

In collaboration with
Imperial College London



Water-BOOST: Enabling Innovation for Future-Ready Cities

INSIGHT REPORT
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Contents

Foreword	3
Executive summary	4
Introduction	6
1 Unlocking water innovation	8
1.1 The need for urban water innovation	8
1.2 Limitations of existing frameworks	9
1.3 Methodology: Building a systems-based approach	10
1.4 Case-study cities: A diverse testing ground	11
1.5 Stakeholder engagement and co-design	12
2 Water-BOOST: A systems toolkit for scaling water innovation	15
2.1 Mapping the water innovation ecosystem	15
2.2 Water-BOOST principles	17
3 Water innovation ecosystems in practice: City-level insights	22
3.1 San Francisco	22
3.2 Valencia	24
3.3 Singapore	25
3.4 Accra	27
3.5 Barcelona	30
3.6 Bengaluru	32
4 From mapping to strategy: Operationalizing Water-BOOST	34
4.1 Cross-comparison of cities	34
4.2 Cross-city reflections and emerging impact areas	36
4.3 Scaling and future directions	39
4.4 What Water-BOOST teaches	40
Conclusion: Aligning systems to accelerate innovation	41
Appendix	42
Contributors	44
Endnotes	49

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Foreword



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Water underpins the health, prosperity and resilience of cities worldwide. Yet the global water crisis is intensifying. From increasing scarcity and pollution to more frequent floods, water-related risks are accelerating under the combined pressures of climate change, urbanization, population growth and economic development. As cities expand and populations concentrate in urban areas, managing water wisely and equitably is no longer optional; it is a fundamental enabler of sustainable and resilient development, economic stability and human well-being.

Addressing water challenges requires more than novel technologies or isolated policy efforts. It demands whole-system, cross-sectoral solutions that bring together public and private actors, align regulatory and financial incentives and promote environments that enable innovation to thrive. Despite encouraging advances, water innovation remains hindered by fragmented efforts, limited investment and an absence of enabling mechanisms to translate ambition into impact.

Recognizing these challenges, Imperial College London and the World Economic Forum partnered through the Hoffmann Fellowship programme, generously supported by André Hoffmann, which empowers scientists and researchers to bridge academia and practice in tackling global challenges. This collaboration enabled the exploration of how innovation ecosystems in cities and the broader water sector can be accelerated. The strength of this partnership lies in its blend of academic depth and rigour, together with the Forum's global convening capacity, driving engagement across government, industry, finance and civil society. Already, this collaboration has achieved key milestones, including convening more than

130 stakeholders in six global cities, co-hosting World Water Day 2025 in London and presenting the research at high-level panels and strategic dialogues to raise international interest in water innovation ecosystems.

Beyond research and engagement, the outcomes of this ambitious fellowship programme converge to a strategic framework and a practical toolkit, designed to help stakeholders map their enabling environments, identify barriers and define actionable pathways towards resilience and innovation at scale. Its name, Water-BOOST (Bridging Opportunities and Optimising Support Toolkit), summarizes its spirit and purpose.

Crucially, Water-BOOST is not only a tool for cities. Its adaptable, systems-based design makes it relevant to water-sector ecosystems more broadly, including industrial, rural and regional contexts. It offers structured guidance on how diverse actors – utilities (utility service providers), regulators, innovators, investors, academia and community organizations – can work together to create environments in which water solutions are piloted and, critically, scaled.

This report presents the outcome of two years of collaborative research and stakeholder engagement, demonstrating the value of structured partnerships among academia, industry and global organizations to address systemic challenges.

Ultimately, Water-BOOST is a call to action to rethink how we approach water – not just in cities but across all water-dependent systems – and to unlock innovation as a catalyst for water security, resilience and equitable growth.

Executive summary

Cities need enabling environments in which innovation can thrive, scale and strengthen water resilience.



Urban water innovation is becoming increasingly critical in addressing mounting pressures on infrastructure, governance and resource security. Yet, despite growing ambition and a steady flow of new technologies, many solutions remain fragmented and underfunded, or they fail to scale.

This research, supported by the Hoffmann Fellowship and conducted through a collaboration between the Forum and Imperial College, began by asking: what conditions allow urban water innovation to thrive – and how do key actors and institutions need to interact for that to happen? Drawing on systems thinking, the research project investigated the governance structures, financing mechanisms, partnerships and institutional alignments that shape water innovation ecosystems. The analysis focused on six cities – San Francisco, Valencia, Singapore, Accra, Barcelona and Bengaluru (Bangalore) – selected to reflect diverse geographies, governance models and innovation contexts.

Findings from stakeholder engagement and field research revealed that successful ecosystems are not defined by any single actor or technology. Instead, progress depends on the quality of relationships between stakeholders and the enabling mechanisms – such as permitting frameworks, investment structures or cross-sector platforms – that connect them.

From this insight emerged a novel systems framework to better understand the enabling environments: Water-BOOST (Bridging Opportunities and Optimising Support Toolkit). Water-BOOST was developed to support cities, policy-makers, funders and innovators in assessing ecosystem functionality, identifying gaps and adapting solutions from other contexts. This report presents the framework's development and early application as a systems-based approach for understanding, comparing and strengthening enabling environments for water innovation.

The framework is grounded in three core principles:

1. Innovation cannot scale without ecosystem structure.

A functioning innovation ecosystem requires a minimal viable system (MVS): the essential configuration of stakeholders and enabling mechanisms. Most cities studied had at least one missing or underdeveloped element.

2. Innovation ecosystems depend not just on who is involved but on how they work together.

Relationship enablers such as collaborative procurement, regulatory flexibility and shared testbeds are key to scaling innovation.

3. Cities can, and should, learn from one another.

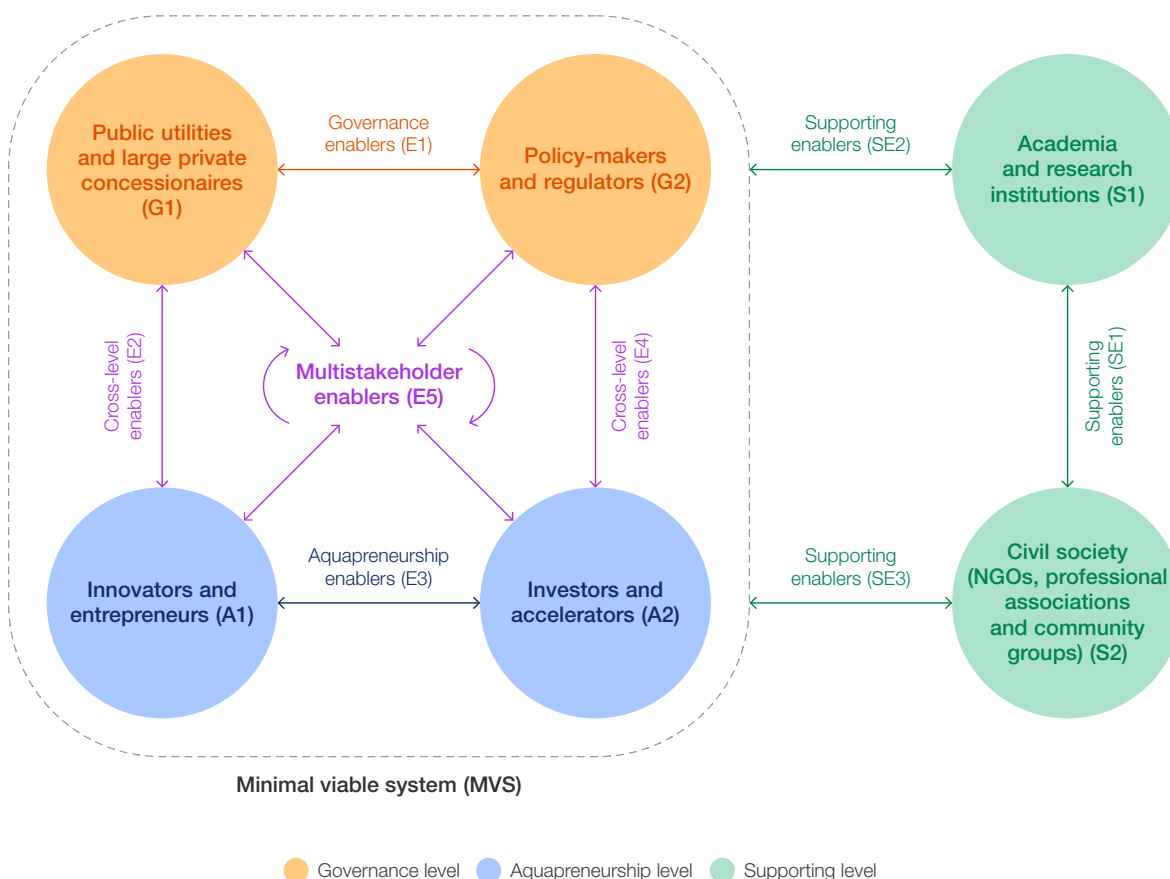
Enabling environments differ, but they are not incomparable. Cities can adapt successful mechanisms to fit their institutional context, using structured comparison as a tool for strategic adaptation.

Water-BOOST's ambition is not only to identify gaps but also to help decision-makers transition from fragmented efforts towards coherent, scalable innovation systems.

Strategic recommendations emerging from this work include the need to:

- Use structured ecosystem mapping to align stakeholders around common goals
- Strengthen inter-institutional coordination and cross-sector collaboration
- Improve procurement, financing and scaling pathways for early-stage innovation
- Facilitate cross-city learning and adaptation through peer comparison

With further development, Water-BOOST offers a practical contribution to the global water innovation agenda. By making complex systems more visible – and more tractable – it helps cities design enabling environments that are inclusive, adaptive and ready to meet future challenges. Its flexible, systems-oriented structure also makes it applicable beyond cities – including in peri-urban areas, industrial zones, rural communities and catchment-scale governance settings where innovation ecosystems must also be activated and aligned.



↑ Structural WaterBOOST map of the water innovation ecosystem across governance, aquapreneurship and supporting levels

Introduction

With billions of people already facing water stress, the need to strengthen enabling environments for innovation has never been more urgent.

↓ Image credit:
Wateroam



The water crisis: An escalating global challenge

The world is facing an intensifying water crisis. Global freshwater demand has more than doubled since 1960 and continues to rise by about 1% each year.¹ Today, an estimated 3.6 billion people – nearly half the world's population – regularly face water shortages for at least one month per year, a number projected to surpass 5 billion by mid-century.²

This pressure is unevenly distributed. In regions such as the Middle East, North Africa and South Asia, water withdrawals regularly exceed 80% of available resources.³ Yet water scarcity is no longer confined to the Global South; parts of Europe and North America – including Spain, Italy, the western United States and Mexico – are nearing unsustainable use levels.⁴

The economic and climate risks are equally stark. By 2050, nearly 31% of global gross domestic product (GDP) – around \$70 trillion – will be exposed to high water stress.⁵ In the hardest-hit regions, climate-driven scarcity could reduce GDP by up to 14%.⁶ Meanwhile, water-related disasters have increased fivefold since 1970, accounting for 70% of all natural disaster deaths.⁷

These escalating challenges underscore a growing imperative: technical fixes alone are no longer sufficient. What's needed is a systemic understanding of the enabling environment for water innovation – a mix of policies, governance structures, financing models and partnerships that determine whether innovations can succeed. To respond effectively to the water crisis, cities and institutions require frameworks that move beyond isolated interventions and enable integrated, scalable solutions.

Cities at the centre of the water crisis

Urban areas are emerging as the front line of this crisis. By 2050, urban water demand is expected to increase by nearly 80%,⁸ as the global urban population is projected to rise to nearly 70%.⁹ Already, hundreds of millions live in cities where water demand routinely exceeds supply, a figure set to double in the coming decades.¹⁰

However, cities are more than focal points for risk – they are also platforms for innovation. The intersection of climate volatility, ageing infrastructure and governance fragmentation makes cities especially vulnerable, yet this very complexity creates spaces for transformation.

With political ambition, capital investment and citizen action converging in urban spaces, cities can become high-leverage testing grounds for water solutions.

Global momentum for change: Policy and innovation alignment

Amid these challenges, there is growing international recognition of the need for coordinated, systems-wide responses. In 2024, the Global Commission on the Economics of Water (GCEW) launched its landmark report¹¹ calling for a fundamental reframing of water as a global common good – emphasizing the whole hydrological cycle as the foundation for human and planetary well-being.

Building on this foundation, the World Economic Forum, through its multistakeholder community on water – [Water Futures](#) – launched a white paper¹² in 2025 to help translate the GCEW’s vision into action by the private sector and public–private collaborations. Among its proposed pathways for action, the policy-innovation nexus is identified as a critical lever, which has also been explored through Uplink’s [Aquapreneur Innovation Initiative](#). This research responds directly to that call – aiming to strengthen the enabling environments that allow innovation ecosystems to emerge, connect and scale across sectors.

Such momentum is supported by a renewed institutional focus internationally. The United Nations Water Conference in 2023 – the first in nearly 50 years – set the stage for future global convenings in 2026 and 2028, offering a political window to mainstream water action. Yet momentum alone is not enough. Bridging ambition and implementation requires targeted support for the ecosystems that allow innovation to move from pilots to impact.

The challenge of scaling water innovation

The water sector is experiencing an unprecedented surge in innovation – from decentralized treatment technologies and artificial intelligence (AI)-powered monitoring to circular resource systems and digital twin modelling. But most innovations struggle to move beyond small-scale pilots. They remain siloed, underfunded or excluded from regulation – unable to scale within the very systems they aim to improve.

This disconnect is not due to a lack of creativity or technical capacity – entrepreneurs and researchers are building solutions every day – the problem lies in the absence of enabling environments that can translate potential into progress. Many water start-ups – or aquapreneurs – encounter a “valley of death”: the critical phase where promising technologies stall due to unclear rules, lack of financing or insufficient institutional support. Within

the Forum’s UpLink initiative, a global community of aquapreneurs is already emerging, and their ability to thrive will directly depend on how effectively enabling environments are defined and strengthened.

Designing enabling environments for water innovation is therefore essential. Scaling innovation requires systemic approaches, not just products. It demands integrated ecosystems that connect utilities, regulators, entrepreneurs, investors, researchers and community actors – not as separate stakeholders, but as co-creators. It requires testbeds, procurement frameworks, regulatory flexibility and risk-sharing models that lower the barriers to adoption. As highlighted by the Organisation for Economic Co-operation and Development (OECD),¹³ the World Bank¹⁴ and GCEW,¹⁵ this is not just a technical issue, it is a governance and systems design challenge.

Political attention and investment are increasing, but regulatory frameworks and institutional capacity are lagging. Public agencies remain risk-averse and lack a transformative mission.¹⁶ Procurement still prioritizes the lowest cost over the highest value, and financing rarely supports early-stage or decentralized solutions. As a result, ecosystems generate ideas but struggle to embed them at scale, particularly in complex urban settings with fragmented governance and legacy infrastructure.

This report focuses on bridging that gap. By identifying the systemic enablers that allow innovation to scale – and highlighting where they are weak or absent – it provides a strategic lens for moving from pilots to integrated, city-wide solutions.

Report structure

This report is structured to explore how enabling environments can be designed and strengthened to accelerate water innovation:

Section 1 outlines the urgency of urban water innovation, reviews limitations in existing frameworks and introduces the systems thinking approach and co-design process that underpin this work.

Section 2 presents the Water-BOOST framework, explaining its conceptual foundations, core principles and the systems-based methodology used to analyse water innovation ecosystems.

Section 3 applies the methodology to six global cities, offering ecosystem mappings, insights and spotlight cases drawn from field research.

Section 4 explores how the framework can be operationalized, including cross-city comparisons, digital prototype development and strategic pathways for scaling and application.

The report closes with a brief reflection and call to action.

1

Unlocking water innovation

To scale water innovation, cities need systems-based approaches and coordinated action across sectors and stakeholder ecosystems.

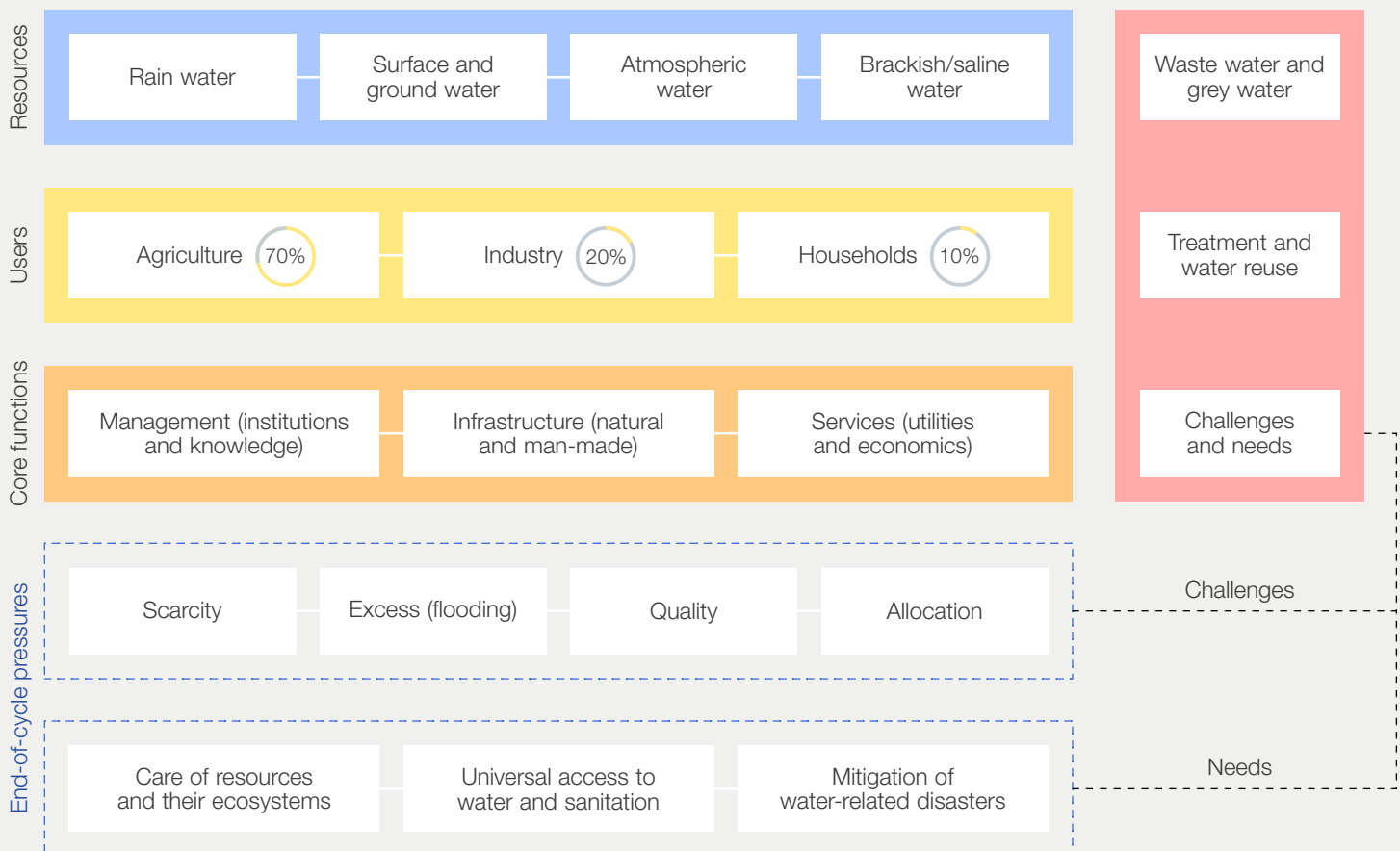
1.1 The need for urban water innovation

Urban water systems are under growing pressure from multiple, interconnected risks. Whether the issue is too much (flooding), too little (scarcity) or too polluted water, cities face intensifying water-related shocks and stresses.¹⁷ Fragmented governance and limited investment capacity further exacerbate these risks, leaving many cities unprepared to respond at scale. The risks are often

cascading, such as floods that contaminate drinking water¹⁸ or droughts that concentrate pollutants and increase health hazards.¹⁹

Addressing this complexity requires innovation grounded in a systems-based view of the water sector and its key dimensions (Figure 1), which include resources, users and core functions.²⁰

FIGURE 1 Dimensions of the water sector: resources, users, core functions and end-of-cycle pressures, where waste water, treatment and challenges converge



Source: Adapted from Wehn, U., & Montalvo, C. (2018). *Exploring the dynamics of water innovation: Foundations for water innovation studies*

↓ **Image credit:** Kay Bailey Hutchison (KBH) Desalination Plant, El Paso Water

These dimensions are interwoven with a growing set of challenges – scarcity, excess, declining quality and inequitable allocation – and needs, including ecosystem protection, universal access and risk mitigation. As Figure 1 shows, many of these challenges converge at the end of the cycle, where waste-water treatment and reuse remain weak points for innovation.

However, implementation lags behind ambition. Many cities still lack the enabling conditions to translate innovative intent into systemic change. This highlights the urgent need for methodologies that map water innovation ecosystems, reveal bottlenecks and guide context-specific action.



1.2 Limitations of existing frameworks

Over the past two decades, the global water sector has seen a growing wave of tools, pilots and frameworks aimed at advancing urban water sustainability. Yet, despite this momentum, innovation efforts remain highly fragmented, often siloed across institutions, disciplines and geographical boundaries.²¹ Many initiatives focus on a single dimension of the water system – whether technical, environmental or financial – and as a result, struggle to support systems-based change or scale effectively across diverse governance and infrastructure contexts.

In response to these limitations, newer conceptual approaches have begun to emerge. Urban water neutrality²² and water neutrality governance²³ offer actionable models to mitigate the net impacts of new developments, complementing broader approaches such as integrated urban water management (IUWM).²⁴ These shifts reflect a growing move from reactive management towards proactive, systems-based innovation.

While many of the more established frameworks provide valuable insights into resilience planning, infrastructure performance, digital monitoring or scenario modelling, they tend to focus on individual components of the water system in isolation. As a result, they rarely address the structural enablers needed to move from diagnosis to delivery. In many cases, cities – including city authorities and utilities – understand what needs to be done but remain unclear on how to align actors, unlock financing and implement solutions systemically.

Table 1 summarizes a sample of these established tools, which span a range of use cases, from urban sustainability benchmarking and scenario planning to resilience assessment and nature-based solution design. Yet most remain limited in geographic application, institutional scope or system integration. This underscores the persistent need for methodologies that not only assess water systems performance but also highlight the systemic enablers – regulatory, financial, institutional – that are necessary to activate and scale innovation in diverse urban contexts.

TABLE 1 | Comparison of selected tools for urban water innovation and resilience, outlining focus, context, geography and developers; tools are shown in approximate chronological order of implementation

Tool	Key focus and features	Cities or regions applied	Developers or organizations involved
Urban Water Optioneering Tool (UWOT) ^{25,26}	Simulating water technologies at development scale	Alicante, Bodø, Gdansk, Lisbon, London	University of Exeter, B-WaterSmart
City Blueprint (Blue City Index) ²⁷	Indicator-based assessment of urban water sustainability using 25 indicators	Amsterdam, Istanbul, Melbourne, Milwaukee, Quito, Rotterdam, plus cities in more than 30 countries	KWR Watercycle Research Institute, European Commission, University of Utrecht
WaterMet² Tool ^{28,29}	Scenario modelling for long-term urban water planning	Belgrade, Bucharest, Istanbul, Oslo, Trnava	University of Exeter, EU TRUST project
Water4Cities (Polis Wizz Tool) ^{30,31}	Smart water management platform using real-time data	Amman, Cape Town, Ljubljana, Manchester, Mexico City, Miami, Skiathos	University of Athens, Water Board of Skiathos, EU Horizon 2020
City Water Resilience Approach (CWRA) and OurWater Tool ^{32,33}	Framework and digital tool for urban water resilience planning	Thessaloniki	Arup, Stockholm International Water Institute, World Bank, Rockefeller Foundation, Resilience Shift
Design with Water 2.0 ³⁴	Design framework integrating water into urban planning	Hull, New York City, Shanghai, various United Kingdom planning initiatives	Arup

Sources: *Environmental Modelling & Software*,²⁵ *WaterSmart*,²⁶ *Water Resources Management/KWR*,²⁷ *Drinking Water Engineering and Science*,²⁸ European Commission,²⁹ *Proceedings*,³⁰ *Polis Wizz*,³¹ *Resilient Cities Network*,³² *International Coalition for Sustainable Infrastructure*,³³ Arup³⁴

1.3 Methodology: Building a systems-based approach

This research project was designed to investigate the enabling environments for water innovation – the policy, institutional, financial and governance conditions that allow water solutions to scale. Existing frameworks rarely explain why promising innovations fail to achieve systems-based uptake. This gap led the project to adopt a systems-based approach, which helps reveal the interdependencies between stakeholders, incentives and structures – enabling decision-makers to identify leverage points, align fragmented efforts and coordinate interventions across sectors and scales.

The research followed an iterative, multistage process (Figure 2) that combined analytical rigour with insights grounded in city case studies and water-sector stakeholders. It began with problem-scoping and hypothesis development, supported by a literature review and early engagement with city actors, experts and innovators to shape the conceptual framework and set investigation priorities.

FIGURE 2 | Multistage systems approach used to develop the methodology presented in this report



Source: World Economic Forum

Fieldwork in six cities helped ground the emerging thinking in global realities. The first explorative fieldwork phase engaged 79 consultees from 40 organizations across four cities (Accra, San Francisco, Singapore and Valencia), using interviews to identify barriers, enablers and structural gaps in local water innovation ecosystems.

Subsequent phases focused on validation and refinement. To strengthen the framework's robustness and cross-contextual applicability, two additional cities (Bengaluru and Barcelona) were included, along with the return to Singapore as one of the original case-study cities. This extended phase garnered insights from an additional 33 organizations and 59 consultees, thereby broadening the diversity of perspectives, geographies and institutional models.

Validation also included a workshop co-organized by Imperial College London and the World Economic Forum on World Water Day 2025. The session convened UK-based stakeholders from utilities, innovators, non-governmental organizations (NGOs) and government agencies to test the usability of the emerging framework and gather expert feedback.

Throughout, feedback loops across all stages – from hypothesis to fieldwork, validation and refinement – enabled iterative adaptation and continuous learning, as reflected in Figure 2.

The outcome is a structured, evidence-based and implementation-focused methodology that equips cities and water-sector actors with a tool to map innovation ecosystems, uncover systemic barriers and enablers and co-design actionable strategies for building resilient, future-ready urban water systems.

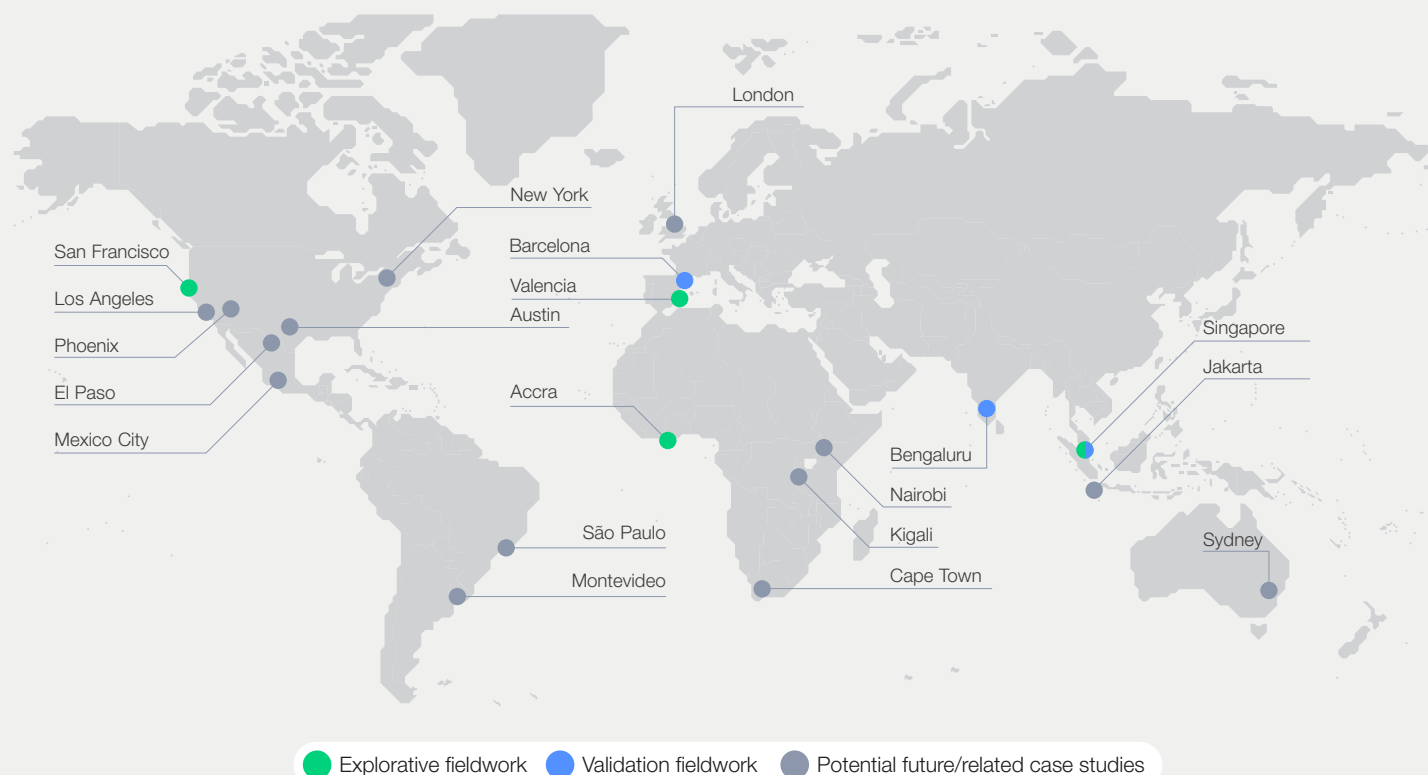
1.4 Case-study cities: A diverse testing ground

While water challenges differ across regions, a core hypothesis of this work was that cities – despite their diversity – share common barriers and opportunities that shape their capacity for innovation.

From a longlist of 20 cities selected for their innovative approaches to building system resilience,

six cities were chosen based on four criteria: (1) the presence of emerging innovation ecosystems; (2) diversity in socioeconomic and institutional contexts; (3) exposure to pressing water challenges; and (4) openness to change through cross-sector collaboration or reform.

FIGURE 3 Geographical distribution of case-study cities



Source: World Economic Forum

Fieldwork was carried out in two phases (Figure 3), comprising an explorative stage and a validation stage across six cities. Full details of the scope, methods and participants are provided in Section 1.3.

Together, these cities offered a rich testing ground to explore how enabling environments function and what systemic factors support or hinder innovation.

While local contexts vary, a set of recurring constraints emerged, including disconnected actors, limited early-stage support and misaligned incentives.



1.5 Stakeholder engagement and co-design

Understanding enabling environments for water innovation requires more than desk-based research. It entails close collaboration and learning from the individuals and institutions that shape water systems on the ground. To ensure that this project remained grounded in real-world dynamics, a co-design process was built around extensive stakeholder engagement across multiple global contexts.

In total, 138 stakeholders from 73 organizations were consulted through semi-structured interviews. Interviews were recorded, transcribed and

systematically analysed; findings were triangulated with literature and sector reports. Their insights shaped every stage of the work, from refining the conceptual framework to validating emerging patterns and needs.

To reflect the diversity of the water innovation ecosystem, participants were grouped into six stakeholder categories, ranging from utilities and regulators to entrepreneurs, investors, researchers and civil society organizations. Table 2 provides an overview of these categories and their definitions.

TABLE 2 Stakeholder categories and definitions used to analyse water innovation ecosystems

Stakeholder categories	Definition
Public utilities and large private concessionaires	Public service providers and private companies operating under long-term concession agreements, delivering water services on behalf of public authorities
Policy-makers and regulators	Institutions responsible for developing, enforcing and overseeing water governance frameworks, policies and regulations
Innovators and entrepreneurs	Start-ups, technology providers and established water-sector companies with dedicated innovation or research and development (R&D) teams
Investors and accelerators	Entities providing financial support, seed funding, venture capital and acceleration services (e.g. mentorship, networking and capacity-building for start-ups) to innovators and service providers
Academia and research institutions	Universities, think tanks and research centres generating knowledge, developing new technologies and informing policy and practice through scientific research and capacity-building
Civil society organizations	NGOs and community-based actors that drive advocacy, accountability and equity in water service delivery

Source: World Economic Forum

Table 3 summarizes stakeholder participation across cities during the two fieldwork processes (explorative and validation).

This collaborative, co-designed approach ensured that the research remained both context-aware

and systems-informed. It helped reveal common enablers and constraints among cities, and it identified areas where targeted interventions could strengthen the enabling environment for urban water innovation.

TABLE 3 Stakeholder participation across six cities during the two fieldwork phases (explorative and validation)

Case-study city	Fieldwork phase	Total number of organizations	Total number of stakeholders
San Francisco	Explorative	6	12
Valencia	Explorative	11	19
Singapore	Explorative	9	18
	Validation	5	12
Accra	Explorative	11	26
Barcelona	Validation	14	18
Bengaluru	Validation	14	29
Non-case study	Explorative	3	4
TOTAL Explorative		40	79
TOTAL Validation		33	59
TOTAL		73	138

Source: World Economic Forum



Image credit:
Pure Home Water –
CREATE Station

Water-BOOST: A systems toolkit for scaling water innovation

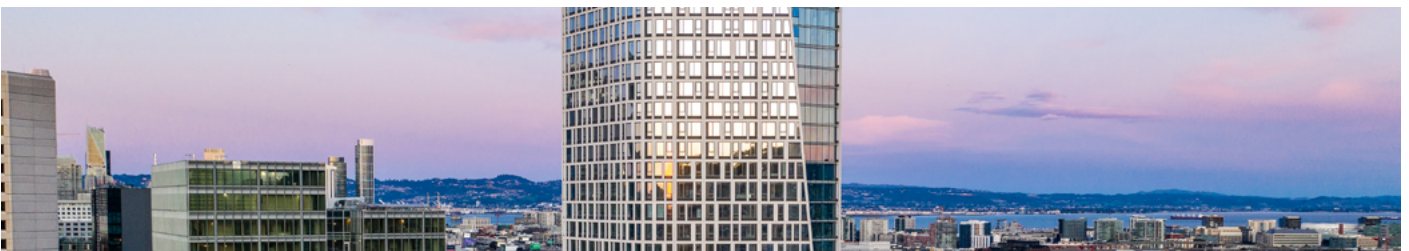
Water-BOOST provides a practical framework to help cities understand, strengthen and adapt the enabling conditions needed for water innovation.

The scope of this project was to investigate what makes urban water innovation succeed – and why so many promising solutions remain fragmented or fail to scale. Drawing on systems thinking, the initial research focused on identifying commonalities across different enabling environments. Who are the key actors that shape successful enabling environments for water innovation, and how do they interact? What types of partnerships, policies or financing strategies help innovations take root? How do governance, entrepreneurship and public institutions align (or misalign) in practice?

As insights from the initial four case-study cities began to accumulate, a clear pattern emerged. Innovation ecosystems were defined not just by individual technologies or institutions but by the strength, quality and alignment of relationships

among stakeholders – and by the enabling mechanisms that support their collaboration. Through iterative mapping and stakeholder engagement, a framework began to take shape – one capable of capturing this complexity in a clear, visual and actionable way.

This systems mapping led to the creation of Water-BOOST (Bridging Opportunities and Optimising Support Toolkit). Based on lessons learned from the research and the city case studies, Water-BOOST was developed to support assessment and strategy in order to help cities and water stakeholders understand their enabling environment and define more coherent pathways for scaling innovation. It translates systemic insights into operational guidance, bridging the gap between fragmented efforts and coordinated transformation.



2.1 Mapping the water innovation ecosystem

To enable water innovation, cities need more than strong institutions or new technologies – they need an environment in which key actors are connected through relationships and mechanisms that support collaboration, investment and delivery.

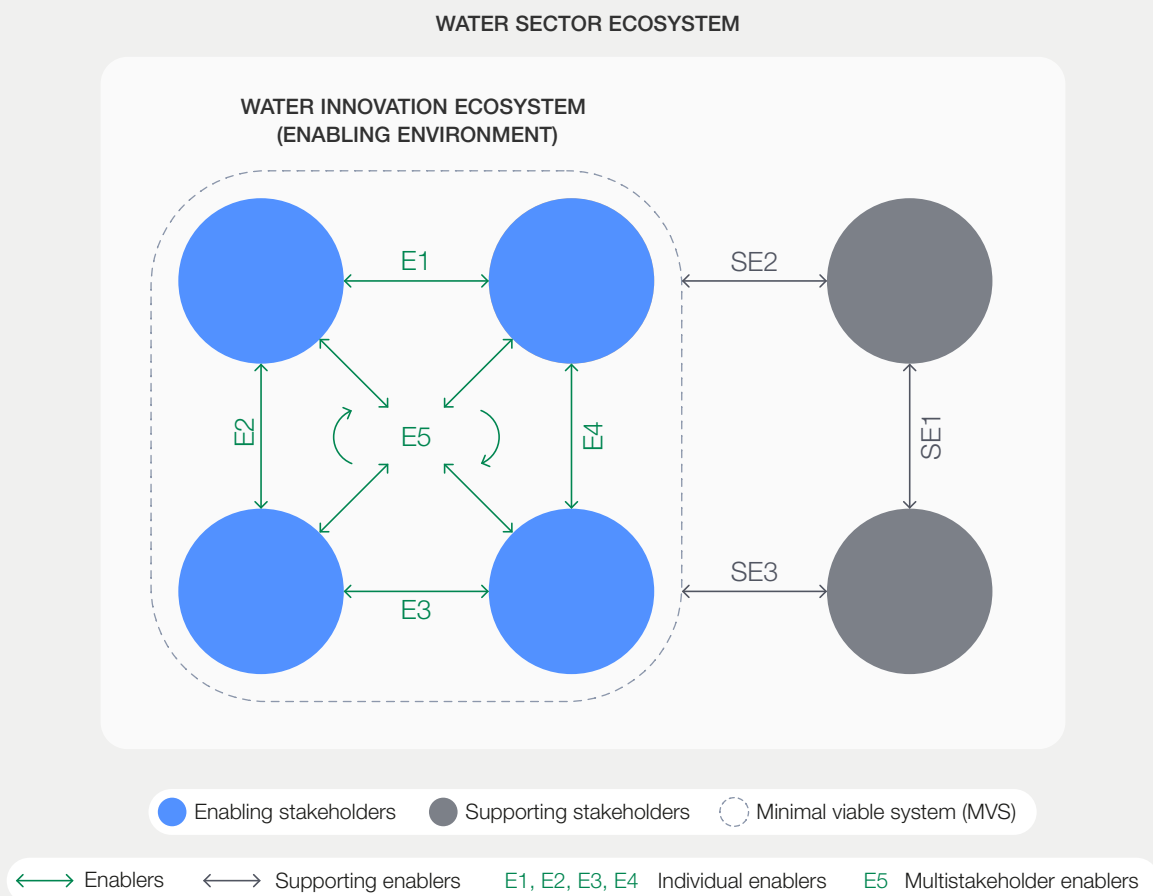
At the heart of the Water-BOOST framework is the concept of a minimal viable system (MVS) – the baseline configuration of enabling stakeholders and enablers required for a functional, innovation-ready ecosystem. Without this minimal structure in

place, water solutions struggle to move from pilots to impact.

This overall framework is illustrated in Figure 4, which maps how enabling stakeholders (in blue) interact through enabling mechanisms (green arrows), forming the MVS at the centre. Surrounding this core are supporting stakeholders (in grey) and their corresponding enablers, which reinforce system performance, capacity and long-term resilience.

Key	Water-BOOST codes used in the figures
E1	Individual governance enablers (linking G1 and G2)
E2 and E4	Individual cross-level enablers, linking governance and aquapreneurship levels
E3	Individual aquapreneurship enablers (linking A1 and A2)
E5	Multistakeholder enablers across all stakeholder groups
SE1	Supporting enablers within supporting stakeholders (linking S1 and S2)
SE2 and SE3	Supporting enablers connecting supporting stakeholders with the MVS
MVS	Minimal viable system composed by key stakeholders and enablers necessary for a functional water innovation ecosystem
G1	Public utilities and large private concessionaires (governance level)
G2	Policy-makers and regulators (governance level)
A1	Innovators and entrepreneurs (aquapreneurship level)
A2	Investors and accelerators (aquapreneurship level)
S1	Academia and research institutions (supporting level)
S2	Civil society organizations (NGOs, professional associations and community groups) (supporting level)

FIGURE 4 Abstract representation of the water innovation ecosystem



Source: World Economic Forum

To guide practical application, a set of core concepts underpins the structure of this framework. These are summarized in Table 4.

Stakeholders are divided into:

- **Enabling stakeholders**, who are central to decision-making and implementation (e.g. utilities, regulators, innovators, investors)
- **Supporting stakeholders**, who provide knowledge, advocacy or facilitation but are not directly responsible for implementation (e.g. academic institutions, NGOs, professional platforms)

Enablers are categorized as:

- **Individual enablers (E1–E4)**, linking two specific stakeholder groups (such as partnerships between utilities and entrepreneurs, or regulators and investors)
- **Multistakeholder enablers (E5)**, connecting multiple stakeholder categories simultaneously, for example, through national innovation strategies or cross-sector consortia
- **Supporting enablers (SE1–SE3)**, acting as mechanisms provided that support enabling stakeholders, such as capacity-building programmes, data platforms or advocacy campaigns that enhance the broader ecosystem

TABLE 4 Core concepts underpinning the water innovation ecosystem framework

Term	Definition
Water sector ecosystem	The broader socio-technical system encompassing all water-related institutions, technologies, infrastructure and governance structures in a given context
Water innovation ecosystem	The enabling environment within the water sector that promotes the development, adoption and scaling of innovative solutions
Stakeholder groups	Actors who influence or are affected by water-related challenges and innovations, including institutions from the public, private, academic and civil society sectors
Enablers	Mechanisms, policies, strategies or instruments that facilitate the creation, adoption and scaling of innovative water solutions
Minimal viable system (MVS)	The essential configuration of enabling stakeholders and enablers required for a functional water innovation ecosystem; it defines the foundational elements needed to activate and sustain innovation

Source: World Economic Forum

2.2 Water-BOOST principles

Building upon the conceptual structure of the water innovation ecosystem, the Water-BOOST framework is designed not only to analyse enabling environments but also to support their strategic improvement.

As a diagnostic and planning tool, Water-BOOST helps reveal where systems are strong, where connections are missing and which mechanisms matter most for scaling innovation. Applied across diverse cities, it not only captures current

conditions but also creates a common language for comparison, making it easier for stakeholders to learn from peers and adapt effective strategies to their own context.

At the core of this approach there are three foundational principles. These guide how the toolkit interprets ecosystem configurations and define the minimum conditions needed to move from isolated initiatives to a functioning and scalable innovation system.

Principle 1

A functional innovation ecosystem requires all core elements of the minimal viable system (MVS)

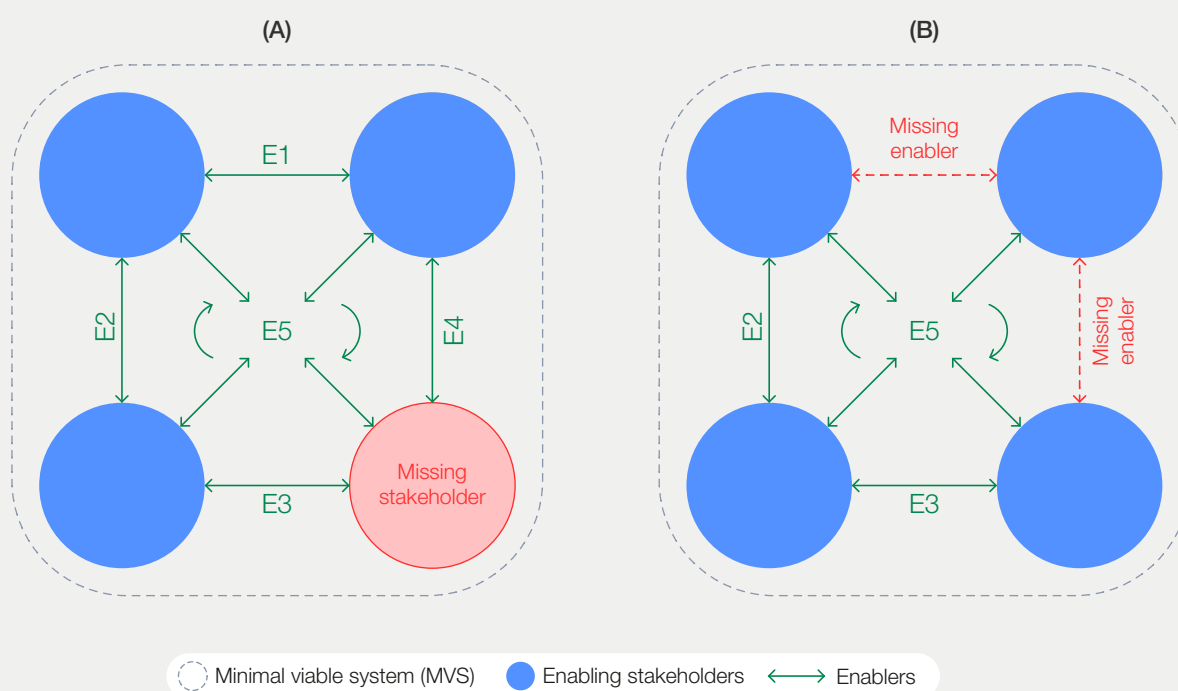
The first principle recognizes that innovation cannot thrive in the absence of essential components. The MVS consists of four core enabling stakeholder groups and the enablers that connect them. If any of these are missing, inactive or poorly connected, the system lacks the capacity to support innovation at scale.

Figure 5 illustrates two common configurations where innovation ecosystems become non-functional or underperforming:

(A) An enabling stakeholder is missing (e.g. no investor presence or disengaged regulator), weakening decision-making, financing or implementation.

(B) Critical enablers are absent (e.g. lack of permitting pathways or co-financing), disrupting the relationships between actors and preventing system alignment.

FIGURE 5 Water-BOOST Principle 1: Two examples of incomplete MVS configurations



Source: World Economic Forum

This principle reinforces the importance of both structure and connectivity: all core stakeholders must be represented, and the enablers linking them must be strong enough to support collaboration, risk-sharing and scaling. Where elements are

weak or absent, the system may stall or remain fragmented – not due to a lack of innovation but because the enabling environment cannot support its delivery.

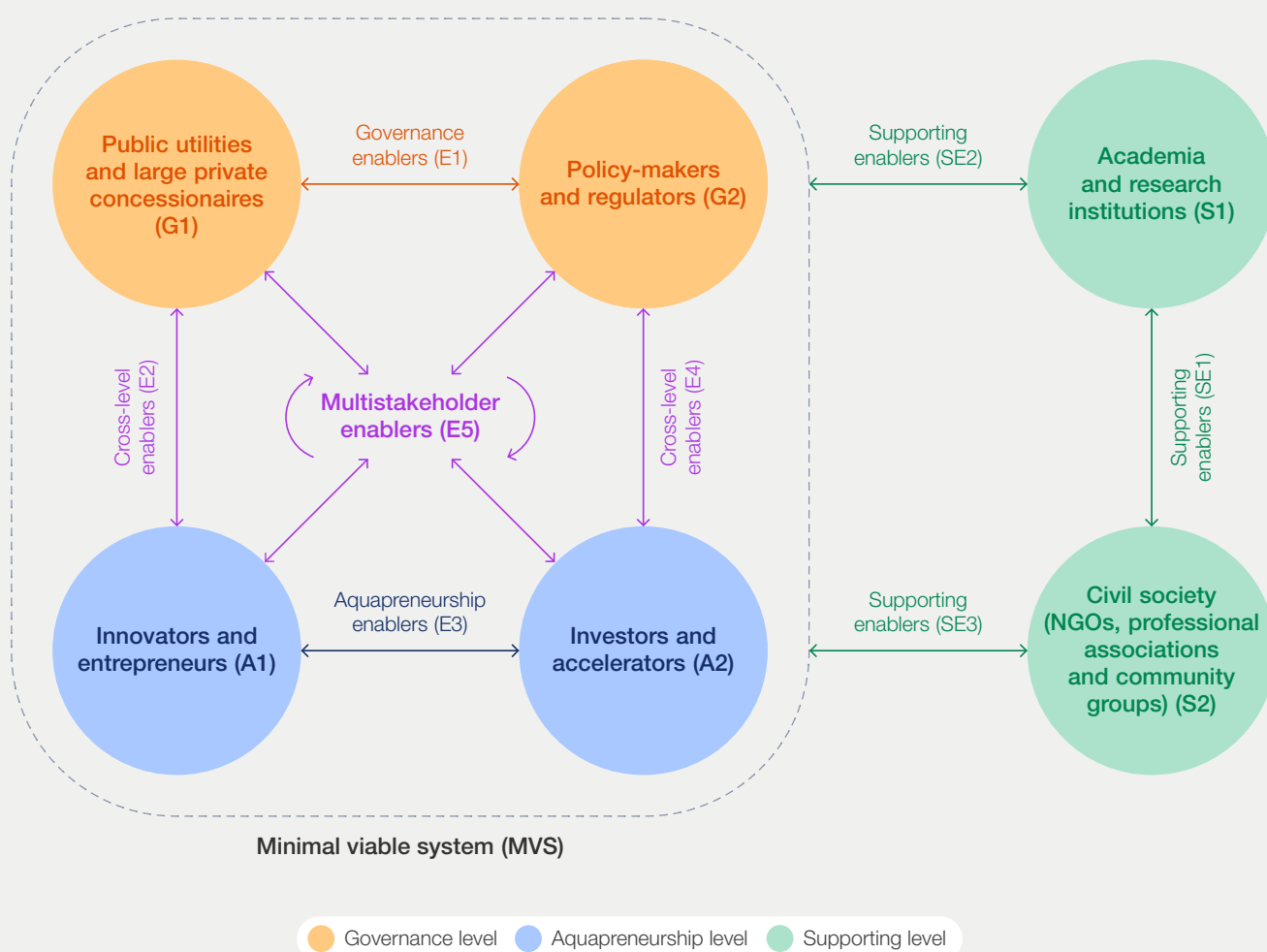
Principle 2

Innovation ecosystem elements operate at governance, aquapreneurship and supporting levels

Water-BOOST's second principle highlights that both stakeholders and enablers within a water innovation ecosystem are distributed across three structural levels, each with a distinct role in enabling innovation and shaping the ecosystem's functionality:

- **Governance level:** This includes public utilities and large private concessionaires (G1) and policy-makers and regulators (G2), who are responsible for service delivery, policy formulation and regulatory enforcement.
- **Aquapreneurship level:** Comprising innovators and entrepreneurs (A1) alongside investors and accelerators (A2), this level drives solution development, testing and scaling – from early-stage technologies to commercialization and market integration.
- **Supporting level:** Made up of academia and research institutions (S1), together with civil society organizations (S2), these stakeholders contribute through technical expertise, advocacy, public engagement and capacity-building. While not directly responsible for implementation, they play a critical enabling role.

FIGURE 6 Water-BOOST Principle 2: Structural map of the water innovation ecosystem across governance, aquapreneurship and supporting levels



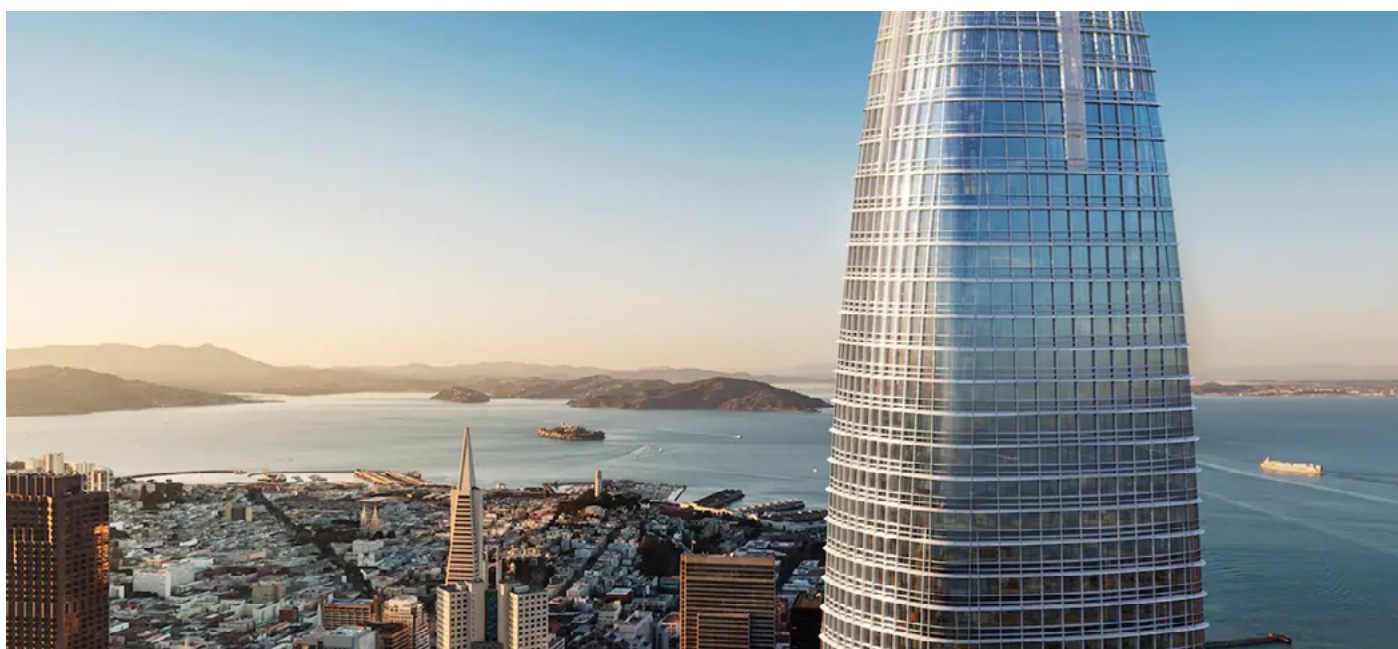
Source: World Economic Forum

Figure 6 illustrates how Water-BOOST organizes these actors and their connections into a coherent operational framework. This layered representation helps clarify how different mechanisms – or enablers – operate across and within levels:

- **E1** represents governance enablers, connecting utilities (G1) with policy-makers and regulators (G2).
- **E3** captures the relationship between innovators (A1) and investors or accelerators (A2).
- **E2** and **E4** serve as cross-level enablers, linking aquapreneurs with governance actors.
- **E5** reflects multistakeholder enablers – shared platforms, funding schemes or policy frameworks that engage all enabling stakeholders simultaneously and support systems-wide coordination.

In parallel, supporting enablers (SE1, SE2, SE3) reflect how the knowledge and advocacy functions of academia and civil society interface with the core system. SE1 links S1 and S2 together, while SE2 and SE3 connect them to the core enabling stakeholders, strengthening alignment between community insights, research expertise and institutional action.

Recognizing and mapping these distinct structural levels is central to the Water-BOOST methodology. It enables users to assess weaknesses or misalignments within the ecosystem and to identify interventions based on the specific type and level of enabler requiring support.



Principle 3

MVS elements can be adapted across contexts

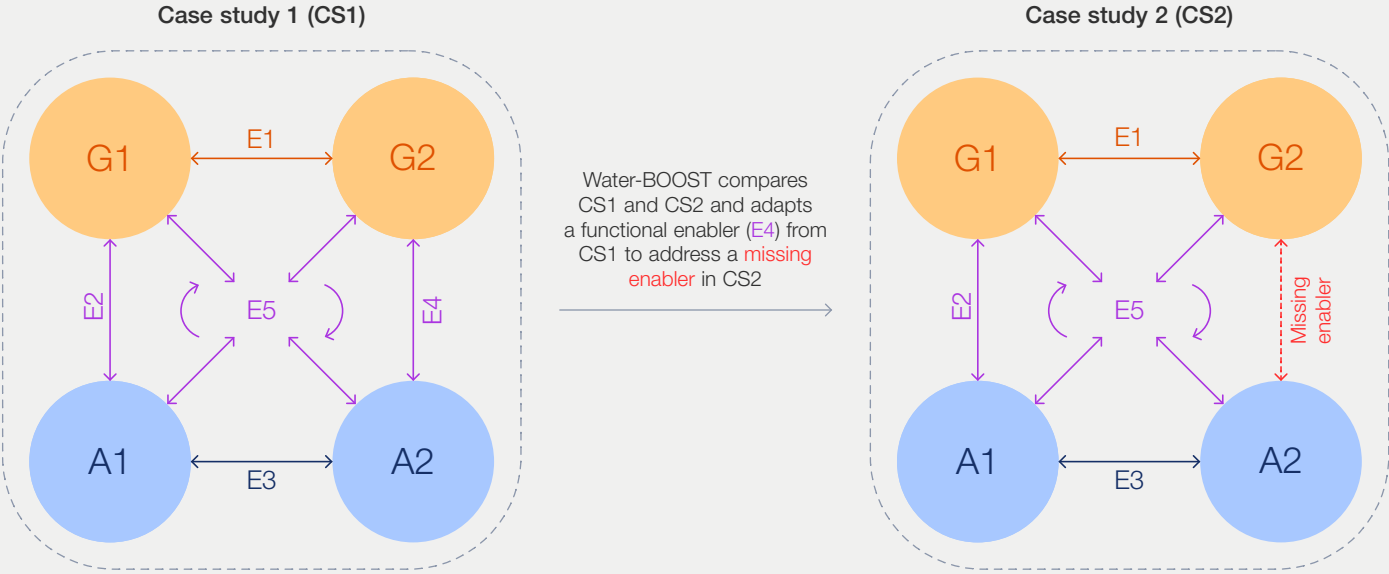
The third principle of Water-BOOST recognizes that, while every city's water innovation ecosystem is shaped by unique socioeconomic, institutional and infrastructural conditions, the core elements of the MVS – both stakeholder groups and enablers – can be adapted across contexts to reinforce local enabling environments.

Functional partnerships, stakeholder configurations and enabler mechanisms that succeed in one setting can often be translated to address similar challenges elsewhere, provided local dynamics are carefully considered. This principle positions Water-BOOST as a tool for cross-city learning and adaptive innovation, enabling users to compare ecosystems, identify transferable features and adapt them to strengthen innovation capacity in new contexts.

This approach draws on systems thinking, which highlights that while no two ecosystems are identical, their structures often exhibit recurring patterns and leverage points. By focusing on stakeholder roles and enabling functions (rather than specific institutions or governance models), Water-BOOST helps identify transferable ecosystem features that can be localized to strengthen innovation capacity.

As shown in Figure 7, the toolkit examines each city's MVS configuration to highlight focus areas and then supports targeted adaptation.

FIGURE 7 | **Water-BOOST Principle 3: An example of how enablers and stakeholder roles within the MVS can be compared and adapted across cities**



Source: World Economic Forum

This principle frames innovation as a learning process across ecosystems. Rather than encouraging direct replication, Water-BOOST enables stakeholders to ask what works elsewhere, why it works and how it can be adapted to fit the institutional and governance context. By viewing cities not as isolated cases but as part of a broader community of practice, the framework supports local adaptation of enabling environments to better promote innovation, coordination and resilience.

Together, these three principles form the operational logic of Water-BOOST:

- **Principles 1 and 2** guide the mapping and assessment of local ecosystems.
- **Principle 3** supports adaptation, scaling and strategic transformation.

Section 3 demonstrates Principles 1 and 2 in practice – applying Water-BOOST across six cities to visualize their enabling environments and highlight focus areas for strengthening water innovation systems. These insights set the stage for cross-city comparison and adaptive strategy design (Principle 3) in section 4.

3

Water innovation ecosystems in practice: City-level insights

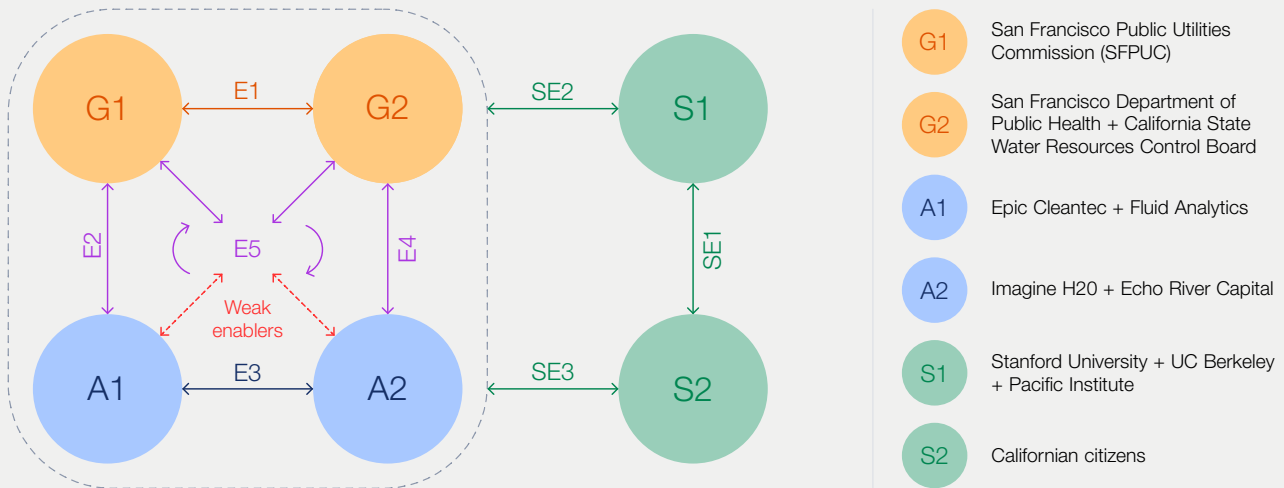
City-level mappings reveal how water innovation ecosystems function in six global contexts, highlighting enablers, constraints and opportunities.

3.1 San Francisco

San Francisco's water innovation ecosystem operates within a context of recurring droughts³⁵ and is supported by a regulatory framework at both the state and city level that actively mandates and facilitates innovation. As a global innovation hub, home to Silicon Valley's technology ecosystem, the city benefits from a vibrant community of innovators, a strong start-up culture and a

population that actively embraces sustainability and forward-looking solutions. Within the water sector, this innovation-friendly environment is reinforced by the leadership of the San Francisco Public Utilities Commission (SFPUC), which has institutionalized pioneering practices such as mandatory on-site water reuse in large new buildings.

FIGURE 8 Water-BOOST diagram for San Francisco



Disclaimer note: The stakeholder groups and organizations listed in this diagram represent a sample of those engaged in this research. Their inclusion does not imply exclusivity, nor does it suggest that other actors within these groups are less relevant or less active. Categorization is indicative and should not be interpreted as fixed.

Source: World Economic Forum

At the governance level, collaboration between the SFPUC, the San Francisco Department of Public Health (Environmental Health), and state regulators such as the California State Water Resources Control Board is very strong. This relationship is supported by effective individual governance enablers (E1), including formalized permitting frameworks, proactive regulatory engagement and public-sector leadership in piloting and procurement. The SFPUC operates as both a service provider and a policy innovator, driving regulatory leadership and enabling cross-functional governance coordination.

The aquapreneurship level presents an opportunity area for strengthening the ecosystem. Start-ups such as Epic Cleantec and Fluid Analytics – both recognized Top Innovators in the Forum’s UpLink Aquapreneur Innovation Initiative – are actively contributing innovative solutions. Yet opportunities remain to enhance their integration into structured multistakeholder collaboration frameworks and long-term scaling pathways. In particular, fragmented procurement processes and limited cross-sector platforms can make it difficult for early-stage innovators to engage consistently with public actors and investors. Strengthening cross-level enablers and establishing more coordinated multistakeholder mechanisms (E5) could help unlock greater alignment and scaling potential throughout the ecosystem.

Nevertheless, San Francisco’s ecosystem benefits from several key enablers. Investors such as

Echo River Capital and accelerators like Imagine H₂O play important roles in supporting early-stage companies, offering investment, strategic guidance and access to international markets. Non-dilutive pilot funding from the SFPUC and public-private partnerships facilitates solution testing under real-world conditions. Creating more structured platforms could help build on this momentum by strengthening long-term connections between governance, innovation and investment communities. Aligning procurement processes more closely with private innovation, as well as supporting innovators in areas such as marketing and investor engagement, would further enhance scaling pathways.

Knowledge stakeholders, including Stanford University, University of California Berkeley and the Pacific Institute, contribute valuable research and technical expertise, particularly in AI-enabled water management. Meanwhile, San Francisco’s citizens – characterized by high environmental awareness – provide a receptive social foundation for innovation adoption.

The SFPUC’s leadership has positioned San Francisco as a regulatory pioneer and policy-driven enabler of water innovation. To take this momentum to the next level, the city can build on its strong foundation by formalizing multistakeholder collaboration, broadening scaling pathways for aquapreneurs and embedding innovation more deeply into its long-term water resilience strategy.

BOX 1 **San Francisco spotlight:** The Non-Potable Water Ordinance and Epic Cleantec

In 2015, San Francisco became the first US city to mandate on-site water reuse for large developments. Under the Non Potable Water Ordinance (or Article 12C of the Health Code)³⁶ all new buildings 250,000 square feet or more must install and operate on-site systems to collect and treat grey water, rainwater or foundation drainage for non-potable uses such as toilet flushing and irrigation. Further amendments in 2021 lowered the threshold to 100,000 square feet.

This ordinance transformed on-site reuse from a voluntary initiative into a binding regulatory standard, underpinning San Francisco’s transition towards circular, decentralized water systems and driving sustained demand for reuse technologies.

One example is Epic Cleantec, a recognized Top Innovator from the Forum’s UpLink Aquapreneur

Innovation Initiative. Originating from the Gates Foundation’s Reinvent the Toilet Challenge, Epic’s OneWater system is being deployed in high-profile projects throughout the US. Epic also operates the first approved grey-water system in San Francisco at the 40-storey Fifteen Fifty building, as well as the black-water system at the 61-storey Salesforce Tower, the nation’s largest in-building water-recycling installation.

This case illustrates how the SFPUC’s policy mandate – backed by enabling permitting frameworks and financial grants – has de-risked market entry, encouraged technology adoption and enabled innovators like Epic to scale. It exemplifies how municipal leadership can actively bridge between governance and aquapreneurship, turning regulatory ambition into on-the-ground innovation impact.

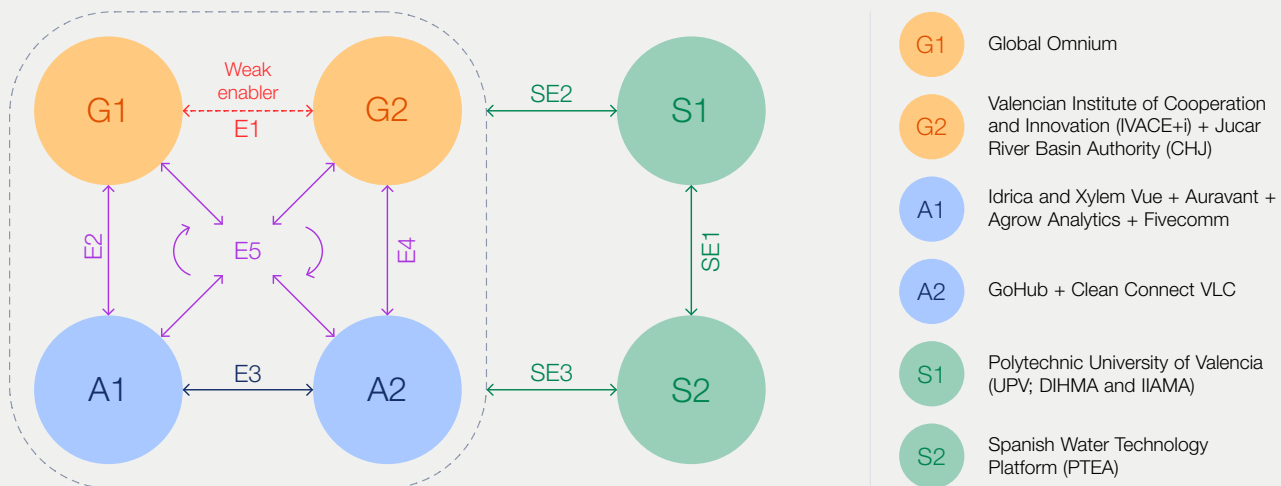


3.2 Valencia

Valencia's water innovation ecosystem reflects a legacy of adaptive resilience and strong private-sector leadership, yet it faces institutional and governance challenges that limit systemic scaling. The city's history of bold decisions in large infrastructure – most notably the post-1957 Turia River diversion³⁷ – highlights its approach to responding to water-related shocks with long-term

urban planning and infrastructure investments. Recent flooding events underscore the urgency of innovation and capacity-building: in October 2024, Valencia experienced one of its most severe flood episodes in decades,³⁸ highlighting the need for forward-looking strategies that integrate digital, decentralized and nature-based solutions.

FIGURE 9 Water-BOOST diagram for Valencia



Disclaimer note: The stakeholder groups and organizations listed in this diagram represent a sample of those engaged in this research. Their inclusion does not imply exclusivity, nor does it suggest that other actors within these groups are less relevant or less active. Categorization is indicative and should not be interpreted as fixed.

Source: World Economic Forum

At the governance level, service provision is dominated by concession contracts led by Global Omnium (GO), Valencia's primary private utility, which operates with efficiency and digital maturity. However, direct collaboration and alignment with public authorities – principally the Valencian Institute of Cooperation and Innovation (IVACE+i) and the Jucar River Basin Authority (CHJ) – remains limited. Coordination mechanisms (E1) between utility operators and regulators are often informal and project-based, and regulatory frameworks tend to be risk-averse and administratively rigid, offering few incentives for experimentation or decentralized treatment adoption.

Valencia's innovation within the aquapreneurship layer is a recognized regional strength. Led by GO's digital spin-off Idrica, the city also hosts a thriving cluster of technology-driven start-ups such as Auravant, Agrow Analytics and Fivecomm. While the private sector demonstrates strong innovation and operational uptake, these efforts remain largely

embedded within corporate domains. Expanding cross-level enablers (E4) and establishing stronger bridges with public authorities and urban planning agendas through multistakeholder mechanisms (E5) could enable broader scaling and cross-sector impact, ensuring that high-tech solutions contribute not only to operational efficiency but also to Valencia's long-term urban water resilience goals.

Supporting stakeholders also play a critical role in Valencia's ecosystem. The Polytechnic University of Valencia (UPV), through its Department of Hydraulic Engineering and Environment (DIHMA) and Research Institute of Water and Environmental Engineering (IIAMA), provides deep technical expertise and participates in multiple joint projects with public and private partners (SE2). National-level networks such as the Spanish Water Technology Platform (PTEA) foster knowledge exchange and sector-wide dialogue, although their influence on local governance remains limited (SE3).

To strengthen systemic impact, Valencia must reinforce policy agility, deepen multistakeholder collaboration and better integrate academic and private-sector insights into formal decision-making. By addressing the focus area through targeted

enablers, the city can transform its operational excellence into a full-spectrum innovation ecosystem capable of responding to growing climate variability and urban water challenges.

BOX 2 **Valencia spotlight:** Global Omnium's innovation reinforcing loop

Valencia's private sector offers a blueprint for water innovation adoption and scaling, led by Global Omnium (GO). Over a 15-year period, GO has digitalized its operations, installing more than 1 million sensors and adopting advanced data analytics to optimize service delivery. This transformation gave rise to Idrica, a digital spin-off that developed GoAigua – now Xylem Vue – an AI-enabled platform managing water networks in real time.

To further accelerate innovation, GO launched GoHub Ventures in 2019, investing more than €90 million in high-tech start-ups to date. This strategy created a reinforcing loop: start-ups such as Auravant, Agrow Analytics and Fivecomm have developed solutions that GO

integrates into its operations, improving efficiency, reducing water losses and energy consumption and enhancing service delivery. These operational insights then inform GoHub's future investment priorities, creating a continuous cycle of innovation feedback.

Results are tangible: GO reports a 30% reduction in non-revenue water, a 15% decrease in energy use during treatment and a 20% reduction in operating expenditure costs. Yet this innovation remains largely confined to operational domains, without influencing public-sector transformation. Valencia's experience shows that while private leadership can drive digital water management, bridging towards public innovation ecosystems remains critical for systemic change.



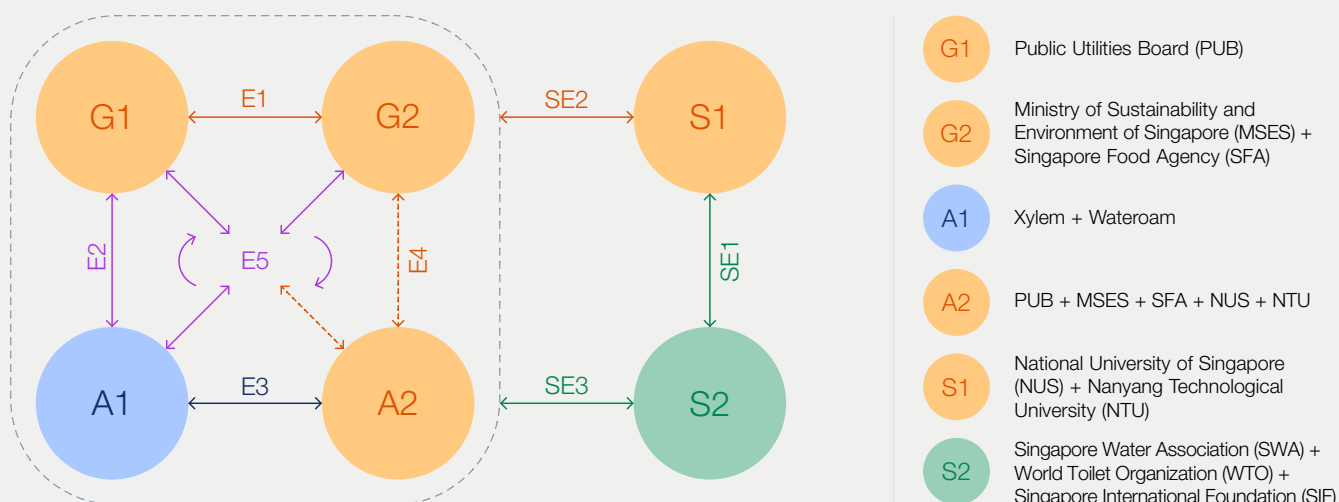
3.3 Singapore

Singapore's water innovation ecosystem is globally recognized for its integrated, state-led approach. Confronted by acute water scarcity and national security concerns, the city state has long prioritized water as a strategic resource.³⁹ This commitment has fostered an enabling environment built on strong governance, public-private collaboration and investment in research and development.

At the governance level, the Public Utilities Board (PUB) serves as Singapore's national water utility and operates under a self-regulatory framework to ensure the safety of water for domestic and

industrial use, audited regularly by external experts. The Singapore Food Agency is the statutory regulator, while the Ministry of Sustainability and Environment (MSES) acts as the primary policy driver, working closely in partnership with PUB to ensure cohesive regulatory and strategic leadership. This governance model benefits from strong intra-government collaboration (E1) and robust individual enablers (E1, E2, E4), such as transparent public procurement processes and coordinated regulatory mandates. Together, PUB and the ministry maintain consistent policy direction, prioritizing water and food security through diversification and innovation.

FIGURE 10 | Water-BOOST diagram for Singapore



Disclaimer note: The stakeholder groups and organizations listed in this diagram represent a sample of those engaged in this research. Their inclusion does not imply exclusivity, nor does it suggest that other actors within these groups are less relevant or less active. Categorization is indicative and should not be interpreted as fixed.

Source: World Economic Forum

Multistakeholder collaboration (E5) is notably advanced. PUB regularly partners with private companies such as Keppel and Binnies for project delivery, while working with national academic institutions including the National University of Singapore (NUS) and the Nanyang Technological University (NTU), which also includes the Nanyang Environment and Water Research Institute (NEWRI) and the Separation Technologies Applied Research and Translation (START) Centre. These academic public stakeholders contribute not only technical knowledge but also play roles in piloting, public engagement and skills development.

In addition, the Singapore International Foundation (SIF), while classified as a stakeholder organization, often operates as an enabler by bridging different groups across sectors. A recent example is the Southeast Asia Partnership for Adaptation and Water (SEAPAW) coalition, developed in collaboration with the Forum, which illustrates SIF's convening capacity and its contribution to strengthening multistakeholder collaboration and regional water resilience.

The aquapreneurship layer demonstrates considerable strength, with start-ups such as Watroam and multinationals like Xylem actively contributing to Singapore's innovation ecosystem. However, this layer is tightly embedded within a governance triangle led by PUB, the ministry and national universities (NUS and NTU). Much of the investor and accelerator role is performed by PUB itself, through dedicated funding schemes

and innovation testbeds. While this configuration ensures strong public-sector coordination, it also concentrates aquapreneurship within state-led structures. As a result, external investor presence and cross-level enablers (E3, E4) remain relatively limited, constraining the diversity of innovation pipelines.

Supporting stakeholders such as the Singapore Water Association (SWA) and the World Toilet Organization play important roles in industry promotion, capacity-building and knowledge-sharing, helping connect innovators with broader networks and policy priorities.

Singapore's enabling environment is reinforced by PUB's proactive role in public communication. Its national branding initiatives, such as the "Every Drop Counts" campaign, cultivate a strong societal understanding of water scarcity and the importance of innovation. This societal buy-in facilitates infrastructure projects and helps scale public-private solutions.

Nevertheless, opportunities remain to further strengthen Singapore's ecosystem. Expanding cross-level collaboration and deepening private-sector engagement could complement the strong public-led model. Enhancing market access for local start-ups beyond Singapore's borders, promoting greater private-sector leadership in scaling, and building on government-driven innovation pipelines would help diversify and expand the ecosystem's global impact.

Singapore's water transformation has been shaped by the leadership of the Public Utilities Board (PUB), which uniquely serves as both national water utility and regulator. A cornerstone of PUB's strategy is its Living Lab initiative – a dedicated platform that provides real-world testbeds across water treatment plants, catchments and urban infrastructure to pilot emerging technologies.⁴⁰ By offering controlled, operational environments and streamlined regulatory pathways, the Living Lab reduces adoption barriers and accelerates the transition from prototype to deployment.

This enabling infrastructure has supported a range of local and global innovators, including Wateroam – a Top Innovator from the Forum's UpLink Aquapreneur Innovation Initiative. With

refine its portable filtration technologies, which are now used in more than 40 countries to provide clean drinking water in humanitarian and disaster-relief contexts. The success of Wateroam illustrates how public-sector de-risking and technical validation mechanisms can empower start-ups to scale beyond national borders.

PUB complements these initiatives with innovation funding schemes and cross-sectoral partnerships, reinforcing Singapore's position as a water innovation hub. Beyond technical piloting, PUB's role extends into societal engagement: through education programmes and national campaigns, it helps cultivate public trust in advanced technologies such as NEWater⁴¹ – turning policy into practice through behavioural change and citizen buy-in.



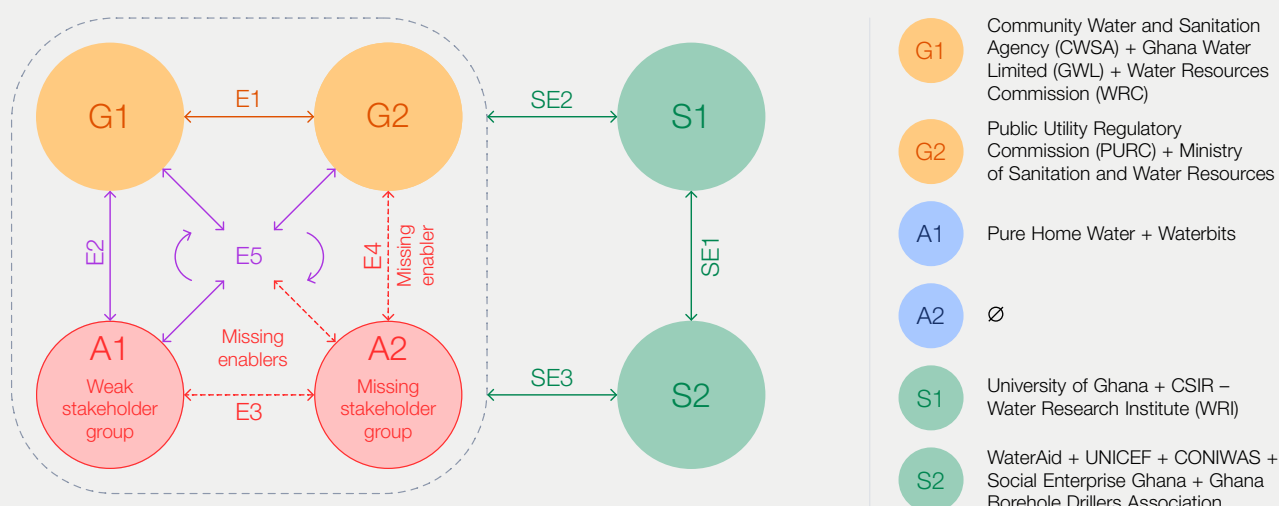
3.4 Accra

Accra's water innovation ecosystem reflects both the urgency of its water challenges and the dynamism of grassroots responses. The city faces persistent infrastructure gaps, high non-revenue water losses and mounting threats from climate change and pollution. Yet these pressures have stimulated decentralized responses and new forms of public-private-community collaboration.

At the governance level, the Ghana Water Limited (GWL), the Community Water and Sanitation Agency (CWSA) and the Water Resources Commission (WRC) operate alongside national

regulators such as the Public Utilities Regulatory Commission (PURC) and the Ministry of Sanitation and Water Resources. Coordination among these actors has improved in recent years (E1), but mandate fragmentation, regulatory discontinuity and enforcement challenges continue to constrain innovation at scale. Public utilities are nonetheless piloting change: GWL is trialling smart metering and digital billing to reduce its 50% non-revenue water rate, while CWSA is shifting towards a rural utility model anchored in decentralized delivery and community participation.

FIGURE 11 | Water-BOOST diagram for Accra



Disclaimer note: The stakeholder groups and organizations listed in this diagram represent a sample of those engaged in this research. Their inclusion does not imply exclusivity, nor does it suggest that other actors within these groups are less relevant or less active. Categorization is indicative and should not be interpreted as fixed.

Source: World Economic Forum

In Accra, aquapreneurship emerges as the system's critical area, as it is the most fragile layer within the ecosystem. While enterprises such as Pure Home Water and Waterbits are developing promising household treatment and AI-powered water-quality technologies, the absence of a clear investor and accelerator base leaves aquapreneurship enablers (E3) underpowered. This is compounded by weak links to governance (E2, E4), which constrain integration into procurement, policy or utility pathways. Although multistakeholder collaboration (E5) is relatively strong, driven by active NGOs and research institutions, it is not yet sufficient to offset the lack of financial and institutional support. As a result, innovators face systemic barriers to scaling, leaving the ecosystem vulnerable to innovation bottlenecks despite international partnerships and recognition.

Supporting stakeholders play a growing and influential role. Academic institutions such as the University of Ghana and Council for Scientific and Industrial (CSIR)–Water Research Institute provide applied research, data analysis and technical support. They are joined by a diverse set of civil society actors – including WaterAid, the United Nations Children's Fund (UNICEF), the Coalition of

NGOs in Water and Sanitation (CONIWAS), Social Enterprise Ghana and the Ghana Borehole Drillers Association – which play key roles in piloting, convening and advocacy. These groups are central to enabling functions such as community mobilization, capacity-building and cross-sector learning (SE2, SE3).

Across all stakeholder groups, one shared concern is the rising threat of illegal small-scale mining activities – known locally as *galamsey* – which severely degrade river systems and compromise water quality. These practices increase the operational burden on utilities such as GWL, reduce the lifespan of treatment infrastructure and undermine public trust in water safety. Despite public outcry and national task forces, enforcement remains limited, pointing to the need for cross-sector solutions that combine policy, technology and community monitoring mechanisms.

To strengthen Accra's enabling environment, priority should be given to unlocking financing mechanisms for early-stage solutions, creating structured platforms for public-innovation partnerships and embedding NGOs and research institutions as formal partners in scaling community-based innovation.

Accra's water innovation landscape is shaped by grassroots solutions and strong NGO involvement. Pure Home Water (PHW), a Ghanaian social enterprise, produces AfriClay ceramic water filters made from local clay and rice husks, designed to remove bacteria and reduce waterborne diseases such as diarrhoea. Originally developed in collaboration with the Massachusetts Institute of Technology (MIT)'s D-Lab, these filters offer an affordable, locally appropriate solution for household water treatment. Beyond improving access to clean water, the AfriClay filter also seeks to reduce plastic waste by offering an alternative to sachet and PET bottled water. To complement this, PHW has launched CREATE Stations, community hubs designed to raise awareness about circular economy practices and plastic recycling. Since its founding in 2005, PHW has reached more than 800,000 people across Ghana,

combining public health impact with environmental sustainability.

NGOs and international partners are instrumental in scaling these types of decentralized solutions. WaterAid Ghana, UNICEF and CONIVAS act as key enabling actors – supporting solar-powered boreholes, prepaid water systems and professionalized rural water delivery. These organizations help fill critical gaps in financing, technical capacity and community engagement.

In Accra, this model of decentralized, NGO-enabled innovation is not peripheral – it is central. By anchoring water solutions in public health, international collaboration and local ownership, these stakeholders are creating a distinct and impactful pathway for scaling water innovation in low-resource contexts.



↓ Image credit:
Wateroam



3.5 Barcelona

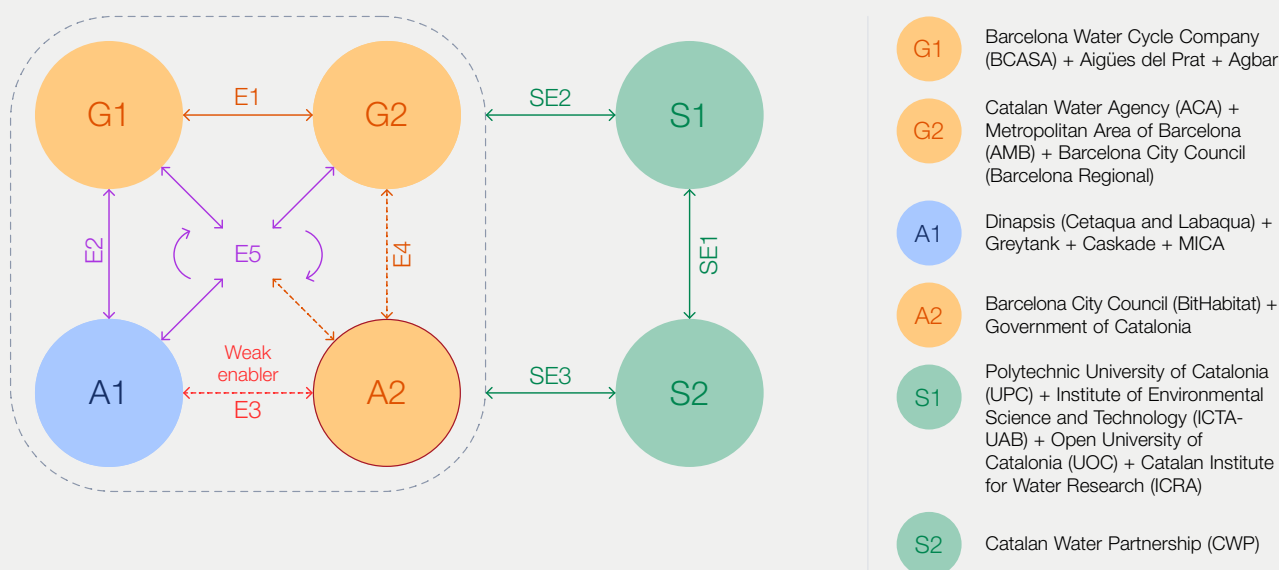
Barcelona's water innovation ecosystem is shaped by persistent water scarcity, strong governance leadership and significant investment in adaptive infrastructure. With increasing pressure from climate change, population growth and tourism, drought resilience has become a central policy priority across Catalonia.⁴² This context has enabled a long-term focus on water reuse, circularity and cross-sector collaboration.

At the governance level, Barcelona exhibits a strong enabling environment. Regional public institutions – including the Catalan Water Agency (ACA), the Metropolitan Area of Barcelona (AMB) and municipal actors such as Barcelona Water Cycle Company (BCASA) – have spearheaded innovative infrastructure initiatives such as the El Prat water reclamation facility, which recharges the Llobregat River aquifer upstream, and various district-level grey-water reuse schemes. In El Prat de Llobregat, a distinctive dual water system is operated by Aigües del Prat, supplying reclaimed water for

non-potable uses. These public stakeholders, in close collaboration with Agbar – the city's private concession owned by Veolia – operate within a shared strategic vision and with robust permitting frameworks (E1) that support experimentation and innovation.

Innovators such as Greytank, Cascade and MICA are advancing decentralized and resource-efficient solutions as well as supporting circular economy models. However, most incentives and micro-funding streams originate from public actors such as the Barcelona City Council and the Government of Catalonia – creating a support base that attracts early-stage ventures but often lacks the investment depth required for scale-up. Private-sector investors and accelerators remain scarce, and early growth-stage capital is limited (E3). While programmes such as BitHabitat and Barcelona Regional play a key role in seeding innovation, the absence of sustained co-investment weakens the transition from pilot to market.

FIGURE 12 Water-BOOST diagram for Barcelona



Disclaimer note: The stakeholder groups and organizations listed in this diagram represent a sample of those engaged in this research. Their inclusion does not imply exclusivity, nor does it suggest that other actors within these groups are less relevant or less active. Categorization is indicative and should not be interpreted as fixed.

Source: World Economic Forum

The city also benefits from a dense network of academic and research institutions, which are deeply embedded in its innovation ecosystem. These include the Polytechnic University of Catalonia (UPC), the Institute of Environmental Science and Technology (ICTA-UAB), the Open University of Catalonia (UOC) and the Catalan Institute for Water Research (ICRA, based in Girona). Their contributions range from systems analysis and applied R&D to training and policy advice. Sectoral platforms such as the Catalan Water Partnership (CWP) further promote cross-

sector collaboration and export readiness, although they offer limited direct support for piloting or commercialization (SE3).

Barcelona's innovation pathway illustrates the value of long-term vision and strong public leadership. To fully unlock the ecosystem's potential, the city must activate mechanisms that enable scaling – strengthening public-private investment flows, establishing cross-sector platforms and closing the gap between early-stage innovation and systems-wide transformation.

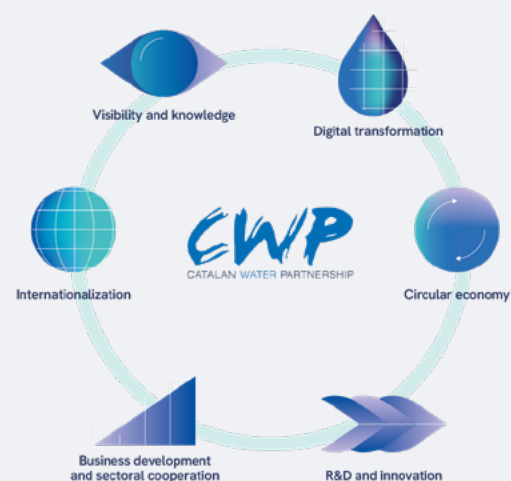


BOX 5 | **Barcelona spotlight:** The Catalan Water Partnership – a unique innovation enabler

The Catalan Water Partnership (CWP) plays a central and unique role in Catalonia's water innovation ecosystem. Founded in 2008, it serves as a multistakeholder cluster that brings together more than 170 members spanning the public, private and academic sectors. Unlike any national equivalent in Spain, CWP operates as a neutral enabler, promoting collaboration throughout the entire water value chain – from large utilities and small and medium-sized enterprises (SMEs) to universities, research institutes and government agencies.

CWP functions as an informal multistakeholder enabler (E5), helping overcome structural fragmentation by coordinating innovation efforts and facilitating knowledge transfer. Its activities range from collaborative R&D projects and working groups to strategic matchmaking, funding support, internationalization services and regular knowledge-sharing events (jornades) that disseminate best practices and foster dialogue across the sector. By actively engaging SMEs alongside large players, the cluster ensures that innovation opportunities remain inclusive and scalable.

Each year, the partnership drives more than 20 projects and it has positioned Catalonia as a global water technology hub. Its Gold Label recognition from the European Cluster Excellence Initiative underlines its leadership, while its work demonstrates how coordinated platforms can turn regional water challenges into drivers of systemic innovation.

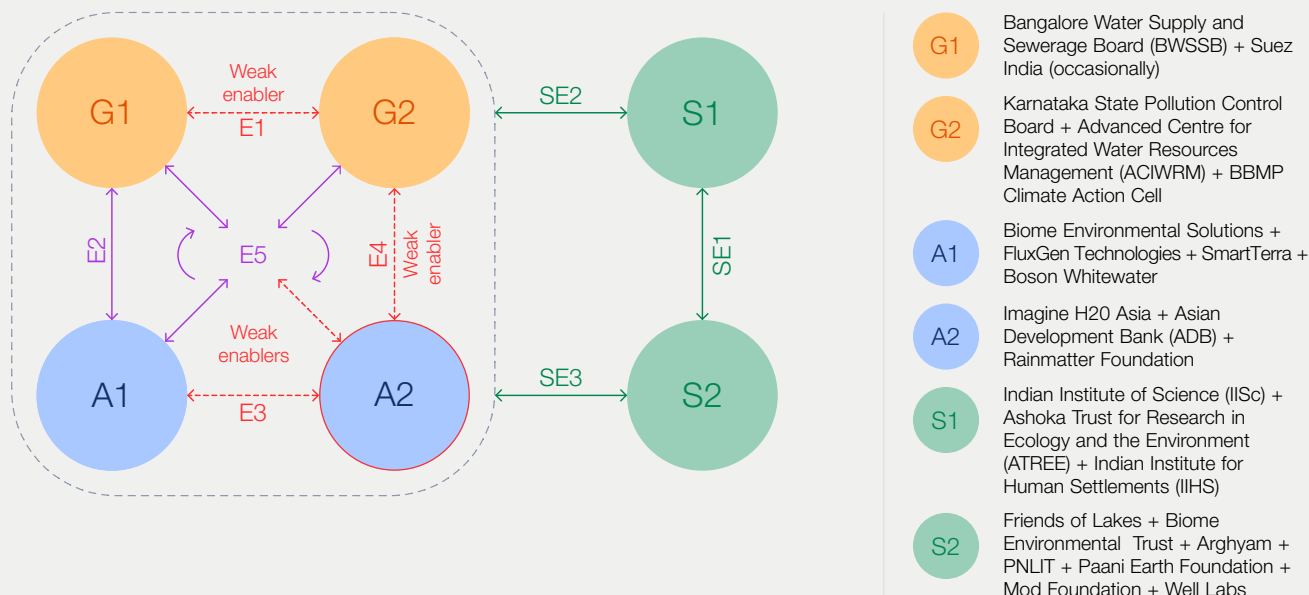


3.6 Bengaluru

Bengaluru's water innovation ecosystem is under mounting pressure from environmental degradation, unplanned urban expansion, and fragmented governance. Yet, amid these challenges, grassroots innovation and community-led action are

emerging as critical forces for resilience. As India's "Silicon Valley", Bengaluru benefits from a strong technological base and entrepreneurial energy, but systemic weaknesses in governance and investment continue to hinder the scaling of innovation.

FIGURE 13 Water-BOOST diagram for Bengaluru



Disclaimer note: The stakeholder groups and organizations listed in this diagram represent a sample of those engaged in this research. Their inclusion does not imply exclusivity, nor does it suggest that other actors within these groups are less relevant or less active. Categorization is indicative and should not be interpreted as fixed.

Source: World Economic Forum

At the governance level, institutional fragmentation remains a fundamental constraint. Public utilities such as the Bangalore Water Supply and Sewerage Board (BWSSB) operate with limited resources and must cope with high non-revenue water rates and rapid urbanization. Policy-making bodies such as the Karnataka State Pollution Control Board and the Karnataka Groundwater Authority function with limited inter-agency coordination, while enforcement of environmental regulations remains a challenge. While innovation bodies – such as the Bruhat Bengaluru Mahanagara Palike (BBMP) Climate Action Cell and the Advanced Centre for Integrated Water Resources Management (ACIWRM) – have emerged, they are still defining their agendas and remain overstretched. Furthermore, it is worth noting that fragmentation is not only evident between G1 and G2 institutions, but occasionally also within individual organizations belonging to these two categories – a dynamic that could

benefit from more in-depth exploration for specific stakeholder groups in future analyses. This results in a very weak E1 connection and regulatory frameworks (E4) that are inconsistent and lack support for innovation scaling.

Multistakeholder collaboration (E5) is primarily driven by grassroots action. Civil society organizations and citizen groups play a critical bridging role in the absence of formal coordination. Organizations such as the Puttenahalli Neighbourhood Lake Improvement Trust (PNLIT), Biome Environmental Trust, Friends of Lakes, Arghyam, Paani Earth Foundation, Mod Foundation and Water, Environment, Land and Landscape (WELL) Labs are active across the city – restoring urban lakes, enabling community rainwater harvesting, piloting decentralized sanitation systems and advocating for sustainable water governance.

In Bengaluru, the ecosystem's critical area lies at the intersection of aquapreneurship, governance and financing. Early-stage innovators such as FluxGen Technologies, SmartTerra (an UpLink Aquapreneur Top Innovator) and Boson White Water are developing promising solutions in water quality, sanitation and resource efficiency. However, without stronger support from investors, accelerators and public institutions, these innovations struggle to grow beyond pilot projects.

The focus for stakeholders in Bengaluru – particularly city authorities, utilities and funders – is therefore to strengthen investment mechanisms, improve integration with governance processes and build cross-sector coordination (E3, E4) that can help aquapreneurs scale.

The investor and accelerator landscape is particularly thin. Rainmatter Foundation stands out as one of the few India-based entities providing grant-based support for water innovation. International actors such as Imagine H₂O Asia and the Asian Development

Bank (ADB) offer some mentorship and exposure, but their reach remains limited within the local entrepreneurial context. As a result, aquapreneurs face a persistent gap in private investment and access to commercial scaling opportunities.

Supporting academic stakeholders such as the Indian Institute of Science (IISc), the Indian Institute for Human Settlements (IIHS) and the Ashoka Trust for Research in Ecology and the Environment (ATREE) contribute high-quality research and environmental modelling – for example, tracking lake and river pollution through remote sensing. However, these actors remain disconnected from decision-making and lack pathways to support innovation deployment.

Bengaluru's innovation ecosystem reflects a vibrant, bottom-up drive for change. Realizing its full potential will require bridging institutional gaps, building stable financing mechanisms for water start-ups and embedding grassroots solutions into formal public-sector planning frameworks.

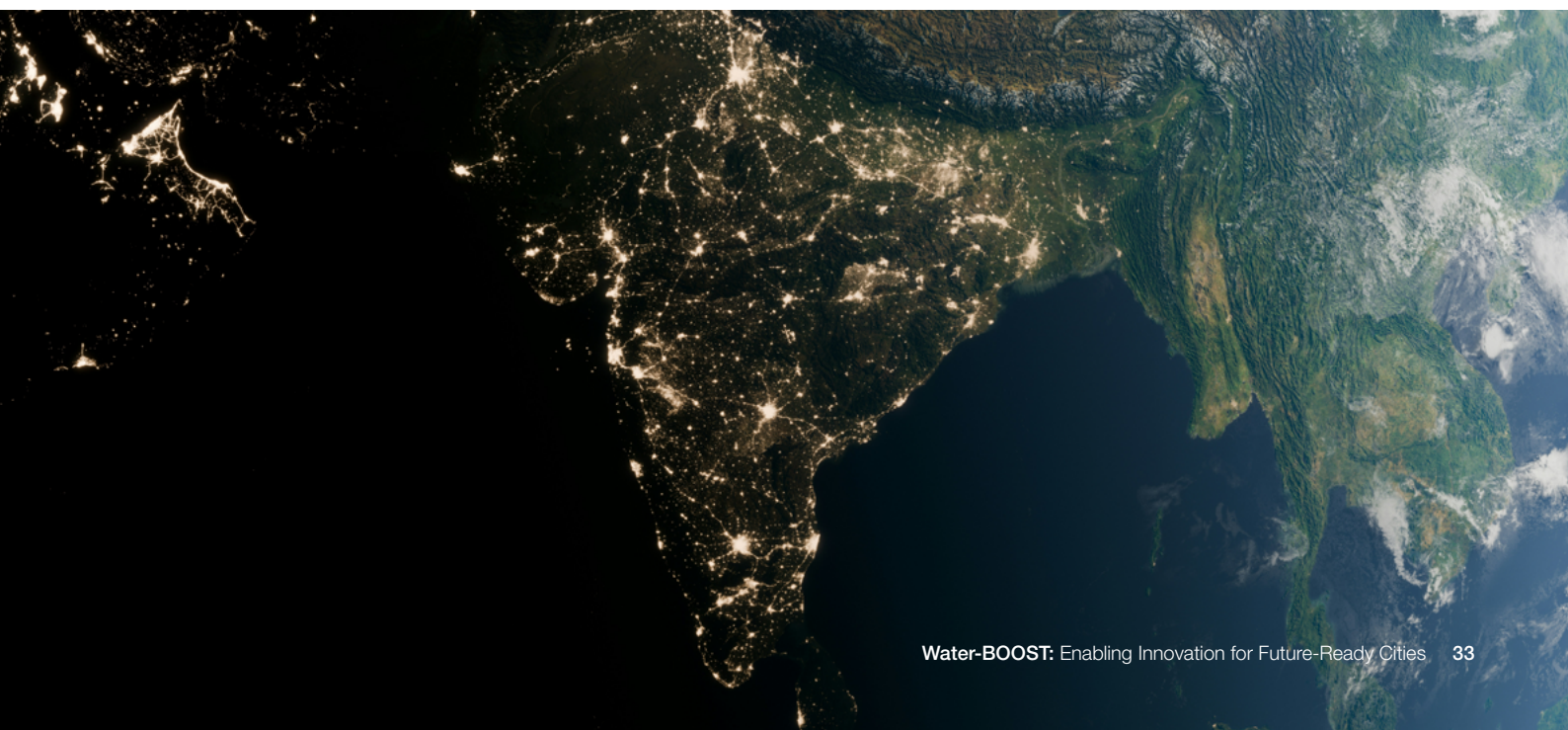
BOX 6 Bengaluru spotlight: Bengaluru NGOs driving data and accountability

Bengaluru's water sector benefits from robust NGO activism that bridges data transparency, technology and grassroots engagement. WELL Labs, a city-based water research group, prepares comprehensive analyses of the urban water system to inform better water-security planning. Its 2023 Bengaluru Urban Water Balance study highlighted critical issues – from over-exploited groundwater to neglected lakes – providing data-driven evidence for policy action.⁴³

Paani Earth Foundation, a citizen-led think tank, empowers communities with accessible river data and open-source tools. The initiative produces maps and pollution analyses using free geographic information system (GIS) software and collaborates with institutes such as the

International Centre for Clean Water on water-quality monitoring. By sharing findings publicly (e.g. on Arkavathi River pollution) and convening “riverside” citizen forums, Paani Earth enables the public to advocate for cleaner water and hold authorities accountable.

Arghyam, a Bengaluru-based foundation, scales such innovation by linking grassroots and government efforts. It partners with public agencies as a tech and data collaborator and it champions open-data “commons” for water. Through participatory groundwater programmes and open knowledge platforms like the India Water Portal, Arghyam fills institutional gaps and pushes for more accountable water governance.



From mapping to strategy: Operationalizing Water-BOOST

Cities can move from fragmented innovation efforts to coordinated action through systems-based learning and adaptation.

Water-BOOST's third principle highlights the toolkit's value not only for mapping but for strengthening water innovation ecosystems through comparison and adaptation. By identifying common gaps and transferable enablers across cities, Water-BOOST helps decision-makers move from static

diagnosis to targeted action. This section continues that logic – illustrating how cities can first compare ecosystem configurations to identify key focus areas for improvement and then adapt effective mechanisms from other contexts to meet their local needs.



4.1 Cross-comparison of cities

To initiate this comparative process, Water-BOOST's structured framework is applied across all six case-study cities, allowing for a consistent analysis of ecosystem configurations. By assessing both the presence of core stakeholder groups and the strength of their enabling connections, the tool can translate qualitative insights into comparable patterns that help cities understand their ecosystems, identify peers, reflect on shared challenges and uncover transferable practices to strengthen enabling environments.

For this purpose, stakeholder presence and enabler effectiveness were assessed on a five-level scale – Absent, Limited, Moderate, Strong, Very Strong – each corresponding to a numerical score from 1 to 5. This categorization provides a common language to compare diverse contexts, while the scores were derived from qualitative fieldwork insights, stakeholder interviews and triangulation with secondary sources. The detailed scoring framework and results are provided in Table A1 in the Appendix to this report, and Figure 14 translates these scores into a visual overview of stakeholder presence and strength across the six cities.

FIGURE 14 | Water-BOOST presence of stakeholder groups across the six case-study cities



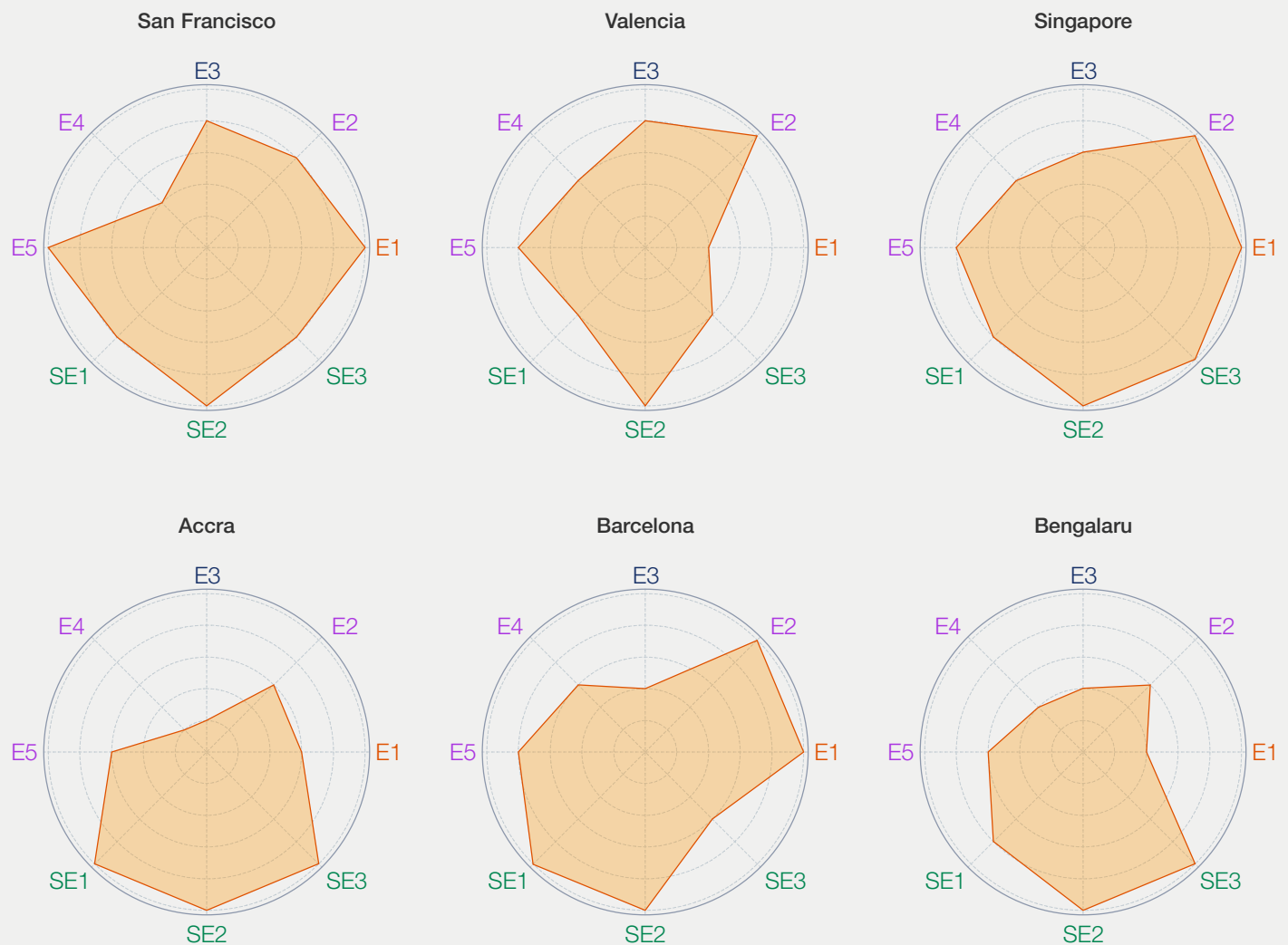
Source: World Economic Forum

Figure 15 complements this view by illustrating the presence and effectiveness of enabling mechanisms – the links that connect stakeholder groups. These plots illustrate how performance varies across contexts: for instance, Valencia demonstrates strong academic support but lacks certain cross-level enablers, while Bengaluru exhibits active grassroots engagement but fragmented institutional integration. Here, too, results are standardized using the same five-level categorization, which ensures consistency across

both stakeholder and enabler analyses. The corresponding scores that underpin Figure 15 are summarized in Table A2 in the Appendix to this report.

By enabling both systems-level insight and contextual alignment, this comparative approach creates a foundation for informed decision-making – not by replicating other models but by selectively adapting what works elsewhere to strengthen local water innovation ecosystems.





Source: World Economic Forum

4.2 Cross-city reflections and emerging impact areas

As the Water-BOOST framework is applied across diverse global cities, a more nuanced understanding of enabling environments for water innovation begins to emerge. While each city operates under a unique constellation of institutions, policies and socioeconomic conditions, recurring patterns and structural weaknesses suggest that many of their challenges are shared. Just as importantly, by understanding how stakeholders and enablers are configured across multiple cities, the framework can highlight examples of models that other cities can adapt to address their own specific gaps. This creates a pathway for actionable learning, comparative analysis and strategic adaptation.

This section presents two proof-of-concept illustrations that move beyond mapping and diagnosis, illustrating how cities can learn from one another's enabling mechanisms. These examples do not simply show what is missing but begin to explore how systems connect (or fail to) – and how targeted improvements in those connections can unlock broader innovation potential.

First illustration: Accra and Bengaluru

The first example (Figure 16) compares Accra and Bengaluru, two rapidly urbanizing cities in the Global South, each with contrasting innovation capacities and governance structures.

In Accra and Bengaluru, Water-BOOST reveals complementary strengths and areas for improvement that create a clear case for cross-city learning. Accra benefits from strong civil society and academic engagement, supporting multistakeholder collaboration (E5) and moderately aligned governance mechanisms (E1). Yet its aquapreneurship layer (A1, A2) remains underdeveloped, with limited investment pathways and few structured opportunities for scaling innovation.

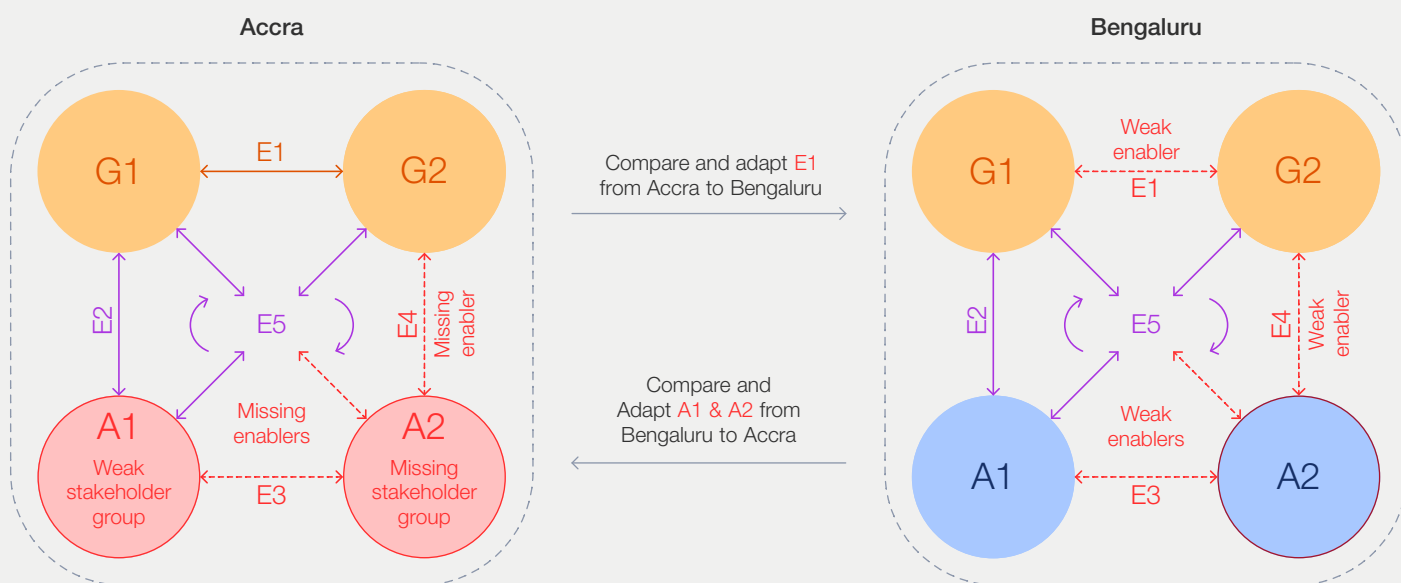
Bengaluru, by contrast, exhibits a more dynamic aquapreneurial and investor landscape (E3, A2), but continues to struggle with fragmented governance

and weak regulator coordination (E1). These differences align with each city's focus areas as identified in Section 3 of this report.

By placing these cities side by side, Water-BOOST enables a two-way insight: Bengaluru can learn from Accra's more cohesive regulatory-to-utility alignment (E1), while Accra could adapt Bengaluru's investment and aquapreneurship mechanisms (E3, A2) to enhance its innovation capacity.

More broadly, the comparison illustrates that even in cities where funding remains a major constraint, strategic peer learning can help identify different entry points or examples to strengthen investor ecosystems. It also highlights that it is not enough to support individual stakeholder groups in isolation – innovators and investors need to be embedded within systems where enabling mechanisms link them to public institutions, procurement pathways and multistakeholder platforms.

FIGURE 16 Water-BOOST cross-city comparison and adaptation between Accra and Bengaluru cities



Source: World Economic Forum



Second illustration: San Francisco, Valencia and Barcelona

The second example (Figure 17) transitions from a binary comparison to a multi-city reflection, illustrating how similar cities can identify complementary strengths within shared typologies. San Francisco, Valencia and Barcelona are all high-income cities with established governance and infrastructure, but they present differing configurations and gaps, making them ideal for mutual learning.

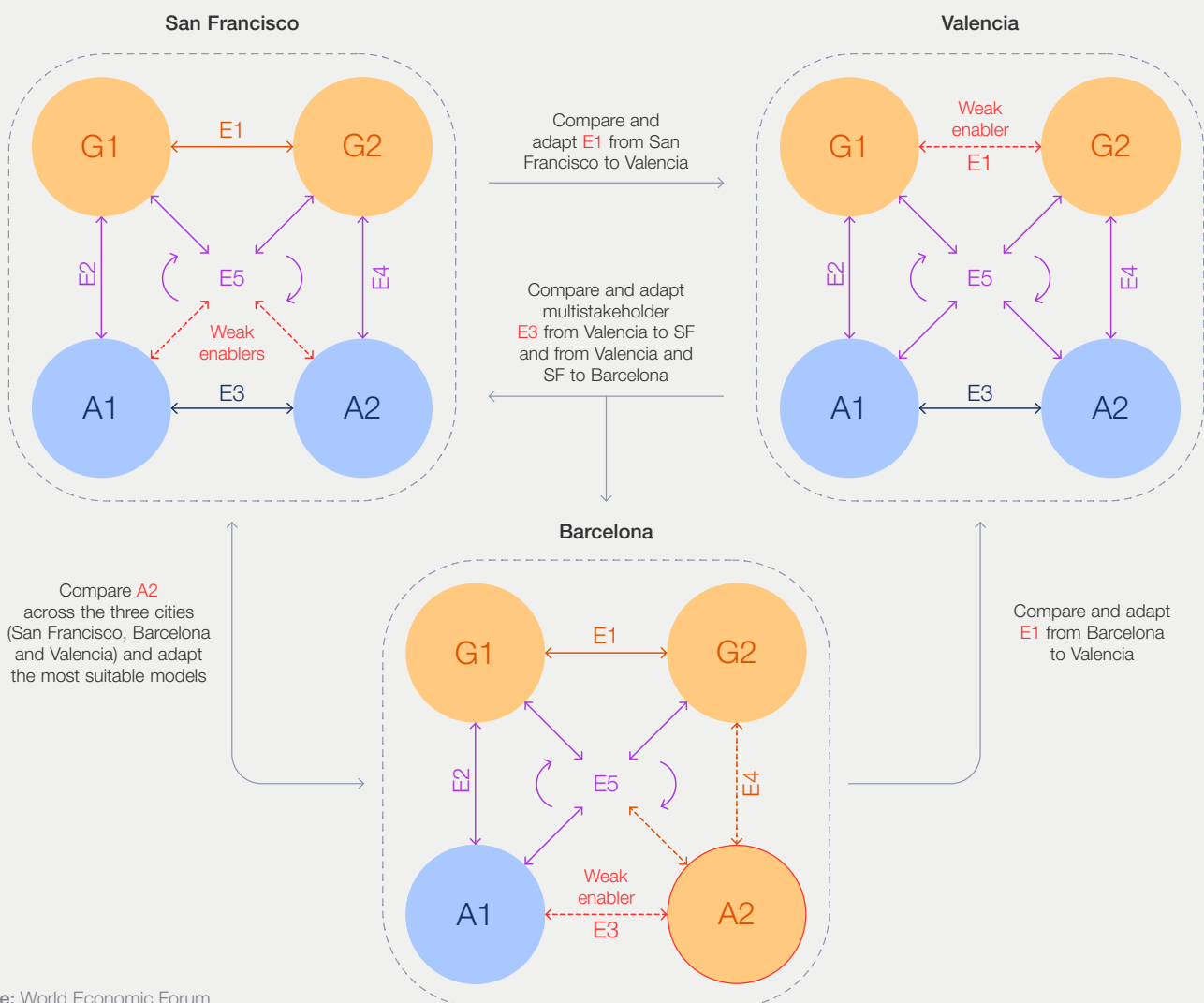
San Francisco demonstrates strong governance and regulatory enablers (E1), led by a proactive public utility and supportive policy mandates. However, its investor ecosystem remains relatively informal and not well connected to the broader multistakeholder community (E5), limiting the scaling of early-stage innovation. Valencia, by contrast, has a vibrant aquapreneurial ecosystem, driven by players such as GoHub and Idrica, but suffers from governance fragmentation and weak policy alignment (E1). Barcelona sits between the two, with solid foundational governance but ongoing challenges in scaling entrepreneurship (A2) and strengthening trans-level enablers (E4) that connect innovators with public institutions.

By comparing these cities, Water-BOOST reveals several opportunities for strategic adaptation: Valencia could draw from San Francisco's and Barcelona's governance enablers (E1) to improve alignment between utilities and regulators; San Francisco and Barcelona could learn from Valencia's aquapreneurship infrastructure (E3) to strengthen its investor pathways; and Barcelona could benchmark A2 mechanisms across both peers to refine its support for early-stage start-ups.

These examples underscore a core insight: cities don't need to replicate each other's systems, they can adapt what works, tailored to their structure, capacity and institutional logic. Water-BOOST makes these insights tangible by focusing not just on what exists but how ecosystems interact, where the connections are weak and how they can be rewired for better system performance.

As the Water-BOOST dataset grows, this functionality can be extended to regional clustering, typology-based benchmarking and strategy design tailored to city archetypes – not just individual locations. Cross-city learning, then, becomes not an exception but a tool for navigating shared complexity.

FIGURE 17 **Water-BOOST cross-city comparison and adaptation between San Francisco, Valencia and Barcelona cities**



4.3 Scaling and future directions

Water-BOOST was intentionally designed as a flexible, systems-based framework, piloted across six global cities to demonstrate its versatility in diverse geographies and institutional settings. Its core value lies in providing a structured approach to assess and strengthen water innovation ecosystems, making it equally applicable to industrial zones, rural communities, peri-urban regions and catchment-scale governance.

To move beyond benchmarking, an interactive Water-BOOST prototype has been developed through a research initiative at Imperial College London. Designed as a decision-support tool, the platform enables users to visualize stakeholder networks, assess enabling conditions and explore contextual data for strategic planning. It also integrates socioeconomic indicators – including GDP per capita, Human Development Index (HDI), Gini index (a World Bank measure of income inequality) and access to safely managed drinking water – helping users position cities within a broader global landscape. These features enhance transferability, making it easier to identify comparable contexts and adapt relevant solutions. A preview of this early-stage prototype is included in this report's Appendix, where interested readers will also find guidance on how to explore the platform further.

The initial prototype marks a first step towards transforming Water-BOOST into a scalable, digitally enabled platform. By full development, it aims to support governments, funders and innovators in designing more coherent, inclusive and innovation-ready water systems – bridging the gap between ecosystem understanding and strategic action.

Further enhancements under consideration include:

- **Expanding application to underrepresented cities:** Extending fieldwork to contexts such as São Paulo, Montevideo, Nairobi, Sydney and Kigali to broaden the evidence base and strengthen global relevance
- **User-driven data input:** Enabling cities and water stakeholders to self-assess and contribute to a growing global database
- **Lightweight post-processing and AI integration:** Automating aspects of analysis to improve scalability while maintaining rigour

- **Embedded technology guidance:** Already prototyped in Imperial's platform, linking system gaps to curated innovation typologies and real-world aquapreneurs
- **Participatory refinement:** Through workshops, scenario planning and validation sessions to test clarity, stress-test assumptions and align design with operational needs

The framework is relevant at multiple levels of governance:

- **Global:** Supporting alignment with international initiatives such as the United Nations Water Action Agenda and Sustainable Development Goal (SDG) 6 by enabling consistent innovation-mapping and comparative analysis
- **National:** Informing regulatory reform, investment priorities and innovation policies aimed at strengthening water resilience
- **Regional (e.g. watershed or basin level):** Enhancing upstream–downstream coordination and cross-jurisdictional planning – in line with initiatives such as Water Futures⁴⁴ third pathway on basin-level partnerships⁴⁵
- **Local and community:** Empowering cities, utilities and user groups to co-design water innovation pathways tailored to local needs and capacities

Its intended users include decision-makers at multiple levels – from city planners, regulators and utilities to entrepreneurs and investors. Milestones such as the Forum's Urban Transformation Summits 2025 and 2026 and the UN Water Conferences in 2026 and 2028 offer critical testbeds to apply and refine Water-BOOST, turning its insights into concrete strategies that can shape the global water innovation agenda.

4.4 What Water-BOOST teaches

Water-BOOST's cross-city analysis reveals three emerging lessons about what enables (or constrains) water innovation in urban settings:

1. Innovation cannot scale without an interconnected ecosystem

Even the most ambitious ideas stall when key stakeholders are missing or disconnected. It is not enough to have strong utilities, forward-looking regulators or vibrant start-ups on their own. Innovation ecosystems become functional only when all essential actors are present and linked through enabling mechanisms.

2. Innovation ecosystems depend not just on who is involved but on how they work together

The most catalytic enabling mechanisms were often those that improved relationships between actors – from targeted innovation funding to regulatory flexibility or shared platforms for piloting. These relationship enablers lower risk, build trust and enable scaling. Cities must pay as much attention to the quality of these connections as they do to the presence of stakeholder groups.

3. Cities can, and should, learn from one another

Enabling environments differ, but they are not incomparable. Cities do not need to replicate each other's systems – they can adapt what works.

Strategic comparison allows decision-makers to identify transferable enablers and tailor them to local needs, capacities and governance structures.

These reflections reinforce a core principle: **innovation thrives when systems align.**

Water-BOOST helps make that alignment visible and shows how it can be strengthened through shared learning and targeted action.

Key learnings from six cities:

- **Governance gaps are systemic.** Even where policy ambition is high, procurement and regulatory frameworks often lag behind innovation.
- **Finance pathways are fragile.** Limited pilot funding and risk-averse utilities make it difficult for entrepreneurs to demonstrate impact at scale.
- **Ecosystem fragmentation persists.** Stakeholders operate in silos, slowing alignment and cross-sector collaboration.
- **Context matters.** What works in Barcelona may not work in Accra without adaptation, but structured comparison reveals transferable mechanisms.

↓ Image credit:
Paani Earth Foundation



Conclusion:

Aligning systems to accelerate innovation

Water-BOOST turns institutional complexity into strategy, helping cities build innovation-ready systems.

Water-BOOST is more than a toolkit, it is a **call to action**. As global water challenges intensify, cities must move beyond isolated pilots and embrace systems-wide strategies that connect stakeholders, align incentives and enable innovation to scale.

By analysing six diverse cities, Water-BOOST shows that enabling environments for water innovation depend not only on the presence of key actors but on the quality of their relationships and the mechanisms that connect them. The findings highlight the role of enablers – policies, platforms and financing models – in fostering collaboration and scaling solutions, while also demonstrating that cities need not work in isolation; strategic comparison and adaptation can unlock insights that accelerate progress across contexts.

The findings presented in this report highlight the importance of connecting enablers: the policies, platforms and financing models that allow institutions to collaborate, test and adopt new solutions. They also show that cities do not need to work in isolation; strategic comparison and adaptation can unlock insights that accelerate progress across contexts.

Water-BOOST provides a practical framework to map these dynamics, identify gaps and strengthen innovation ecosystems. Its systems-based design

supports application across local, regional and national levels, offering value to city leaders, funders, utilities and policy-makers alike.

The opportunity now is to embed this thinking in practice: using the framework to guide planning, inform investment and enable more coherent innovation pathways. With continued piloting, iteration and institutional support, Water-BOOST can help translate scattered ambition into coordinated action. Equally, by positioning structured cross-city learning within global platforms such as UN Water or C40,⁴⁶ the framework can influence policy dialogues and create new loops between local practice and international ambition.

The message is clear: **cities must design not only for water innovation but also for the systems that enable it to succeed.**

Water-BOOST helps make this possible, turning institutional complexity into strategic clarity, and transforming fragmented enabling environments into connected platforms for long-term impact. Already informing global platforms such as Water Futures and the UpLink Aquapreneur Innovation Initiative, it highlights a simple truth: collective action is essential, but acceleration is now urgent – and tools like Water-BOOST can help make it happen.

Appendix

TABLE A1 Water-BOOST stakeholder groups' presence across the six case-study cities, scored on a 1–5 scale

Stakeholder category	San Francisco		Valencia		Singapore		Accra		Barcelona		Bengaluru	
G1: Public utilities and private concessionaires	Very strong	5	Very strong	5	Very strong	5	Moderate	3	Strong	4	Moderate	3
G2: Policy-makers and regulators	Strong	4	Limited	2	Very strong	5	Moderate	3	Very strong	5	Limited	2
A1: Innovators and entrepreneurs	Very strong	5	Strong	4	Very strong	5	Limited	1	Strong	4	Strong	4
A2: Investors and accelerators	Strong	4	Moderate	3	Strong	4	Absent	0	Moderate	3	Limited	2
S1: Academia and research	Very strong	5	Very strong	5	Very strong	5	Strong	4	Very strong	5	Strong	4
S2: Civil society	Moderate	3	Moderate	3	Moderate	3	Very strong	5	Moderate	3	Very strong	5

TABLE A2 Water-BOOST enabler presence and effectiveness across the six case-study cities, scored on a 1–5 scale

Enabler category	San Francisco		Valencia		Singapore		Accra		Barcelona		Bengaluru	
E1: Governance enablers	Very strong	5	Limited	2	Very strong	5	Moderate	3	Very strong	5	Limited	2
E2: Trans-level individual enablers (from governance to aquapreneurship)	Strong	4	Very strong	5	Very strong	5	Moderate	3	Very strong	5	Moderate	3
E3: Aquapreneurship enablers	Strong	4	Strong	4	Moderate	3	Absent	1	Limited	2	Limited	2
E4: Trans-level individual enablers (from aquapreneurship to governance)	Limited	2	Moderate	3	Moderate	3	Absent	1	Moderate	3	Limited	2
E5: Multistakeholder enablers	Very strong	5	Strong	4	Strong	4	Moderate	3	Strong	4	Moderate	3
SE1: Capacity-building and knowledge transfer	Strong	4	Moderate	3	Strong	4	Very strong	5	Strong	4	Strong	4
SE2: Academic and research support	Very strong	5	Very strong	5	Very strong	5	Very strong	5	Very strong	5	Very strong	5
SE3: Civil-society engagement	Strong	4	Moderate	3	Very strong	5	Very strong	5	Moderate	3	Very strong	5

Source: World Economic Forum

FIGURE A1 | Water-BOOST web-based prototyped platform preview. Developed for the four initial cities and including socioeconomic indicators such as GDP per capita, HDI, Gini index and access to safely managed drinking water

IMPERIAL

Water-BOOST

Bridging Opportunities and Optimising Support Toolkit for Water Innovation

Toolkit Introduction

The following analysis is generated by the Water-BOOST toolkit, designed to support and scale water innovation through a two-stage process:

Stage 1 – Building the Minimal Viable System (MVS): This stage assesses whether all key stakeholder groups (such as utilities, policy-makers, innovators, and investors) and the enablers that connect them are present in a given ecosystem. These enablers include both individual mechanisms (between specific actors) and multi-stakeholder ones (supporting system-wide collaboration). Together, these elements form the foundational conditions for a functional water innovation ecosystem — or what we refer to as the Minimal Viable System (MVS).

Stage 2 – Tailored Technology Guidance: Once the MVS is established, the user is guided through a series of questions to determine the most suitable technology solutions, based on the specific characteristics, challenges, and priorities of each city.

Please select one of the following cities for your study:

San Francisco

Accra

Singapore

Valencia

Any Other City

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Water-BOOST tool concept and methodology developed by Dr Pepe Puchol-Salort, Braulio Eduardo Morera, Prof Ana Mijic, and Prof Michael Templeton.

Web-platform implementation by Ashley Yu and Eddie Khan.

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IMPERIAL

Intra-level Aquapreneurship enablers

Accra

- Incentivising employee innovation and creativity

Singapore

- Support from academic programmes (e.g., NUS Hydropreneur Programme) providing funding and visibility through awards
- Long-term investment in knowledge infrastructure and translation of research into application

San Francisco

- Non-dilutive pilot funding
- Start-ups/innovators to improve storytelling and marketing capabilities to attract more attention and resources
- Have international presence (e.g., Asia, India) to understand market dynamics and provide tailored support to startups

Valencia

- Investment fund for technology startups (GoHub) as a complement to promote technology transfer
- Valencia's innovation actors (e.g., GoHub, Idrica) operate autonomously within a connected ecosystem, enabling flexible startup scaling and decentralised experimentation
- Decentralised innovation governance allows regional actors like GoHub and Clean Connect VLC to independently scale startups without centralised control
- Entrepreneurial ecosystem prioritises open innovation and rapid iteration, attracting both domestic and international innovators

Accra

GDP per capita	Moderate
HDI	Moderate
Gini Index	Low
Access to safely managed drinking water	High

Singapore

GDP per capita	High
HDI	High
Gini Index	Moderate
Access to safely managed drinking water	High

San Francisco

GDP per capita	High
HDI	High
Gini Index	Low
Access to safely managed drinking water	High

Valencia

GDP per capita	Moderate to High
HDI	High
Gini Index	Moderate
Access to safely managed drinking water	High

Guidance Criteria

	Low	Moderate	High
Gross Domestic Product (GDP) per capita ¹	< \$2,500	\$2,500 - \$30,000	> \$30,000
The Human Development Index (HDI) ²	< 0.550	0.550 - 0.700	> 0.700
Gini Index (equality) ³	> 0.4	0.3 - 0.4	< 0.3
Access to safely managed drinking water ⁴	< 50%	50% - 90%	> 90%

Source: Web-platform developed by Ashley Yu and Eddie Khan (2025).

Note: This is a prototype preview of the Water-BOOST digital platform developed at Imperial College London. The platform is not yet publicly available. For further information or collaboration enquiries, please contact **Pepe Puchol-Salort** (jp1218@ic.ac.uk).

Water-BOOST: Enabling Innovation for Future-Ready Cities 43

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Endnotes

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