4. Pushing the economics: The case for shaping markets

Key takeaways

Markets must be shaped by governments and other actors to become more efficient, equitable, and environmentally sustainable. The current system treats our biggest challenges – climate change, inequality, the lack of clean water – as failures of an otherwise sound system, even though these challenges are embedded in the way global economies operate. We must shift our economic framing from fixing externalities after-the-fact to proactively shaping economies so that water is allocated efficiently, equitably, and sustainably from the start. Markets across our economies – from agriculture and mining, to energy and semiconductors – must be reshaped in their water use and impact on the hydrological cycle, using outcomes-orientation and directionality.

Governments must adopt a mission-driven approach to policymaking, bringing multiple sectors together to tackle the global water crisis in an economy-wide way. Missions are ambitious, clear, and time-bound objectives that mobilise cross-sectoral solutions to difficult challenges. They focus on outcomes, as opposed to outputs, and in doing so, missions can target challenges that do not necessarily have pre-defined, technological fixes. Solving these therefore requires a bottom-up approach, exploring many possible solutions and mobilising economy-wide innovation, investment, and partnerships. This approach is adaptive, cross-sectoral, inclusive, and firmly committed to economic efficiency, justice and sustainability.

Justice and equity must be at the centre if we are to solve the global water crisis (Gupta et al.,2024). The common-good approach and a framework for Water System Justice can help governments shape markets so that blue and green water is managed in a fair and sustainable way. Taking justice and equity seriously ranges from including voices of local communities and the most vulnerable, to embedding justice- and equity-based values in partnerships and contracts.

We need to revise our assessments for how much water humans need for a dignified life. Taking an economy-wide approach and factoring in other needs for human development, such as food and industry, as well as blue and green water supplies, presents a far higher integrated estimate of freshwater needs for a dignified life. The GCEW recommends increasing the minimal water requirements from 50 to 4,000 litres/person/day.

Managing water efficiently, equitably, and sustainably as an economic good requires a new set of economic principles for water governance. Chapter 3 introduced three overarching principles: (1) value water for the essential services it provides; (2) establish absolute limits for the amount of water that can be safely and sustainably consumed; and (3) develop policy packages to promote synergy, because no single policy can achieve the competing requirements of efficiency, equity, and environmental sustainability.

To ensure these priorities lead to the systemic, collective, and economy-wide action demanded by the global water crisis, they must be underpinned by a new economic framing that is less reactive and more proactive. Water economics must be rethought so that we shape markets from the start instead of waiting to fix them after they fail. This means we need to begin by identifying the outcomes we want to achieve with a view to tackling the global water crisis and work backwards through what this means for the economy and its components – innovation, partnerships, finance, and the governance of utilities and data. Designing justice and equity into these components cannot be an afterthought but needs to be a condition for achieving desired outcomes. This chapter investigates a new economic framing based on shaping markets, designing policy with outcomes- and mission-orientation in mind, and embedding justice at the heart of our policy response.

From fixing markets to shaping economies

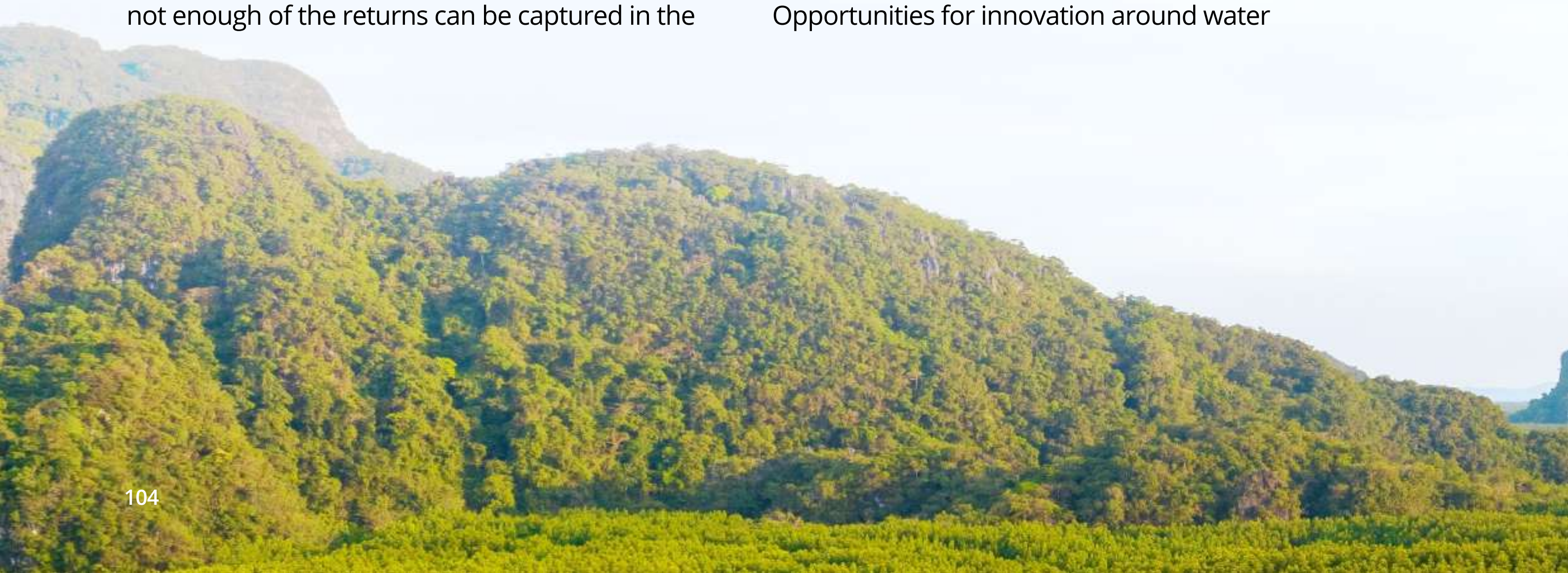
Much of the discussion of the economics of water focuses on the role of externalities, with sustainability and justice concerns explained as market failures (Mazzucato, 2024; Hess and Ostrom, 2003). Goods and services with positive externalities might not draw enough private investment, as not enough of the returns can be captured in the returns. On the other hand, negative externalities such as pollution require regulatory measures such as environmental impact assessments, water quality standards, punitive actions, and mechanisms to internalise the costs, such as putting a social-cost price on carbon or taxing profligate water use in dry areas.

Instead of waiting for externalities to arise and markets to fail, then intervening after the fact (ex-post), the market system can be shaped differently from the start (ex-ante) to minimise externalities and failures. This means shifting from an outsized focus on correcting externalities via redistributive mechanisms like taxes, to a focus on pre-distributive mechanisms by rethinking the market structures that lead to externalities; there is a role here for the adoption of priority of use of environmental impact assessments, emission standards, and pollution permits.

Conventional economic theory assumes that once the sources of market failures have been addressed – a monopoly reined in, a positive externality subsidised, or a negative externality taxed – market forces will efficiently reallocate resources, enabling the economy to follow a path to efficiency.

However, markets are outcomes of how economic actors, including governments and businesses, are governed and interact (Mazzucato and Ryan-Collins, 2022). Shaping markets requires starting with an objective, and designing property rights, partnerships and financial structures to deliver on that objective in a pre-distributive way from the start. This requires attention to contract design and the form of partnerships between actors. It requires moving from an ex-post lens to an ex-ante one. If not shaped with efficiency, equity, and environmental sustainability, markets can deliver sub-optimal outcomes.

Efficiency should be thought of in dynamic terms. Opportunities for innovation around water



challenges must be understood not in terms of short-run costs but of long-run investments that can catalyse economy-wide benefits and hence dynamic (versus static) efficiency gains. This requires understanding increasing returns to scale, where cumulative investments generate learning and innovation, leading to cost reductions.

Equity and justice can be put at the centre of how public and private actors invest. Otherwise, if not actively shaped, markets can create and exacerbate the existing system of property rights, and encourage hoarding and monopolisation of scarce resources, allowing some to buy up land, thereby accessing green and blue water (Bosch and Gupta, 2023). They can neglect societal or environmental concerns. Mining, energy or semiconductor companies, even farmers have no reason to use less water than they have available, or to pollute less. The past century has seen around a 600% increase in freshwater withdrawals worldwide; and water pollution has aggravated water scarcity in 2000 sub-basins worldwide (Wang, Nature 2024).

In other words, in the absence of adequate regulation, the economic system that aims at maximising returns on investment, profits, and GDP moves along a water-intensive path, taking as much water as it can and potentially polluting it without regard for water needs across social, economic, cultural, and ecological contexts. This is not just about externalities – it is about getting stuck in the wrong kind of market. It is also inherently about justice.

Further, the conception of states as a market-fixers has led to the idea that governments are not supposed to steer the economy, but only enable, regulate, and facilitate it. This has exacerbated inequalities and injustices worldwide: in low-income countries, water can cost individuals as much as 45% of income, compared to as little as 0.1% in high-income countries (see life stories reported in WaterAid, 2016).

Industrial strategy (actions taken by states to shape how economies are structured and grow) can be an engine for sustainable and inclusive economic growth only if it shifts focus from sectors to missions (Mazzucato et al., 2024). To avoid mistakes of the past, a mission-oriented approach to industrial strategy would not pick winners (sectors) but missions that all sectors are required to tackle. A well-designed, mission-oriented industrial strategy can transform water challenges into opportunities for cross-sectoral innovation and investment. This can boost business investment and lead to jobs and growth that serve the interests of people and the planet.

From ex-post to ex-ante measures

The paths that economies follow under free-market conditions are problematic, particularly in the face of manifold crises, including the risks of rising sea levels, drought, floods, conflict, youth unemployment, obesity, aging, cyber security and inequality, to name a few. In these situations, states must lead by actively shaping and co-creating markets, even as they continue to regulate existing ones (Mazzucato, 2013).

A market-shaping approach means governments can shift their focus from ex-post redistributive mechanisms – like allocating water from those who have too much to those who do not have enough – to ex-ante pre-distributive mechanisms – like changing who has access to water from the start. For example, instead of taxing water used by semiconductor manufacturers in dry areas, governments can play a more important role in determining where semiconductor manufacturers produce, so that they do not have to solve the problem later.

Big, transformative changes in the world are seldom the result of market forces alone: they are largely the result of public policies and strategic investments. From the internet to the renewable energy revolution, nearly all major technological shifts start with the public sector. Even the iPhone, often heralded as an example of market-driving innovation, relies on the government investments that led to the internet, on GPS technology developed by the United States (US) military, and on touchscreen technology first conceived in a publicly funded lab at the University of Delaware.[9]

Singapore offers a good example of shaping water markets (Leong and Li, 2017). Being amongst the most water-stressed countries in the world, Singapore has sought solutions to overcome freshwater scarcity by virtue of its geography, including building up its environment and water industry. In 2006, with water and environmental technologies identified as a key growth industry, SGD 670 million in public funds were secured to foster technologies and create a thriving research community over 15 years. As of 2024, Singapore has over 180 water companies and more than 20 water research centres. Singapore's National Water Agency (PUB) continues to facilitate private and public sector collaboration on research and development (R&D) projects, such as enabling firms to test technologies at PUB's facilities under actual site conditions.

This example shows that states have an arsenal of instruments to shape markets and should seek to use the full range of them where beneficial. In managing blue water, these tools include supply-side policies like providing strategic direct investments to support the construction of reservoirs or damns, or regulation to ensure water recycling and reuse. They also include demand-side policies, like public procurement, requiring water footprint disclosures from vendors, and only buying from those who meet sustainability standards, or being the first buyer of a cutting-edge water-saving technology such as water-recycling systems. As Chapter 3 shows, policies to manage blue water efficiency have a chequered history, and must be designed and implemented with care.

Governments also have policy instruments to manage green water. These instruments often pertain to policy domains beyond water management, making it important to adopt an all-of-government and economy-wide approach. For instance, in the context of land planning (for urbanisation, extension of agricultural land, or building infrastructure), governments can define zones where ecosystems are protected and encroachments are banned. Land-planning instruments can be used in the management of evaporationsheds to maintain vapour flows. Where properly designed and enforced, labels and certification schemes can be used to shape and direct markets away from goods that can affect ecosystems that sustain evapotranspiration.

Outcome-orientation and missions

Government policy for blue and green water management requires a direction because countries must actively change their patterns of water allocation and consumption to tackle the global water crisis. Shaping markets provides governments with the justification to use policy to change water allocation, consumption, and other drivers that tilt the hydrological cycle. Outcome-orientation indicates the direction of travel.

Distinguishing between outcomes and outputs is important to evaluate the success of market-shaping policies. *Outputs* are the tangible products or activities resulting from a project. In the case of blue water, this might include the construction of infrastructure like latrines or water treatment plants, while in case of green water, this might include planting trees in the Amazon rainforest to preserve precipitation patterns. *Outcomes* refer to the broader, long-term effects of these outputs, focusing on the real-world changes they bring, such as improved public health or increased access to clean water. Focusing solely on outputs without considering outcomes can lead to projects that deliver infrastructure but fail to achieve meaningful, sustainable improvements in water and sanitation access.

Chapter 5 examines a new approach to water governance: a mission-centred approach that operationalises market-shaping, based on directionality and outcome-orientation (Mazzucato, 2018b, 2019, 2021; Box 4.1). Missions are ambitious, clear, and time-bound objectives that mobilise cross-sectoral solutions to challenges. They focus on outcomes, as opposed to outputs. By doing so, missions can target challenges that do not necessarily have pre-defined, technological fixes. Solving these requires a bottom-up approach, exploring many possible solutions and mobilising economy-wide innovation, investment, and partnerships.

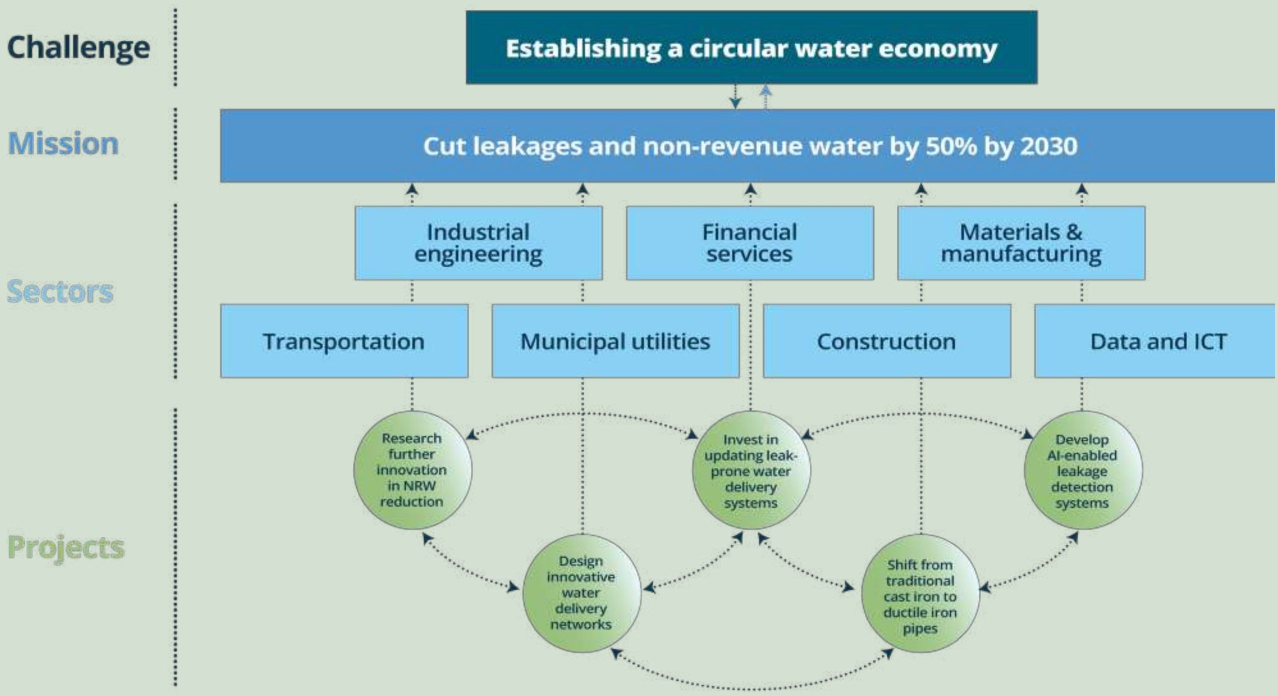
Box 4.1: Elements of a mission-centred approach and mission maps

A mission-centred approach, as detailed in Mazzucato (2018, 2019, 2021), has five criteria:

1. ***Be bold and inspirational with wide societal relevance.*** *Engage the public by demonstrating that ambitious actions and solutions will have an impact on people's daily lives.*
2. ***Set a clear, targeted, measurable, and time-bound direction.*** *Provide a framework and specific targets, whether binary (e.g., providing water, sanitation, and hygiene access to all) or quantified (e.g., increasing water efficiency by a certain percentage).*
3. ***Be ambitious yet realistic****. Set mission objectives that are centred on innovation, considering the feedback effects between basic and applied research.*
4. ***Encourage cross-disciplinary, cross-sectoral, and cross-actor innovation****. Frame missions to stimulate activity across and between scientific disciplines, industrial sectors, and actors, incorporating epistemic justice.*
5. ***Involve multiple, bottom-up solutions.*** *Allow for diverse approaches, avoiding reliance on a single development path or technology.*

Mission maps can help policymakers visualise the different components of missions and how they interact. The illustrative mission map below is adapted from Mazzucato (2018) and based on the mission of creating a circular urban water economy, as elaborated in Chapter 5. One mission to tackle this challenge could include reducing water leakages in urban areas 50% by 2030. Currently, about 40% of urban water supply globally is lost through pipeline leaks, costing USD 39 billion annually and generating significant CO2 emissions (GCEW 2023a; Burke et al. 2023). Reducing these losses will save money and resources. Innovations such as leak-resistant materials and sensor technologies for early leak detection are essential to achieving this goal.

Figure 4.1: Mission to establish a circular water economy.



Source: Adopted with permission from Mazzucato (2018a)

Focusing on outcomes is critical for water-related challenges because water is not a sector, as underscored in Section 4.1. Water policies must be economy-wide and cross-sectoral. Indeed, a mission around reducing water consumption in agriculture while enhancing crop yields and farmers' incomes can include sectors as diverse as agriculture, digital services, financial services, and construction.

Embedding outcomes-orientation and directionality in government policy means that all instruments and tools, such as those mentioned in Section 4.2.2, should be designed to deliver the relevant outcomes (Mazzucato & Kuehn von Burgsdorff, 2024). Part 2 of this report examines the innovations, partnerships, financing, utilities, data, and global governance required to achieve the five overarching missions. Each policy area will consider how to align concrete policy tools and public institutions with the missions in an outcome-oriented way.

Putting water justice at the centre of shaping markets

The hydrological cycle seen through the lens of a global common good requires not only outcomes-orientation and market shaping, but also a new perspective on justice. As discussed in Chapter 2 we use the common good approach for three reasons. First, water connects communities across borders and even continents, including through atmospheric moisture flows. Second, the planet has entered a vicious cycle in which the interaction of the water crisis, climate change, and the loss of biodiversity exacerbate one another. Third, the water crisis impacts virtually every one of the United Nations (UN) Sustainable Development Goals (SDGs) and threatens people everywhere: insufficient food for a growing world population, accelerated spread of disease, and increased forced migration and cross-border conflicts are some of the predictable outcomes. As a result, countries need systemic, collective, and economy-wide action to tackle the global water crisis.

In shaping markets to become more equitable and just in their water allocation and consumption, a common good lens pays attention not only to the outcomes being sought but also to how the actors in the system work together to deliver those outcomes with justice and equity at the centre (Mazzucato, 2024).

The innovation (Chapter 5), partnerships and collaborations (Chapter 6), and financing (Chapter 7) must therefore be designed in a way that recognises the contributions of different economic actors and shares the benefits more equitably. The governance of institutions such as water utilities (Chapter 8) should be done in a way that aligns with the missions, while ensuring that transparency is baked into the whole process, so that governments, businesses, and other economic actors are held accountable. Data collection and disclosure (Chapter 9) is critical to strengthening the transparency of water use and accountability of water users. Finally, global governance arrangements (Chapter 10) must be designed in a

Box 4.2. The common good framework

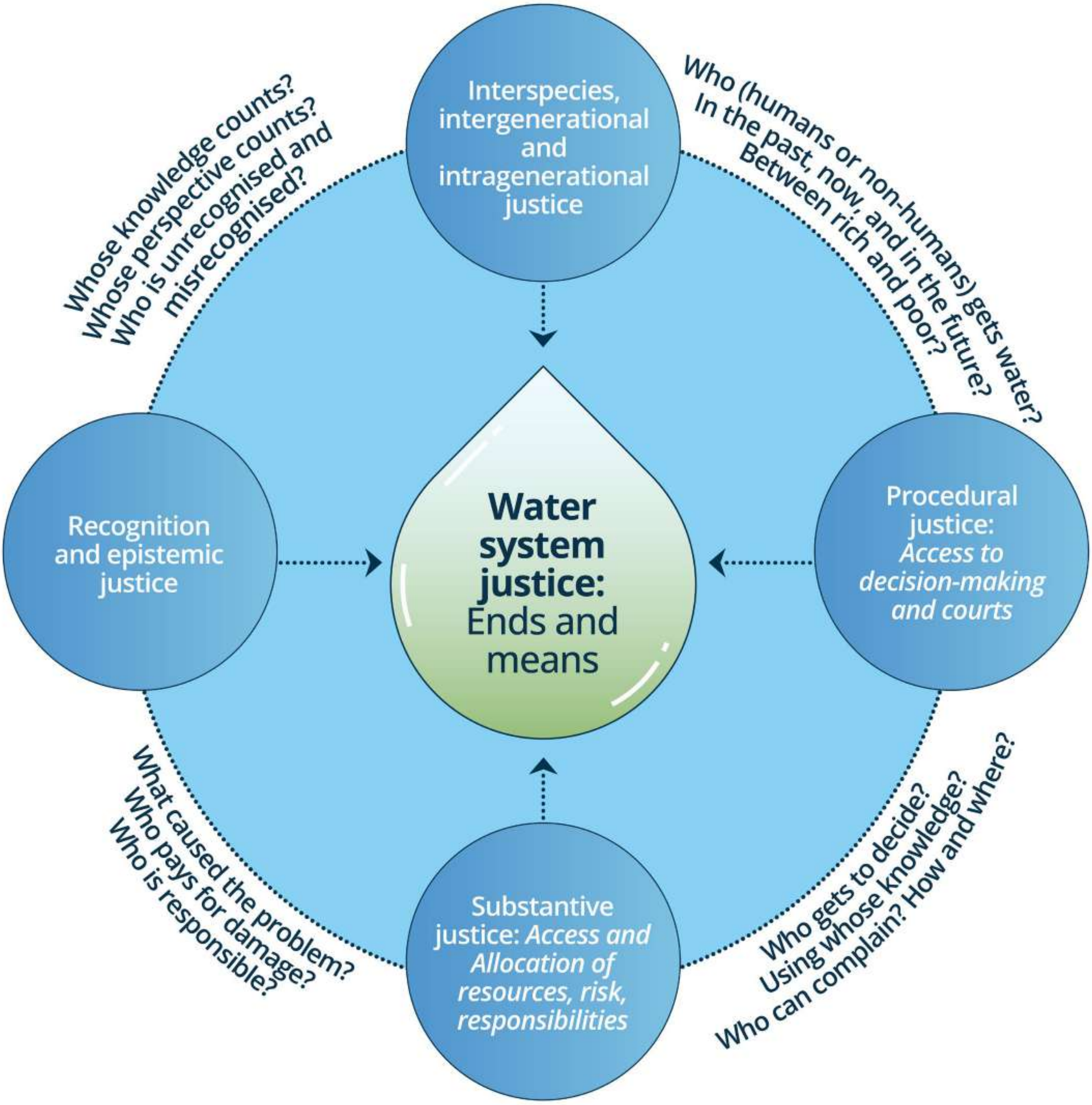
In Mazzucato (2023) the following 5 principles are used to underpin the common good framework.

- ***Purpose and Directionality** emphasises that growth must have a clear direction with policy tools and public institutions designed in an outcomes-oriented way to tackle shared missions.*
- ***Co-creation and Participation** ensure different stakeholders are involved in decision-making and implementation processes.*
- ***Collective Learning and Knowledge-Sharing** are essential for the systemic and collective action required to tackle the global water crisis.*
- ***Access for All and Equitable Sharing** of resources, risks, and rewards, and related responsibilities are also crucial.*
- ***Transparency and accountability** are essential for accessible and visible governance, with a focus on the governance of water data and utilities.*

way that is truly collective and participatory so that one part of the world is not adversely affected by actions in another part of the world.

The five common good principles help guarantee that justice and equity are baked into the global response to the water crisis. The common good framework is used in Mazzucato and Zaqout (2024) to consider the implications for designing solutions to our biggest water challenges. A robust definition of Water System Justice is required. The GCEW endorses a definition of justice beyond equity and redistribution, and the Earth Commission provides a valuable reference, explored below.

Figure 4.2: Building off the Earth System Justice Framework (Gupta et al., 2023)



Defining Water System Justice

Justice in the water space has mainly been framed at the local, basin, or national level, focused on ensuring that people's basic needs, sources, and supplies are not polluted, that uses are prioritised, and to a lesser extent, that decision-making processes are inclusive (Bosch et al., 2024, and Sultana, 2018). Water justice goes beyond equity to address a broader analysis. The rights of rivers and Indigenous rights are increasingly promoted. In transboundary basins, the priority is typically sharing water equitably, balancing the needs of different riparian states, and reducing harm to others; international law calls for equitable and optimal use of the watercourses.

Like conventional water economics, and resource and irrigation management, water justice debates focus on blue water, with little attention to green water except in the context of land- and water-grabbing.

Building on the Earth Commission's Earth system justice framework (Gupta et al., 2023), analysis for this report explores what it means to restore the hydrological cycle and manage water sustainably for people today, for future generations, and for all living beings. The result is a framework for Water System Justice (Figure 4.2) that aims to tackle structural injustices from a pragmatic approach and identify a just and sustainable path for blue and green water management (Gupta et al., 2023).

A distinctive feature of Water System Justice is to assess ends and means simultaneously. Water System Justice starts with the hydrological cycle as a global common good. It includes justice elements (recognition, epistemic; interspecies, intergenerational, and intragenerational; procedural; and substantive) and applies them to water to operationalise just ends and just means. Water System Justice argues that conservative justice is unable and unlikely to address the justice issues of the Anthropocene:

- **Recognition justice**, acknowledging all the rights-holders and stakeholders in each context, their different situations, their knowledge, values, identity and culture, as well as past and present injustices that might affect them. It counters exclusion and prioritises people and communities who are poor, marginalised, or have disabilities.

- **Epistemic justice**, or how knowledge is generated, shared and valued, addressing possible biases, power imbalances and inequities in representation and access to information (Fricker, 2007; Byskov & Hyams, 2022). It means recognising, incorporating and sharing diverse sources of knowledge about water, including scholars from the Global South, Indigenous groups and peoples with different knowledge about water, and those writing in languages other than English.

- **Relational justice**, emphasising that justice is about our relationships with the Earth and fellow living beings (interspecies), with future generations (intergenerational), and with one another (intragenerational).

- **Procedural justice** or giving all actors relevant information and the possibility to influence decisions. If unhappy, they should be allowed to protest and go to court. Positive action is often needed to help the most marginalised to participate effectively.

- **Substantive justice**, which supplements procedural justice – and its focus on governance – by considering the outcomes. If procedural justice merely implements existing policies and laws, it can exacerbate substantive injustice. Substantive justice defines a just allocation of water and of water-related risks and opportunities.

These elements should be implemented simultaneously to operationalise just ends and just means. Ends are operationalised through: (1) boundaries and standards for water quantity and quality; and (2) minimum access. Means are operationalised by addressing: (1) the drivers of water crisis and inequality; and (2) the distribution of harm/risks, resources, and related responsibilities.

AAchieving Water System Justice requires a programmatic approach that combines local realities with global necessities. By recognising and valuing diverse knowledge systems, ensuring inclusive and intersectional governance, and addressing procedural and substantive justice, we can move towards a more equitable and sustainable water future. For example, one way of ensuring Water System Justice is by ensuring that all children before the age of five do not die from a water-related cause (see mission 5). Each chapter in Part 2 of the report will investigate the changes required for the relevant policy area to ensure that water justice is integrated from the start.

Estimating water requirements for a dignified life

One key implication of putting justice at the centre of our response to the global water crisis is rethinking what it means to live with enough water for a dignified life – not just to survive, but to thrive. This is an objective, an outcome that requires policymakers to redesign the tools and institutions at their disposal to deliver on it. One of these tools is the way we measure how much water humans need to lead a dignified life. It is 14 years since access to safe drinking water and sanitation was recognised as a human right (UN, 2010). Fifty litres of freshwater per person per day (l/p/d) represents a minimum human right to water for basic health and sanitation (WHO, 2003). While progress is slow, the human right to water and sanitation has been a cornerstone of the global water agenda.

Revising these assessments requires an economy-wide approach, taking water use from all sectors into account, and a systemic approach, considering both blue and green water flows. Factoring in food and industry for adequate human development, as well as blue and green water supplies, presents a far higher integrated estimate of freshwater needs for a dignified life. This is a bottom-up estimate of human freshwater requirements, not a definition of the freshwater planetary boundary. Falkenmark & Rockström (2004) lay out the foundational logic for human water requirements based on diet, domestic, and industry needs, arriving at an estimated 1,500 m^3/p/year (y). This estimate remains largely intact twenty years later, though we have revised the diet estimate based on nutritional requirements and updated industrial usage based on current rates.

While the total estimate can be refined, local solutions will not suffice to secure such volumes for large populations in most parts of the world. Trade has a role to play but is affected by misaligned policies and by the water crisis, as discussed in Chapter 3. The global community needs to explore and realise the conditions for trade (food trade most prominently) to contribute to efficiency (delivering food, valuing water endowments, and sound water policies), equity (just allocation and cost-efficiency), and environmental sustainability (protecting water and related ecosystems that support a stable hydrological cycle).

In estimating human water requirements, it is important to distinguish water *withdrawal* from water *use*. Water withdrawal is the direct, human extraction of blue water for societal application in irrigated agriculture, industry, and municipal contexts (distributed as piped water for human uses). A proportion of withdrawn water is consumed – water use – while the rest is returned to the environment. Consumptive water use refers to water withdrawn from a source and made unsuitable for reuse in the same basin (Gleick, 2000), such as green water flow from vegetation, including crops.

The policy focus for estimates of the human need for freshwater – which impacts its priority in economics and governance (e.g., SDG 6) – is on the minimum human right to domestic water (for drinking, cleaning, and health). This amounts to 50-100 l/p/d, or an annual human water requirement of 18-36 m^3/p/y.

In this report, we widen the human requirement for freshwater, as a necessary basic accounting factor in the economy, to include the freshwater required for food and industry. While including water for domestic, food, and industry uses is a significant broadening, it still underestimates human freshwater needs, as it excludes freshwater for sustainable ecological functions and services, like moisture feedback (generating future rainfall), carbon sequestration in plants and soil, and nurturing biodiversity in stable ecosystems.

For food we estimate the freshwater requirements per person based on dietary requirements in calories (kcal) and average water productivity estimates for animal-based kcal versus plant-based kcal. We utilise a range of daily caloric (kcal) estimations:

- Food and Agriculture Organization (FAO) estimated average adequate diet of 2,700 kcal/p/d based on empirical average food balance between supply and demand at country level.

- EAT-Lancet Commission Planetary Health Diet (PHD) estimates for an optimal diet for human health and environmental sustainability (2,500 kcal) of which 14% is animal-based and 86% plant-based.
- The Earth Commission's (EarthC) contribution, with two levels of just access to a minimally sufficient diet: the upper level using the EAT-Lancet PHD (2,500 kcal) and the lower level using the WHO guideline for emergency nutrition needs (2,100 kcal) (Rammelt et al., 2022).

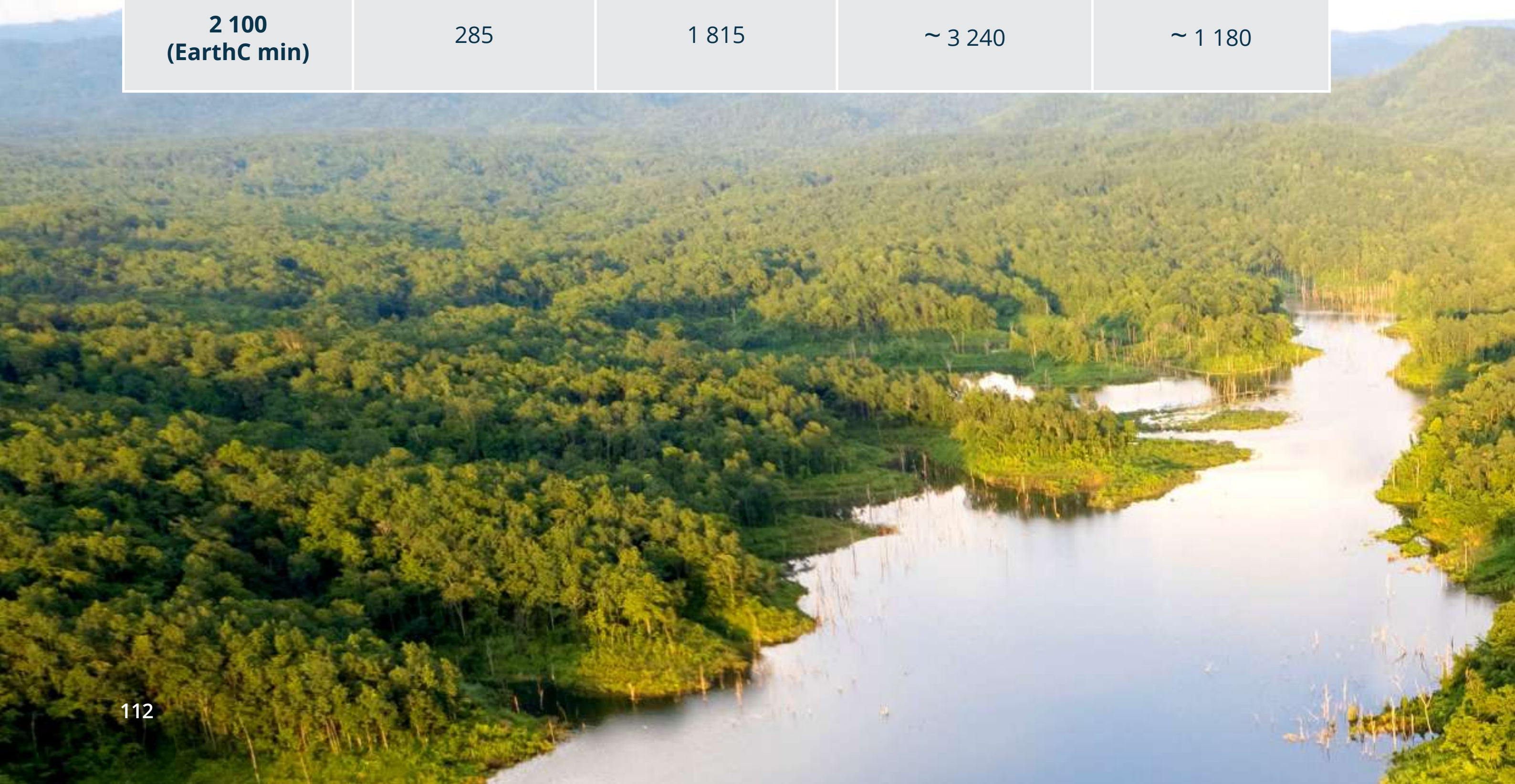
Despite wide variability in water productivity (m^3/ton or kcal) for different crops, agricultural yield levels, and hydroclimatic zones around the world, the evidence shows a relatively similar range across hydroclimatic zones for different stable food crops (the basis for food groups in diets) at approximately 1,000 m^3/ton (with a range of 500-5,000 m^3/ton explained by yield levels determined by management practices rather than hydro-climatically, which in turn result from the linear relationship between yield and transpiration).

Evidence indicates that animal-based kcals consume an order of five times more freshwater (per unit kcal) on average compared to plant-based kcals (FAO). As a generic guide for human water requirements (recognising large local variability due to different crops, hydroclimates, management, and diets), this translates to ≈ 0.5 m^3/1,000 kcal of plant-based foods and ≈ 4 m^3/1,000 kcal of animal-based foods.

Combining these gives the following estimates of human freshwater requirements for food for different dietary targets:

Table 4.1: Estimates of human freshwater requirements

Daily total target kcal estimate	Animal-based kcal (14% of total)	Plant-based kcal (86% of total)	l/p/d (avg water productivity)	m^3/p/y
2 700 (FAO)	400	2 300	~ 4 300	~ 1 570
2 500 (PHD)	340	2 160	~ 3 860	~ 1 410
2 500 (EarthC max)	340	2 160	~ 3 860	~ 1 410
2 100 (EarthC min)	285	1 815	~ 3 240	~ 1 180



This provides us with a global average water requirement for food of approximately 3,800 l/p/d (with a range around 3,200-4,300 l/p/d).

Industrial demands are difficult to define at a per capita level, given the uneven global distribution of water-consuming industries. At the same time, one can argue that in a globalised world with significant virtual trading of goods, dividing the global estimate of industrial freshwater consumption by the global population provides an indicator of the level of freshwater consumption per person to keep the world of today operating.

Global industrial water withdrawal in 2020 was approximately 920 km^3 (Richie, H. & Roser, M. (2024). Distributing this evenly across the 2020 global population of 7.9 billion people yields a nominal 322 l/p/d or 118 m^3/p/y. Despite the difficulty in explicitly allocating this at a per-capita level locally, we do think it is valuable to include it in defining human water needs.

The total updated human water requirement for a dignified life thus amounts to approximately 4,000 l/p/d (3,800 + 50 + 322 for food, domestic and industry, respectively).

In addition to this, approximately one third of mean annual blue water flow should be set aside for environmental water flows in aquatic ecosystems. The green water equivalent – the minimum level of soil and plant moisture in any given landscape/watershed – is unknown.

Conclusion

To shape markets that balance competing priorities of efficiency, equity and justice, and environmental sustainability in a way that provides enough water for citizens to lead a dignified life, we need a new direction, guided by clear and ambitious missions. By making investments and crafting policies that strategically promote efficient, equitable, and sustainable solutions, governments can catalyse economy-wide transformations that lead to necessary water outcomes. Setting ambitious targets to achieve them in an outcomes-oriented way can provide the foundation for such just transformations.

Chapter 3 sets out the priority to consider a range of policy packages, because no single policy can achieve the competing requirements of efficiency, equity, and environmental sustainability. Part 2 will set out five critical water missions before examining the policy changes we need in innovation, partnerships, financing, utilities, data, and global governance.