside in a number of dimensions, spanning the economic, cultural, spiritual, emotional, aesthetic and environmental. These are not all measurable by the same standard, which poses a challenge. It is furthermore unclear how these values can best be articulated – for example, in monetary terms or in political preferences or in some other metric – and whether they could be made commensurable. Expressing all value components in a common unit, such as monetary amounts, as attempted in studies of TEV, could put unnecessary limitations on water valuation, suggesting that achievement of all objectives can be meaningfully measured by a common denominator. However, some social objectives, like food security and social equity, may be considered paramount regardless of the virtual monetary value assigned to them. Valuing water needs to bring explicitly together the public and private values of water. As these are intrinsically different in value and scale, it is difficult to bring these together using a common denominator, typology or methodology. From a policy perspective, this is not necessary – as long as both are explicitly accounted for and weighted on their merit, they can guide explicit decision-making and negotiated priority setting. Commensuration is a political act since it transforms the categories people use into values and represents what is meaningful to them (Nelson Espeland & Stevens, 1998). It redefines the terms of the debate. Thus, valuing water is ultimately a political process, even when done as 'scientifically' or as 'rationally' as possible.

The fourth challenge is the difficulty of accounting for all externalities at the various scales, due in part to the fifth challenge, which is the global interlinked economy. Water valuation is inherently complex, due to various unintended consequences of water use on third parties, the so-called externalities. Assessments of potential impacts on third parties, such as social externalities and the impact of water use on ecosystems and other geographical areas, are often lacking, which means that the values derived are often imperfect. Though all water is used locally, impacts cascade across geographies (Dalin *et al.*, 2017). Unsustainable patterns of water use at a local level can affect social stability, with regional implications (such as during the Arab Spring) and ultimately manifest at a planetary scale.

Regarding the global interlinked economy, people around the world share and exchange water directly and indirectly through natural hydrological systems and through, for example, the global food trade (i.e., virtual water). Water problems, however, are not addressed on a global scale. In this, water is unlike, say, carbon dioxide emissions. But in valuing water, how can we account for the dependence of globalised economies on distant water resources that are affected by economic activities at home? It is a big challenge to link the urgency expressed at the global level to local action and achieve the scale of effort required, especially since agricultural and trade policy as well as geopolitics often determine what is produced where.

It has become clear that undisputed, comprehensive, commensurable and perfect valuation across various scales is hard to achieve, due to analytical complexity and complexity caused by the involvement of different stakeholders across spatial scales in the decision-making process. In the face of such diversity, the question then arises as to how useful can valuing water be in practice?

How diverse values can be factored into decision-making in practice

This section discusses how diverse values of water can be factored into the decision-making of various stakeholders, with different intersecting and overlapping value systems. Because values are often

disputed and unstable, it is important that decision regimes be adjustable to reflect shifting priorities and physical circumstances as well as the outcomes of new negotiations at the least cost to society (Hellegers & Leflaive, 2015).

The value of water is taken into account with various degrees of comprehensiveness and effectiveness, but ultimately decisions are made in a political bargaining process. In such a process, pros and cons of alternative options are weighted, priorities are set, and winners and losers make their cases heard. Financial considerations are, according to Savenije & Van der Zaag (2002), only part of the analysis, and seldom the main consideration. Even when allocations are based on market mechanisms, it takes a political process to set the rules for whom can take part in the transactions and under what conditions.

In practice, it is difficult to define a socially optimal allocation strategy that encompasses all water values, as different value systems intersect and overlap. Equity, for instance, is a normative concept with no universal definition; what one person views as equitable may not be considered equitable by someone else (Hellegers & Leflaive, 2015). Consensus on priorities may seem a very distant horizon. Water decisions truly appear to be at the nexus of ethics, public policy, nature, values, beliefs and rationality (Priscoli, 2012). It is recommended that valuing water be used as an intrinsic part of a multi-stakeholder process to jointly reach a certain level of agreement on the management of water resources within the set priorities of a development strategy. This is consistent with the way allocation works in practice, as development strategies often set explicit priorities for water allocation. Most countries acknowledge some kind of national security objective that must be met; then, domestic uses, and sometimes the needs of livestock take precedence over either agricultural or environmental needs (OECD, 2015). A multi-stakeholder process, helping those involved to express their values and jointly reach a certain level of agreement on the use and management of scarce water resources (see Hermans *et al.*, 2006), is then a good approach to deal with overlapping value systems.

When there are various unintended consequences of water use, market-clearing water prices and water markets can play only a limited role in water resource allocation. Water markets can operate within the realm of private goods without unintended consequences, but not across the realm of public benefits. The latter requires safeguarding through explicit and targeted regulation. This would imply that water markets can only operate within a tightly regulated trade-space, in which public values are secured through regulatory rules. In times of crises (e.g., the Cape Town water crisis or 2008 financial crisis), the latter often turn out to be left wanting. A comprehensive valuing of water seeks to forestall such crises by imposing public safeguards for public values. Water markets are only desirable if their outcomes do not conflict with underlying value systems. This means that they must take adequate account of, for example, ecosystem needs and social externalities such as stranded populations and reductions in return flows. This is generally not the case. Water prices can play a role in achieving social goals if their design is guided by overarching social values. Urban block-rate tariff systems can, for instance, be designed in a stepped manner to achieve both welfare goals of access as well as efficiency and conservation objectives. It is also possible to cross-subsidise water supplies for social purposes where there are problems of affordability and access.

Despite the need to address globalisation challenges more holistically, discussions about global water governance (GWG) have been limited, as it is difficult to make consumers accountable for their water use in other catchments. Those water governance studies that have taken a broader perspective have focused largely on transboundary water resources. Global governance has been addressed within other, more prominent global governance challenges (notably climate change and energy) and within

discussions on global development objectives (Tropp, 2007). Pahl-Wostl *et al*. (2008) defined GWG as 'the development and implementation of norms, principles, rules, incentives, informative tools, and infrastructure to promote a change in the behaviour of actors at the global level in the area of water governance'. GWG should facilitate interaction and dialogue among key stakeholders to inform the development of solutions to problems at the local, national and regional levels to ease global pressures (Colley *et al*., 2013).

Discussion and conclusions

In this paper, we reflected on the essence of valuing water in practice. Decisions about water management and allocation depend on the perspectives they are taken from. The alterations made in water valuation methods and frameworks over time, we argued, are traceable to changes in perspectives with which water is valorised. Valuing water has long been the domain of economists who have developed methods for quantifying the monetary value of water-related goods and services. But as wider scopes and concerns on how water affects the well-being of society entered the fray of valorisation, it has become increasingly clear that decision-making should be more concerned with weighing diverse values of water, rather than establishing one commensurate value. Valuation then should no longer be solely targeted, in our view, at value determination (which becomes inherently difficult as values become disputed, partial, incommensurable and imperfect), but more towards offering a structured and transparent mechanism that supports a multi-stakeholder process. This is in line with the view of the World Economic Forum (WEF, 2014, 14):

> '*[A] structured review of the values that govern the priorities of the community or society concerned can help … chart a course … In such endeavours, it is important not to conceal complexity or to seek simplistic solutions to complex problems: a systematic approach is useful.*'
>
> '*[O]ne element of such an approach is to develop an understanding of the importance of the different values that are attributed to many dimensions of water and its use by different groups in a society.*'

As many participatory processes mask abuses of power and inequity, a more politically explicit process, such as water diplomacy, may be wanting. Valuing water helps herein to make the stakes explicit for society at large as well as for individual stakeholders (Hellegers & van Halsema, 2018). This can become a key tool for water diplomacy, for instance, in transboundary water management initiatives.

So, the key role of valuing water lies not so much in its numerical assessment as in the process it offers to engage stakeholders across different perspectives and interests of water use. Water valuation can play a key role in making explicit the trade-offs intrinsic to decision-making and priority setting, especially when it concerns societal needs. Safeguarding public values are ultimately political processes and political decisions. Valuing water cannot absolve policy or society from this task – what it can do is to provide a framework to make explicit both the public and the private values. As public and private values of water are intrinsically different in value and scale, it is difficult to bring economic values and societal needs together using a common denominator, typology or methodology (as commensuration is a political act). From a policy perspective, this is not necessary – as long as both are explicitly accounted for and weighted on their merit, they can guide explicit decision-making and negotiated priority setting. Such a framework – for instance, based on a quick-scan – can compare the scores of different

development strategies on a number of criteria, such as food security, food sovereignty, equity and environmental impact.

The economic value of water can only be as great as the foregone benefits to society one is willing to consider. Thus, an ecological oriented framework might yield a high monetary value for coastal mangroves (as the TEV of coastal protection against tsunamis may be considerable); yet, when offset against the potential benefits of cheap food supply to urban centres (i.e. avoidance of the costs of food riots), the economic balance may easily change or be nullified. Rather than trying to commensurate these dispersed services into one valorisation value (and framework), we see more merit in a structured approach that is geared towards making explicit these dispersed values of water to society and accounts for them explicitly in a weighted decision.

Water allocation cuts across multiple stakeholders and multiple sectors – each of which may have their own valorisation framework (whether social, political, economic and environmental). Stakeholder-based valorisation is thereby geared towards explicitly accounting for differing valorisation frameworks of stakeholders. Resulting valorisations consist of multiple values based on multiple valorisation frameworks. This has two advantages to offer: (i) it may reveal differential strategies to address different values and stakeholder valorisation objectives (in contrast to one optimisation strategy of a singular valorisation); (ii) it sensitises the valorisation process to trade-offs between different values, stakeholders and sectors that may occur from the pursuit of single value optimisation. Explicitly accounting for divergent interests and values in this way may not eliminate the power equation from water allocation issues, but it will force valorisation and allocation choices to be made more explicitly (instead of becoming hidden in an optimisation of one encompassing overall value), and thereby, hopefully, there will be more accountability for the choices made.

The ultimate role of valuing water may be to reframe a water resource management problem as a multi-stakeholder decision-making process, rather than as an economic optimisation problem. A decision that impacts water is, in practice, a political bargaining process, in which the globalising challenges could be addressed more holistically. This may contribute to the prevention and resolution of water-related disputes around the globe. Valuing water can even become a key tool for water diplomacy, as, through it, stakeholders at multiple levels of governance can jointly negotiate a certain level of agreement on water management.

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