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Prioritising the purpose: a Water System Justice framework for water utilities

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ABSTRACT

Water utilities provide water, sewerage and sanitation services. Yet, they have failed worldwide to provide safely managed water services to at least 2.2 billion people and safely managed sanitation services to between 3.5 and 4.4 billion. Following 70 years of experience in different modes of water services provision, this paper addresses the question: *What lessons can be learnt from the scholarship on the policy and practice of water service provision, and how can these inform and be integrated into a justice framework?* This paper examines the literature through the lens of Water System Justice, charting how an early stage of state water and sanitation provision gave way to an increase in private sector participation and eventually hybrid services provision. Neither the state, private nor hybrid models have been able to provide water and sanitation services to all. Combining a Water System Justice approach with a purpose-led market-shaping approach, we argue that the state must take responsibility for a purpose-based approach that puts the furthest behind first – in line with the Agenda 2030. This includes using water within water system boundaries (quantity) and standards (quality), through collaboration with other actors, using patient and local finance, contextual modular systems and ensuring accountability.

Key words: Mission-oriented approach, Purpose-based approach, Safe and just boundaries, SDG6, SDG10, Water Justice

HIGHLIGHTS

- Introduces the Water System Justice framework.
- Examines inequality in water utilities over time.
- Advocates decentralised, inclusive governance models.
- Calls for a purpose-led, market-shaping approach to achieve sustainable WASH services for all.

1. INTRODUCTION

Already in 1977, the first UN Water Conference concluded: '[a]ll peoples, whatever their stage of development and social and economic conditions, have the right to have access to drinking water in quantities and of a quality equal to their basic needs' (Mar del Plata, 1983). What followed was the International Drinking Water Supply and Sanitation Decade (1981); the New Delhi Statement (1990) emphasising the 'some for all rather than more for some' approach, Agenda 21 (Chapter 18) (1992); Dublin Statement (1992); UN Millennium Declaration and Millennium Development Goals (2000); General Comment N.15 on the Right to Water (2002); establishment of UN-Water (2003); Water for Life Decade (2005); Resolution 61/192 (2005) declaring the International Year of

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Sanitation (2008); Resolution 64/292: Human Right to Water and Sanitation (2010); the 2030 Agenda for Sustainable Development (2015), specifically SDG 6; High Level Panel on Water (2016); International Decade (2018) for Action – Water for Sustainable Development; and more recently the UN Water Decade Conference (2023). Although these are soft laws and not legally binding, they represent consensus amongst leaders and their calls for action are loud and clear. Not only have they brought the issue to the forefront, but they also played a crucial role in setting global agendas, offering normative guidance, enabling mechanisms for monitoring and accountability, and fostering international cooperation. However, while the 2030 Agenda calls for meeting the Water, Sanitation and Hygiene (WASH) needs of *all* and halving the proportion of untreated wastewater¹ (Goal 6) (UNGA, 2015), the reality remains stark; globally, 2.2 billion people still lack access to safely managed drinking water and 3.5 billion people continue to lack adequate sanitation services (WHO and UNICEF, 2021; UNESCO WWAP, 2023). A more recent assessment of low- and middle-income countries found that these may be vast underestimates, as more than 4.4 billion people in these countries lack safe drinking water (Greenwood *et al.*, 2024).

Water utilities provide water, sewerage, and sanitation services, and – increasingly given the effects of climate change – rainwater management and catchment protection services. However, the failure to supply these services to huge parts of the world despite global commitments indicates that water utilities are not fit for purpose. Figure 1 shows schematically how the gap between commitment and delivery on water manifests in the utilities sector.

If the world is to achieve minimum access to WASH and ensure that the systems set up are durable and environmentally sustainable, this requires reconsidering how utilities – as primary providers of water infrastructure and sanitation facilities – are designed, financed and governed. Given the continuous failure to meet the needs of the poorest and furthest behind, this paper asks: *What lessons can be learnt from the scholarship on the policy and practice of water service provision, and how can these inform and be integrated into a justice framework?*

We examine the history of utilities in terms of three water provision phases: public, private, and corporate/commercial provision (see 1.1). Given both the failure of the phases to meet WASH goals, and the move from *purpose* to *process* in water service provision, we turn to elaborate on Water System Justice theory as the basis of a new approach (see 2), before operationalising Water System Justice into conclusions about how a *purpose-led market-shaping approach* that can instantiate the means and ends of a Water System Justice framework to drive systemic changes needed for inclusive and sustainable water service provision (see 3).

1.1. Process rather than purpose

In focusing on the role of water utilities in ensuring access to safely managed services, three ‘phases’ have dominated the water utility landscape since the 21st century. As these phases developed, attention was increasingly given to how water utilities should operate.

1.1.1. Phase 1: public service provision

Initially, water services were treated as a merit good or basic service to which everyone should have access. This required keeping service provision in the hands of the public sector and adhering to the modern infrastructural ideal. Under the modern infrastructural ideal services are to be provided by (i) a single public WASH provider, which ensures (ii) universal service coverage, and delivers (iii) a standardised level of service for all. For example,

¹ We expect that in the follow-up to the 2030 Agenda, the world will aim to treat *all* wastewater, on which we anticipate in this paper.

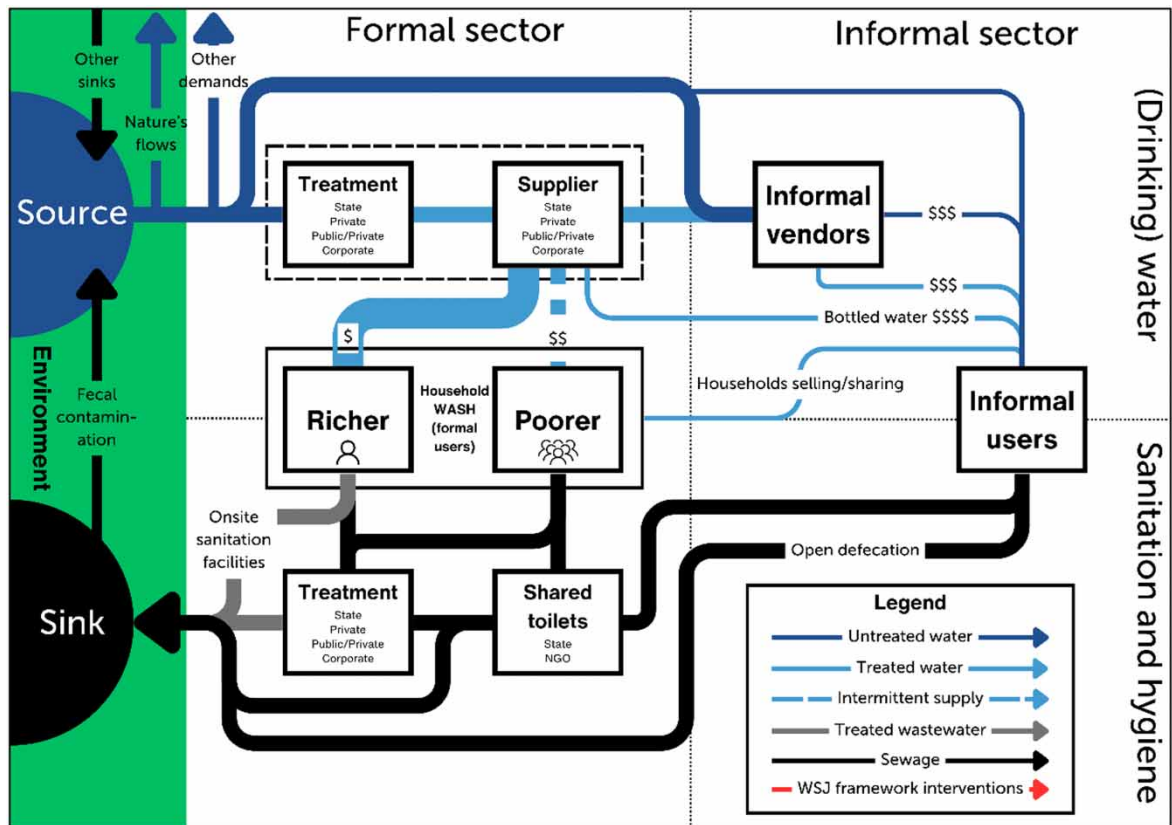


Fig. 1 | Current water provision and sanitation system in developing countries. N.B. The figure shows how richer and poorer households and 'informal' users (users who do not have a household connection) access water and at what price and quality, and whether the water is subsequently treated before disposal or not. Richer households often pay less for water and receive good quality service. Block tariffs often charge the poor more. Informal users also spend more on expensive informal vendors and pay for toilets, although the quality is poorer. Some wastewater is treated. Wastewater from informal users may contaminate soil and water creating environmental and health hazards. Furthermore, open defaecation places women and girls at risk of assault when they must search for a place to go to the toilet.

in the late 1970s urban planners in Lagos hoped to connect the city to a modern water supply system (Gandy, 2004:368). Water service provision was seen as a technological and financial endeavour; if the government invested sufficiently in infrastructure, universal access would be ensured (Schwartz, 2008). Illustrative of this phase was the Mar del Plata UN Water Conference in 1977. During that conference governments committed to investing in water supply and sanitation with the goal of ensuring universal access to water supply and sanitation by 1990. The results of the Drinking Water Decade, however, were disappointing. Most of the gains in service coverage were off-set by population growth, and at the end of the decade as many people lacked access to services as at the start of the decade (Tutusaus, 2019). Moreover, public water utilities were often bureaucratic (Baisa *et al.*, 2010), subject to political interference and showed little consideration to consumers. By the mid-1980s public water utilities had the reputation of being characterised by the 'the three lows' [...]: low rates of cost-recovery, low productivity, and ultimately low service quality and coverage' (Spronk, 2010:157).

1.1.2. Phase 2: private service provision

Given the poor performance and reputation of public water utilities, in phase 2 a discursive shift emerged in the early 1990s that emphasised a more business-like, efficiency-oriented approach to delivering water services. It was argued that public utilities lacked the incentives to be efficient providers of water services. Private organisations, operating under private sector principles, could more efficiently and effectively deliver WASH. The underlying reasoning was that competitive pressures would lead private operators to increase efficiency² and achieve contractually agreed upon performance indicators; private funds could release the pressure on public budgets; and private operators would bring increased technical and managerial expertise because many private water operators were multinationals with vast experience (World Bank, 1994; Idelovitch & Ringskog, 1995; Brown, 2001; Hodge & Greve, 2007). Moreover, by bringing in private water operators, the provision of water services would be insulated from the political interference that characterised many public water utilities before (Brown, 2001).

Despite heavy promotion from donors and international development banks, private sector participation neither took off nor lived up to expected benefits. Some attribute problems to the over-regulation of water stifling competition and efficiency (Robinson, 2004). However, much of the scholarship critiques the commodification and market liberalisation of water associated with (although not limited to) the private model itself. Private operators are compelled by market dynamics to prioritise efficiency by reducing costs and maximising revenues to pay their shareholders, which can come at the expense of reduced service maintenance and equitable access to water services for all (Jaglin, 2002; Roa-García, 2014; Marson & Savin, 2015; McDonald, 2016). Private provision aggravated inequities in service provision (McDonald, 2002; Castro, 2007; Loftus, 2009; Bakker, 2010), for example by cherry-picking richer neighbourhoods to maximise profits (Swyngedouw, 2005). It was argued to have reinforced environmental injustice as vulnerable communities with comparatively less political capital are unable to resist or change these processes (e.g., black communities in the United States) (Greiner, 2016). Furthermore, the emphasis on cost-recovery hampered expansion to connect low-income, hence unprofitable, households (McDonald, 2002).

In short, private water provision did not emerge as the panacea to the issues facing public service organisation, having in many cases failed to increase efficiency, access, and service quality. By the turn of the century, momentum for private sector involvement faded. By 2006, with the collapse of the Buenos Aires Concession contract, the 'privatization decade' had ended (Franceys, 2008:45).

1.1.3. Phase 3: corporatisation of public water utilities

Following the privatisation decade, hybrid models of corporate/commercial public water utilities began to emerge. In these models, the organisations providing services are public but operate under private sector institutions and culture. The underlying reasoning of this corporatisation of public water utility posits that the institutions and culture that makes the private sector efficient and effective can be internalised in the public sector to optimise value in public services and mitigate the risks of government failure (Hood, 1991; Osborne & Gaebler, 1993; Mazzucato & Ryan-Collins, 2022). At the same time, the public nature of the water utility reduces the controversy surrounding private sector involvement in providing water services.

Under the corporate public water utility, efficiency targets and management practices previously associated with the private sector are instilled in the public sector to bolster performance. The 'hybrid model' of 'corporatisation' of public water utilities encompasses a variety of definitions but most emphasise cost-recovery and, to

² Because water providers are usually monopolies, competition often takes the form of quasi-competition (such as bench-marking schemes) or competition for-the-market (rather than competition in-the-market).

a lesser extent, autonomy. It addresses the ‘principal-agent problem’ (i.e. the public’s inability to hold government employees accountable, as shareholders can corporate managers) by letting the public utility operate at arms-length from the government.

The corporatisation of public water utilities have been critiqued along the same lines as the critique levied against private water operators (Dagdeviren, 2008; Tutusaus *et al.*, 2019). Although autonomy is desirable, ‘corporatisation has been used to create market-friendly public sector cultures and ideologies’ (McDonald, 2014:2) and a ‘second wave of neoliberalism’ (Smith, 2004:375). Water utilities that emphasise cost-recovery and commercial viability may shy away from extending provision of services to consumers that are unable to pay for services (Schwartz *et al.*, 2017). However, corporatized public utilities are in a better position to emphasise asset value rather than cost.

1.1.4. Process and purpose

A comparison of the three phases of service provision suggests that there is a distinct shift in emphasis from the movement between phases, from the more outcome-oriented approach of the first phase that centres universal standardised service, to the more process-oriented approach of the second phase. This endures in the third phase despite the relatively stronger role played by the public sector compared to the second phase, as hybrid models continue to emphasise operational aspects. In doing so, with different phases the emphasis shifted away from the *purpose* of water utilities (to secure universal provision of water services). The underlying reasoning is that if a water utility operates according to the ‘right’ practices and principles, it will also ensure that the purpose of universal services is achieved.

In this article, we challenge this assumption that focusing on the ‘right’ practices and principles of operation will lead to achievement of the purpose of achieving universal service coverage. Instead, we argue that the purpose needs to be (re)prioritised, and the practices and principles of operation need to be determined from that starting position. We turn to Water System Justice theory as the starting point to approach water services provision by water utilities. By starting with the Water System Justice framework, we let the practices and principles of the operation of water utilities follow from their purpose.

2. THEORETICAL FRAMEWORK: WATER SYSTEM JUSTICE

2.1. Water system justice and implications for water services

Water System Justice applies Earth System Justice (Gupta *et al.*, 2023) to water, treating the global hydrological cycle as a public good (Kaul, 2016) and global common good (GCEW, 2023, 2024; Mazzucato, 2023a), and water supply and sanitation as merit goods (Hanemann & Whittington, 2024) and human right (UNGA, 2010).

The framework builds on *recognition* and *epistemic justice*, focuses on *ideal/transformational justice* as opposed to *conservative justice*, and applies the 3I’s of justice (Interspecies Justice and Earth System Stability (I1), Inter-generational Justice (I2) and Intragenerational Justice (I3) including Intersectional Justice). These perspectives shape *procedural* and *substantive justice*, which requires a continued calibration between the two to ensure injustices are not reproduced. *Procedural justice* focuses on access to information, decision-making, civic space and courts, and requires affirmative action to create equal opportunities for the furthest behind and strengthen their agency. *Substantive justice* focuses on issues of reaching access to minimum water services (including water treatment) and the equitable allocation of the remaining water resources, risks/harm and related responsibilities.

2.2. Safe and just water boundaries

Water abstraction by water utilities from water bodies must be within water boundaries. Already, water boundaries have been crossed from the local to the global level, while the global hydrological cycle is spinning out of balance (Wang-Erlandsson *et al.*, 2022; Rockström *et al.*, 2023) and the minimum needs of a growing global population are not being met (WHO and UNICEF, 2023), all of which is exacerbated by climate change. The challenge is not only to reduce our water consumption to return within safe water boundaries, but also to equitably reallocate our water resources to stay within the safe and just corridor.

The safe and just water boundaries can be easily applied and contextualised at the local level by policymakers, unlike planetary water boundaries (Gupta, *et al.*, 2024). The safe and just boundaries imply groundwater withdrawals do not exceed recharge and surface water withdrawals do not lead to surface water variation of more than 20% against base line levels on a monthly basis (Rockström *et al.*, 2023). Research on the current allocation of water in the context of the Anthropocene shows that globally many countries and regions have already crossed blue ground- and surface water boundaries: groundwater levels are declining in 47% of areas, while 34% of surface water bodies experience fluctuations greater than 20% (Rockström *et al.*, 2023:107).

2.3. Applying water system justice to water services provisioning

In a context where: the non-connection of housing to sewerage systems exacerbates health and environmental issues (World Bank, 2020); women in the Global South often spend hours collecting water daily that could be spent on education (UNICEF, 2016); and a lack of adequate sanitation facilities severely impacts students' and especially girls' education (Pearson & Mchphedran, 2008) while also increasing the risk of rape, sexual assault, and shame (WaterAid *et al.*, 2017), we apply the Water System Justice framework to WASH. We argue that: (i) *ideal justice* implies WASH provision to all, while prioritising the last first (SDG 6; Targets 6.1 and 6.2) in implementing the Human Right to Water and Sanitation; (ii) *recognition justice* implies acknowledging and emphasising the perspective of the poor, marginalised, disabled, homeless and ensuring *affordability and accessibility*; and (iii) *epistemic justice* implies a plural *understanding* of the different social norms people have and their WASH needs (Hyun *et al.*, 2019; Tseklevs *et al.*, 2022). This is because WASH service needs are mediated through cultural, religious, gender, age, and health norms and perceptions; for example, a Tanzanian project modified urinals in line with Muslim cultural values (Person *et al.*, 2016).

In terms of the 3I's, (iv) *interspecies justice* implies that: (a) water abstraction from water bodies must be within water boundaries to maintain ecological integrity; (b) wastewater discharge must meet ambient water standards to protect ecosystems and freshwater bodies; and (c) the ecological footprint of water utilities, including materials required for WASH services, are minimised through ecosystem-based management, watershed, rain shed and catchment protection to ensure and maintain enough water supplies (*availability*). (v) *intergenerational justice* requires examining how past generations have depleted water supplies (e.g. Aral Sea) and how today's generation depletes and degrades water for future generations (global over-abstraction of aquifers). This requires that water provisioning should occur within safe and just water boundaries (Stewart-Koster *et al.*, 2024). (vi) *Intragenerational justice* requires ensuring that some do not exercise their rights at the cost of others and those who can afford water service (the rich) directly or indirectly subsidise those who cannot (the poor) (*affordability*) and that the water is of reasonable *quality*. It requires sharing water between uses and users, and between sectors to ensure that basic water needs are met in times of shortage. Moreover, externalised impacts of not meeting these minimum needs to water, sanitation, and hygiene are kept limited, and the significant social costs of inaction on poor water services are reduced.

(vii) *Procedural justice* requires that people can hold governments and service providers accountable through access to information, decision-making, civic space and courts. In operationalising *substantive justice* for Just Minimum Access to WASH and Just Allocation, we argue that minimum access to drinking water should

be: (a) between 50 litres per person per day for a dignified life and 100 litres per person per day to enable escape from poverty (Rammelt *et al.*, 2022), (b) free of faecal and priority chemical contamination and meeting water quality standards for human consumption (WHO-guidelines as a minimum), (c) located on the premises; (d) available when needed³. Minimum access to private, affordable or free safely managed sanitation services with water for handwashing is within 50 m of the dwelling/workplace/school and excreta is safely disposed and treated *in situ* or off-site and designed to separate human excreta from human contact. Under just allocation, water allocation should (a) prioritise access to WASH, including during water scarcity, without the payment of compensation for expropriating water; (b) exclude water allocation for WASH from market-based mechanisms and eliminate the need to 'buy-back' water from private entities. Regarding harm, (c) account for any harm caused by disposing of untreated water, and (d) compensate for and reduce the removal of too much water from the water system. Most of these ideas are already accepted in the 2030 Agenda (see Table 1).

3. A WATER SYSTEM JUSTICE APPROACH TO WATER UTILITIES

Utilities geared towards public value and informed by the Water System Justice framework should collectively meet WASH needs and treat wastewater sufficiently within safe and just water boundaries. They should aim to put the 'furthest behind first' and design justice into the service delivery and organisation of water utilities. It requires carrots and sticks to ensure WASH provision in the interest of enhancing human wellbeing and ensuring water boundaries and standards. This requires a water system justice-based purpose-led approach (see Figure 2).

3.1. A purpose-led water system justice approach: from market-fixing to market-shaping

To do this, this paper argues for a market-shaping approach to water utilities. Market failure theory argues that public intervention in the economy is justified to fix markets when they allocate resources inefficiently. But government is not only a fixer but also a shaper and co-creator of markets. Polanyi (1957) sees markets as outcomes of the interactions of individuals, firms, and the state, 'embedded' within social and political frameworks (Evans, 1995; Mazzucato, 2016). This means that value in the economy is created collectively and requires understanding investment and production capacity in all actors, including the state (Mazzucato, 2018; Mazzucato & Kattel, 2020). This mandates that public sector institutions like public water utilities are no longer about correcting externalities, but about market creation itself (Mazzucato, 2023a; Mazzucato & Zaqout, 2024).

The market-shaping approach to water utilities requires a 'mission-oriented approach' or 'purpose-based approach'. This describes a policy framework applicable to utilities that foregrounds addressing societal challenges by understanding WASH provision, as broad, cross-sectoral issues requiring a clear mandate and new partnerships across institutions, in particular private and public agencies (Directorate-General for Research and Innovation (European Commission) & Mazzucato, 2018, Mazzucato, 2021). This implies reasserting the role of the state and public sector organisations in shaping innovation, partnerships, contracts, data, and financing strategies to focus on outcomes such as achieving the public good. This represents a re-conceptualisation of the public good and commons approach, which calls for empowering governments (local and national) to achieve collective goals (Mazzucato, 2023a). Incorporating Water System Justice principles into this approach ensures that the creation and shaping of markets are aligned with justice and equity goals.

A purpose-oriented approach to water therefore entails conceiving of the Earth's hydrological cycle as a global public good that necessitates long-term, holistic, outcome-focused efforts in which the state will play a prominent role (cf. GCEW, 2023, 2024; Mazzucato & Zaqout, 2024). This approach is compatible with the Water System

³ However, this represents only a minimum water standard, as access to other minimum needs includes access to food, energy and infrastructure, which all require water.

Table 1 | Linking Water System Justice applied to utilities to the 2030 Agenda.

Justice	Service provision should	Link to 2030 Agenda
Recognition	Serve poor and marginalised first	'leaving no one behind'; 'the furthest behind first'
Epistemic	Use and build on other knowledges	'intercultural understanding', 'recognize all cultures'
Interspecies (I1)	Protect and restore water ecosystems	Improve water quality: reduce pollution, treat wastewater; increase recycling and safe reuse; Protect/restore water ecosystems
Intergenerational (I2)	Meet I2 & anticipate future demands	Protect planet from degradation to support present and future needs
Intragenerational (I3)	Targeted subsidies to ensure affordability accounting for intersectional inequality	Accessible, available and good quality water on premises; adequate, equitable sanitation and hygiene for all, commit to the Human Right to Water and Sanitation
Procedural	Transparent, including access to information, decision-making, civic space and courts	Support & strengthen participation of local communities in improving WASH (Target 6.2; 11.3; 16.7)
Substantive	Meet minimum needs within water boundaries	
Operationalisation		
Ends: Minimum needs	Ensure: 50–100 litres per person per day: safely managed, on-premises access, available when needed and free of contamination. Improved, on-premises, safely managed, affordable/free sanitation facility with hand washing facilities, within 50 metres of dwelling/school/work with safe in situ or off-site disposal and treatment of excreta, separating human excreta from human contact	Target 6.1, 6.2 of universal access
Ends: Just boundaries	Water supplied within boundaries; wastewater treated before disposal	Target 6.3, 6.4, 6.6
Means: address drivers	WASH projects are treated as bankable when in many contexts they are not. Non-bankable project should not be made bankable. A purpose-oriented programmatic systemic approach is needed to achieve this goal	
Means: address harm	Harm caused by poor sanitation services must be addressed	
Means: address allocation of remaining resources	Water allocation should prioritise access, including during water scarcity; Finance for infrastructure must be patient, low interest, in local currency and be cross subsidised from other water users or by tax payers	Target 6.1, 6.2; 6.a Target 6.a: 'By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies.'

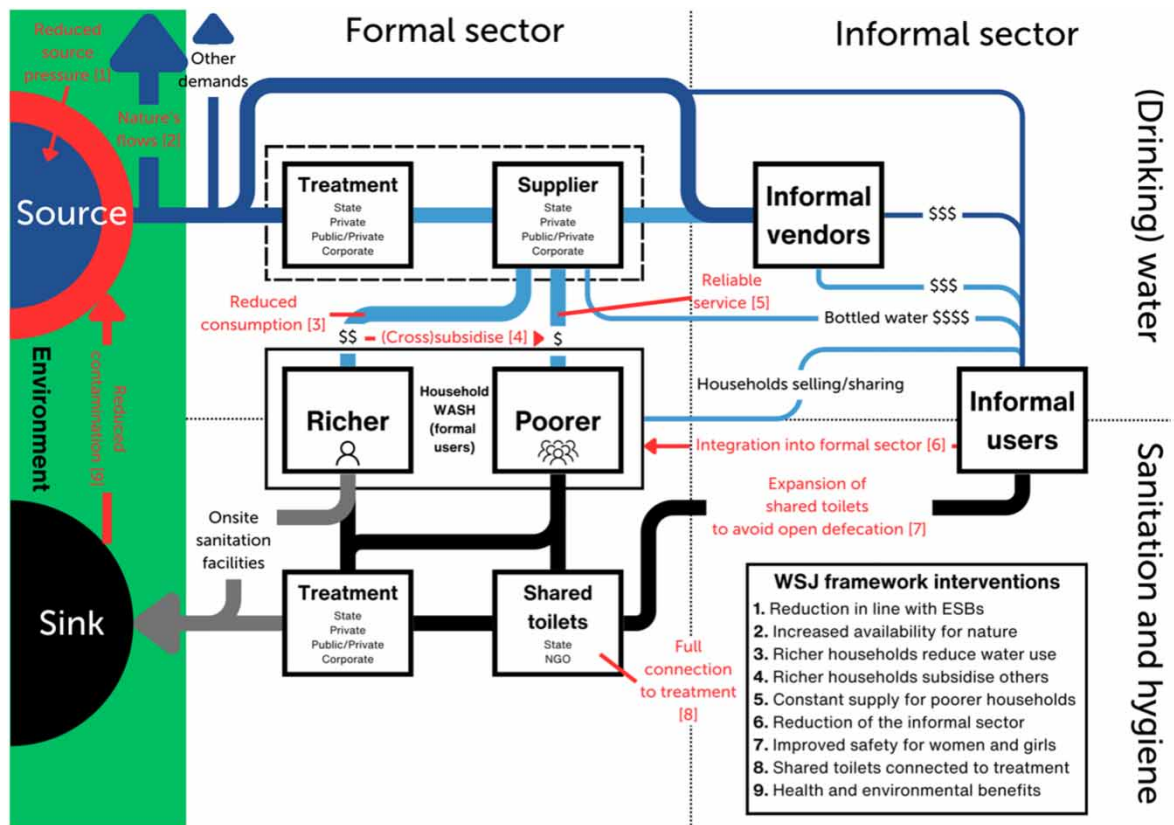


Fig. 2 | Purpose-led water provision and sanitation system in developing countries. N.B. The figure shows how water abstraction needs to be within Earth System Boundaries (which respect interspecies/intergenerational and intragenerational justice). Within the formal sector, richer households should subsidise other households directly or through cross-subsidies (e.g., other utilities). Furthermore, overuse should be discouraged for the wealthy to reduce intermittency for others. Informal users should be integrated into formal (centralised or decentralised) utility systems to enhance access to better toilets connected to the treatment system and which reduce risks for gender-based violence and environmental contamination.

Justice framework for utilities requiring that justice principles are complemented by cross-sectoral engagement, and just standards permeate the broader water challenges and missions such as virtual water trade, sustainable land use, and ecosystems transitions.

Both require symbiotic, rather than parasitic partnerships between the public and private sector (Mazzucato, 2018; Mazzucato & Rodrik, 2023). In practice this means that governments work to involve the necessary private interests in WASH provision (UCL IIPP, 2020; Mazzucato, 2023b), but they should share the rewards as well as the risks of this practice and ensure that justice is served. This includes, for example, embedding conditionality in water use permits and contracts to ensure that water allocation is efficient, equitable, and environmentally sustainable. This requires the use of more dynamic evaluation methodologies of potential investments in things like water infrastructure, whose long-term spillover benefits for the economy and health can be discounted in traditional methodologies and hence disincentivise private investment (Deleidi & Mazzucato, 2021).

The integration of the purpose-oriented approach and the Water System Justice utilities framework must be reciprocal. The former acknowledges that this will need to be negotiated between stakeholders, including

public, private, labour, and community interests. The Water System Justice framework underlines and expands on this prerequisite through the concepts of epistemic and procedural justice, which foreground the concerns and participation of local communities and indigenous and other marginalised groups in decision-making. Privileging these interests will also be key to creating an explicitly decolonial purpose-oriented approach. Here, we also recognise and flag the problematic colonial connotations of the name of this approach in Global Southern contexts. We suggest avoiding this language in favour of alternatives such as the ‘purpose-led approach’. Finally, the approach relies on up-to-date data to evaluate and appraise its goals, which is potentially problematic from a Water System Justice perspective for two reasons. Firstly, if ‘purpose’ is informed by data or research from the Global North given gaps in the South, interventions will at best be contextually inappropriate and at worst entrench (neo)colonial power imbalances and injustices (Liverpool, 2021). Secondly, who collects and owns data matters, as multinational technology corporations expand to the South and development interventions become increasingly tied up with the flows of informational capitalism (Lynch *et al.*, 2023). Thus, a call for undifferentiated ‘data’ is counterintuitive to the mission-oriented approach’s aims as it may further empower the private sector in this space (Taylor & Broeders, 2015). Hence the relevance of democratising access to data.

3.2. Operationalising a purpose-based approach

A purpose-based approach to meet the basic needs of people within safe and just water boundaries defines ‘just’ levels of service delivery, based on the generally accepted SDG’s, targets and indicators, as (i) safely managed drinking water services; (ii) safely managed sanitation services; (iii) safely treated wastewater; and (iv) freshwater withdrawal that should not exceed available freshwater resource boundaries.

Applying the Water System Justice framework means entering into heterogenous debates about how best to achieve WASH (Braadbaart, 2002; Spar & Bebenek, 2009; Bel, 2020), interrogating how water constitutes social, political and biophysical configurations and how this is mediated by power relations (Swyngedouw *et al.*, 2002; Swyngedouw, 2013). In reflecting on these debates, a systems approach to WASH delivery is applied. The underlying idea of a WASH systems approach is that the ultimate delivery of services is dependent on the interaction of a variety of system elements. In the various models of the systems approach that exist, system elements may be more or less detailed, depending on the purpose and aim of the systems model used⁴. Below we identify infrastructure, finance, organisation, operation, maintenance and monitoring, and regulation as the system elements.

3.2.1. Governance regulation

With water supply and sanitation being merit goods that are usually supplied by a monopoly provider and subject to market failures, regulation of the services provided is crucial. Regulation of WASH services takes on several different forms (Groom *et al.*, 2006):

- Environmental regulation – regulation to ensure that the provision of WASH services does not lead to environmental degradation (effluent discharge standards, etc.);
- Safety regulation – establishing safety standards (water supply quality, etc.) that must be met by providers;
- Consumer protection – regulation to ensure consumers are informed and can hold water and sanitation providers accountable;
- Social objectives – regulation to incentivize water and sanitation providers to achieve social objectives such as universal service coverage;

⁴ See for example Huston & Moriarty (2018), Tutusaus (2019) or Krueger & Alba (2022).

- Economic regulation – this concerns the ‘rules and organizations that set, monitor, enforce, and change the allowed tariffs and service standards for water [and sanitation] providers’ (Groom *et al.*, 2006:5).

In most countries achieving these different objectives is a delicate balancing act. On the one hand, water utilities need to have sufficient income to be financially viable and allow them to deliver an acceptable level of service to all consumers. At the same time, tariffs need to be affordable for consumers, including the most economically vulnerable households. This is why independent and robust economic regulation is required, to set performance standards, monitor and reward performance; challenge development and investment plans developed by utilities; and set tariffs for water services. However, the governance of economic regulators deserves particular attention to ensure universal service provision and control political interference⁵.

3.3. Operationalisation

A system for recognising where water should be accessed, how and within which boundaries and what quality of water can be released back into the natural system. Furthermore, there should be a system for liability for failure to meet WASH. Courts can provide space for NGOs to argue on behalf of the marginalised when their rights are not met. Perhaps a shorter, cheaper and more accessible procedure for liability may be needed to ensure that there is a ‘stick’ to promote accountability.

3.3.1. Level of service provision

The product of a WASH system is a service of water, sewerage and/or sanitation that is delivered to or accessed by a household. Under the modern infrastructural ideal, the level of service that households would have access to was to be standardised, meaning everyone would have access to the same high level of service. Increasingly however, the idea of service differentiation has become the norm for water and sanitation providers in the global South.

Service differentiation tailors services to consumer needs (Boakye-Ansah *et al.*, 2022) and ‘bring diversity within the public service’ (Jaglin, 2008:1905). In practice, this means that low-income consumers who cannot afford in-house water supply receive a lower service level. A large share will gain access without a utility (through private vendors, own wells, etc.). The underlying idea is that this will translate into a ‘win-win’ of both lower (i) prices for these customers and (ii) operation costs for the utility (Njiru *et al.*, 2001; Jaglin, 2008; Boakye-Ansah *et al.*, 2022).

The success of service differentiation is debatable; critics question its effectiveness and equity (Gulyani *et al.*, 2005; Boakye-Ansah *et al.*, 2019). First, while low-cost services have improved water access for many, some low-income consumers pay as much as 18 times more than wealthier customers (Gulyani *et al.*, 2005) exacerbating injustice, while water utilities lose money because they deliver bulk water below cost price (Gulyani *et al.*, 2005; Boakye-Ansah *et al.*, 2019). A study of the price of water in 93 locations in 47 countries shows that the price of water is generally far cheaper when provided by the state, as compared to private providers, vendors, tanker trucks and carters (UN, 1983), using data from Kariuki & Schwartz, 2005). Second, service differentiation entrenches low service levels in low-income neighbourhoods, perpetuating injustices (Schwartz *et al.*, 2017), made worse by poor maintenance of low-level WASH infrastructure (Rusca *et al.*, 2017), especially where race and class marginalisation intersect (Jegade & Shikwambane, 2021). Lastly, service differentiation often fails to meet minimum access standards, making this strategy inappropriate for achieving just outcomes (Hadzovic Pihljak, 2014; Rusca *et al.*, 2017; Schwartz *et al.*, 2017).

⁵ See OECD (2015), The Governance of Water Regulators, OECD Studies on Water, OECD Publishing, Paris, <https://doi.org/10.1787/9789264231092-en>.

Additionally, the monitoring, operation, and maintenance of water systems by utilities are often subject to uneven delivery and development (Eales, 2011; Mothetha *et al.*, 2013; Alda-Vidal *et al.*, 2018; Hove *et al.*, 2019). Cost-recovery principles encourage water utilities to prioritise the monitoring, operation and maintenance of infrastructure of profitable consumers at the cost of that for lower-income areas (Rusca *et al.*, 2017). In many cases, informal housing is not connected to sewerage systems, exacerbating health and environmental issues in these communities and thus further marginalising them. Since water kiosks, yard taps, prepaid dispensers (and sanitation services) are often operated by intermediaries (Boakye-Ansah *et al.*, 2022), the question arises as to who is responsible for maintaining these infrastructures (Rusca *et al.*, 2017). An intersectional lens reveals that injustices along racial, gendered, religious or class lines become entrenched through uneven water infrastructure maintenance and operation (Anand, 2011; Hackenbroch & Hossain, 2012; Alda-Vidal *et al.*, 2018; Oyshi *et al.*, 2024). The everyday practices of WASH providers shape *who* has access, *when* and in *what* quantity and quality (Coelho, 2004; Anand, 2012; Karpouzoglou & Zimmer, 2016).

3.4. Operationalisation

Water for household needs should be on-premises and meet WHO water standards. Sanitation services should be within 50 metres of places of living, schooling, working and recreation for all and should be linked to standard treatment services so that the treated water meets acceptable standards. This is to protect the water ecosystems and human health. Furthermore, service provision under the Water System Justice framework is in line with the concept of ‘priority of use’: in times of shortage, water must be recovered from other uses and provided for WASH – in other words, it should be the top priority.

3.4.1. Governing water provision

Governments can shape markets in different ways. For example, in Sydney, the Independent Pricing and Regulatory Tribunal serves as an independent regulatory body overseeing water utilities (Leong & Li, 2017). The Independent Pricing and Regulatory Tribunal’s regulatory framework has enabled a structured integration of private participation through clear regulatory guidelines that foster competition and enhance service quality. Moreover, the regulatory framework in Sydney encourages private sector engagement by establishing a competitive demand-side procurement process for water services. Meanwhile, in Singapore, the Public Utilities Board uses a contract-based approach without a separate regulatory body (Leong & Li, 2017). The Public Utilities Board manages all aspects of water services from collection and production to distribution and treatment, operating under stringent governmental oversight but with significant autonomy. The agency engages the private sector through partnerships leveraging private expertise and investment to advance its technological and operational capabilities. Contracts in Singapore are carefully crafted to ensure that private sector participation aligns with national water security goals and sustainability standards. This model has ensured that water management remains a core component of the public service mandate, underpinning the broader public value and public good. However, Singapore is a very rich city state and Sydney is in a highly developed country. For the low-income regions of the world, the private sector has shown that it is unable to meet the needs of the poorest. This requires a different model, or at the very least further research to specify the conditions under which these models can deliver given distinct challenges. They also need support with the contracting process where they are often ‘out-played’ – lacking the necessary resources, technical expertise, or negotiating power to secure fair contracts. As a result, private companies may take advantage of this imbalance, leading to contracts that are not in the best interest of the country or its people (Bosch & Gupta, 2022).

3.5. Operationalisation

A Water System Justice-based governance model for water provision has four aspects: (1) decentralised governance structures, which empower local governments or communities to co-manage water utilities, ensuring

services are tailored to local needs and conditions. Decision-making must be transparent and participatory, incorporating marginalised groups to reflect their specific challenges and needs. (2) Social and economic tariff structures, such as cross-subsidies where wealthier consumers pay higher rates to offset the costs for lower-income households. Tariff structures should be progressive to ensure water affordability without sacrificing the financial viability of utilities. (3) Public–Private Partnerships with accountability, so that where private sector participation is necessary, contracts emphasise public accountability, with provisions that guarantee the protection of vulnerable populations. Contracts should include specific, enforceable targets for water access, quality, and pricing that reflect Water System Justice principles. (4) Inclusive monitoring and maintenance so that water services are regularly monitored for both quality and equity, especially in underserved areas. A clear system of accountability for maintaining decentralised water infrastructure – such as water kiosks and sanitation stations – must be established, ensuring that intermediaries (often private or community-based) have the resources and capacity to uphold standards.

3.5.1. System for financing WASH

Three possible revenue streams are available for water utilities. (i) *Tariffs* can generate revenue from consumers based on the volume of used water or related services (e.g., leak detection). A very common tariff structure includes two parts, one covering fixed costs and one based on consumption (when metered). (ii) Government *taxes* can be used to subsidise water utilities. (iii) *Transfers* are grants provided by foreign aid entities and philanthropies. Since the 1990s, water utilities have mainly been pushed to achieve tariff-based cost-recovery. Moreover, developing countries often need assistance in negotiating international contracts.

The Camdessus report (Camdessus & Wimpenny 2003:19) highlights that subsidies should be used to lead to a ‘transition to higher tariffs’. The World Bank (2004) and the African Development Bank (2010) promote cost-recovery, although few water utilities in the Global South are able to fully recover their costs and require taxes and transfers for their investments (Schwartz *et al.*, 2017). It should be noted that utilities in the Global North historically benefitted from public finance to cover the cost of building initial infrastructures. Moreover, they also face an investment backlog, as current revenues do not provide for replacement of existing infrastructures and adaptation to a changing context (including climate change, uncertainties about water availability and demand, and more stringent health and environmental standards) (OECD, 2020).

Water sector subsidies and cross-subsidies have a long history. Subsidies include direct municipal government compensation to households to enable water tariff payment; however, well-targeted subsidies are difficult to design and implement (Foster *et al.*, 2000): they are (i) much more complicated to design, (ii) face limitations and are opaque, (iii) send a blurred message to water users, and (iv) do not benefit the ones who are not connected to the service (usually the ones most in need) (Leflaive & Hjort, 2020).

Cross-subsidies can be facilitated by utilities operating in two markets, allowing subsidisation from consumers in one market to the other (e.g., dual energy-water utilities in Germany (Schlandt, 2015)), or where higher-income households pay higher tariffs to enable lower tariffs for low-income households. A block tariffs system divides water usage into different ‘blocks’ or ‘tiers’, each with a specific price per volume of water. Utilities charge a lower price for the first block, which covers basic water needs at the lowest rate. Usage above this block is charged at a higher price, thus incentivising efficient water use. This works if richer households use more water than low-income households, which is not necessarily the case.

However, in practice, water utilities face political pressures to set the consumption limits for the lowest tariff blocks relatively high (Boland & Whittington, 1998:6). Second, low-income households often consume more water because there are more people in the household, because of shared connections or because they use water to earn a living, whilst higher-income households often have a private connection, ironically making

them fall in a low tariff block (Whittington, 2003). Thirdly, most consumers are unaware of their use rates, and this does not affect their use. Moreover, such tariffs benefit households that are connected to the network and ignore those who are unconnected and do not benefit from the subsidised water.

Most water utilities charge a connection fee for households to connect them. This fee is dependent on the connection size, property location, and distance to the nearest water main (Frauendorfer, 2008) and aims to cover the costs of connection. High connection fees may deter poor households from getting a connection (Le Blanc, 2008), even in rich countries like the US where the connection can cost USD 100 (McIntosh, 2003:79). Subsidised social connections may help to address this problem (Lesterhuis & Schwartz 2024), but does not address those in informal settlements.

3.5.2. Operationalisation

Financing WASH is expensive and depends on the kinds of infrastructure and operational models needed. Given that up to 2.2–3.5 billion people cannot access WASH, and poorer people pay much more for such services at the cost of other household necessities, such services must be made available through targeted subsidies. However, such investments must be contextually relevant, be made as far as possible in local currency (to avoid foreign debt), and the state must take responsibility for the entire system, even if activities are delegated to different actors.

3.5.3. Contextually relevant infrastructural and operational model

The modern infrastructural ideal emphasises: (i) large, capital-intensive and centralised systems (Bichai & Cabrera Flamini, 2018) and (ii) compartmentalising water supply, sewerage and drainage (Wong & Brown, 2009). It optimises individual elements such as ‘supply security’ while ignoring other elements of the water cycle. Given aging infrastructure, polluted and depleted resources, climate change, growing demand and increasing competition (Bichai & Cabrera Flamini, 2018), the limitations (e.g., risks of maladaptation), lack of resilience to multiple shocks (e.g., climate change, demographics, terrorism, energy prices, diseconomies of scale) have become visible. Furthermore, centralised systems use large quantities of water, require significant investment, have long planning horizons (Larsen *et al.*, 2016) and risk ‘overdesign’ if projected population and consumption levels do not materialise.

Increasingly, water services are viewed as an integral part of Integrated Urban Water Management, where ‘urban water planning [...] protect, maintain and enhance the ‘multiple’ benefits and services of the total urban water cycle that are highly valued by society’ (Wong & Brown, 2009:674). These multiple benefits encompass ‘supply security, public health protection, flood protection, water-way health protection, amenity and recreation, greenhouse neutrality, economic vitality, intra and inter-generational equity; and demonstrable long-term environmental sustainability’ (Wong & Brown, 2009:674; see also Marlow *et al.*, 2013).

This emphasises matching centralised with decentralised solutions (Bichai & Cabrera Flamini, 2018). As the former requires wasteful piped sewerage systems with loss of nutrients, energy and water (Marlow *et al.*, 2013), the latter can be more contextually relevant as there are benefits in producing and treating water close to where it is used. Integrated Urban Water Management also focuses on source diversification (Marlow *et al.*, 2013) or fit-for-purpose water systems (Bichai & Cabrera Flamini, 2018) which align the quality and source of water to the intended water use (e.g., water for toilets/gardening need not be potable and require less/different treatment). Stormwater and wastewater can be mobilised for certain urban water uses.

3.6. Operationalisation

From a Water System Justice perspective, MAD systems of water supply and wastewater treatment can be tailored to a specific water use in a specific context and provide *fit-for-purpose* water quality (Stoler *et al.*, 2022). Secondly,

because these systems are relatively small and flexible, they can be installed at short notice requiring shorter planning horizons. Moreover, because these MAD systems are modular and adaptive, they also reduce the dependency on large-scale investment in treatment facilities (Larsen *et al.*, 2016). MAD systems are amenable to local, inclusive financing mechanisms. These advantages suggest that water utilities can progress towards both substantive and intergenerational justice through MAD systems, as they can be installed in more contexts, increasing service provision, and they help avoid ‘over-designing’ water infrastructure, which would leave future generations with expensive and unnecessary maintenance obligations from larger centralised systems. Water utilities can design justice into the regulations, contracts, and other tools at their disposal (Mazzucato & Rodrik, 2023).

4. CONCLUSION

We argue that a Water System Justice approach is needed to address WASH challenges requiring the application of seven justice criteria (i.e. recognition, epistemic, interspecies, intergenerational, intragenerational, procedural and substantive) to WASH provisions. This implies service provision that prioritises the furthest behind first and is within the Water System Boundaries and that disposal of waste waters does not cross ambient water standards.

We showed that three discourses – public, private, corporatisation – have dominated over time. We reviewed the literature to show that, while undeniable progress has been achieved through massification of access to safe water and improved sanitation, (i) none of these have met and prioritised the needs of the poorest, (ii) the poorest often pay substantially more for poor quality water, (iii) infrastructure is not adequately maintained, and (iv) water streams are polluted. Additionally, poor water quality and associated health risks, the burden of water collection on women, the risk of assault due to inadequate sanitation facilities, and the impact of poor school toilets on education, particularly for girls, trigger significant social costs. We conclude with calling for a justice-based purpose-oriented approach, integrated into the principles and DNA of utility governance.

In applying a justice-based purpose-oriented approach to achieve WASH for all, and putting the furthest behind first, we advocate for a ‘positive rights’ approach to water and sanitation. This requires a change in the mindset and political will that we currently see in many countries, at international conferences and in practice today. Positive rights are ‘an affirmative obligation of the state to provide a minimum quantity and quality of these goods and services to all citizens’ (Larson, 2015:2), necessitating proactive measures to ensure they are fulfilled instead of abstention from certain actions. Positive rights are typically enshrined in constitutions, laws and international human rights treaties. Although the human right to water is recognised internationally, it is often not reflected in most national legislation. Conceiving of water access merely as a negative right implies citizens are not hindered from accessing water sources, but it does not ensure proactive provision by the state, leaving many without adequate access.

Positive rights include for example education, which in many countries is provided free by the state at primary and secondary levels (and at the tertiary level in some countries) ensuring the development of their citizens; healthcare, where states offer medical services to ensure citizens’ wellbeing; or maintaining an army, many states provide the right to security ensuring national defence and protection for their citizens. What these have in common is that the state provides these services for free (or strongly subsidises them) as they will benefit society as a whole – ‘advancing the achievement of an equitable and free society’ (Larson, 2015:3). This means the state provides water and sanitation or delegates responsibility to another entity. In case of failure, the state bears the responsibility.

According to a recent World Bank report, the 113 low- and middle-income countries only spend between 0.24 and 0.27% of their GDP towards water supply and sanitation (\$69.5 billion and \$79.0 billion respectively) (Joseph

et al., 2024). While 91.4% of total spending comes from the public sector, the private sector contributes only 1.7%. Thus, treating WASH as a positive right inevitably requires countries to increase their public spending.

In operationalising a purpose-based approach, we call for: (a) commitment to WASH; (b) availability; (c) ensuring standard and yet context specific service provision; (d) specific governance provisions; (e) a system for financing WASH from national resources; (f) an infrastructural and operational model that is contextually relevant; (g) priority of use for WASH; and (g) a system of liability for failure to meet WASH.

DATA AVAILABILITY STATEMENT

All relevant data are included in the paper or its Supplementary Information.

CONFLICT OF INTEREST

The authors declare there is no conflict.

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