



Rethinking the global water challenge through a common good lens

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Contents

Abstract	4
1 Introduction	5
2 The economic governance of water	7
2.1 Water as an economic good	7
2.2 Water as a function	8
2.1.1. Water as a public health service	8
2.1.2. Water as a production resource	10
2.1.3. Water as an ecosystem service	11
3 Beyond market failure: water as a common good	13
3.1 Purpose and directionality	14
3.2 Co-creation and participation	16
3.3 Collective learning and knowledge-sharing	17
3.4 Access for all and reward-sharing	18
3.5 Transparency and accountability	19
4 Conclusion	21
References	22

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Abstract:

The hydrological cycle has become unstable and requires a new approach to governance. This paper makes three points. First, countries are globally interconnected through the hydrological cycle and anthropogenic impacts are causing it to destabilise. Second, the response of countries must be economy wide and systemic as all sectors of the economy are critically dependent on water. Third, tackling the water crisis requires collective action as no one country or region can combat the problem on its own. The paper suggests that conceptualising and governing water as a common good offers a productive framework through which the response to the water crisis can be (1) global, (2) economy wide and systemic, and (3) rooted in collective action. It argues that doing so requires going beyond existing economic goods scholarship and thus expanding the notion of water as either a public good, a private good or a common pool resource.

Keywords:

Water Economics; The Global Hydrological Cycle; The Common Good; Market shaping

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1. Introduction

The global water crisis is now more present than ever before: countries and regions either have too much water, too little water or their water is too dirty (GCEW 2023). Water-related disasters such as droughts, storms, floods and extreme temperatures have already directly killed around two million people in the last 50 years, mainly in the Global South (Mohanty et al. 2020; WMO 2021), and 700 million people are at risk of displacement by 2030 (HLPW 2018). Four billion people – almost two-thirds of the world's population – experience severe water scarcity for at least one month each year, while over two billion people live in countries where the water supply is inadequate and half of the world's population could be living in areas facing water scarcity by as early as 2025. What is more, unsafe water sources are responsible for over one million deaths each year (Ritchie et al. 2019). It is time to embolden our response to the global water crisis and think about this challenge more holistically.

First, the water crisis is a global challenge. While socioeconomic characteristics, such as gender, income, race and geopolitical location, impact the forms of water challenges that individuals and communities face and how they are addressed, the threat to the stability of the hydrological cycle is universal. The hydrological cycle is connected in nature, but human activities such as deforestation, land degradation, infrastructure development, and energy and food production are increasingly destabilising the environmental conditions that are sustaining the cycle across the planet (Steffen et al. 2015). Deforestation in one region impacts rainfall patterns in neighbouring regions (Rockström et al. 2023). For instance, irrigation crops in India increase water flows in the Yangtze River in China as the moisture evaporated from crops is transported to that region (Wang-Erlandsson et al. 2018). Changes to the global hydrological cycle and the resulting extreme water-related crises illustrate the ways in which communities and countries are interdependent. Thus, a siloed approach to governing the global water challenge is likely to be ineffective (Rockström et al. 2023).

Second, the response to the global water crisis must be economy wide and systemic, because water cuts across all sectors. Water also cuts across all SDGs. While water as a service has its own dedicated goal in SDG 6 – 'Ensure availability and sustainable management of water and sanitation for all' – it is also crucial for SDG 1 (no poverty), SDG 2 (zero hunger) and SDG 8 (decent work and economic growth).¹ Most economic activities, and thus livelihoods, depend on water-related activities, although at the same time they contribute to water pollution. For example, globally, the agriculture sector consumes around 70% of total freshwater withdrawal (Gleick 2011), while also discharging large quantities of agrochemicals, organic matter, drug residues, sediments and saline drainage into bodies of water (Matro-Sagasta et al. 2017). Similarly, the textile industry is responsible for 20% of global clean water pollution from dyeing and finishing products, and 10% of harmful environmental impact in the EU. This is predominantly felt in low- and middle-income countries where most of the textile production takes place there (Šajin 2019). In short, water challenges cannot be tackled by a 'water sector', they must be addressed in a cross-sectoral way. Despite water being intricately connected to other social and environmental priorities, it has been governed in a siloed way. The fact that all industrial sectors and different economic actors (consumers, producers, distributors) use water means that tackling our water challenges requires a holistic approach that brings equity, efficiency and sustainability to every water solution.

¹ It has also been shown that much violence against women and girls happens when they are fetching water far from their homes, which links to SDG 5 on gender parity (UNICEF/WHO 2023).

Third, the water challenge requires collective action not only through economic activities, but also institutional, governance and social action to create consensus on how to pool the efforts of states, development banks, businesses and local communities to promote an equitable and sustainable approach to our global water challenges. Collective action is needed to foster an outcomes-oriented approach based on partnerships and shared responsibility, and informed by collective intelligence, to move away from the current siloed approach to governing water (GCEW 2023). We cannot address transboundary water challenges by only transforming the economy, we need a deliberate inclusive approach to the co-creation of water solutions.

However, the absence of a comprehensive approach that recognises all three points when addressing the water crisis will persist unless there is an underlying economic theory substantiating and guiding such efforts. As this paper shows, the literature on the economics of water has been limited in two ways. On the one hand, economic goods scholarship has been the primary resource for determining responsible actors, limiting the state's role to a market-fixing one and neglecting the need for more ambitious governance. On the other hand, water has three separate functions, which require more efforts to offer a holistic and outcomes-oriented governance framework capable of recognising water's economy-wide implications. Importantly, the former constraint has significantly determined which actors are deemed responsible within each function, compounding the limitations of both.

While recognising the benefit of conceptual classifications and simplifications, this paper's goal is to offer an approach potentially capable of unifying the disparate perspectives on water and in this way creating synergies between the benefits of each literature. To do so, the following sections unpack the global water crisis to demonstrate the different priorities and limitations of existing economic approaches. Section 2 outlines the two main ways in which we have understood water – as a human right and as an economic good. Section 3 digs into the three main functions of water – as a service, as a resource and as an ecosystem service – explaining how economic goods scholarship has dominated the conceptualisation of these functions. Section 4 then introduces the economic of the common good, which can help to govern water in a more outcomes-oriented way.

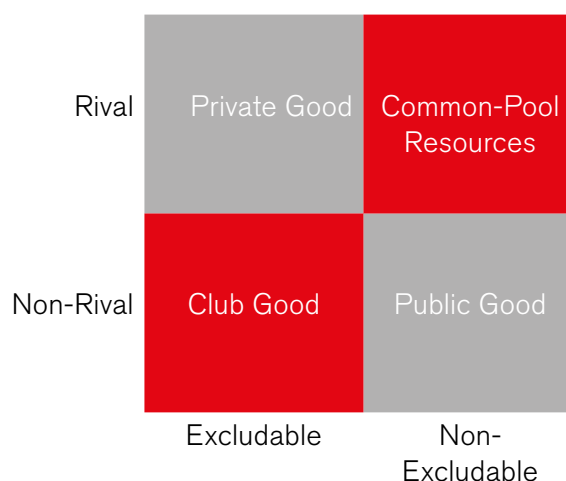
2. The economic governance of water

The contemporary failure to meet the basic human need to access safe and clean water has prompted some researchers to approach it through a human rights perspective and others through an economic perspective. While the former is important, current regulatory frameworks and laws are not able to operationalise and administer the human rights principles to water, so this paper focuses on the latter to potentially promote the symbiotic partnerships between all stakeholders needed to realise this human right, discussing on the two dominant approaches through which the economics of water has been approached: 1) water as an economic good and 2) water as serving one of three functions.

2.1. Water as an economic good

Water was recognised as an economic good in 1992 under the fourth Dublin Principle: 'Water has an economic value in all its competing uses and should be recognised as an economic good.' The Economic Co-operation and Development (OECD) also defined it as such based on the premise that there are scarce economic resources needed to make water available (quality, time, location) (OECD, 1987). Importantly, defining it as an economic good does not imply that it should be privately provided (Opschoor 2006). Indeed, economic goods scholarship assigns different actors varying roles in the provision of water based on two criteria: the excludability and the rivalry of the good as illustrated in Figure 1 (Hess and Ostrom 2003). The former is the ability to deny non-payers from accessing a good or a service without incurring additional costs. The latter refers to a scenario where the consumption by an individual prevents the consumption by others.

Figure 1. The four types of economic goods or the economic goods quadrant



Source: Hess and Ostrom 2003

Goods and services that are excludable and rival such as consumable goods (food) or buying a house are **private goods**. In contrast, goods and services that are non-excludable and non-rival, where the provider would incur extra costs to exclude non-payers from using it and using it does not subtract it from other users, are **public goods**. Partially non-rival but excludable goods where the subscribers of a service jointly use it while excluding non-payers (for example

cable TV, shared gated sanitation facility) are considered **club goods (toll)**. The fourth form is **common-pool resources (CPR)**, which are non-excludable, but rival and therefore require collective governance, such as using a groundwater reservoir or extracting oil.

Drawing on the economic goods quadrant (Figure 1), market failure theory (MFT) explains the categorisation of water as a public good, with the existence of positive and negative externalities as consequences of market failure that governments need to address (Arrow 1951). Here, positive and negative externalities capture the benefits or costs of a third party that are not reflected in the market price and are positioned as requiring public intervention and regulation. To be more specific, public goods with positive externalities are characterised by underinvestment as their high spillovers create difficulties for appropriating private returns. The opposite happens when there is too much investment in goods that have negative consequences, such as investment in areas that cause pollution or damage to public health. Such negative externalities require public measures that prompt the private sector to internalise those costs, for example a carbon tax to cut emissions or a tax on cigarette purchases. Such market failures in the form of externalities are considered to arise in cases of information asymmetries, transaction costs and frictions to smooth exchange.

The limit of public good concept is that it treats some of the most systemic problems in global capitalism (for example climate change and inequality – or having too much water, too little water or water that is too dirty) as externalities and the results of failures of an otherwise perfect system, rather than questioning the structures underlying the market system itself (Nelson 2022). It frames public investment as the need to correct for a gap in private finance. This conception of the state as a market-fixer has led to the idea that governments are not supposed to steer the economy, but only enable, regulate and facilitate it (Mazzucato 2021a). Further, subsidising public goods and assuming that other stakeholders, including the private sector, will be incentivised to fund the other elements, does not work since it does not guarantee demand for the service nor returns on investments for the private sector (Zaqout 2023). Besides, water-related externalities (for example water security) are not merely a market failure impacting a third party; the market failure impacts generations as those failures alter and destabilise the hydrological cycle, as Kaul et al (1999) recognised in their concept of the global public good, which accounts for the temporal and geographical limitation of public goods, as discussed in the following sections.

2.2 Water as a function

The second approach to the economics of water has looked at the function it serves. While this perspective adds another conceptual level, it maintains a connection to the economic goods framework discussed in the previous section. Specifically, the classification of water as one of the four economic goods has significantly influenced the conceptualisation of its three primary functions – public health service, production resource and ecosystem service – and the government's role in securing them. The conceptual bind between these two approaches has resulted in a constrained foundation for comprehending the global water crisis and the governance it requires. This section critically explores the conceptual entanglement between the traditional economic goods perspective and the functional dimensions of water, setting the stage for a more nuanced discussion on transcending these limitations in section 4.

2.1.1. Water as a public health service

Water, sanitation and hygiene (WASH) is a set of services essential to public health and the general societal and environmental wellbeing (United Nations 2016). Considering the excludability and rivalry of accessing WASH infrastructure, the service is often categorised through the lens of the economic goods quadrant (Figure 1).

Water and wastewater networks and treatment are public goods, since one household subscribing to the network does not disqualify others from subscribing to it. It is also non-excludable, as banning non-payers from connecting to it would be costly. Some services that are inherently excludable or rival, such as a household connection to a sewer network, can be classified as public goods because of the non-excludable and non-rival positive externalities attached to it, such as public health gains and environmental protection (Andres et al. 2019; Walsh 1995). In 19th-century London, WASH services were offered through the private market (a private good) as a natural response to high-class home improvement demand. Nevertheless, the lack of WASH provision to the poor classes has impacted the general well-being of the city (economic and health externalities), which prompted the Sanitary Commission at that time to introduce the Public Health Act in 1848 and consider WASH throughout London a public good.

Categorising WASH services generally as a public good assumes high externalities and limited private sector participation as implied by MFT, therefore foregrounding the need for heavy subsidies to run those services, even at larger scales. Subsidies often undermine the operators' incentives to recover costs and promote efficiency. For instance, the water sector in Spain lacks incentives to recover costs since the sector receives EU subsidies. The Spanish water sector sets low tariffs compared to other EU countries and other sectors in Spain (for example electricity and telecommunications), which has made it dependent on diminishing EU funding as more countries joining the EU are eligible for those subsidies (AEAS and AGA 2019).

The classification of WASH services as public goods is further caveated by research that has questioned their non-excludable and non-rivalrous nature. Regarding the former, WASH facilities such as shared or public toilets, for example, can be considered club goods since they are somewhat excludable when a gate or lock is in place to prevent non-payers or subscribers from using them (Zaqout 2023). Being open to users beyond a household makes such goods partially a non-rival service, even though some users might significantly reduce the service quality for the next users, which is a phenomenon called 'congestion' (Cornes and Sandler 1986). Regarding the latter, CPR capture water resources, which are partially related to extending the water supply needed to deliver WASH services. Both the notions of club goods and CPRs are nested within a state failure notion where the state is a passive player in charge of facilitating the private and community-based collaboration to govern those goods through suggesting that non-governmental solutions are more innovative and effective than governmental ones.

Finally, some WASH goods are inherently **private goods**, such as bottled water and household toilets, where user demand stimulates private provision, especially since the externalities are marginal compared to public goods. From the 1980s to the early 2000s, several multilateral development organisations have promoted WASH as a private good and encouraged privatisation to supposedly bring 'fresh private investments' and stimulate competition (World Bank 1995). Privatisation appears to have worked in regions where the sector has previously benefited from state leadership and investments, such as France (Mehta 2003). However, private sector participation, in the form of management or finance, requires transparency and accountability to prevent free riding and abuse of monopolies. For instance, the French water sector, which is often cited as an example of successful water privatisation, has, in fact, been troubled by several national scandals due to the monopolistic control of the water market (Finger and Allouche 2003; Petrella 2001) and an increasing number of French public utilities are taking back control. For example, the city of Grenoble renegotiated its contract with Suez Lyonnaise des Eaux to increase its shareholding to 67.05 % so the city can override the company's objections to protect the public interests (Ibid.). Thus, the private good categorisation of WASH services has confused the roles of the private sector and the state in their provision, which potentially undermines the human right principle to WASH services.

Solutions to achieve universal access to WASH services are limited by the way in which they are repeatedly fragmented across the four types of goods (based on technical excludability and rivalry). In addition, universal access to WASH is often portrayed as a sectorial issue, but it is vital to recognise the interdependencies with other sectors who often disproportionately benefit from water resources, such as agriculture and energy (Butterworth and Soussan 2001). Equitable and sustainable risk and reward-sharing with other sectors is therefore crucial. The status quo does not make an effective economic case for countries and the global community to govern WASH services as a set of basic needs and these governance issues are equally prevalent when treating water as a resource.

2.1.2. Water as a production resource

In its original state, running in rivers, oceans and water aquifers, water is managed at a community, national or transnational level, and is governed through a framework of water resources management (WRM) which was improved to account not only for the economic dimension of water but also for the equity, health, cultures and traditions, and legal and human rights (McDonnell 2008). In this paper we do not provide a critique of this framework, but rather focus on how water as a production resource is conceptualised as an economic good. We use WRM to refer to water as a production resource and to distinguish it from the other two functions.

Water as a resource used for economic activities is predominantly considered an impure public good (Griffin 2006; Mehta 2003). Water is a rival good since users often ignore the effect of their water use on other users, for example in groundwater (overextraction by the upstream users directly impacts extraction capabilities for the downstream users) (Ibid.). The grey area of impure public goods means the role of the state as a market-fixer is poorly defined, as are the ever-changing and locally confined governance policies and regulations that govern it (for example water property rights and water markets).

The term 'public' in public good economic theory often refers to a local or national government or state, thus indirectly implying geographical boundaries, which does not address the temporal and geographical scale of the WRM challenge. Kaul et al. (1999) have conceptualised the notion of global public goods (GPGs) to account for public goods shared between countries, such as transboundary rivers. Kaul (2016) offers relevant policy recommendations that suggest the same role for the state as in public goods. Defining transboundary water issues as GPGs entails broad representation in key political decisions at the international level. However, this is currently not being achieved: there is no inclusion and participation, especially due to the imbalance between countries (wealth, leadership, coalition) and who gets to decide which goods are considered a global public good, especially when water scarcity arises (Desai 2003; Mehta 2003). A key critique for defining water as a global public good is that access to water and the impacts (positive and negative externalities) of consuming it are not uniform around a community, a country or the groups of countries sharing such a good (Ibid.). Therefore, governing the GPGs and the public goods' externalities may create conflicts among the concerned stakeholders.

Eleanor Ostrom (1990) has questioned the top-down approach of public good that relies on the state to govern water resources. Therefore, she coined the concept of CPRs to indicate a departure from market failure to state failure. She suggests grass-root collective action can organise and govern a locally shared water basin sustainably and equitably (Ostrom and Ostrom 1980). However, overly optimistic interpretations of collective action have been cautioned against, as competing needs and priorities, as well as power relations and authority, are often determined by local communities' multifaceted histories and politics (Cleaver 2000; Mosse 1997). For instance, in Merka, an Indian village, grass-roots governance of CPRs lacks equitable

and inclusive community participation since participation is dictated by the prevailing power relations constructed by gender, caste, class and religion, which could result in abuse of power and exclusion (Mehta 2001). Consequently, community elites monopolise water resources on the expense of marginalised community members. Scholars such as Obeng-Odoom (2016) and de Soto (2000) have also questioned Ostrom's approach to governing CPRs, arguing that her work does not promote just access and is only based on the notion of jointness of access. In addition, Ostrom has repeatedly endorsed private property rights (see Ostrom 2008) and markets to govern CPRs with little regard to the state, and this has made CRPs closer to being a private good than being a common.

Similar to the concept of public goods, researchers have expanded the geographical boundaries of CPRs and referred to the transboundary water basins as global commons, suggesting that all nation states have domestic interest to protect those goods (Nakicenovic et al. 2016). However, this is a simplistic view for both CPRs and the global commons, as it assumes homogeneous set of interests amongst different nations states, which is not the case since many water challenges are mostly localised and therefore the potential for bottom-up self-governance would fail (Herrfahrdt-Pähle et al. 2019).

2.1.3. Water as an ecosystem service

Water, in all its forms and across the hydrological cycle, plays a significant role in stabilising the planet. It helps circulate carbon and nutrients in the air and soils, and consequently regulates the planet temperature (Rockström et al. 2023). The growing pressures on the hydrological cycle due to climate change, blue water use and change in land use are undermining the reliability of water resources and causing severe threats to the prosperity of humanity. Water flowing (in the form of moisture and vapour) from land and vegetation partly regulates the hydrological cycle and influences future rainfall patterns, and therefore human activities that interfere with this (for example deforestation and agriculture) have a significant impact on water security, especially the green water evaporated from land, accounts for half of all global terrestrial precipitation (Tuinenburg et al. 2020). For example, despite the early warning issued by the Libyan national authorities, the heavy rain and flood in September 2023 in the country caused two ageing dams to collapse, affecting the lives of more than 800,000 in Derna and other cities, with more than 20,000 reported dead or missing (Al Jazeera 2023).

This overarching ecological function of water constitutes a non-rival and non-excludable good, making it a public good (Costanza et al. 2014; Griffin 2006); it cannot be considered any form of private goods since it does not offer exchange value (Daly 1998). Given its transboundary scale, it would be a GPG. Globally, no country acquires the moisture responsible for precipitation solely from within its borders (Gleeson et al. 2020). For instance, 25% of Brazil's green water travels to neighbouring countries, such as Argentina, Bolivia and Colombia, and therefore deforestation in Brazil would directly impact those countries (Rockström et al. 2023). Costanza et al (2014) suggest that the ecosystem services are a form of CPR. However, this is problematic as the regions impacted negatively by deforestation are not necessarily part of the governance system in that region and are only passive recipients of the negative or positive externalities (if any). Therefore, there is little space for collective governance, especially since there is information uncertainty as the environmental science community has yet to fully understand the dependencies among nations regarding green water and its role in maintaining regular rainfall patterns.

In the previous two sub-sections we mapped how the function of water as a service and as a resource represents blue, grey and black water. However, such conceptualisations fail to account for green and white water since human interactions with it are not as direct as with the other types. People directly consume blue water for domestic, agriculture and industrial

activities, and later produce grey and black water. Human beings have devised regulations, laws, contracts and technologies to govern those types of water, while the importance of valuing and governing white and green water are still neglected, despite their crucial interdependence with the other forms of water and the stability of the global hydrological cycle more broadly. Recent scientific advances have described the causal relationship between deforestation and changes in rainfall patterns (see, for example, Ruiz-Vásquez et al. 2020; Wang-Erlandsson et al. 2018), but this is still not accounted for in mainstream economics, due to the high ambiguity and complexity of the problem, and the changing nature of the challenge (extreme events of flooding and droughts happening in the same region).

3. Beyond market failure: water as a common good

Section 2 has shown how the categorisation of water as different types of economic goods has determined the role of the state, the private sector and civil society in the governance of its three functions. We argue that, as a result, the existing framework remains constrained by the notion of market failure and state failure, and thus fails to offer practical solutions that account for water as simultaneously 1) a global issue, 2) requiring an economy wide and systemic response, and 3) in need of collective action. The way in which policies have treated water distinctly depend on its function and economic good category, and this has made a systemic and holistic policy approach difficult. Table 1 summarises key limitations of these categories (Mazzucato 2022, 2023a).

Table 1. Economic goods and their limitations

	Scope	Focus	Limitations
Public good	National	State fixes market failures and provides non-rival and non-excludable goods	Oriented towards maximisation of private rather than collective interest; state regarded as market-fixing
Global public good	International	Global coordination between states based on over-exploitation and under-provision	Top-down with risk of democratic deficit; rooted in market failure framework
Commons and common-pool resources	Local	Communities govern resources as an alternative to the state vs. market dichotomy	Limited to the local level; implicitly assumes state to be weak

Source: Mazzucato 2023c

We propose shifting to a new economics of water that solidifies the three sub-functions of water as a common good that can be realised through an outcomes-orientated and market-shaping approach. Because markets are outcomes of how various actors and systems relate to one another, governments can use policy to shape such outcomes more deliberately (Evans 1995; Polanyi 1944). Market-shaping enables a bolder set of policy tools, providing a direction as opposed to a correction. Applying a common good framing to how economic activity is governed focuses on how objectives are set and met by foregrounding the design of collaboration between all value-creating actors to get there.

Viewing water as a common good creates opportunities to devise purposeful and ambitious solutions through collective intelligence, as well as designing the interface for collaboration – designing this in a pre-distributive way to get the relationships right between the public and private actors from the start, instead of having to pick up the pieces later in a redistributive way. The common good approach encompasses five pillars as shown in Figure 2: 1) Purpose and directionality can promote outcomes-oriented policies that are driven by public purpose; 2) Co-creation and participation allow citizens and stakeholders to participate in debate, discussion

and consensus-building that bring different voices to the table; 3) Collective learning and knowledge-sharing can help design true purpose-oriented partnerships that drive collective intelligence and sharing of knowledge (with particular care given to how property rights and other instruments are designed); 4) Access for all and reward-sharing can be a way to share the benefits of innovation and investment with all the risk takers – whether through equity schemes, royalties, pricing or collective funds; and 5) Transparency and accountability can ensure public legitimacy and engagement by enforcing commitments amongst all actors and by aligning on evaluation mechanisms (Mazzucato 2023c).

Figure 2: The common good



Source: Mazzucato 2023c

3.1. Purpose and directionality

The first pillar of a common good approach suggests that creating public purpose is not only about crowding resources, programmes and initiatives, but also about setting a clear direction (Mazzucato 2023c). Explicitly defining a direction towards which policies may be designed, public-private partnerships formed and citizens engaged is critical to shape the economy in the service of the common good. In other words, this pillar is about aligning multiple activities while crowding in willing actors towards a collective goal. At the heart of this pillar is public purpose and promoting human rights as the guiding principles. Water governance approaches to meet the different priorities and interests need to be designed equitably and evaluated against the societal and environmental values associated with water.

Tackling the diverse water challenges could be achievable by breaking them into missions with 'concrete targets' that can stimulate innovation with the involvement of different stakeholders and sectors (Mazzucato 2021a; Mazzucato and Dibb 2019). Missions put a focus on achieving a certain goal without dictating how to achieve it. For example, instead of promoting the use of a certain approach or technology focused mostly on increasing water use efficiency (such as virtual water trading), missions would stimulate the development of different solutions towards

not only increasing water use efficiency, but also with intentional directionality towards a goal beyond market metrics.

Lack of directionality has undermined the sustainability of investments and progress in the water sector. Outcomes from WASH and WRM are often short-lived or stagnant as they are performed in project-based activities in response to a certain challenge, without any established strategic vision for how to sustain the outcome and build on it. For example, Bangladesh succeeded in ending open defecation (a WASH public good), a chronic issue throughout the country, by raising awareness and increasing access to pit latrines through community-led total sanitation (Zaqout et al. 2020). This was an approach that had different outcomes depending on context and scale, for example the country subsequently faced a 'secondary' challenge of managing the faecal waste collected from pit latrines, which was causing serious public health hazards (Zaqout et al. 2020). Had the country set a long-term achievable strategy, the positive gains from ending open defecation could have been sustained and there could have been progression to universal safe WASH throughout the country. In doing so, it could have shaped the market to deliver fit-for-purpose faecal sludge collection, transport and treatment technologies across various actors throughout the sanitation value chain (industry, research, community-based organisations, public and private financial institutions), which could have been an integral part of Bangladesh's mission to end open defecation, instead of tackling it as pure public good.

The absence of an outcomes-oriented approach is evident in both WASH and WRM governance frameworks, as characterised by a bias towards investments in capital- and energy-intensive grey infrastructure, as well as a reliance on conventional business models (OECD 2023). While these approaches have met immediate needs, they have also given rise to various social challenges, such as migration and environmental issues, as documented by Auerbach et al. (2014) and Richter et al. (2010). These rigid solutions are ill-suited to addressing unpredictable water-related challenges and shifting priorities, including instances like the Cape Town 'Day Zero', which have been exacerbated by climate change (Hallegatte 2009; Milly et al. 2008). Emphasising large-scale and costly grey infrastructure has led to a narrow focus on accumulating assets. This approach is driven by a mindset centred on short-term outputs and targets, rather than longer-term outcomes for the public purpose. Even progressive solutions that prioritise environmental and social considerations tend to focus on adaptation and resilience (Cassin and Matthews 2021). It is imperative that governments and other development partners promote innovative solutions in the realms of WASH and WRM that prioritise public purpose, rather than merely reacting to current or impending crises.

The Orangi Pilot Project (OPP) focused on providing low-cost sanitation solutions in the Orangi settlement of Karachi, Pakistan, and stands as a notable example of proactive and outcome-oriented policies. By aligning its goals with the common good, the community mobilised its skills, raised funds and enhanced its capacities to develop an affordable and functional sewer system. The OPP, a non-governmental organisation that orchestrated and expanded this project to other regions, strongly emphasises that such initiatives need to stem from a collective interest in achieving objectives, rather than be stimulated by external donors (Zaidi 2001). In 1997 they notably rejected subsidies and actively lobbied to cancel a national-level Asian Development Bank (ADB) loan amounting to US\$ 70 million for the Korangi Sewerage project, asserting that well-defined goals and programmes that are fit for purpose take precedence over crowding funds (Ibid.). The OPP intentionally employed technology that aligned with the existing infrastructure, and local artisans and construction workers executed the project, ensuring that local knowledge would be capable of sustaining the operational needs of the sanitation system in the future. While the scale of this experience may be limited, it offers insights into how local governments can take the lead and create conducive conditions for innovative and sustainable

water solutions.

3.2 Co-creation and participation

The second pillar, co-creation, and participation, renders more explicit the stakeholders at the table, participating not only in the provision, but in the decision-making processes over what ought to constitute a common good. An emphasis on co-creation brings to the fore the human right principle of participation and inclusion, and promotes genuine interfaces between the public sector, the private sector and civil society to mobilise collective intelligence. It not only offers an opportunity, but also promotes the necessity of involving stakeholders in determining a collective orientation. In this way, the principle advocates an environment that allows everyone to participate and contribute to society.

In the realm of water management, various governance models exist, which can be categorised as follows: (1) purely public ownership and management involves the complete ownership and operation of water resources by government entities; (2) public ownership with delegated management involves public ownership of water resources while delegating management responsibilities to the private sector through leasing or concession agreements; and (3) purely private management with independent public regulation involves water resources being managed entirely by private entities, but operating under the oversight of independent public regulatory bodies. In the case of Chile, water is treated as a purely private commodity and is traded within a free market framework with minimal regulations. In contrast, many other regions view water as a public good that can be managed within a regulated private market to safeguard the interests of users (Bauer 2004). In the UK, for example, the issue of water governance has resurfaced recently in response to challenges such as the mounting debt of Thames Water (exceeding £14 billion), aging infrastructure and environmental degradation, all while private shareholders accumulate wealth. The government is contemplating the possibility of temporarily bringing the company under public ownership and some authorities, such as Oxford City Council, have even advocated for the re-nationalisation of the sector (ITV Meridian 2023).

Partnerships between the public and private sectors around water governance often fall short of establishing symbiotic relationships and fostering collective value creation, as noted by Mazzucato (Mazzucato 2018b). Furthermore, the prevalent approach in mainstream economics has tended to confine the role of the state to merely levelling the playing field for the private sector. States have a pivotal role to play in nurturing partnerships with a diverse array of stakeholders. Additionally, civil society must actively engage as a legitimate and essential stakeholder in addressing the multifaceted challenges related to water. This engagement is crucial to acknowledge the intrinsic social value of water beyond its purely monetary worth, an aspect underscored by WWF (Morgan and Orr 2015). Meaningful involvement with civil society is critical, given the capital-intensive nature of significant water investments and services, which limits the ability of communities to respond effectively. As Hirschman (Hirschman 1978) suggests, when dissatisfied with a service provider or investor, activists may choose to either voice their concerns while remaining engaged in the hope of effecting improvements or exit from the organisation to seek alternatives elsewhere. In the case of the water sector, which is largely monopolistic, society often faces challenges in seeking alternative providers or investors and may lack the financial means to devise alternative solutions, particularly in networked or catchment-based systems.

Co-creation is also needed between WASH, WRM and ecosystem services actors and institutions. National, regional and international policies and financial architecture to address those issues are siloed and lack coordination, let alone collaboration and partnership. Bringing different voices to the table to set purposeful collaboration is critical and must be built in accordance with the understanding of water as a fundamental human right. The different sub-

sectors concerned with water-related challenges need to embrace their interconnection and interdependency throughout the hydrological cycle, and ensure that solutions and innovation are steered in the right direction to prevent creating additional problems. For example, the construction of the Three Gorges Dam on the Yangtze River in China, the world's largest hydropower project at the time, had catastrophic consequences, such as displacing around 1.3 million people as its reservoir submerged 13 cities and 466 towns (Stone 2011), in addition to many environmental, ecosystem changes and public health concerns. In 2003, the mitigation efforts cost China around US\$26.45 billion (Ibid.). Siloed efforts across the sectors are arguably due to siloed learning and knowledge creation, resulting in isolated views on what constitutes collective value and how to create it, as described earlier.

An evaluation for 13 watershed investment programmes in the United States reported that the participation of various stakeholders, including private and public investors, land conservation organisations, regulators, public outreach groups, technical experts and land owners, was key to building bridges between water at the consumption point (through water utilities) and the source (conserving forests and its role in conserving green water) in order to promote sustainable approaches to water management through nature-based solutions (Ozment et al. 2016). Each stakeholder fulfilled specific needs important to the success and longevity of the programme. For instance, in Maine, the Portland Water District did not have experience of working closely with landowners and relied on the support of public outreach groups to ensure their buy-in, especially since the programme was voluntary (Ozment et al. 2016).

3.3. Collective learning and knowledge-sharing

The third pillar foregrounds the need for the common good to be achieved through processes of collaboration and collective learning. Despite the urgent need to address the multitude of water challenges, the water sector is far behind in knowledge-sharing and collective learning, which is essential to scale innovation (Matheson 2013; O'Callaghan et al. 2021). Innovation is inhibited in the water sector due to the nature of its infrastructure, such as its durability, capital intensive, regulatory, systemisation and environmental impacts (Markard 2011). Other barriers include the short-term planning and budget constraints, lack of innovation management skills and institutions (Albury 2005), and the need to further understand and assess investments risks when scaling water technology innovation from decision makers (Lieberherr and Truffer 2015).

Governments need to work closely with other stakeholders to shape and govern innovation for the water sector and align it towards a clear goal (Mazzucato 2018a, 2021b, 2023a). This can entail addressing opportunities and the shortcomings of the patent system in driving innovation and knowledge-sharing (Mazzucato 2023a). Implementing and adapting new innovations is also a challenge. A survey for wastewater managers in California showed that water utilities face barriers such as financing, risk aversion and regulatory compliance when adapting new technologies (Kiparsky et al. 2016). Those barriers led managers to believe that 'in spite of its importance, innovation has limited short-term relevance.' Although it is a utility-level survey, it poses the question of whether this is the normative for innovation in water in different institutions of a larger scale (Ibid., p.1213). Innovation in the water sector inherently has weak incentives or even 'counter-incentives to innovation' due to the public good nature of the innovation (Hartley 2005), that often lack competition and profit maximisation (Tidd and Bessant 2021).

Beyond innovation, sharing information and metrics related to water risks and their relationship with other wicked issues, such as biodiversity degradation and climate change, is needed to break the silo, and unlock investments and finance from other sectors. The dynamic nature of water as a 'good' requires collaboration between the public and private, civil society, and different sectors and disciplines. This is vital as emerging issues like climate change are

undermining the financing of water-related programmes (Linkov et al. 2019). Businesses are increasingly asked to disclose their financial risks associated with nature and climate, such as the Taskforce on Nature-related Financial Disclosure or the Taskforce on Climate-related Financial Disclosure (Kedward et al. 2020). Although this is a positive step to understanding water-related investment risks, it is mostly centred around protecting private investors and is driven by this pillar of the common good rather than promoting accountability to the global community impacted by the activities of those businesses. This is also important in shaping contracts such as PPPs and allocating risks between the public and the private sector. The following pillar expands more on the issues of risk- and reward-sharing, beyond those related to knowledge governance.

3.4. Access for all and reward-sharing

Governing the economy for the common good means that the conditions must be correct in the first place, without over-relying on the taxation system to redistribute problematic forms of wealth creation that create structured inequities. Creation and distribution must be seen as two sides of the same coin. The fourth pillar emphasises that new thinking is required for the ability of public institutions to share not only the risks, but also the rewards. A balanced risk-reward relationship is not only about redistributing ex post, but also about proactively ensuring a fair distribution from the outset – in a predistributive way (Mazzucato 2018a; Mazzucato and Perez 2023).

Current practices have failed to consider the interconnectedness of water across its different economic, political, social and spiritual values, and its three sub-functions. For example, treating water as an input for agriculture and industry often dismisses its other functions (as a basic service and ecosystem function), leading to undervaluing it as a finite resource, overusing it and undermining the stability of our ecosystem. This is evidenced by the fact that the portion of global water for agricultural use is more than 70% of the available fresh water, while millions still lack basic access to water. Unequitable access to water is arguably due to the continuous pressures to commodify it and the calls for unregulated private property rights for water. Water commodification is also perpetuated by the tension between water for cities versus water for rural areas (Finewood and Holifield 2015). In 1995 the World Bank suggested that a solution for water scarcity in Morocco would be to privatise to ensure more water goes to the growing cities (Finger and Allouche 2003). The water sector is troubled with private sector monopolies (though facilitated and sometimes supported financially by the state), leading to an abuse of power due to the weak implementation of regulatory measures.

As water is expensive to transport, it is instead virtually traded through other water-intensive industries, such as agriculture, textiles and energy production. The virtual water trade is a concept Allan (1993) introduced to account for traded water embedded in food products. The concept prioritises water use efficiency (and comparative advantage between countries), so that water-rich countries cheaply produce and export water-intensive food to water (ibid.). The concept mainly uses water accounting with an appreciation of the virtual water trade's social, environmental and political costs (Roth and Warner 2007; Xu 2018). It rarely addresses the opportunity cost for the economies of the exporting countries and is yet to account for the impact of such trade on the global hydrological cycle. In addition, laws, policies and contracts in place often do not promote equitable risk- and reward-sharing in virtual water trading. This stems from the heterogenous water property rights between the exporting and importing countries. Countries with weak property rights have been found to export more water-intensive products, even in water-scarce regions (Xu 2018). Weak property rights often result in the under-pricing of water and there needs to be consideration of opportunity costs, and the social costs of intensive water extraction and consequently overusing it (ibid.). Although it is an ambitious ask, deriving standard pricing and water property rights is critical to promoting

equitable risk, reward-sharing and environmentally sound virtual water trading.

As evidence of how human activities are interconnected and increasingly putting the hydrological cycle at risk, it is now more important than ever to devise policies that link communities, nations and their institutions together as a starting point to promote access to water for all, while ensuring equitable risk- and reward-sharing. Countries suffering from extreme droughts and flood events due to the behaviour of neighbouring countries can benefit from policy instruments to promote sharing both risks and rewards. Prime Minister Mia Mottley of Barbados and the Bridgetown Initiative have called for the creation of a loss and damage fund. The fund is meant to address what Mottley calls a double jeopardy, where the prosperity (with its associated high-carbon emissions) of high-income countries has been achieved at the expense of lower-income countries, which are being forced to pay again, as victims of a climate breakdown that they did not cause (Mazzucato 2023b). These kinds of tools are equally important for water governance, with a focus on devising agreements between communities and nations to share transboundary water resources efficiently and equitably. However, this is only applicable when transparency and accountability measures are in place.

3.5. Transparency and accountability

The fifth pillar, transparency and accountability, is critical to ensure that the way in which the economy is governed is accessible and visible to all stakeholders. To create and retain trust between all actors of civil society, public organisations need to commit to being transparent and applying an open data policy. Strengthening accountability and transparency mechanisms can help prevent misappropriation of funds, tax evasion and fraud. The fifth pillar is critical for enforcing the other four common good pillars. In WASH, literature shows cases of corruption and abuse of monopolies, in some cases due to the maximisation of shareholder value being the objective. In the UK water sector, broader utility regulatory regimes would theoretically promote risk-sharing between companies and users, but investors' capital is highly protected (PWC 2015). Large British water companies like Thames Water and Southern Water have struggled with debt, while shareholders' dividends have increased. Thames Water, one of the most indebted British water companies (Ofwat 2019), paid £45.2 million in dividends at the end of March 2023, while it was struggling with £14 billion debt (ITV Meridian 2023). The ageing British water infrastructure will soon require upgrading, but given the fragile financial status of the water companies, and the fact that they operate for the benefit of their shareholders, it is customers who will bear the high costs of the upgrading (Bayliss 2021). Water infrastructure is a natural monopoly that serves a basic need, suggesting an investment opportunity with minimal risks, especially with an established regulatory regime that ensures cost recovery. Ofwat, the UK's water regulator, plays the main role in holding the water companies to account. In 2019, Southern Water agreed to pay £126 million in penalties and payments to customers following severe failures in operating its sewage treatment sites, and deliberately misreporting its performance (Ofwat 2019). Ofwat also found that Southern Water manipulated its wastewater sampling process, which resulted in it misreporting information about the performance of several sewage treatment sites. This meant the company avoided penalties under Ofwat's incentive regime (Ibid.).

Transparency and accountability in WRM are also key to rethinking how water is allocated across sectors like agriculture and energy with little regard to the opportunity cost for its use in other sectors, and more importantly its impact on the stability of our ecosystem. Commodification of water, for example through virtual water trading, has offered solutions to water scarcity to many regions and become normative as a cheap solution to increase global water use efficiencies and prevent conflict. Egypt resorts to virtual water trading to avoid conflict over the Nile basin (Allan 2002). However, this has become problematic as it became a tool (mostly embedded in water accounting and macroeconomics) to legitimise unsustainable

and inequitable water consumption(Roth and Warner 2008). The annual amount of virtual water in international trade is estimated at 1.6 trillion m³, of which 80% is for agriculture and 20 % for industry (UNESCO 2006). Dalin et al. (2012) showed that the virtual water trade more than doubled from 1986 to 2007. Similarly, Duarte et al. (Duarte et al. 2016) found that exchanges of virtual water experienced a three-fold increase between 1965 and 2010, with this growth being particularly intense after 1980.

Conclusion

This paper has argued in favour of a comprehensive approach to address the global water crisis. First, collective action is essential, as no single country, region or city can tackle this crisis in isolation. While socioeconomic factors affect how WASH services and water resource management challenges are experienced, the threat to the hydrological cycle is universal, driven by activities like deforestation and infrastructure development. Second, addressing water challenges requires an economy-wide perspective since all sectors and economic actors rely on water, with agriculture and industries such as textiles contributing significantly to water scarcity. Lastly, considerations of collective action must be integrated into water solutions. We suggest treating the global hydrological cycle as a common good – one that is to be governed collectively and in the interests of all, and this means putting water at the heart of our economy. To put water at the centre of the economy, we suggest moving from a market fixing to a market-shaping approach to economics. A market-shaping approach promotes co-creating and transforming the economy with public value at the centre of production, distribution and consumption to deliver on water-related challenges.

Rather than replacing conventional water economics, this approach introduces fresh perspectives to advance it. By regarding water as a common good, we create opportunities for purposeful and ambitious solutions through collective intelligence. It emphasises designing collaboration with a pre-distributive focus, establishing the right relationships between public and private stakeholders from the outset, instead of picking up the pieces later. This common good framework comprises five pillars, as illustrated in Figure 2: 1) Purpose and directionality for outcome-driven policies aligned with public purpose; 2) Co-creation and participation to engage diverse voices in debates and consensus-building; 3) Collective learning and knowledge-sharing to foster purpose-oriented partnerships; 4) Access for all and reward-sharing to distribute innovation benefits equitably; and 5) Transparency and accountability to ensure public engagement and uphold commitments among all stakeholders, with a focus on evaluation mechanisms. Finally, the common good offers a potential avenue of reconciling economic and human rights perspectives on water by foregrounding the need for transparency and accountability metrics that hold involved actors responsible.

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