A Mission-Oriented Approach to Governing Our Global Water Challenges and Opportunities

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GLOBAL COMMISSION on the ECONOMICS OF WATER

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A Mission-Oriented Approach to Governing Our Global Water Challenges and Opportunities

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Abstract

The hydrological cycle is out of balance. At the same time, governments have mismanaged water resources for decades, contributing to widespread water scarcity, pollution, and inequity. The Global Commission on the Economics of Water emphasizes the need to protect the Earth's hydrological cycle as a global common good, requiring systemic, collective, and economy-wide action. This policy brief highlights the Commission's recommendation to adopt five missions addressing the global water crisis: food systems, natural habitats, circular economy, water efficiency, and water, sanitation, and hygiene (WASH). It explores four pillars critical for governments to design, develop, and deliver mission-oriented policies that target the most pressing water challenges: mission-oriented policy design, outcomes-oriented tools and institutions, symbiotic partnerships, and dynamic public sector capabilities. To ensure that justice is at the centre of our response to the global water crisis, this paper recommends that the principles of efficiency, equity, and environmental sustainability (the 3Es) cut across all water missions.

Contents

1. Introduction

Governments have mismanaged water for decades. Too much, too little or too dirty — water is destabilising human societies and planetary boundaries. Communities are increasingly grappling with water-related disasters, including flooding, droughts, storms and extreme temperatures, with a death toll of approximately two million over the past half-century, predominantly affecting the Global South (Mohanty et al. 2020; WMO 2021). Risks of displacement loom for 700 million people by 2030 (HLPW 2018). Already, 55% of the world's food production is in places with declining freshwater supplies, and 38% of people live in areas of extreme water loss, particularly in densely-populated regions like northwestern India and northeastern China (GCEW, 2024). Alarmingly, periodic severe water shortages affect two-thirds of the global population annually and over two billion people live in areas with insufficient water resources. By 2025, water scarcity may threaten half of humanity (UNICEF 2021). Moreover, dirty water sources claim over a million lives every year (Ritchie et al. 2019). The economic impacts of changing precipitation patterns, rising temperatures, and declining water access and storage will be dire. High-income countries could see an 8% decrease in GDP by 2050, with that figure rising to 10-15% in lower-income countries (GCEW, 2024). It is time to embolden our response to the global water crisis.

Governments and non-state actors must protect the Earth's hydrological cycle as a global common good (GCEW 2023a; Mazzucato 2023c; Mazzucato and Zaqout 2024). First, countries and communities are interdependent through the global hydrological cycle, not just through transboundary blue water flows, but through atmospheric green water vapour flows, which transcend traditionally-understood watershed boundaries. Deforestation in one region impacts rainfall patterns in neighbouring regions (Rockström et al. 2023). Changes to the global hydrological cycle and extreme water-related crises are proof that communities and countries are interdependent, and must address global water challenges through local, regional and global actions that integrate to stabilise the global hydrological cycle.

Second, the water crisis is inextricably intertwined with the climate and biodiversity crises, and they all exacerbate one another in a vicious cycle. Deforestation and other land-use change decimates green water retention, simultaneously decreasing carbon storage capacity, leading to global temperature increases. Droughts and floods erode soils and degrade lands, robbing them of their ability to support plant and animal biodiversity. Countless other interconnections between water, climate, and biodiversity point to the need for integrated water resources management (IWRM) frameworks to encompass blue and green water and address the mutually-accelerating crises (GCEW, 2024).

Third, the water crisis runs through all the UN's Sustainable Development Goals (SDGs). Virtually every challenge — from SDG 1 (zero poverty) and SDG 2 (zero hunger) to SDG 6 (gender parity) and SDG 8 (decent work and economic growth) — depends on the efficient, equitable and environmentally sustainable use and governance of water. Unless we tackle the water crisis, the world will have food shortages facing a growing population, faster spread of disease, and increasingly-intense conflicts over forced migration and scarce resources (GCEW, 2024).

Lastly, water runs through all sectors in the economy – from agriculture and mining to semiconductors and energy. For example, water is a critical input for energy sources and technologies driving the renewable energy transition. Lithium is a critical resource for batteries and electric vehicles, but it is also very water intensive (with each tonne of lithium requiring around 2 million litres of water), can lead to the salination of groundwater, and can pollute toxic waste (Blair et al., 2024). Water is not a sector and tackling the water crisis demands that all sectors be part of the solution.

Thus, countries must respond with systemic, collective, economy-wide action to tackle the water crisis and create a more just water future. Government, business, labour, communities and all other economic actors must partner and work together in fundamentally new ways.

As the science evolves, our policies must account for a more complex relationship between human societies and the global hydrological cycle. We need a new approach to policy to tackle the interdependent, systemic and collective dynamics head-on. A mission-oriented approach can help. Missions turn policy on its head. Instead of focusing on sectors, technologies or firms, a mission-oriented approach begins by identifying the most pressing societal challenges before breaking them down into manageable policy pathways (Mazzucato 2021; 2018). In the case of the global water crisis, these challenges include highly water extractive models of agriculture, inefficient water use in industry, manufacturing, mining and other economic sectors, and high mortality rates, because of unsafe and untreated water.

Missions are a policy mechanism that can help governments put these challenges at the centre of their policy response. By setting a clear direction, empowering public sector organisations with more proactive mandates, changing the way outcomes are measured, appraised and evaluated, designing mission-aligned partnerships with business, labour and communities, and delivering patient long-term finance, a mission-oriented approach can help governments develop policy that is both ambitious and pragmatic.

Missions offer a new approach to achieving directed economic growth (Mazzucato 2013). If structured in a way that catalyses new public and private investment, and collaborative innovation, mission-oriented policies can solve big water challenges — around too much, too little and too dirty water — while galvanising economy-wide innovation, diversification, productivity increases, employment and structural transformation. For example, to tackle the challenges around water-extractive agriculture practices, governments can shape and co-create markets for new innovations around advanced monitoring systems to optimise irrigation systems, improving soil health through customised fertiliser mixes, or plant-based proteins so we shift away from water-intensive meat production. Public and private investment into new markets and innovations can expand the productive capacity of the economy. By designing contracts that embed conditionalities, governments can create more symbiotic partnerships that deliver water outcomes aligned with their public policy objectives.

So, the key question is how to make sure the structures, tools, institutions and new collaborations around policy create a catalytic change that leads to growth and water outcomes that are more efficient, equitable and environmentally sustainable.

This working paper sets out how governments can adopt a mission-oriented approach to tackle the global water crisis. Section 2 outlines the fundamentals of a mission-oriented approach. Section 3 examines how missions can be applied to water, and how a mission-oriented framework can help tackle major water challenges around food systems, a circular water economy and safe water for all. Section 4 digs into one mission, namely to improve water productivity in agriculture, to show how governments can begin with an outcome and work backwards to design innovation, partnerships, finance, and the governance of data to deliver on it, before section 5 concludes.

2. A mission-oriented approach

A mission-oriented approach means shifting the focus of policy away from supporting specific technologies and sectors, towards tackling key societal challenges, like those set out by the UN's Sustainable Development Goals (SDGs), before breaking these challenges down into achievable policy goals (Mazzucato 2021). Starting with a challenge means you begin by identifying a specific outcome that requires many bottom-up solutions and innovations to achieve it (see Box 1 below for an example of the European Commission's mission for a plastic-free ocean; Mazzucato 2018). For example, these outcomes could include providing universal access to drinking water or regenerating resilient, biodiverse freshwater ecosystems. Economic outcomes like increased productivity, employment and growth are not missions in themselves; a successful mission can produce these positive outcomes as a result of the economic activity and innovation needed to achieve the mission (Mazzucato 2023a). Deleidi and Mazzucato (2021) have demonstrated that mission-oriented policies can lead to a higher multiplier effect.

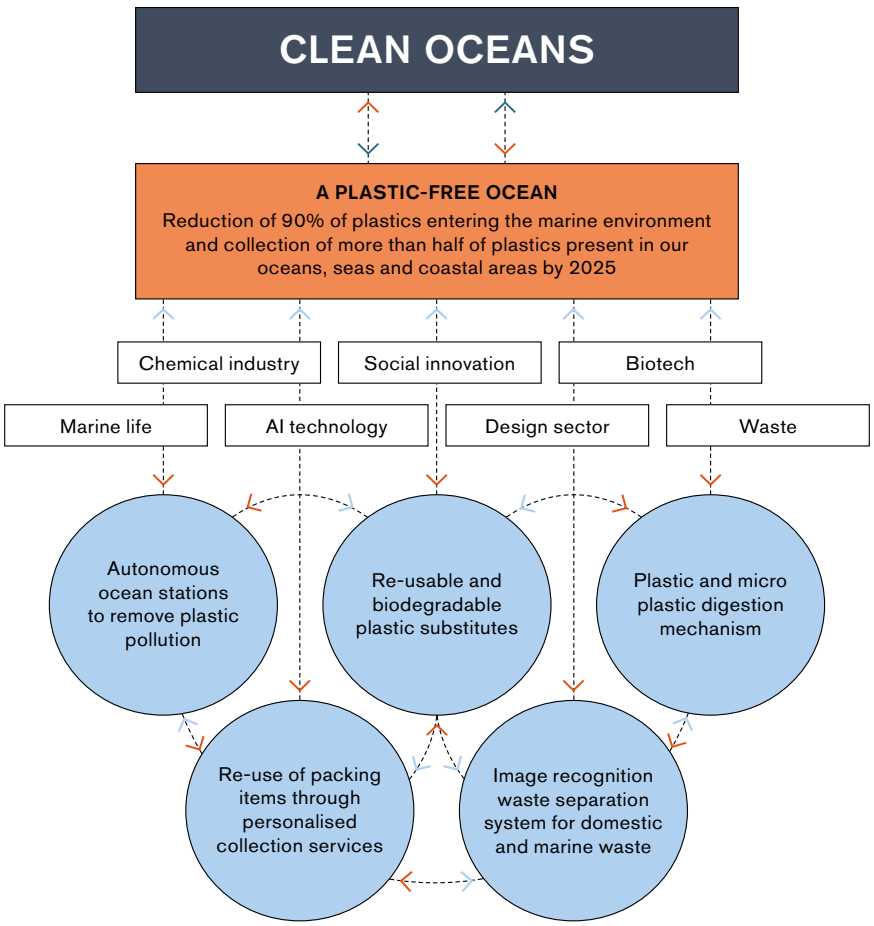
Missions have five main criteria, as detailed by Mazzucato (2018). Missions should:

1. **Be bold and inspirational with wide societal relevance:** Missions should engage the public. They should make clear that through bold, ambitious action, solutions will be developed that will have an impact on people's daily lives.
2. **Set a clear direction — targeted, measurable and time-bound:** Missions need to be very clearly framed. While enabling long-term investments, they need a specific target that can either be formulated in a binary way or quantified.
3. **Be ambitious but realistic:** Mission objectives should be set in an ambitious manner (taking risks), centred on research and innovation activities across the entire innovation chain, including the feedback effects between basic and applied research.
4. **Encourage cross-disciplinary, cross-sectoral and cross-actor innovation:** Missions should be framed in such a way as to spark activity across, and among, multiple scientific disciplines (including social sciences and humanities), across different industrial sectors (for example, transport, nutrition, health, services) and different types of actors (public, private, third sector, civil society organisations).
5. **Involve multiple, bottom-up solutions:** Missions should not be achievable by a single development path or by a single technology. They must be open to being addressed by different types of solutions.

Box 1. The European Commission's mission-oriented approach

In 2019 the European Commission adopted a mission-oriented approach as part of its Horizon Europe R&D programme. The Commission set out five missions: (1) Adaptation to Climate Change: Support at least 150 European regions and communities to become climate-resilient by 2030; (2) Cancer: Working with Europe's Beating Cancer Plan to improve the lives of more than 3 million people by 2030 through prevention, cure and solutions to live longer and better; (3) Restore our Ocean and Waters by 2030; (4) 100 Climate-Neutral and Smart Cities by 2030; (5) A Soil Deal for Europe: 100 living labs and lighthouses to lead the transition towards healthy soils by 2030 (European Commission 2022; 2023). The illustrative mission map below is drawn from advice in Mazzucato (2018) that helped to shape the Commission's approach.

Figure 1. Mission to create a plastic-free ocean (Mazzucato 2018).



As a result, missions are necessarily cross-sectoral and economy-wide. Today's major societal challenges implicate an array of different technologies and economic actors in complex systems, so they require a portfolio of policies all oriented towards the goal of tackling the challenge. This

does not mean we no longer need to focus on sectors; it means we need to focus on sectoral transformation. For example, to tackle inefficient water consumption, all sectors in the economy – from agriculture and mining to manufacturing and industry – must consume less water. A cross-sectoral mission-oriented policy with clear water consumption targets would require all sectors in the economy to transform to achieve those targets. Indeed, water is not a sector. It flows through all sectors and requires all sectors to transform to do things differently.

A mission-oriented approach requires rethinking four pillars: a mission-oriented policy design, an outcomes-oriented approach to designing policy tools and public institutions, a new way to forge more symbiotic partnerships between government, business, and labour, and a renewed effort to build more dynamic public sector capabilities (Mazzucato et al. 2024a).

2.1. Mission-oriented policy design

To implement missions effectively, the way governments design, develop, and deliver policy must change. Missions demand an all-of-government approach to policymaking. They must be governed by a central government body with the backing of the higest offices of executive power, for example housed in the Cabinet Office or a similar body, with oversight from the president or prime minister. This centralization of mission governance can allow for more inter-ministerial and inter-departmental coordination and collaboration in the pursuit of tackling the shared missions. It is essential for governments to combat the 'complexity paradox' that plagues public policy, where more complex policy issues lead to more government agencies taking their own siloed policymaking approaches (Mazzucato 2019). An all-of-government approach to missions recognises that the solution to a complex problem does not sit in just one ministry, but instead mobilises widespread action across the government in pursuit of shared outcomes.

For example, the Colombian Government's National Development Plan adopted in 2023 includes "Territorial planning around water" as the first of its five objectives. The country's National Planning Department, which sits across the government's ministries, has the mandate to coordinate departments and agencies around the overarching objective and its policy programmes, including watershed protection policies and updating infrastructure for water-related data collection (National Planning Department 2023). Likewise, India's National Institution for Transforming India (NITI) Aayog mobilises a broad range of ministries and state governments to promote equitable water access in the context of India's sustainable development (NITI Aayog 2023).

2.2. Outcomes-oriented tools and institutions

If a government decides to pursue a mission, then all its policy tools – procurement, subsidies, grants and loans – and public institutions – public development banks, state-owned enterprises and public innovation labs – should be redesigned to achieve the mission. The right mixes of outcomes-oriented policy tools and public institutions are critical to missions (Mazzucato 2022). Below, we examine three: strategic procurement policy, outcomes-oriented subsidies, and mission-driven public development banks.

Strategic procurement policy: Public procurement is a powerful tool for governments, but it is currently not being leveraged in a strategic way (Mazzucato 2020). For the most part, public procurement has been approached with a view to managing down costs and risks and prioritising efficiency, fairness and the prevention of corruption. However, procurement policy can a highly influential demand-side tool that has the potential to shape new market opportunities that act as a stimulus for innovation and investment in line with government policy priorities. For example, after the North Sea flood of 1953, for example, the Netherlands launched the Delta Works programme, which included a strategic procurement policy to create a market for new types of flood barriers, instead of reinforcing conventional dykes. This policy intervention ultimately transformed the Dutch water construction sector (Wesseling and Meijerhof 2023).

Outcomes-oriented subsidies: The direct and indirect subsidies accruing to water users in agriculture and WASH alone are estimated at over US$700 billion per year (GCEW, 2024). But many of these subsidies lead to water-intensive crops being grown in arid regions, lead to deforestation in the tropics, and result in nitrogen pollution from runoff. Instead, guided by a mission to increase efficiency of water use across the economy governments can redesign and rechannel subsidies from water-extractive to water-saving solutions and support those that need water most.

Mission-driven public development banks: Public development banks are effective vehicles for distributing financial capital that is patient and favours longer-term returns, conditions that are important for water projects (Mazzucato and Macfarlane 2023). In many countries, water-related investments are increasingly coming from public development banks (both national and multilateral). Banco Desarrollo del Ecuador, BNDES in Brazil, Banco Nacional de Obras y Servicios in Mexico, Caisse de Depot et de Gestion Capital in Morocco and the Development Bank of Southern Africa (to name a few) provide loan, grant and equity funding to drive water projects (Smits and Rodriguez, 2022). For example, India's National Mission for Clean Ganga employs a hybrid annuity model for water infrastructure projects, wherein the government's public bank pays out the bulk of construction costs over a 15-year period, contingent upon performance of the wastewater assets (Global Infrastructure Hub 2022; U20 Task Force 2023). Due to their mandates and stable sources of finance, public development banks are appropriate partners for the private sector to co-finance riskier water projects. Redesigning public development banks to become more mission-oriented could help align international and national financing agendas around water (Mazzucato 2023b; Mazzucato at al 2024b). There is tremendous opportunity for these institutions to catalyse large-scale systemic change by aligning with country platforms around water to shape policy and fund important capacity-building programmes (GCEW 2024).

2.3. Symbiotic partnerships

A mission-driven approach should not be confused with top-down decision-making processes where governments forcefully regulate industry in pursuit of their objectives. Instead, it should create space for collaboration between the public sector, private actors, labour and other actors. However, there are many examples of water partnerships that have been parasitic and have led to the inefficient, inequitable, and unsustainable use of water. For example, in 1999 the Bolivian

government privatized Cochabamba's water services, granting a concession to Aguas del Tunari without adequate safeguards (Baer 2017). The company significantly increased water tariffs, leading to widespread protests, before the government terminated the contract.

Instead, partnerships between government and business can be designed in a way that helps tackle shared objectives, with justice and equity at the center (Lazonick and Mazzucato 2013; Mazzucato and Rodrik 2023). All partnerships — from land-based property rights, water permits and intellectual property rights to water-related grants, loans and procurement — are based on contracts, and redesigning these contracts represents a high-leverage opportunity to rethink the relationship between public and private actors (Mazzucato et al. Forthcoming). One policy tool that governments can use is conditionalities. Governments can embed conditionalities in contracts to, for example, (1) improve water conservation and the efficiency of water use, (2) direct investment for water-intensive industries towards regions that are less water stressed, (3) reinvest profits in productive business activities, such as R&D and innovation around water, or (4) reinvest profits into watershed and water basin conservation programmes so the source is being governed in a sustainable way (Mazzucato and Rodrik 2023; Mazzucato and Zaqout 2024).

Arrangements like Just Water Partnerships (JWPs) could bring public, private and philanthropic sectors together to make ambitious investments in water with clear conditionalities attached. Governments can bring in key financing partners by pooling smaller investment opportunities for increased bankability, utilising well-designed guarantees and co-investment setups, and enforcing the agreements that facilitate these investments (GCEW 2023a). On a country-by-country basis, policymakers can weave together the financial tools and institutional arrangements that best fit their specific contexts. When developing JWPs, some considerations include: (1) Consider the missions, outcomes, and targets that each JWP should seek to achieve; (2) Align multilateral, national development banks, and governments around JWPs; (3) Shift from a project-based approach to a programmatic, portfolio-based, strategic approach aligned with policy objectives; and (4) Embed conditionalities in JWP financing contracts that help deliver on the missions set out (GCEW 2024). In this way, countries can design JWPs to meet the particular water needs of their contexts.

Box 2. Efficiency, equity, and environmental sustainability (3Es) as cross-cutting principles

In the governance of water resources the three 'Es' (3Es) – efficiency, equity, and environmental sustainability – have historically been treated as trade offs. For example, when developing large-scale irrigation projects, efforts to maximize water use efficiency for agriculture may harm natural ecosystems and biodiversity, undermining the environmental sustainability of water resources. Meanwhile, implementing water trading schemes often favors economic efficiency but risks marginalizing vulnerable groups. However, the 3Es do not have to be trade offs if we envision them as interdependent, equally important, and best implemented together.

- **Efficiency:** 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.

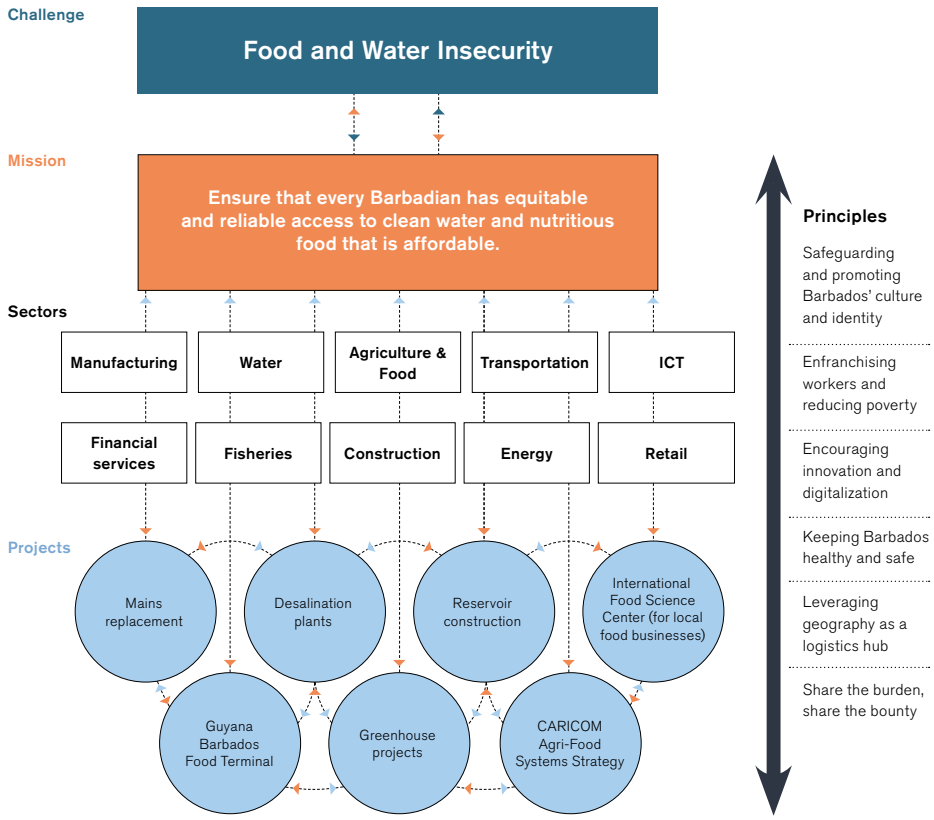
- **Equity:** We take a Water System Justice lens, which goes beyond traditional understandings of equity (Gupta et al., 2023). While water justice debates focus on blue water at the local, basin, or national level, the Water System Justice framework looks at what it means to restore the hydrological cycle to provide sustainable and equitable access to communities globally. This framework includes the recognition that we need more equitables partnerships between government and business. To date, it is the government that takes on most of the risk around water-related investments, while the private sector reeps the rewards. An equitable water partnership would mean that both government and business share the risks, as well as the rewards.

- **Envrionmental sustainability:** Environmental sustainability stresses the need to balance the hydrological cycle to preserve Earth's ecosystems and natural resources. It involves integrating ecological considerations into water governance, such as conserving green and blue water resources and restoring degraded ecosystems to support biodiversity and mitigate climate change impacts. By embedding environmental considerations into economic decisions, it aims to achieve long-term resilience and sustainability for natural systems that our economies depend on and are part of.

Together, the 3Es can help with mission design. They should be seen as principles that cut across all missions, sectors, and projects. For example, in 2023 the Government of Barbados adopted six missions as part of its Mission Barbados strategy (Government of Barbados, 2023; Mazzucato, 2023a). With 90% of water supply in Barbados coming from groundwater, but increasing demand and changing rainfall patterns affecting the ability of aquifers to recharge, groundwater depletion is a big challenge for the island (Nibbs, 2024). The government sought to tackle the country's food and water insecurity through a mission to "By 2030, ensure that every Barbadian has equitable and reliable access to clean water and nutritious food that is affordable" (see Figure 2 below).

The way the missions were designed meant that justice is at the centre of their implementation and governance. The country's Social Partnership, which consists of leaders from government, business, and labour unions, was responsible for developing the missions. Because labour had a seat at the table, the Social Partnership came up with a specific set of principles, including "Enfranchising workers and reducing poverty" and "Share the burden, share the bounty." As a result, the government's policies and resulting projects must account for fairer labour practices and a fairer deal with business.

Figure 2. Barbados' mission to tackle food and water insecurity is guided by cross-cutting principles (Mazzucato 2023a).



2.4. Public sector capabilities

A mission-oriented approach requires leaders within government to recognise their role as value creators who are responsible for directing and shaping economies. This shift demands a more proactive and dynamic role for the state, not least because it requires the state to take risks through choosing a particular direction of change. Realising this potential will require governments to invest in their own capacity to operate in ways that are more dynamic, risky, iterative and networked. Public sector capacity includes robust state capacity, effective organisational routines, and dynamic capabilities (Kattel and Mazzucato 2018; Mazzucato and Kattel 2020).

State capacity involves developing strong bureaucratic institutions staffed by skilled professionals, enabling effective governance and resource mobilisation. For example, many countries face significant gaps in human resources, with not enough of the required workforce for water, sanitation and hygiene services, highlighting the need for increased investment in training and retaining skilled professionals (Kihagi et al. 2022).

Organisational routines are critical for the effective activation of resources and achievement of organisational goals. In the water space, it is critical for public sector organisations to build

a water data infrastructure that empowers the public sector, business and other organisations to access key water data and enable science-based decision-making. To do this, governments require new organisational routines to collect data and improve the interoperability of data reporting. These routines can ensure consistent and reliable service delivery, essential for maintaining public trust and organisational performance.

Dynamic capabilities enable organisations to adapt to changing environments and challenges. This adaptability is crucial considering that there is no such thing as a water sector, and that it is essential to design solutions in an all-of-government and economy-wide way. Working across government ministries, departments and agencies in horizontal ways, and engaging citizen groups, indigenous groups and others in decision-making requires a new way of working for governments. These dynamic capabilities ensure that water sector organisations can respond to emerging issues and continuously improve their services.

Together, these pillars can help form a comprehensive framework for enhancing public sector capacity around water. The next section will examine how a mission-oriented approach can be deployed to solve problems that threaten the stability of the hydrological cycle and just water access for citizens and communities.

3. A mission-oriented approach for water

By targeting specific challenges around water, missions can help transform water-related problems into opportunities for innovation, investment and action. A mission-oriented approach can both address specific water-related challenges like drought and flood resilience, water usage efficiency or unsafe water and leverage water as a critical input for tackling other problems around climate, biodiversity, food systems, cities and more. As set out by the Global Commssion on the Economics of Water (2024), five critical mission areas can help inspire governments to adopt missions that target their own context-specific water challenges.

1. **Launch a new revolution in food systems** to improve water productivity in agriculture while meeting the nutritional needs of a growing world population.
2. **Conserve and restore natural habitats** critical to protect green water.
3. **Establish a circular water economy,** including changes in industrial processes, so that every drop of used water generates a new drop through reuse.
4. **Enable a clean-energy world and an artificial intelligence (AI)-rich era** to be achieved with much lower water-intensity.
5. **Ensure that no child dies from unsafe water by 2030**, by securing the reliable and affordable supply of potable water and sanitation to every underserved community.

These five missions address the most significant and interconnected challenges of the global water crisis. The first two seek a transformation in agriculture and natural habitats, to conserve water and enhance yields, redress the neglect of green water, and stabilise the hydrological cycle.

Recognising the surge of urbanisation globally, the next two missions focus on promoting circular economy solutions and reducing the water intensity of rapidly growing industries like clean energy and AI. Finally, we must ensure affordable access to clean water and sanitation for all.

3.1. Launch a new revolution in food systems

Rethinking food systems to use water more efficiently, sustainably and equitably is a key leverage point. Below are three example missions that governments could take inspiration from. They involve reducing water use in agriculture, sustaining soil health and shifting to plant-based proteins to achieve water and climate security.

Reducing water use in agriculture: The first mission could focus on reducing water use in agriculture by one-third while enhancing crop yields and farmers' incomes. Agriculture, accounting for 70% of global water use and 38% of land surfaces, is key to tackling water, climate and food security challenges (FAO 2020; Khokhar 2017). Modern irrigation technologies and enhanced water storage systems can increase crop productivity and minimise water loss through evaporation and runoff. Farmers can use advanced monitoring systems and data analyses to optimise irrigation, making agriculture more efficient and resilient.

Sustaining soil health: The second mission could aim to bring 50% of global cropland under regenerative agriculture systems by 2050. Currently, only 15% of cropland uses these practices, which are crucial for combating climate change and groundwater depletion (Kassam et al 2022). Regenerative agriculture, through methods like minimal soil disturbance and crop diversification, enhances soil health, improves water infiltration and increases drought resilience (Abdallah et al. 2021). Customised fertilisation based on soil needs can also optimise green water use and reduce dependency on nitrogen-based fertilisers, making food systems more sustainable (Savage 2024).

Shifting to plant-based proteins: The third mission could target replacing 50% of meat-based products with plant-based proteins by 2030 for water and climate security. Producing plant-based proteins is more water-efficient and less polluting than meat production. A shift towards plant-based diets can significantly reduce water usage, fertiliser application and greenhouse gas emissions (Mekonnen and Hoekstra 2010; Santo et al. 2020; Meixner 2023). Simple interventions, such as offering plant-based dishes as the default option, can encourage this dietary change. To boost demand, plant-based proteins must become price-competitive, achievable through advancements in crop breeding, genome editing and efficient production techniques.

See Figure 2 in the Appendix for an example of a mission map for making a new green revolution in food systems.

3.2. Conserve and restore natural habitats

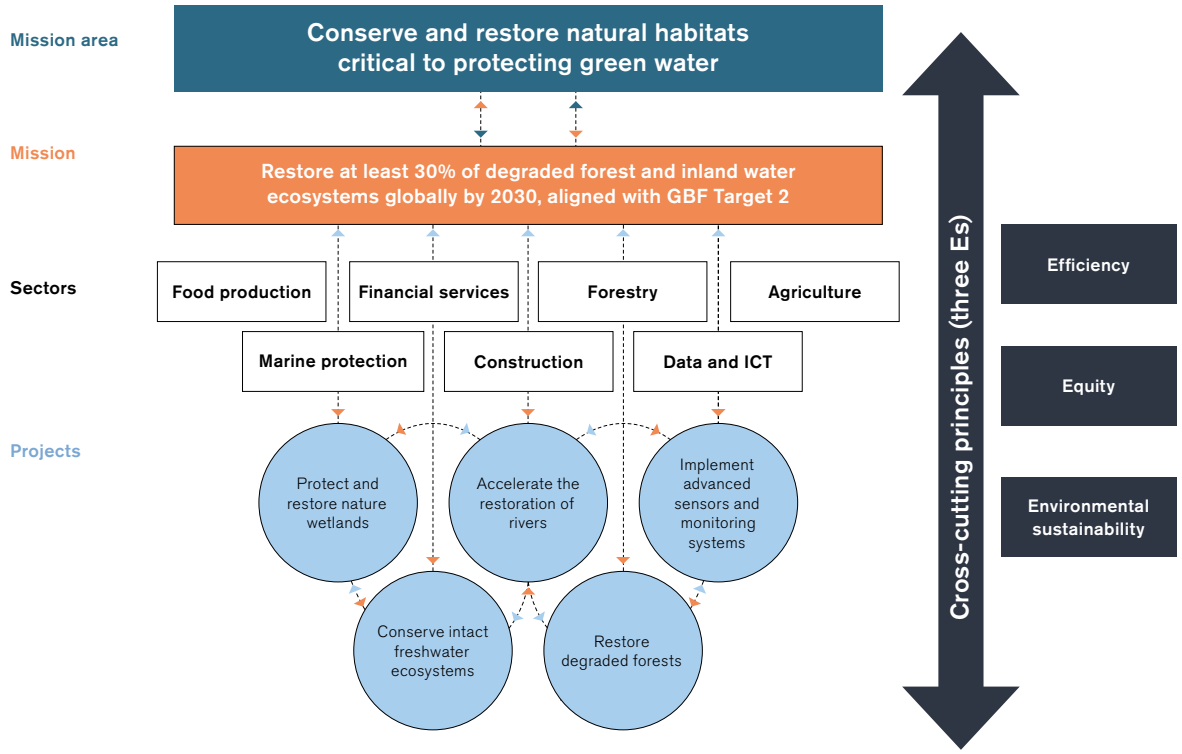
Land-use change has had the largest relative negative impact on terrestrial and freshwater ecosystems since 1970, with agricultural expansion being the most widespread form of land-use change and the main driver of deforestation (Secretariat of the Convention on Biological Diversity

2020). Local pressures on natural habitats vary significantly between industrialised economies, where infrastructure and urbanisation represent 95% of these pressures, and emerging or developing economies, where agriculture is responsible for 73% of deforestation and threatens 86% of species at risk of extinction (Benton et al. 2021).

Since forests are a major contributor to rainfall originating from terrestrial lands, deforestation and land change impact rainfall patterns and the ability to conserve green water down wind. Preservation and restoration of forests are therefore critical to prevent abnormal droughts and floods, while promoting economic activity. Natural habitats play a key role in conserving and restoring green water. Wetlands regulate water flows and provide water needed to support life, and regenerative agriculture enhances the capacity of soils to hold water and of plants to absorb water (World Bank 2023; Abdallah 2021). Successfully designing and delivering missions in these areas will require active engagement with, and guidance from, Indigenous people and local communities.

Restoring degraded ecosystems: The first mission could ensure that by 2030 at least 30% of degraded ecosystems are under effective restoration in all water-scarce basins. There is a risk that even if reached globally by 2030, it is likely that the 30% target is reached first and at higher levels in ecoregions where many ecosystems are still intact or protected. Among the terrestrial ecoregions, only 12% exceed 50% of protected lands, while another 37% could feasibly reach this coverage. The 30% target in the mission is in line with Target 2 of the Kunming-Montreal global Biodiversity Framework adopted in 2022. Figure 2 below illustrates some of the key sectors that need to be involved in achieving the 30% reduction target, including agriculture, food production, and forestry, as well as financial services and digital technologies.

Figure 3. Mission map illustrating the need for a cross-sectoral approach to restoring at least 30% of degraded forest and inland water ecosystems by 2030. Authors' construction based on Mazzucato (2018).



Conserving forest ecosystems: The second mission could ensure that by 2030 at least 30% of forest ecosystems are under effective conservation in all water-scarce basins. Only 8% of the mostly forested ecoregions are extensively (over 50%) protected, while there is potential for almost 200 ecoregions to reach the same degree of protection. Diversification of conservation efforts, increase in representation of ecoregions and expansion of protection to less intact areas are critical. The 30% target in the mission is in line with Target 3 of the Kunming-Montreal global Biodiversity Framework adopted in 2022.

Conserving inland water ecosystems: The third mission could, similarly, ensure that by 2030 at least 30% of inland water ecosystems, such as lakes, rivers, swamps, peatlands, and wetlands, are under effective conservation. These ecosystems help to protect against drought and flooding, support biodiversity, purify water, store and sequester carbon, and provide water for human uses such as agriculture. Despite this, they are significantly threatened; the world's natural wetlands declined by 35% from 1970 to 2015, three times the rate of forest loss over that period (Ramsar Convention on Wetlands, 2021). Wetlands are important for conserving of green water and provision of blue water, and their protection is critical to the hydrological cycle.

See Figure 3 in the Appendix for an example of a mission map for conserving and restoring natural habitats.

3.3. Establish a circular water economy

Tackling the global water crisis will require creating a circular water economy to maximise water use efficiency. This involves reducing water leakages, recycling water and recovering valuable resources from wastewater.

Reducing water leakages: The first mission in creating a circular water economy could consider halving water leakages and non-revenue water by 2030. Currently, about 40% of urban water supply globally is lost through pipeline leaks, costing US$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 achieve this goal (Mjelva 2023; Farley et al. 2008).

Recycling water: The second mission could target recycling 50% of water to enable every drop of used water to generate a new drop. The traditional linear water management model must shift to a circular one. Advanced recycling technologies, such as membrane-based systems and forward osmosis membranes, can improve water recovery and reduce treatment costs. Industrial wastewater reuse also offers significant potential, with processes optimised to meet varying water quality requirements.

Resource recovery: The third mission could focus on creating new value through resource recovery from water treatment and recycling. Currently, only 11% of wastewater is reused globally, yet the potential is much higher. Recovering valuable components like minerals, nutrients and energy from wastewater can create new revenue streams for utilities, making the sector more

sustainable and financially viable (Thygesen and Baker 2023; UNICEF 2023). This approach not only conserves water, but also transforms wastewater into a valuable resource.

See Figure 4 in the Appendix for an example of a mission map for creating a circular water economy.

3.4. Enable a clean-energy world and an artificial intelligence (AI)-rich era

Amid the push to operationalise AI and transition to clean sources of energy, the high water intensity of these transformations is often ignored. Missions can be designed to improve pollution management and water efficiency in energy generation, data centres and manufacturing, and mining to ensure sustainable water usage in a low-carbon, AI-enhanced future.

Generate clean energy with low water-intensity: While lowering emissions, many renewable energy sources consume unsustainable quantities of water throughout their life cycles. To mitigate this and make renewable energy truly sustainable, new technologies, designs, and processes must be implemented at scale. For example, geothermal and nuclear power plants should utilize seawater or recycled water and more efficient cooling towers; second-generation, waste-based biofuel production should be prioritised; solar farms should adopt newly-developed waterless cleaning methods; and relatively water-efficient green hydrogen should be scaled up in comparison to blue hydrogen.

Improve water efficiency in industry: Critical, growing high-tech industries have a number of opportunities to reduce their enormous water footprints. In semiconductor manufacturing, replacing cleaning baths with more-efficient spray rinsing, reusing water for equipment cooling, and employing new, waterless methods at various production steps, can go a long way. AI and cloud data centres can cut water usage with strategies such as seawater cooling, computational load shifting, and optimising internal climates. Mining processes, particularly for critical energy transistion materials like lithium, nickel, and copper – which use lots of water and are often mined in water-scarce regions – should implement dry processing technologies and closed-loop water recycling systems, as well as reducing pollution by covering ore piles and using wastewater treatment systems.See Figure 5 in the Appendix for an example of a mission map for enabling a clean-energy world and an AI-rich era.

3.5. Ensure that no child dies from unsafe water by 2030

The last mission area is to ensure that no child dies from unsafe water by 2030. Concrete missions could be designed around building decentralised water treatment systems, improving industrial water efficiency, scaling up energy-efficient desalination and closing the global water storage gap through innovative solutions.

Decentralised water treatment systems: The first mission could focus on ensuring access for citizens to clean and safe water in part by building decentralised water treatment systems. Over 2

billion people lack access to safe water, leading to over 1000 child deaths daily from waterborne diseases (UNICEF 2023). Decentralised systems, including affordable onsite treatment and advanced membranes, can provide clean water to remote areas (Woo et al. 2022). Technologies like sensors for early leak detection and low-cost point-of-use systems offer scalable solutions, ensuring reliable and safe water supply across regions.

Closing the global water storage gap: The fourth component targets closing the global water storage gap through rainwater harvesting and wetland restoration. Wetlands and other natural storage solutions regulate water flows, provide flood mitigation and enhance dry season water access (World Bank 2023). Managed Aquifer Recharge (MAR) combines natural and built systems to reverse groundwater decline. For example, Spanish farmers use MAR to sustainably manage irrigation, increasing irrigated areas without harming groundwater levels, demonstrating the effectiveness of integrated water storage solutions (Henao Casas et al. 2022).

Preventing water contamination at the source: Pollutants and contaminants threaten water quality around the world, proving detrimental to human health, development, and the ecosystem services water can provide. For example, an excess of nutrients from agricultural runoff can cause eutrophication, wherein large amounts of algae grow and eventually die, decomposing and causing dead zones in the bodies of water they inhabit. To address the causes of water contamination, there is significant opportunity for innovation, including a few tactics that have proven effective when employed: constructing wetlands to filter agricultural runoff; using AI-powered sensors to enforce industrial waste discharge regulations; and creating decentralized sanitation solutions to prevent untreated sewage discharge.

Energy-efficient desalination: The third mission could involve increasing access for citizens to safe drinking water, in part by scaling up energy-efficient desalination and other climate-resilient water sources. Affordable desalination, integrated with renewable energy and advanced membrane technologies, can provide clean water to underserved communities. Innovations like graphene membranes and seabed desalination reduce energy consumption and environmental impact (University of Manchester 2017).

See Figure 6 in the Appendix for an example of a mission map for ensuring that no child dies from unsafe water by 2030.

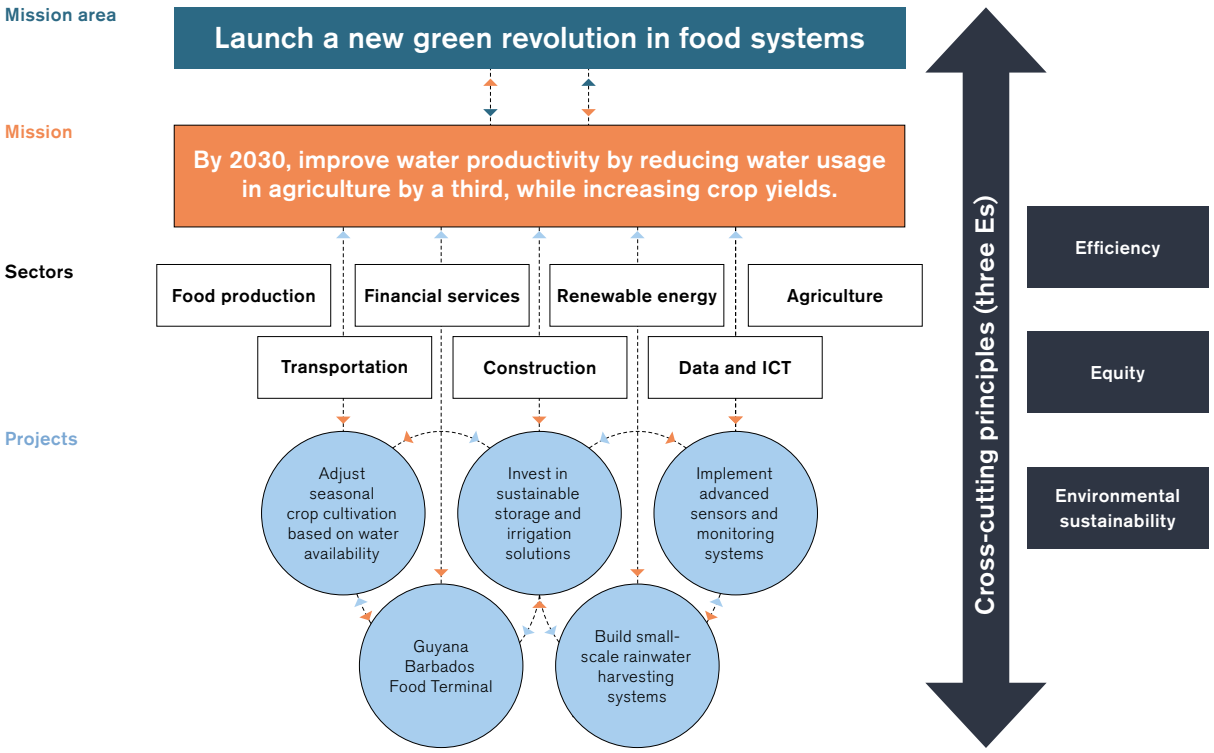
The next section digs into the first mission area around transforming food systems to help show how governments can begin with an outcome and work backwards, designing innovations, partnerships, finance, and the governance of data to deliver on it.

4. Diving deeper into mission area 1: Launching a new green revolution in food systems

Agriculture is at the heart of global water use, accounting for approximately 70% of global freshwater withdrawals (Khokar, 2017). This level of water use is unsustainable, particularly given the escalating pressures of climate change, population growth, and rising food demands, which are expected to increase by 60% between 2019 and 2050 (Falcon et al. 2022). Moreover, water scarcity affects around 2.9 billion people globally, and approximately 55% of the world's food production occurs in regions facing unstable water availability (Mehta et al. 2024).

The current reliance on outdated irrigation methods – such as the continuous flooding of rice paddies – leads to massive water waste. At the same time, new markets for innovative techniques and technologies exist that could help improve water efficiency, ensure food security, and drive new growth opportunities. Against this backdrop, the mission to "[b]y 2035, improve water productivity by reducing water usage in agriculture by a third, while increasing crop yields", can help provide a long-term focus and opportunities around new markets. This transformation of food systems is crucial to stabilizing the hydrological cycle, preserving soil moisture, and meeting growing food demands.

Figure 4. A mission map for a mission to improve water productivity by reducing water usage in agriculture by a third, while increasing crop yields. Authors' construction based on Mazzucato (2018).



The mission map above sets out the various sectors that would need to be involved in tackling this mission, from agriculture and food production to financial services and data and ICT. It also

sets out some of the bottom-up projects that could help provide the different solutions. Below we outline how innovations, partnerships, finance, and the governance of data can be designed to deliver on the mission.

Innovation: Innovations in irrigation, crop selection, and water management offer a massive opportunity to invest in new markets that can help improve the efficient, equitable and environmentally sustainable use of water, while leading to economic outcomes like more growth, productivity, and jobs. Current irrigation methods, particularly in Asia, often rely on inefficient techniques that waste water. Agriculture accounts for 70% of freshwater withdrawals globally, yet the adoption of advanced irrigation technologies can significantly improve water use efficiency. For instance, micro-irrigation technologies such as drip and micro-spray systems have been found to increase water use efficiency while improving crop yields and reducing runoff pollution. Moreover, climate-resilient seed varieties such as Temasek Rice have the potential to yield twice as much as standard varieties while using less water. Accounting for the 3Es as cross-cutting principles, all of these innovations would need to be designed in an efficient, equitable, and environmentally sustainable way, which means designing the partnerships in a new way.

Partnerships: To implement sustainable water practices effectively, coordinated partnerships between governments, farmers, companies, and research institutions are essential. Governments can embed conditionalities in contracts and agreements with farmers to incentivize water-saving practices, including (a) imposing conditions on water permits to only be used for non-water-intensive crops in regions experiencing severe water scarcity, (b) reinvestment into sustainable infrastructure, such as water recycling or renewable energy for irrigation systems, and (c) mandating the use of efficient irrigation technologies before accessing subsidies. Governments can also consider the role of land and water rights, which play a crucial role in empowering farmers to invest in sustainable practices. For example, learning from the traditional "aflaj" water rights in the Middle East, which ensure that farmers share water shortages proportionally, can help reduce the impact of water scarcity on productivity (Gómez-Limón et al. 2021). However, all of this requires finance.

Finance: The direct and indirect subsidies accruing to water users in agriculture alone are estimated at over US$630 billion per year (GCEW 2024). However, more than 60% of these subsidies are environmentally harmful. To address this issue, governments can shape and direct these subsidies to focus on water-efficient agriculture, which could yield both economic and environmental benefits. For instance, subsidies can be redirected towards the innovations discussed above (namely, to support micro-irrigation technologies or alternative, drought-resistant crops that require less water). Meanwhile, public development banks have an essential role in providing more directed, patient long-term finance to support farmers in improving water efficiency and crop yields. National development banks like Banco Desarrollo del Ecuador, BNDES in Brazil, and the Development Bank of Southern Africa are increasingly financing water-related projects through loans, grants, and equity funding. By aligning their efforts with regional or national water objectives, public banks can help embed conditionalities that promote sustainable water practices and mitigate climate risks and build resilience among farmers (Mazzucato 2023b).

Governance of data: Accurate, timely data is crucial for monitoring water usage and ensuring the success of conservation efforts. Implementing data governance policies that ensure transparent and accessible data sharing among stakeholders—including farmers, policymakers, and technology providers—can optimize water use in agriculture (GCEW 2024). Data gathered from soil moisture sensors, weather stations, and satellite technologies allows for real-time adjustments to irrigation practices, enhancing precision and efficiency. To support adaptive management, open data frameworks and policies encouraging private sector engagement through standards for data interoperability are needed. Governments could also require regular data reporting from water utilities and large-scale agricultural operations, thereby creating a feedback loop that supports adaptive water management.

Achieving the mission of reducing water use in agriculture while increasing crop yields is possible. The financing and innovations exist, but governments must help shape them to deliver on the mission. That means putting the 3Es at the centre of policy and partnerships.

5. Conclusion

To radically transform both water use, and supply requires a shift from siloed and sectoral thinking to an economy-wide approach to the entire water cycle including both blue and green water. It will require new commitments from many actors and sectors and new roles for governments – including a mission-oriented approach to meeting the most fundamental water challenges. It means reorienting the policy tools – pricing, subsidies, regulations, procurement, grants, loans – and the roles of the institutions, such as public development banks, water utilities, state-owned enterprises, to achieve these critical goals.

Building on the Global Commission on the Economics of Water (2024), this paper makes the following policy recommendations:

1. **Adopt missions that are bold and inspirational with wide societal relevance**, set a clear direction (targeted, measurable and time-bound), are ambitious but realistic, encourage cross-disciplinary, cross-sectoral and cross-actor innovation, and involve multiple, bottom-up solutions. Governments should adopt a mission-driven policy design around five mission areas:
    a. **Launch a new revolution in food systems** to improve water productivity in agriculture while meeting the nutritional needs of a growing world population.
    b. **Conserve and restore natural habitats** critical to protect green water.
    c. **Establish a circular water economy**, including changes in industrial processes.
    d. **Enable a clean-energy and AI-rich era with much lower water intensity**.
    e. **Ensure that no child dies from unsafe water by 2030**, by securing the reliable supply of potable water and sanitation for underserved communities.
2. **Expand the public policy toolbox to include a diversity of policy tools and public institutions,** including public procurement, subsidies, and public development banks. Design these policy tools and public institutions in an outcomes-oriented way to align with missions.
3. **Forge symbiotic partnerships between the public and private sectors to deliver efficient, equitable, and environmentally sustainable use of water from the start.** Governments should incorporate conditionalities in contracts and property rights to ensure high standards of water use efficiency, environmental protection, and access for the most vulnerable.
4. **Scale and direct finance at water missions using mission-driven public development banks and Just Water Partnerships (JWPs)**. Adopt JWPs (1) with a mandate informed by specific missions, outcomes, and targets, (2) that align multilateral, national development banks, and governments, (3) that shift from a project-based approach to a programmatic, portfolio-based, strategic approach aligned with policy objectives, and (4) that embed conditionalities in financing contracts that help deliver on the chosen missions.

5. **Build public sector capabilities to design, develop, and deliver water missions more effectively.** These capabilities include the state capacity required to run institutions, the organizational routines like using water data infrastructure to inform decisions or designing contracts that are more symbiotic, and the dynamic capabilities that can help design solutions, communicate, and coordinate across government departments.

This paper shows how governments can help deliver on water outcomes while putting justice at the centre of our response. It outlines the massive opportunities for investment and innovation powered by a mission-oriented policy design, an outcomes-oriented approach to designing policy tools and public institutions, a new way to forge more symbiotic partnerships between government, business, and labour, and a renewed effort to build dynamic public sector capabilities. A mission-oriented approach can provide the blueprint for fixing the way we manage water. We can and must succeed in tackling five missions that address the most important and interconnected challenges of the global water crisis. Billions of lives and livelihoods depend on it.

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