Advancing Urban Water Resilience

A Water as Leverage Guidance for transformative and inclusive project development

Water as Leverage Academy

Water as Leverage For Resilient Cities

Cartagena Coastline

Water as Leverage Guidance

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Foreword

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Water Envoy for the Kingdom of the Netherlands

Following the UN Water Conference, the Water Action Agenda is gaining momentum. Across the globe, farmers, mayors, ministers, community groups, businesses, and many others are working towards achieving water security. Our commitment to scaling up Water as Leverage globally for urban climate resilience is also in full motion. As the Dutch government, we submitted this initiative to the Water Action Agenda, alongside our global partners, who have pledged to take Water as Leverage to the next level and drive its upscaling.

This Water as Leverage guidance is a crucial component of our joint upscaling efforts. With this guidance, you can explore how to use water as a lever to enhance your city's livability and climate resilience.

This guidance was developed through the collaboration of professionals from universities, research institutes, governments, and civil society. It was a real-world exercise, with architects, urban planners, sociologists, community leaders, and engineers working together in cities across the globe. The guidance is built around eight Water as Leverage principles and six steps, which together form an inclusive, innovative, and integrated approach to climate adaptation project development. This approach has resulted in tangible and impactful outcomes driven by local champions worldwide.

We are happy that our partners to upscale Water as Leverage, such as UN-HABITAT and the Coalition for Disaster Resilient Infrastructure, already are incorporating this approach in their work. We are collaborating with countries to enhance their planning processes using the WaL approach, such as with the National Mission Clean Ganga in India. Here, we are integrating the eight WaL principles into the Urban River Management Plan exercises, which will be applied in numerous cities across the country.

Part I: Introduction to WaL

WaL Terminology

WaL programme:
The WaL programme was launched in 2017 by the Dutch government and global partners. The programme is still being shaped today.

WaL initiatives:
WaL initiatives are undertaken in cities, following the WaL approach to develop and deliver projects through different stages of project development. Examples of WaL initiatives are WaL for Resilient Cities Asia, WaL Cartagena and WaL Nakuru.

WaL projects:
WaL projects result from WaL initiatives, starting as project proposals, evolving into detailed plans that are eventually implemented as interventions in cities, that are being operated and maintained.

WaL approach:
The WaL approach is the process approach to develop transformative and inclusive projects, that has been applied and developed in WaL initiatives. In this guidance the WaL approach is summarised in the WaL framework.

WaL framework:
The WaL framework is a summary of the WaL approach. It includes eight core principles and a six-stage project development process that are described in this guidance.

Making cities water, climate resilient...

Water: too little, too much, too dirty

Water is life. Without it, we cannot sustain ourselves, nor can the ecosystems we rely on. When properly managed, water is a source of peace and prosperity—the lifeblood of agriculture and a socioeconomic driver for billions of people (UN, 2021). Water can bring us together to do better; it holds a special place across cultures.

Water is essential. Yet, globally, we are experiencing multiple water-related crises. Climate change is exacerbating floods and droughts. Roughly half of the world's population faces severe water scarcity for at least part of the year (IPCC, 2023). Water is often too polluted, spreading disease and damaging delicate ecosystems.

In the period between 2000 and 2019, floods and droughts accounted for over 75% of all natural hazard disasters that affected people (CRED and UNDRR, 2020), causing loss of life and livelihoods, and damaging critical infrastructure and ecosystems. Climate change is projected to intensify these challenges, increasing the frequency and severity of extreme weather, while population growth will place more people under water stress (UNDRR, 2023).

Khulna Bangladesh river bank encroachment

Transformative action on water is a priority

While urgent action on water and climate is needed locally and globally, progress on achieving the Sustainable Development Goals by 2030 is significantly off track (UN, 2023). Adaptation planning, finance, and implementation are slowing down rather than speeding up (UNEP, 2023). Climate and resilience funds remain underused, while the adaptation finance needs of developing countries are estimated to be 10-18 times greater than international public finance flows (UNEP, 2023; GCA, 2024).

To ensure a sustainable future for all, we must fundamentally change how water is managed and valued in society. This involves moving beyond an incremental approach to dealing with water challenges and tackling the root causes of these challenges at a systemic level. Without transformative change, we will not be able to build resilient cities and meet global ambitions.

Cities are hotspots for opportunity

More than half of the world's population now lives in urban areas, placing cities at the forefront of water and climate challenges (World Bank, 2023). Since 1975, exposure to flooding in cities has grown 3.5 times more than in rural areas (UN Habitat, 2024). By 2040, more than 2,000 cities will be located in low elevated coastal zones under 5 metres above sea level, facing a profound threat from Sea-level rise (UN Habitat, 2024).

Despite these challenges, cities are "economic engines", generating over 80% of global GDP and driving inclusive, sustainable innovation through their concentration of people and resources (World Bank, 2023). Solutions, experimentation and innovation are emerging in cities and communities, contributing to climate adaptation and resilience (UN Habitat, 2024). Cities are the incubators for new ways of approaching water challenges and building resilience.

Water being trucked into and through the city during drought period, Chennai India

School boys cautiously navigate their way through a flooded road after the previous night's heavy rain in Semarang

Towards transformative and inclusive projects

We need urban water resilience projects that transform how we manage this precious resource. Too often and despite many efforts, projects fail, wasting time and resources. Projects fail because they do not accurately address the needs of local communities; they fail because funding does not become available, and the project exists only as an idea. Projects fail because they 'solve' one water challenge but exacerbate the next; they fail because they apply the same approaches that created our water problems in the first place. When executed wisely, projects can change the way we manage, operate, and value water—not just locally, but globally—by changing practices and mindsets, and deliver multiple benefits. We need innovative projects that are transformative and inclusive.

The Water as Leverage approach

The Water as Leverage (WaL) approach is a project development approach designed to create transformative and inclusive projects for enhancing urban water resilience. Rooted in the experiences and lessons learned from the WaL programme, which has been active since 2017, this approach addresses the complexity of urban water challenges with a comprehensive and integrative framework.

Central to the WaL approach are four key principles that distinguish its contribution to urban water resilience:

- Focus on the essential early stages of project development
- Acknowledge the interconnectedness of water
- Move beyond single projects towards transformative change
- Build on practical experiences

Focus on the essential early stages of project development

The foundation for transformative and inclusive projects is established in the initial stages of project development. Yet, while we recognise eagerness to fund and support projects once their feasibility is established, the 'pre-project' development stages generally receive insufficient attention and funding from governments and investors. The WaL approach draws attention to the early stages of project development, with the aim of leveraging investments for the implementation of transformative projects: "These are the millions we need to invest [in the early project development stages] to secure the billions for the projects that will really make a difference and prepare our society and planet for our challenging future" (*Henk Ovink in WaL Reflect p. 8)*.

Acknowledge the interconnectedness of water

When addressing water issues in isolation, projects fail to account for the interconnectedness of water systems. When working in silos, we can only address symptoms rather than making true and sustainable change. WaL adopts a systemic approach, recognising the complexities and interconnections in urban water contexts, and incorporating social, institutional, and cultural subsystems. This approach transcends treating the symptoms and addresses water-related challenges in a comprehensive manner, and often delivers multiple benefits.

Move beyond single projects towards transformative change

Individual project interventions may lead to incremental and local change, but often leave underlying systemic failures unaddressed. To achieve urban water resilience, and deal with the root causes of water challenges, it is essential to transition from single projects to coordinated systemic action. A diverse array of change agents are included to develop and invest in an enabling environment, integrating scalability and connecting social, economic, and institutional contexts to foster sustainable impact beyond individual projects.

Build on practical experiences

The WaL approach has been implemented in cities worldwide, spanning Latin America, Asia, Africa, and Europe, while being further enriched by Rebuild by Design's initiatives in North America. Together, these efforts are nurturing a growing community of WaL practitioners. Built on practical experience and local action, the approach emphasizes a culture of action, reflection, and continuous learning and improvement. By linking local action with global ambitions, the WaL approach inspires innovation and drives progress in advancing urban water resilience across diverse regions.

Global WaL journey

WaL Asia
Inspired by the Rebuild by Design competition held in New York in the aftermath of hurricane Sandy, Water as Leverage for Resilient Cities Asia (WaL Asia) was developed as the first initiative of the WaL programme by the Dutch government and global partners. Following a call to action on World Earth Day 2018, six multidisciplinary teams of international and local experts developed innovative solutions for three cities in Asia: Semarang (Indonesia), Khulna (Bangladesh), and Chennai (India). In May 2019, the teams submitted 24 project proposals, each tailored to address the specific resilience challenges of these cities. In Chennai, this culminated in the inauguration of a demonstration project in 2023.

New WaL initiatives
Since WaL Asia, new WaL initiatives have been developed in Cartagena (Colombia), the Wadden Sea (Denmark, Germany, Netherlands), Nakuru (Kenya), Prayagraj (India), and Bangkok (Thailand).

Scaling WaL
In 2023, during the UN Water Conference, former Minister Harbers of the Dutch Ministry of Infrastructure and Water Management, in collaboration with global partners, announced the commitment to “Scaling up Water as Leverage for worldwide urban climate resilience, through water” as part of the Water Action Agenda. The outlined path focuses on scaling and replicating WaL experiences through three key components: (1) The WaL Factory: Institutionalizing the WaL program, which has evolved into the WaL Multilevel Climate Action Programme. (2) The WaL Academy: Cultivating a vibrant WaL culture, enhancing capacities, and fostering innovation. (3) City-Level WaL Initiatives: Implementing targeted actions that collectively aim to improve the quality of life for millions of people.

About the guidance

Aim

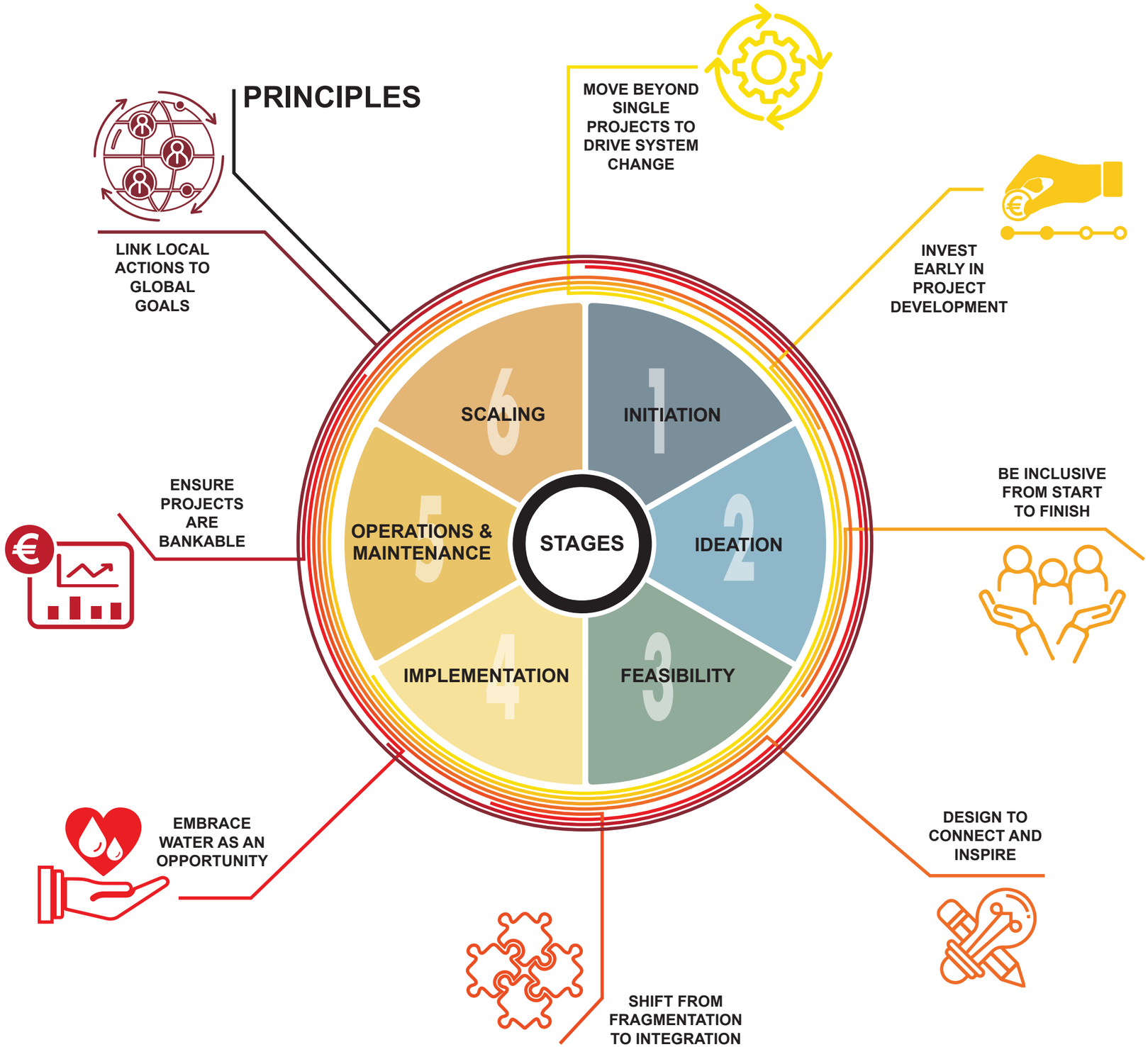
The WaL Guidance is designed to advance urban water resilience by supporting transformative and inclusive project development. It builds on and shares experiences from WaL, Rebuild by Design, and other relevant initiatives, along with practical advice for each stage of project development.

The WaL framework

This guidance translates the WaL approach, derived from experiences and lessons learned in previous and ongoing WaL initiatives, into the WaL framework. The framework consists of eight principles for advancing urban water resilience, which are applicable throughout the project cycle, as well as guidance for six stages in project development.

Explore the WaL library

If you are inspired by what you read in this guidance, and want to explore more, consult the WaL library in the Credits and References. The library features videos, key WaL documents, case studies, and more.



How to use the WaL Guidance?

1 Who is this guidance for?

This guidance provides insights for various actor groups that are pivotal for the success of urban water resilience projects.

Executive organisations

Executive organisations are (mostly public) entities, tasked to organize initiatives by managing people, contracts, money and deadlines. They can be responsible for an entire WaL initiative, or specific stages, handing the initiative over to executive organizations best equipped for a particular stage (such as a local public works department).

Contractors

Contractors are commissioned by the executive organisation to perfom the work required at different stages of project development, from analysis to developing project proposals and construction.

Change agents

Change agents form the enabling environment and include various actors, such as communities, governmental agencies, academics, and financial organisations at the local, national, and global levels.

2 Practise principles

- **Move beyond single projects to drive system change**
- **Invest early in project development**
- **Be inclusive from start to finish**
- **Design to connect and inspire**
- **Shift from fragmentation to integration**
- **Embrace water as an opportunity**
- **Ensure projects are bankable**
- **Link local actions to global goals**

3 Find your project stage

1. Initiation
2. Ideation
3. Feasibility
4. Implementation
5. Operations & Maintenance
6. Scaling

4 Keep learning

Continuous learning is crucial for improving performance. This guidance includes case studies to inspire and draw lessons from. Additionally, it features the WaL library, where you can access videos and documents produced throughout the various WaL initiative.

5 Get to work

However, we don't need to explain to professionals in this field that, despite efforts to bring guidance, the work is never easy. Using the WaL framework will undoubtedly present challenges. However, the worst thing we can do is not start, not innovate, or not try. Embrace the framework, adapt it to your mission, learn, innovate, improve, share, be creative, and most importantly, have fun.

WaL testimonials

In the following pages, we explore WaL through the testimonials from three key actors, from different contexts of the world. They offer valuable insights, sharing their lessons, experiences, and perspectives on the initiative's challenges and impact.

Elijah Hutchinson
Executive Organisation
New York City, USA

Kotchakorn Voraakhom
Contractor
Bangkok, Thailand

Wiwandari Handayani
Change Agent
Semarang, Indonesia

East Side Coastal Resiliency, project area 1 under construction, Spring 2024

Involved from beginning to end
- an executive organisations perspective

Elijah Hutchinson

Executive Director
Mayor's Office of Climate & Environmental Justice,
New York City, USA

"One of the most important things that you can do is the coalition building and giving people a vision so that they actually do want change."

Elijah Hutchinson has been involved in many of New York's design-led infrastructure programmes, including Rebuild by Design and the Lower Manhattan Coastal Resilience initiative, from an executive organisation's perspective. Currently, he leads the Mayor's Office of Climate & Environmental Justice in New York City—a new climate office that combines individual offices previously focused on sustainability, resilience, and adaptation. Reflecting on his experience with Low Manhattan Coastal Resilience project, he notes the challenges from having "all these different pots of funds and multiple design teams working across all those different neighbourhoods," and how they created an entirely new asset class with unclear jurisdiction, unclear ownership, and unclear means and methods of operating the infrastructure.

Emphasising the importance of having one unified framework, he recalls that if individual projects had to resolve their own issues with the agencies, that would have resulted in many small conversations while still having big problems. The initiative made it possible to bring together agencies and decision makers, and coordinate community engagement and messaging. The framework connected and represented all the separate projects. Hutchinson stresses that executive organisations must manage public expectations early in project development. He highlights the impact of attractive urban designs on public expectations, and the risk it poses to project implementation when there are gaps between designs and financial, technical and institutional constraints. With NYC's numerous agencies, it's crucial to clarify project ownership and responsibilities during initial development to inform designs.

Looking back at Rebuild by Design, Hutchinson mentions various learnings. "We now know that we need to adopt a multi-hazard approach and think about combined rainfall events, storm surges, sea level rise, and interior drainage," he says. "But, maybe more important is that the programme brought political recognition that this approach is something that we need." This resulted in alignment of projects and coalitions for funding and gave a mandate for new infrastructure developments, he explains.

"A crucial element is to connect to the people who are going to be impacted most by the projects and to recognise that these communities have already been organised on issues for so long. And keep in mind the time scales that we are providing solutions for: it is not only for long-term big infrastructure projects, but also to make a meaningful difference in the near future, such as better access to waterfront parks and urban heat mitigation, because that is what people really want to see," he says. "Once we have tangible improvements and proof of concepts [showing] that we can make a difference, it makes having that bigger conversation a lot easier because there is more credibility in the partnership."

Bangkok floods 2011

Change begins with people
- a contractor perspective

Kotchakorn Voraakhom

CEO and landscape architect, LANDPROCESS, Bangkok, Thailand

CEO, Porous City Network, Bangkok, Thailand

Co Founder Koungkuey Design Initiative, Bangkok, Thailand

“In the end it is about the people. We need to empower people with the right tools to advance urban water resilience.”

After the devastating floods in Bangkok in 2011, Thai landscape architect Kotchakorn Voraakhom decided to dedicate herself to making her home city water resilient. She is now actively involved in the WaL Academy Bangkok to raise awareness about the city’s precarious situation.

“People do not realise anymore that we built the city in the flood plains,” she says. “The water is coming from the sea, the river, and the rains. With dense urbanisation, the city cannot cope with all that water anymore.” A fundamental shift in mindset is needed in the approach to urban development and water resilience, Voraakhom says. “We need to create green cracks in the concrete jungle, making room for water, as a sponge, and making the city as porous as possible.”

Engineers, architects, urban planners, designers, and other built environment professionals need to change their focus from “ego to eco,” she explains. Most are trained with a human-centric approach to urbanism, which is challenging given the urgency of climate change. Nature-centric development needs to be prioritised.

To help drive the shift toward nature-centric development requires sustainable solutions from those already working in water sectors in all dimensions. “We need to create examples that people can experience, and that go beyond the business-as-usual technical solutions,” she says. “Show that it is possible to integrate natural and urban systems. Do not wait for policy changes that pave the road towards urban water resilience, take action and lead by example.”

There is, of course, no one-size-fits-all solution for urban resilience. All countries, regions and cities have their own path. According to Voraakhom, it is people who make the difference by adopting integrative and inclusive approaches and adapting them to the local context. “The cultural component of each society is as important as this WaL Guidance tool and process, which can be adapted in different places around the world,” she says.

Essentially, WaL is not just a set of stages and principles for building urban water resilience. It is about creating space and critical conversation for the people who use the WaL approach. Voraakhom emphasises that the human aspect is key to making our cities more water resilient: each person needs to play their role and simultaneously be open to others and the collective. “We need to have fun working together,” she says. “It creatively connects us when making resilient cities.”

WaL Semarang workshop, September 2018

Take an integrated approach from the start
- a change agent perspective

Wiwandari Handayani

Professor, Department of Uban and Regional Planning, Diponegoro University, Indonesia

Deputy Resilience Officer Semarang, Global Resilience Cities Network

Asian Cities Climate Change Resilience Network (ACCCRN)

Urban Resilience Expert Team Semarang, Government, Indonesia

“If you really want to make things happen in urban water resilience... a broad stakeholder environment is essential.”

Every day, Wiwandari Handayani works on improving urban water resilience and liveability in the city of Semarang, the capital of Central Java province in Indonesia. As a member of the expert group for Semarang, she played a critical role in shaping the city’s WaL initiative from an academic perspective. She also participated in one of the WaL design teams.

Handayani highlights numerous lessons learned from her experience with WaL and hopes these will inspire other cities to adopt inclusive and integrated approaches to urban water resilience.

While engineering solutions are important for tackling water challenges, it is essential to integrate socioecological aspects into urban resilience projects. “This is an absolute requirement for the impact that we want to make in the city,” she says. Additionally, an integrated approach helps to make complex multisectoral projects bankable.

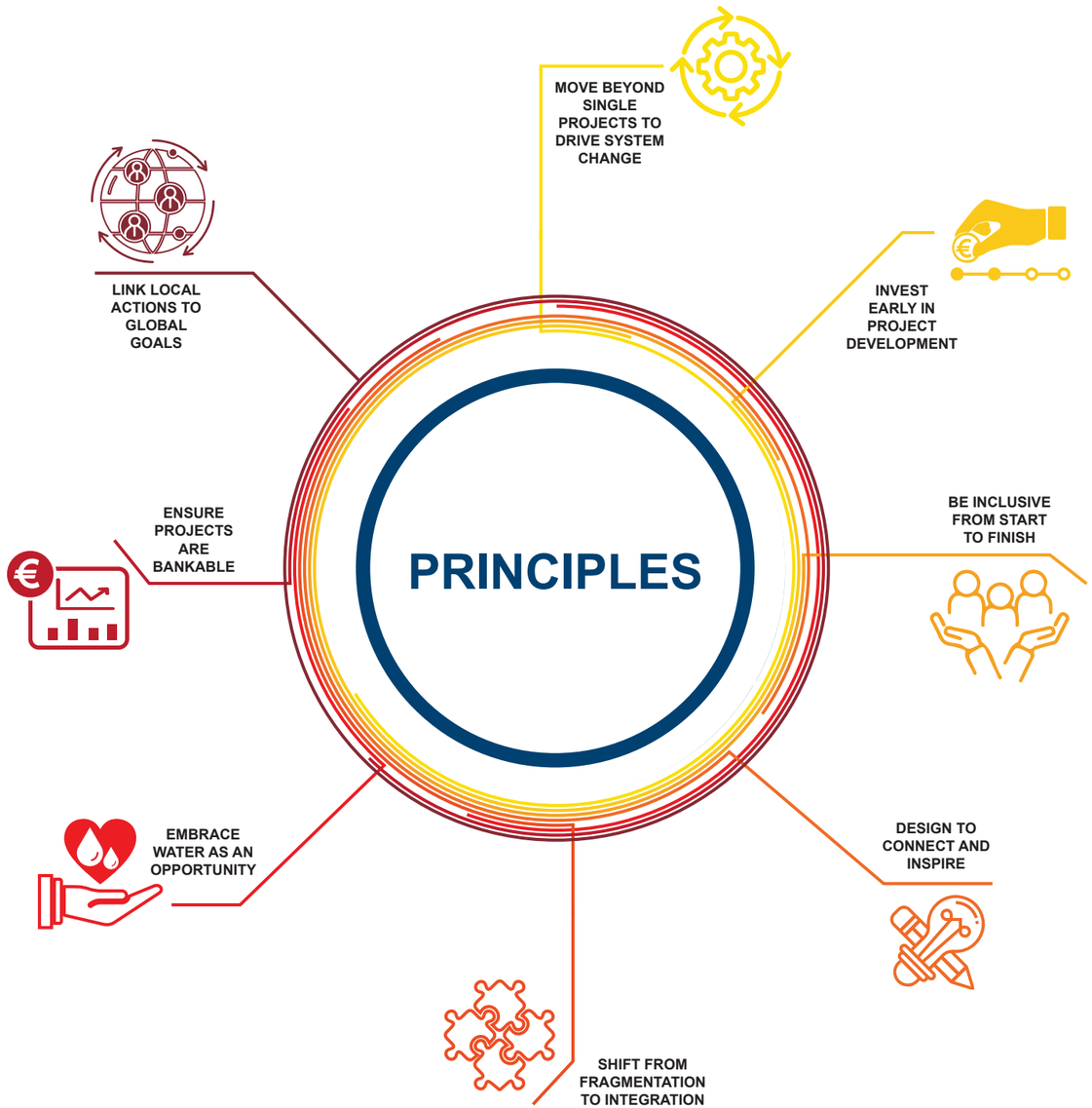
Since urban water resilience projects involve a wide variety of interests from local community groups, public organisations, academia, and private companies, it is critical to actively involve a broad range of stakeholders from the beginning to ensure that projects are implemented. Cross-level responsibilities between national, regional, and local government often make implementation even more complex.

Handayani emphasises that bringing private developers and financial institutions on board is essential because of the integrative character of the projects. This requires a new way of thinking. “Everybody was invited and involved from the beginning, which pays off at the implementation stage,” she says.

Involving a spectrum of stakeholders leads to broader acceptance of urban water resilience projects, which helps governmental decision makers, who often depend on broad public support for their decisions, to be in favour of the resilience initiatives.

Working in an integrative, inclusive, and interdisciplinary way can be challenging at times, but it is also exciting to co-create knowledge with the many people involved, notes Handayani.

Part II:
WaL Principles



Eight principles to advance urban water resilience

Building on the experiences of WaL initiatives, eight guiding principles have been identified to foster urban water resilience. These principles are applied throughout the initiatives to drive transformative, inclusive change.

A comprehensive approach

Urban water resilience requires a shift away from isolated projects toward addressing systemic issues (the first principle). Achieving this demands early stage investments in building partnerships, understanding the water system, and identifying challenges and opportunities before rushing to solutions (the second principle). Inclusivity is key; everyone must be engaged throughout the entire process (the third principle). Design serves as a powerful tool to link sectors, engage communities, and inspire future solutions (the fourth principle). An integrated view of the water system is essential, breaking down silos for a more integrated approach (the fifth principle). Water presents an opportunity to improve all aspects of life by leveraging the system's natural capacities (the sixth principle). Ensuring bankability of projects is critical to turning ideas into action (the seventh principle). Finally, local initiatives can inspire global change (the eighth principle).

All principles all the time

Each principle stands strong on its own, offering valuable lessons and insights. However, their real strength lies in their combined application. While none of the principles may be entirely new or groundbreaking individually, the collective application is essential to achieving our goals. It is still uncommon to see all eight principles applied together. Often, designs are developed without engaging financiers, or water systems are not considered in an integrated way without an inclusive strategy. For these principles to have the greatest impact, they need to be applied consistently at every stage of the project development process (as outlined in part 3).

An invitation for enrichment and development

The principles are rooted in the lessons learned from WaL, Rebuild by Design, and a wide array of sources, including scientific research, expert opinions, and reports. These insights are used to continuously evolve and sustain the principles. The principles are not considered as 'final'. The WaL framework, and these principles in particular, are an open invitation for ongoing exploration, enrichment and refinement, drawing on new research, reports, and both WaL and non-WaL experiences.

Move beyond single projects to drive system change

It is not about doing an individual project or solve an isolated problem, it is about changing the system and making it more resilient.

When we look at urban water resilience, the challenges are visible: the abundance or lack of water and its poor quality. These are the symptoms we can see above the water line. If we want to make real change however, we must move beyond these symptoms and address their root causes of the failures (Scharmer, 2009). Doing so requires major changes in the way we handle and manage water (UN, 2019). Transformative change goes beyond individual projects or incremental improvements to embrace a fundamental, system-wide reorganisation across technological, economic, and social dimensions. To enable urban water resilience, paradigms, goals, and values need to shift (IPBES, 2019). Such transformative change is needed to avoid repeating failures of the past.

Urban water projects have the power to inspire, but they do not automatically lead to transformative and systemic change. Two aspects are crucial for ensuring that new and better ways of managing water are institutionalised: moving beyond symptoms and scaling projects.

Moving beyond simply treating the symptoms of poor water management needs addressing the underlying causes (Van der Brugge et al., 2005). For example, bringing water from outside the city to combat droughts may solve direct water needs, but does not address the real problem of water scarcity. To facilitate transformative change three steps are needed (Scharmer, 2016): (1) understanding the system's current state by observing reality deeply and listening without judgement; (2) reflecting and connecting with deeper inner knowing, allowing new insights and possibilities to emerge, and; (3) prototyping solutions to create tangible change and implementing new ways of operating the system.

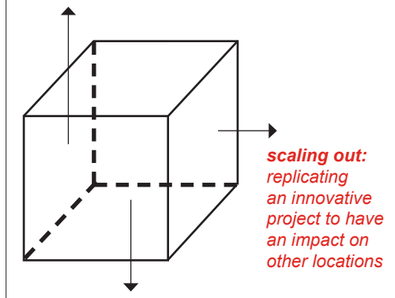
Moving beyond once-off project interventions involves replication as well as institutional and cultural changes and multilevel social learning (Pahl-Wostl et al., 2013). A combination of three scaling strategies can help drive transformative change (Moore et al., 2015). The first involves replicating an innovative project to have an impact on other locations. The second entails changes to policies and laws through partnerships and advocacy. The third focuses on shifting people's beliefs around water and how they value it (see stage 6).

"WaL helped to start a new way of thinking about water problems in Khulna. For the first time, we thought in an integrated way, not only looking at engineering, but also the human dimension, like how water storage can be included in urban development."

Professor Mustafa Saroar
Khulna University of Engineering & Technology, Bangladesh

Scaling strategies

Adapted from Moore et al. 2015



Moving beyond symptoms

- *Engage in deep listening and dialogue with an open mind and open heart. Suspend judgement to consider new ideas and perspectives.*
- *Apply systems thinking to understand the interconnectedness of different parts of the system. Step back to see the broader context and identify leverage points for change.*
- *Focus on underlying issues and systemic structures rather than just symptoms, including organisational cultures, policies, and social norms.*
- *Connect with a deeper purpose. Align actions and decisions with a larger vision or purpose that goes beyond individual interests.*
- *Encourage leadership that emerges from collective wisdom and collaboration rather than from hierarchical positions.*
- *Encourage continuous learning. Change is an ongoing process that requires continuous reflection, learning, and adaptation.*

"If we continue replicating the past without addressing systemic barriers, we will end up with a more vulnerable, less equitable and more fragile world than ever before."

Henk Ovink
Former Special Water Envoy, Kingdom of the Netherlands, in WaL Reflect

Water Balance Demonstration Project - Impact beyond school

The Water Balance Pilot at Little Flower Convent School for the Blind and Deaf (LFC) in Chennai, India, is the first demonstration project of the WaL for Resilient Cities Asia program under the City of 1000 Tanks guidance. Its impact extends beyond the school, raising awareness and building capacity through collaboration and engagement with stakeholders like KfW, Invest International and youth. Since its opening, the pilot has gained significant media attention, with lot of officials attending the event. It is a benchmark for sustainable water management and nature-based solutions. The pilot is used for capacity building. The team is working on replicating the concept throughout Chennai.

Inaugural tour by City of 1000 Tanks summer 2023

Invest early in project development

Investing in the early stages of project development is too often overlooked, while it is consistently needed for better initiatives and outcomes.

Allocating time and resources to thorough research, collaborative problem framing, coalition building, and co-creating designs lays the groundwork for integrated, inclusive, and sustainable project proposals. Making sure this happens is a challenge (Ferrer et al., 2021). While more climate financing is becoming available, there is often a lack of funding for the crucial early stages of project development.

Although it may seem easier to jump straight to technical solutions, like building a pump station, this approach can be short-sighted. To address complex challenges and inspire true innovation, it is critical to first engage with local contexts and communities and build coalitions. Projects that rush to offer 'solutions' without considering local realities run the risk of failing, leading to wasted investments. Early-stage collaboration involves building a shared knowledge base and understanding of the water system, framing the problem collectively, and strengthening local capacity. It is likely the most effective way to ensure project continuity, foster local expertise, and contribute to a supportive environment for the project's development and beyond (Laeni et al., 2020). Such a foundation is crucial for the project's success and the solutions that will emerge. From this point, truly innovative and transformative solutions can begin to take shape.

Much of the essential preparatory work occurs during the initiation and ideation stages of project development. Creating spaces for stakeholders to connect is critical during these stages. Workshops play a central role, providing a safe and inclusive environment where diverse groups—such as executive organisations, users, financiers, communities, and government organisations—can come together, interact, and collaborate. Special attention must be given to integrating key actors who are crucial for later stages, including those involved in feasibility, implementation, operations and maintenance, and scaling. By doing so, conditions for the later phases of the project are considered and addressed early on.

"(...) with a better collective understanding of the future, we can gain a better idea of how to fund innovations (…). These are the millions we need to invest to secure the billions for the projects that will really make a difference and prepare our society and planet for our challenging future."

Henk Ovink, Former Special Water Envoy Kingdom of the Netherlands, in WaL Reflect

Investing in the early stages

- *Don't start with solutions in mind and avoid copy-pasting solutions. Each context is unique; solutions need to be tailored accordingly.*
- *Listen and observe: engage with the different elements of the physical and social system with an open mind. Be curious, postpone judgment, and be compassionate about what you see, feel, and hear.*
- *Field trips are invaluable: they offer first-hand insights into the system's characteristics and help foster meaningful connections with stakeholders.*
- *Leverage diverse knowledge sources: integrate Indigenous knowledge, institutional expertise, and scientific research to create a holistic understanding of the system.*
- *Facilitate safe, productive dialogues: ensure safe spaces for dialogue among all relevant parties, but also establish a 'pressure cooker' atmosphere to maintain momentum and clear direction.*

"Normally, we define the solution, but in this case we only defined the challenge and asked the international water, climate and urban experts to come up with a direction."

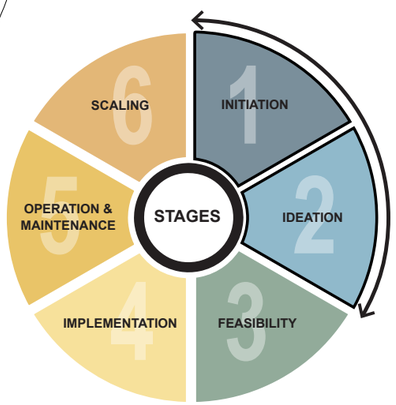
Robert Proos
Program Advisor Water as Leverage,
Netherland Enterprise Agency

Policy and finance workshops in WaL Cartagena

Policy and finance workshop Cartagena, September 2023

In WaL Cartagena, besides design workshops, policy and finance workshops are part of the ideation stage. The purpose is to match the design solutions with financial and policy structures. Most attendees in these workshops represent financial and government sectors, including international financial institutions. In the workshops, participants provide input on how their institution can help support the project or explain why some designs may be more difficult to implement. It is not only about matching the designs with funding or financing criteria but also invites the financial sector to consider what they could do differently to finance integral and inclusive projects.

Invest in Initiation and Ideation



Invest early in project development means investing in the stage 1 Initiation and stage 2 Ideation.

Be inclusive from start to finish

Urban water resilience can only be built through a process that is inclusive from start to finish.

Real transformation requires collaboration between many different organisations and individuals. Nobody can do it alone. Projects are more effective and sustainable when approached through inclusive practices that prioritise equity and justice (IPCC, 2022). Addressing water resilience effectively requires integrating a broad array of inputs and co-creating plans. Different parties contribute unique expertise and perspectives, including local indigenous knowledge, insights on financing possibilities, global water expertise, and more. Invest in people and recognise that everyone brings value to the table. Early engagement helps to clarify challenges and requirements and leads to success in later project stages.

Community groups, women, and youth need to be meaningfully involved and empowered, given their historical marginalisation and the disproportionate impacts climate change has on them (IPCC, 2022). Local community partners have often been treated as merely project beneficiaries, but co-ownership is essential for success.

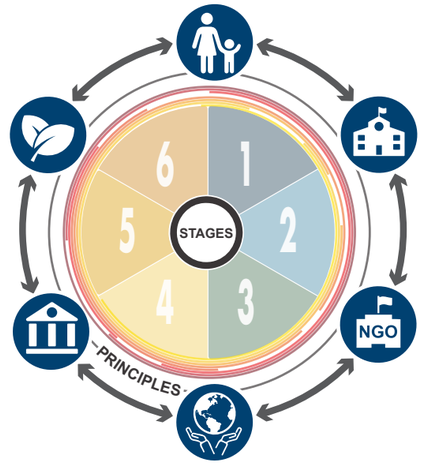
Including Indigenous knowledge helps to reduce the vulnerability of indigenous populations, create ownership, and inform sustainable project development. An inclusive approach involves real listening, valuing local knowledge, and not introducing predefined problems and plans.

Inclusion is about more than just engaging local communities (Janssen et al., 2023). An executive organisation can foster inclusion in the project by building inclusive coalitions and employing inclusive parameters for selecting contractors. For an executive organisation, inclusion also involves active presence, flexibility to adapt to changing circumstances, and trustworthiness as a partner. For their part, contractors can employ inclusive ways of working. The aim to be inclusive or even to "include all' is highly ambitious, inherently challenging, and often unrealistic. We will inevitably fall short of our own and others' expectations. When working in cities with millions of inhabitants, it is neither desirable nor possible to consult everybody and bring everybody to the table. Therefore, a careful strategy for shaping the inclusion process in the various project stages is essential. The impacts of this strategy should be continuously monitored, and the strategy adjusted as necessary.

"There are some communities and some areas of the city that benefit more from our actions, especially because they've been historically forgotten and neglected and we see Water as Leverage as a once in a lifetime opportunity to actually engage in these territories and bring benefits to them."

Julian Restrepo
Architect, TALLER Architects, Cartagena con Agua team in WaL Cartagena

Including all from stage 1 to stage 6



Including youth in Chennai

In Chennai, the City of1000 Tanks alliance has continuously engaged children and youth from vulnerable communities through ideation, training sessions, and arts and culture workshops to empower them to become water ambassadors.

(Ooze 2023/ City of 1000 tanks)

Young water ambassadors rally in their neighborhoods Chennai

Children express their ideas in art forms, Chennai

"I think in terms of consultation, particularly with the poorest sections of the society, the Water as Leverage project has been phenomenal."

Krishna Mohan, Chief Resilience Officer, Chennai Resilience Centre, Chennai, India

Creating a social inclusion strategy

- *Identify existing inclusion challenges and determine what inclusion means for each group.*
- *Pay attention to traditionally marginalised groups, including vulnerable communities, children, youth, and women.*
- *Specify actions that are tailored to each group's requirements for participation, including practical considerations such as travel arrangements and language accommodations.*
- *Facilitate empowerment opportunities and capacity strengthening activities.*
- *Include a monitoring system to track your inclusion parameters.*

Facilitating soft and safe spaces

When working with different stakeholders through an inclusive process, it is important to create soft spaces. These allow people to safely express their thoughts, experiences, and ideas outside of, but complementary to, formal governance structures (Allmendinger & Haughton, 2009). "Soft spaces allow participants to freely share ideas beyond their professional boundaries. They allow the sharing of ideas for creating new (bold or wild) solutions while also developing insights into the connecting of these ideas to formal planning processes. As such, soft spaces encourage the systematic understanding of the interconnectedness of the issues detached from existing problem framing." (WaL Reflect)

Design is the instrument to bridge sectors and people, fostering a comprehensive understanding of the water system and envisioning the possible and desirable future.

Design has strong boundary-spanning potential (Kempenaar et al., forthcoming; Nassauer, 2023). It can overcome fragmentation in project development and bridge silos by connecting communities and stakeholders and combining different knowledge sources (Kempenaar et al., 2016; Cross, 2006).

Taking a systems perspective, designers connect different aspects of the water system and visualise these. They engage in in-depth conversations with stakeholders, communities, experts and governmental representatives to incorporate different perspectives on the water challenges at hand. At a later stage, the research aspect of design shifts towards developing project proposals, which continue the iterative nature of the design process.

Design processes are inspired by research-by-design or research-analysis-design approaches where analysis and inquiry through design iterations provide insights and lead to follow-up questions. Design benefits from multidisciplinary teams, including designers (a.o. architects, urban designers, landscape architects), experts (engineers, scientists, ecologists, social scientists, and economists) and local stakeholders. In the collaborative design process, workshops take centre stage. In workshops, communities and stakeholders bring knowledge and expertise while ideating with the design teams and providing feedback.

Although increasingly constrained by choices, criteria, conditions, and decisions, design iterations throughout consecutive project stages safeguard the essential nature of the project proposal. New insights, constraints, and opportunities inform design iterations. Design teams need to balance openness with the imperative to move a project forward and define the project so that it can be calculated, costed, and constructed. This is not easy; a continuous iterative cycle may conflict with established linear ways of doing things. Experiences with multidisciplinary teams, however, indicate that iterative approaches generate better results and enable teams to manage progressive insights and adapt to new conditions.

“Holistic understanding of ecological, social, economic, cultural and political issues enables us to design projects that are part of larger natural and social cycles, integrating water, energy, and natural flows with human needs and urban development.”

Eva Pfannes
Ooze Architects & urbanists, team lead City of 1000 tanks team

Co-creation in design workshop in Cartagena

Design workshop Cartagena, July 2023

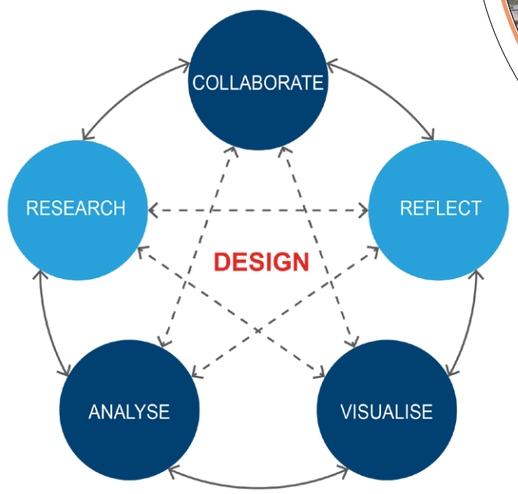
In the WaL initiative in Cartagena, Colombia, a series of local design workshops were organised. These workshops focused on co-creating design ideas with experts and local citizens. More than 150 people participated, including community leaders. The process created a mutual understanding of each other’s needs, challenges, and wishes for a resilient city.

Shaping a design process

- *Select multidisciplinary and cross-cultural design teams to benefit from diverse perspectives and design approaches.*
- *Employ multiple research-analysis-design iterations to understand all interrelated issues, challenges, opportunities, and possible solutions.*
- *Design workshops that create the space for collaborative design practice.*
- *Don’t ‘sell’ preconceived design ideas. Rather, develop them iteratively in collaboration with communities and stakeholders.*
- *When designing after the selection of a preferred design, safeguard design concepts and ideas beyond ideation towards implementation.*
- *Develop design implementation strategies that identify partners, timing, and funding potential.*

Iterative design process

Design thinking in water systems fosters collaboration by bringing together diverse stakeholders to research, analyse, and visualize complex challenges, while continuous reflection allows for adaptive, future-focused solutions.



“Through visualisation, you can make sure that everyone is talking about the same thing, it makes the discussion a lot sharper.”

Design expert
Design team Khulna as Water Inclusive Enclave, Bangladesh

Shift from fragmentation to integration

Water flows across sectors, levels, and scales, yet the siloed structure of our institutions leads to fragmented management approaches, calling for a shift towards integration and bridging these divides.

Although it is well-documented that isolated, short-term sector-focused actions often lead to maladaptation (IPCC, 2022), overcoming this sector-based and mono-disciplinary mindset remains a significant challenge (Meerow et al., 2016). Vested interests and deeply embedded institutional systems and responsibilities contribute to a lack of urgency in addressing this fragmentation, hindering the necessary boundary work.

To prevent maladaptation, an integrative systems perspective is essential—one that breaks down silos, spans boundaries, and leverages the interconnections between water and other aspects of life. A comprehensive, systemic view of urban water systems is crucial for addressing the complex challenges cities face (Hynes et al., 2020). This approach should be flexible, multisectoral, inclusive, and long-term, benefiting many sectors and systems (IPCC, 2022; Polaine et al., 2022).
In project development, this means acknowledging complexity, recognising interrelations, addressing multiple challenges, and producing co-benefits. This perspective integrates natural processes, human activities, governance, infrastructure, and socioeconomic factors, fostering innovation by uncovering novel connections and solutions.

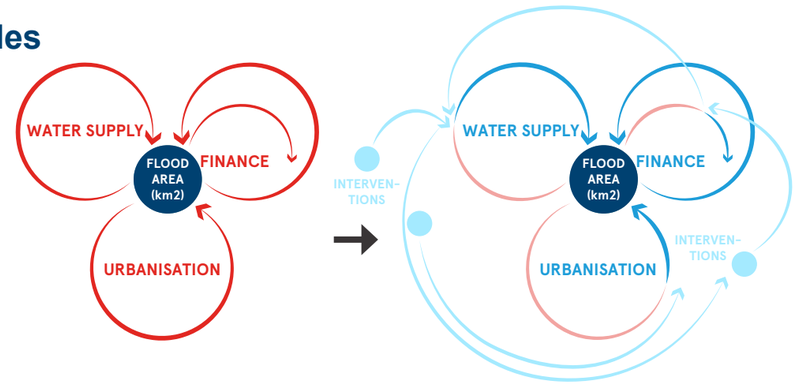
Boundary-spanning actions are necessary throughout the planning process to connect sectors, levels, scales, and disciplines (Van Meerkerk & Edelenbos, 2018). This is especially important when transitioning between the stages of project planning. Determining a project's scope requires stakeholders' commitment beyond their traditional jurisdictions. This often poses a challenge. Maintaining an integrated vision from the project proposal to the feasibility and implementation stages is critical, as implementers and financiers often struggle with handling integrative solutions.

"We know that water flows across different scales in administrations. But projects were always designed with either administrative or institutional constraints. The WaL approach really enabled us to think beyond scale."

Archana Ayyangar
Madras Terrace Architects, Chennai, India

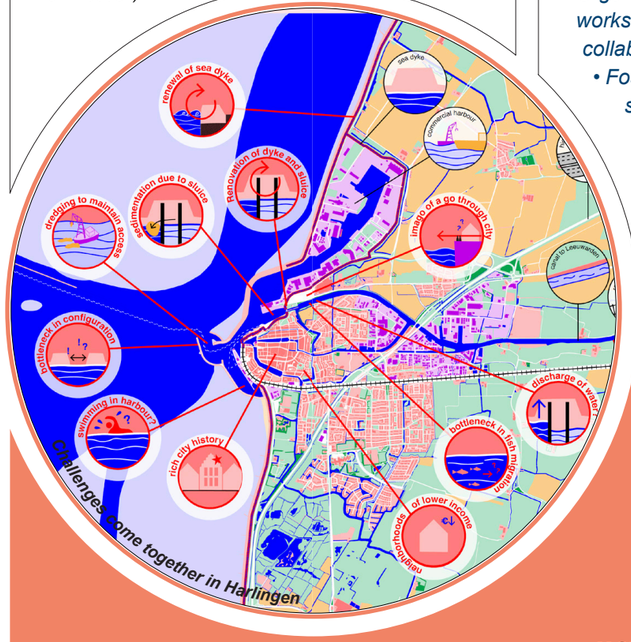
Breaking the cycles

Creatively interconnecting siloed water, urbanisation, and financing cycles opens up integrated opportunities and prospects for multiple benefits *(Adapted from Cascading Semarang phase 2 report).*



"Numerous challenges come together in the Wadden Sea. Tackling them one by one makes no sense. We will have to deal with them in an integrated way"

Karin Lochte, Chair of the Wadden, Sea Board 2018-2022 (Setting the Scene document, WaL Wadden)



Spanning boundaries

- *Work with boundary spanners, such as designers who apply inclusive and integrated design approaches and local ambassadors who foster local connections.*
- *Implement boundary structures and create multidisciplinary teams that integrate different disciplines and roles.*
- *Organise boundary spanning events, such as workshops, that bring together stakeholders and enable collaboration and promote shared understanding.*
- *Foster a boundary spanning culture where stakeholders are curious and open to other perspectives and people.*
- *Implement boundary spanning tools, such as (technical) approaches for modelling and data that enable the project to connect different aspects of the water system.*

Start-up WaL Harlingen, March 2024

Bringing together different challenges in Harlingen

In Harlingen, a port city in the Netherlands, numerous challenges and developments come together, including sea dike renewal, city development, dredging, biodiversity, and port development. Each circle reflects a different challenge. WaL Harlingen is unique in bringing together the different challenges instead of solving them one by one. *(Setting the Scene WaL Wadden, 2023)*

Embrace water as an opportunity

Water is not a 'problem'; it is a vital opportunity for life. When nurtured with care, it, in turn, sustains and cares for us.

Water plays a life-giving role in every facet of our lives. It is necessary for sustaining food production, safeguarding health, promoting equality, fostering biodiversity, and more. Water holds special meaning in many cultures and is a vital connector in all our societies. It intersects with all 17 United Nations Sustainable Development Goals (PBL, 2023). Water's universal role as a life force and connector means everybody can relate to it. This relationship creates opportunities for driving transformative change and harnessing solutions to ensure a more resilient future.

Acknowledging that water affects all aspects of life involves recognising and embracing its true value and myriad economic, environmental, social, and cultural benefits (HLPW, 2018). When water is taken for granted and not sustainably managed, it leads to resource depletion, ecosystem degradation, economic decline, and social instability. Current value systems, practices, and policies overlook the essential role of water (PBL, 2023). Determining the real value of water is difficult; there is a need to develop innovative means for valuing it (UN, 2021).

Embracing water as an opportunity means harnessing the inherent capacities of natural systems. This involves collaborating with water's abilities, respecting its natural cycles, and seeking mutually beneficial outcomes for people and the environment.

Nature-based solutions offer many ways to work with natural systems and manage water sustainably. Often they function best in combination with already existing and/or grey infrastructure. For example, healthy wetlands filter and purify water while acting as sponges, absorbing rainwater and reducing the risk of floods.

"As a program, Water as Leverage made sure that water was not looked upon as a problem issue, but looked upon as an opportunity. Something the city had not witnessed before."

Jayshree Vencatesan, Ecologist
Chennai, India (Ovink & Clifford, 2020)

The cultural value of water: Chennai temple tanks

Fenced off temple, in Mylapore neighborhood Chennai

Temple tanks as an ancient technology were not used to collect water for resuse, but to recharge the aquifer, to later be extracted through personal wells. These tanks served as a barometer of the city's underground resource, making its fluctuating level visible. Today this system has been forgotten as the city grows with modern infrastructure, leading to interrelated disasters of floods, droughts, and pollution. By this means of diverse tactics and green-blue strategies,the temple tanks will be restored to its original purpose as essential points of water recharge in the city.

(www.cityof1000tanks.org)

Valuing water

- *Recognise and embrace water's multiple values to different groups and interests in all water-related decisions.*
- *Reconcile values and build trust. Conduct all processes in ways that are equitable, transparent, and inclusive.*
- *Protect water sources, including watersheds, rivers, aquifers, ecosystems, and used water flows for current and future generations.*
- *Educate to empower. Promote education and awareness about the intrinsic value of water and its essential role in all aspects of life.*
- *Invest and innovate. Ensure adequate investments in institutions, infrastructure, information, and innovation to realise the benefits of water and reduce risks. (High-Level Panel on Water, 2018)*

The Karaneeswarar Temple tank, Chennai

Sustainable Development Goals related to water

Water is essential for life and critical for sustainable development. The circle shows how water impacts on all Sustainable Development Goals *(Adapted from PBL, 2023)*.

Strongly related
Related to water
Indirectly related

1. No poverty
2. Zero hunger
3. **Good health & well-being**
4. Quality education
5. Gender equality
6. **Clean water & sanitation**
7. Affordable & clean energy
8. Decent work & economic growth
9. Industry, innovation & infrastructure
10. Reduced inequalities
11. **Sustainable cities & communities**
12. Responsible consumption & production
13. **Climate action**
14. **Life below water**
15. **Life on land**
16. Peace, justice & strong institutions
17. Partnerships for the goals

"People here tend to think that water is actually their enemy rather than their friend."

Ismet Adipradana, Urban Planner, Semarang, Indonesia (Ovink & Clifford, 2020)

Ensure projects are bankable

Successful projects are 'bankable' projects: projects for which funds or finance can be secured. Without this, project proposals remain ideas on paper, never brought to life.

Connecting integrated and inclusive project proposals with funding (money provided to a project, such as grants or donations, as non-repayable resources) or financing (capital or borrowing money, which typically must be repaid) is a critical challenge. Urban water resilience projects generate substantial values by reducing damages, enhancing liveability, and fostering economic activity. However, some projects can also be seen as 'cost' projects when they are not directly linked to revenue sources to cover project costs.

Communicating and discussing designs with potential funders and financing partners from the start allows for iterating the project proposals to become bankable. These partners can be governments, international financial institutions or other. Identifying and maximising the multiple benefits of urban water resilience projects is a critical step (Kok et al., 2021). Clarity about projects beneficiaries is key to exploring potential benefits and co-benefits. Developing and mapping potential revenue generating activities can trigger financiers' interest in the project.

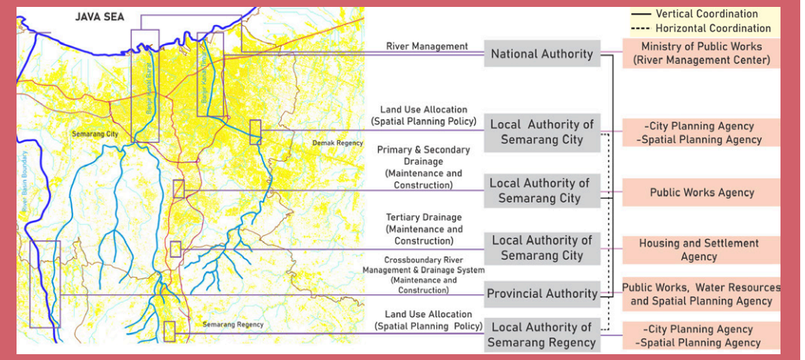
Projects with multiple benefits usually build on multiple funding and financing streams. For example, private sector financiers focus on project elements with a potential return profile and have limited or no possibilities to financing 'cost-only' elements (Pauw et al., 2022). Finding and aligning multiple sources require creativity and adaptability in designing and structuring a project, leading to context-specific and innovative mechanisms, including for example issuing green bonds, public-private partnerships, and blended finance approach. It can be a challenge to maintain the comprehensive nature of project designs while depending on multiple funders and financiers, each interested in covering only specific project components. Doing so requires a balance between designing a project with multiple benefits and managing the complexity of funding and financing.

"We try to involve all of the stakeholders possible because we know that those projects are not easy to implement. Also, the local and the national government, the banks, well, everybody needs to be part of the process."

Luis Villadiego Cárcamo, Former Secretary of District Infrastructure
Mayor's Office of Cartagena de Indias, Colombia

Urban flood protection in Semarang

Following the WaL for Resilient Cities Asia program, Semarang, Indonesia is advancing urban flood resilience interventions. While the economic benefits are evident, financing remains a challenge due to varying ownership of stormwater assets like canals. Aligning local, regional, national, and international funding options and solving the "financial puzzle" is crucial to achieving an integrated stormwater management solutions.



Roles and Responsibilities related to Watershed Management: Case of Semarang

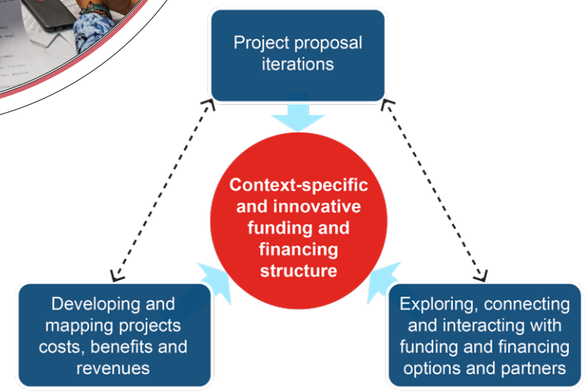
"There is tension between integral, inclusive and innovative projects and implementability. Ensure early engagement of critical stakeholders while keeping an eye on governance arrangements."

Corrado Minardi
Investment Manager, Invest International

Developing bankable projects

- *Include the financing aspect from the start exploring benefits, beneficiaries, funders, and funding sources.*
- *Use valuation tools to assess impacts in ecosystem services and social well-being.*
- *Identify revenue and funding potential.*
- *Engage with funders and financiers from the start to understand requirements, needs, and concerns.*
- *Manage expectations throughout all project stages.*

Collaboration is key



Bankable projects are developed through the interplay between understanding multiple benefits of the project, working and creating design iterations with financiers.

Effective water initiatives recognize the multilevel interdependencies and opportunities, ensuring optimal coordination across all levels.

Locally, cities and communities face disruptive consequences of changing global water patterns like droughts and floods, which require place-specific solutions and adaptation. Globally, the world has identified seventeen Sustainable Development Goals (SDGs), while the changing and unstable global hydrological cycle directly affects local water patterns and availability (GCEW, 2024). Water governance spans multiple levels and sectors. Coordination across and coherence among policy framework across sectors and governance structures are one of the key enablers for sustainable urban water resilience (UN Water, 2019).

Administrative and institutional boundaries, reflecting different levels of governance provide the context in which water projects are being developed. To pursue effective coordination, these issues of scale need to be addressed (Gupta et al., 2013). This includes: understanding of how different levels of government are organised; recognising interplay and synergies among organisations in charge, and; ongoing forms of collaboration. Significant progress in projects results from actions that recognise the efforts of actors and networks at all levels and can serve as a catalyst to enhance coherence between them.

Multilevel coordination is a two-way interaction process. Connecting local to national and global actions supports knowledge exchange and thereby spurs innovations. National frameworks such as National Urban Policies (NUPs), Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAPs) and global frameworks like the Sendai Framework for Disasters Risk Reduction, the Paris Agreement, the New Urban Agenda and the Sustainable Development Goals (SDGs) can support water action locally. Concrete actions at local level can inform global discussions, national strategies and policies. Connecting local innovations and priorities with the national and global frameworks to water change can advance shared local and global water goals and support the scaling of successful local models, increasing their resonance and impact.

"The territory is not given but emerges as the appropriate scale that you can redesign or reimagine as needed for your project. That creates a number of challenges, but at least you will ask the right questions, which is a big part of getting the right answers."

Xavier Le Flaive, Principal Administrator
Organisation for Economic Co-operation and Development (OECD)

UN 2023 Water Conference

The March 2023's conference convened by the UN General Assembly, led to the Water Action Agenda, accelerating progress on the Water Action Decade (2018-2028) and the 2030 Agenda. A key commitment was 'Scaling-up Water as Leverage Globally for worldwide urban climate resilience'. The conference united the WaL Network—cities like Cartagena, Chennai, and New York, with international institutions, governments, researchers, and designers to network and learn.

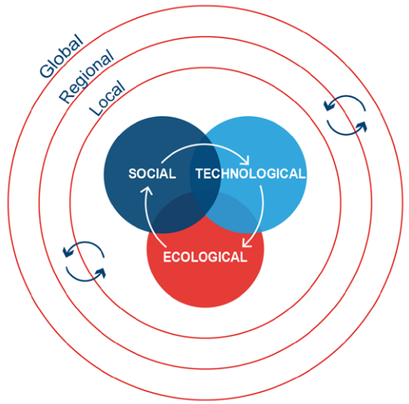
Cities, Design and Water Innovation lab, New York Water Week, March 2023

Facilitating local-to-global connections

- *Foster cross-level and cross-sector coalitions by engaging stakeholders at all levels from the earliest stages of project development.*
- *Clarify rules, mandates, and roles for all levels and sectors, ensuring accountability and transparency.*
- *Clarify hierarchy to enhance coordination and streamline collaboration.*
- *Create coordinating bodies and mechanisms where representatives from various levels and sectors can meet regularly to align actions and strategies.*
- *Strengthen connections beyond the local and national levels by actively engaging with global partners and networks.*

Linking actions across scales

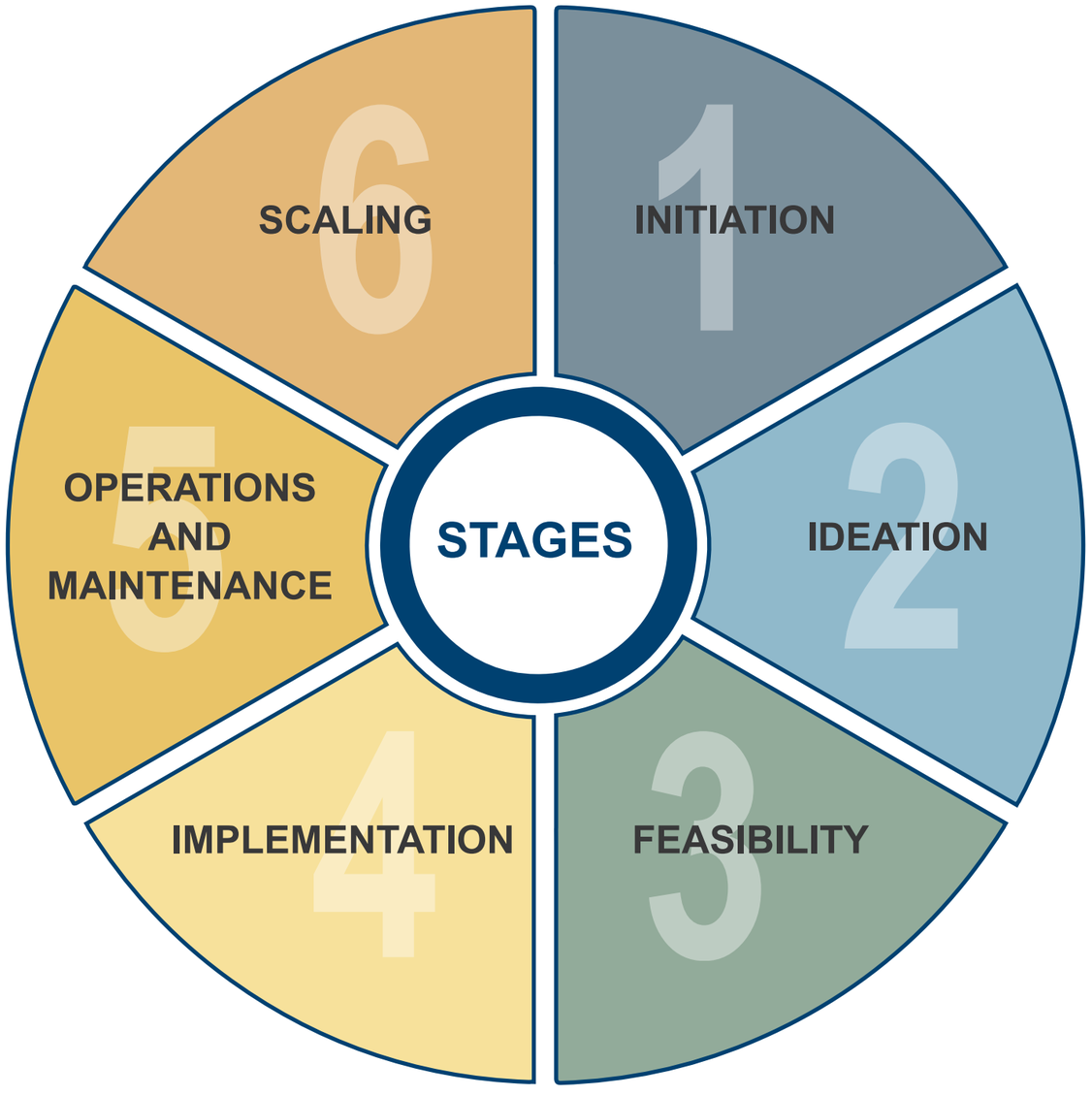
Coordination happens vertically between local, regional, national and global, and horizontally between sectors such as environment, planning, industry and others. A balance between different levels and dynamics can enable innovation and experimentation locally to result in systemic transformations *(Adapted from Krueger et al., 2022)*.



"WaL is a generic approach that must be tailored to specific contexts. I am privileged to work with local ambassadors whose passion, commitment, and deep connection to communities are the keys to WaL's success. The same drive is evident within the expanding global WaL community"

Sandra Schoof, WaL programme manager at the Netherlands Enterprise Agency (RVO)

Part III:
WaL Stages



Guidance for each stage in the project development cycle

This part of the guidance provides instructions for each stage of the project development cycle. The aim is to support initiatives that seek to advance urban water resilience with transformative and inclusive projects. For each stage in the project development cycle we provide support for the key roles: executive organisations, contractors and change agents.

A project development cycle for transformative and inclusive projects

The project development cycle comprises six distinct stages, inspired by widely recognized project development frameworks but with key adaptations specific to the WaL process. Notably, the WaL project cycle places a strong emphasis on Ideation (Stage 2), incorporating a creative and inclusive design phase. Additionally, Scaling (Stage 6) is highlighted to stress the importance of replicating the project in new locations while embedding it within the institutional environment and culture.

Extra emphasis on the early stages of project development

Many of the insights and lessons learned from the WaL and Rebuild by Design initiatives relate to the earlier stages of project development. This is because some of the initiatives (e.g. WaL Cartagena, WaL Wadden) are, at the time of writing, still in these early stages. Also, WaL initiatives emphasise the early stages of project development (see principle Invest early in project development). Therefore, this guidance offers more elaborate details about the earlier project stages while including best practices from other initiatives for the later stages of project development.

A simple and linear representation of a dynamic reality

The stages are presented in chronological order since it is necessary to go through each stage when developing a project. However, as anyone with project experience can attest, in reality, project development is not a simple linear process. Every project moves at its own dynamic pace - sometimes fast, sometimes slow, heading forwards, and sometimes even backwards. Specifically, Stage 6 (Scaling) may start before project implementation.

Do not forget the WaL principles

The WaL principles apply at every stage of the project development cycle. When executing each stage, we encourage collaborators to incorporate the principles: include all, involve financiers, perceive water as an opportunity, take an integrated lens, connect global to local, use the power of design, nurture a culture of change, and invest in the early stages of project development.

Three target groups: roles, activities and outputs

	EXECUTIVE ORGANISATIONS	CONTRACTORS	CHANGE AGENTS
ROLE	The executive organization's role is to shape, organize, and facilitate the initiative at every stage, guided by the eight WaL principles.	The contractor is an organisation, or a team of organisations and individuals, hired by the executive organisations to carry out the work required to complete a project stage. The same contractor may be hired for multiple stages (e.g. ideation and feasibility or implementation ánd operations and maintenance), or for only a single stage or product.	Many stakeholders are needed to develop relevant and implementable projects. Ranging from local communities to interest groups, governmental authorities, financiers and global partners. All these parties are needed for their resources, responsibilities, knowledge, and perspectives. The role of this loose group of change agents is to help shape the conditions that create an enabling environment for achieving optimal project outcomes.
ACTIVITIES	Outlining a plan, which includes setting the scope of the initiative, creating an overview of tasks and responsibilities, planning, and mobilising resources. Metrics support the evaluations of the plan, for example, with a Theory of Change.	Doing the work required in each stage: scoping (Stage 1), project proposal development (Stage 2), detailing and iterating project proposals (Stage 3), construction work (Stage 4), operations and maintenance (Stage 5), scaling (Stage 6).	Co-creating the project by shaping its conditions so that a sense of project co-ownership emerges. Engaging in workshops and sessions in each stage of the project.
	Organising and facilitating a support track that shapes the enabling environment for the initiative. This includes checking progress and adapting the process or its planning where necessary.	Iterating to improve and optimise the project.	Providing information, knowledge, data, and perspectives to inform the process of project development while allowing for iterations and optimisation.
	Securing resources. Every stage requires resources, finance to pay contractors, and capacity to execute activities and implement projects.	Employing an inclusive approach, connected and co-creating with local context and the network of partners in every stage.	Building a network of parties who are engaged in the initiative.
	Activating, building and maintaining the partnerships and coalitions in a way that allows for engagement throughout the initiative.		Supporting a learning journey that allows for capacity building, learning about the system, and ways to deal with challenges.
	Commissioning and then working with a contractor. While in more traditional project development processes, the executive organisation oversees and evaluates the contractors work, in WaL they often also act in partnership with contractors and the various change agents.		Organising resources and commitments to enable parties to engage in the process. For each party, the required resources and commitments may be different.
OUTPUTS	A framework and set of plans that structure and implement the initiative, through the management of resources, partners, and contractors.	Initiative scope (Stage 1), project proposals (Stage 2), project plan based on feasibility studies (Stage 3), project realised (Stage 4), project operating (Stage 5), project scaled (Stage 6).	Shared ownership in the project, engagement in the process, resources to engage, a lasting coalition, and enhanced capacity.

Each target group has a unique role within the project development process, contributing through specific activities and delivering outputs. This overview highlights these roles, activities, and outputs across the entire project lifecycle. Furthermore, in the stage descriptions customized guidance for each target group is offered, ensuring their efforts are aligned with the objectives of each phase.

STAGE 1 - INITIATION

… be inspired, explore and scope, create a coalition

An initiative often begins when curiosity or urgency arises about exploring new ways to address existing water challenges. Sometimes, a crisis serves as a catalyst, such as Hurricane Sandy in New York, which spurred the Rebuild by Design initiative. In other cases, it may stem from a shared realization that a different approach is urgently needed, as was the case with the start of WaL Asia. Alternatively, it can emerge from a mix of curiosity, conviction, and chemistry among individuals, as demonstrated by WaL Wadden. At its core, initiation is ignited by a spark—the desire to embrace new ways of thinking and doing.

When parties agree to explore an initiative, the shaping work begins to lay the groundwork that will enable the future stages of the project development process. The executive organisation has the power to start the initiative and activate and involve contractors and change agents.

Shaping the initiative involves defining its value for the specific context; scoping the geographical area and the focus therein through identifying challenges and opportunities that arise from understanding the integrated water system; building coalitions with partners; securing resources; establishing governance, and more.

In this stage, there are many uncertainties and unknowns (see case study Water as Leverage Wadden). Will the efforts yield the desired outcomes? Can a robust initiative that is different from traditional practice be sustained? Can resources be secured? Embracing a novel approach requires courage to embrace the unknown and challenge conventional planning methods. All WaL initiatives have been entirely novel with uncertain outcomes. As Dr Jayshree Vencatesan, Managing Trustee at Care Earth Trust, put it: “This is something the city of Chennai never witnessed before.”

An initiative’s ability to successfully deliver transformative and inclusive projects is determined from this first stage. All WaL principles apply from the start: bringing individuals and organisations together to build partnerships and shape coalitions, cultivating a deep and integral understanding of the landscape and water system, using design to connect, integrating the diverse values of the water system, involving financiers, and more.

GUIDANCE

EXECUTIVE ORGANISATIONS

- *Shaping a successful initiative is a combination of intention and creating, or building on, possibilities that arise.*
- *Shaping an initiative is a co-creation process. When introducing the WaL approach to a new context, it is necessary to adapted it to the new context in collaboration with the network of change agents.*
- *The first step involves many unknowns on how the initiative will take shape. Therefore, it is important to be clear and transparent. Communicate intentions, define roles, and outline what is needed and expected from partners to participate. Regular check-ins with partners will keep you informed about how they experience the process.*
- *The scoping process involves careful and detailed preparation to outlining the scope of an initiative, in part through the ‘hotspot’ analysis that is often carried out by a contractor. This document informs the request for proposals and enables the teams in the ideation stage.*
- *Without a plan that includes resources, governance and a schedule, no next step will happen!*

CONTRACTORS

- *The contractor prepares the scope of the initiative by developing a ‘Setting the Scene’ analysis of the physical, ecological, and social systems and identifying of ‘hotspots’ (challenges and opportunities).*
- *The analysis builds on diverse sources, including science, Indigenous knowledge, data from different entities, and the perspectives of work with a broad range of parties.*
- *Do not start with solutions in mind. This step involves understanding the system and scoping challenges and opportunities for developing conceptual designs and project proposals in Stage 2.*
- *Identify and connect to ongoing and planned projects and initiatives.*

CHANGE AGENTS

- *Co-shape the initiative: bring in perspectives, knowledge, experiences, and resources that make the initiative realistic and relevant to the local context.*
- *Define WaL for your context. Make sure to define the value of this initiative and what it means for you.*
- *Reflect on the coalition to identify the partners needed to make the comprehensive ambitions real and involve all of them in building the coalition.*
- *Identify what partners need to participate. This can include financial resources, internal commitments, and (in the case of a municipality) approval from the city council.*

CASE STUDY STAGE 1
Water as Leverage for Resilient Cities Asia: How it started

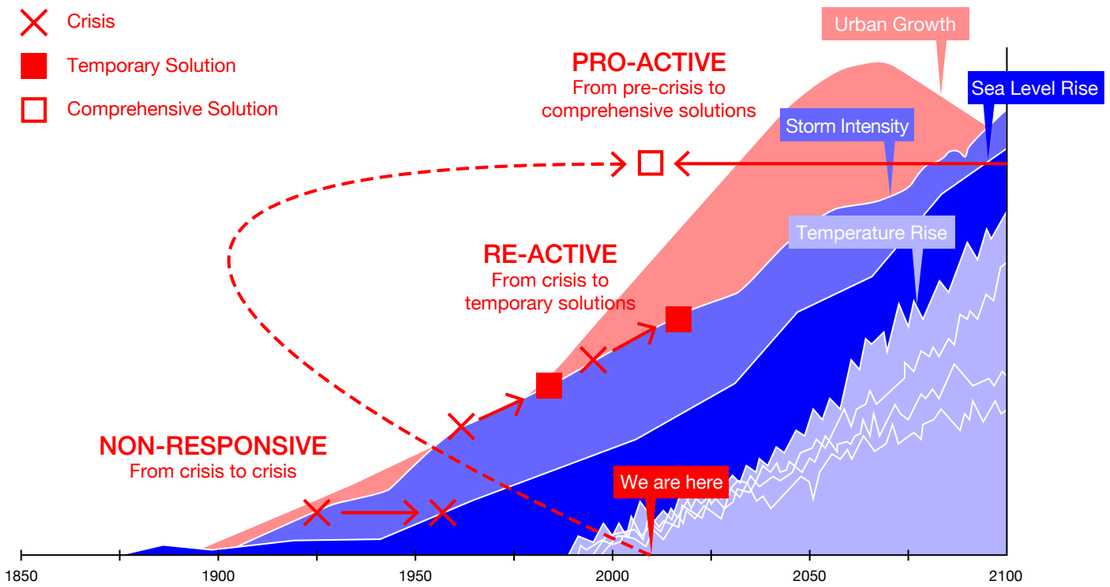
WaL was inspired by the Rebuild by Design competition initiated after Hurricane Sandy in New York. There, through collaboration, inclusive, design-driven, problem-solving urban resilience projects were designed (and are now being built).

Rebuild by Design happened post-disaster; in that sense, it was too late. To build on the insights from Rebuild by Design and to work pre-disaster, the WaL Asia programme started by looking at the future instead of the past (see figure Shifting response from re-active to pro-active).

WaL was initiated and led by Henk Ovink, former Special Envoy for International Water Affairs, and implemented and managed by the Netherlands Enterprise Agency (RVO) funded by the Dutch government. From the start, WaL included a coalition of local and global partners to shape the programme. The first paper exploring a WaL programme was published in 2017 by Henk Ovink in his capacity as former Special Water Envoy, International Architecture Biennale Rotterdam (IABR), and Architecture Workroom Brussels (AWB), supported by the UN/World Bank High Level Panel on Water.

An initial selection of 30 cities was guided by insights from the Netherlands Environmental Assessment Agency (PBL) in their 2018 publication, The geography of future water challenges, which delved into the climate and water challenges confronting regions and cities worldwide.

Shifting response from re-active to pro-active. WaL Asia used this graphic to illustrate the shift needed in response to the challenges coming at us: "Instead of non-responsive or re-active approaches, what is needed is a pro-active approach that does not wait for a crisis to occur in order to respond, but instead formulates resilient solutions able to prevent crisis and act, taking the complexity of its effects into account." (Setting the Scene WaL Asia, p.19)



Among these, Southeast Asia emerged as a focal region due to its many challenges, leading to the selection of three diverse cities: Chennai in India, Khulna in Bangladesh, and Semarang in Indonesia. These cities vary significantly in scale, location, geography, climate challenges, governance, capacity, and culture. They were chosen precisely for the multitude of challenges they present, both at the urban scale and in terms of water management.

Using the Setting the Scene for a Call to Action, Water as Leverage for Resilient Cities Asia as a basis, on the Earth Day in 2018, WaL launched the tender with a call for action, requesting professional multidisciplinary teams to engage in Chennai, Khulna, and Semarang in Asia.

WaL, Semarang

CASE STUDY STAGE 1
Water as Leverage Wadden: Initiation stage

The Wadden Sea, the world's largest tidal flat ecosystem, is celebrated for its unique landscape, nature, and cultural significance but faces mounting climate challenges. Addressing these issues requires tackling multiple concerns simultaneously.

In January 2021, during Climate Adaptation Week in Groningen, Karin Lochte, Chair of the Wadden Sea Board, called for a stronger focus on climate adaptation in the Wadden region. This call, combined with discussions with Henk Ovink, former Special Envoy for International Water Affairs, inspired the idea of a WaL initiative for the trilateral Wadden Sea region. The Initiation stage evolved with outlining a plan, defining the scope, identifying sites in the Netherlands, Germany, and Denmark, mobilizing resources, building a coalition and the development of a Setting the Scene document. The Netherlands Enterprise Agency (RVO) and the local Programme Towards a Rich Wadden Sea took executive organisation roles. They brought together diverse partners—local organizations, financing partners, and multi-level governments—to form a coalition and co-develop the WaL initiative. Architecture Workroom Brussels (AWB) was commissioned to create the Setting the Scene document, which mapped challenges and opportunities in the islands and coastal cities across the Wadden region.

Maintaining coalition cohesion and securing resources for the subsequent ideation stage proved challenging. The ideation stage, in particular, came with uncertainties among others related to securing financial resources, governance, and more. While some partners readily engaged with the process, others were hesitant, making coalition-building uneven. The coalition submitted a funding proposal to the European Union (EU), but in October 2023, the proposal was not awarded. Despite this setback, Harlingen adopted the WaL approach for its next steps. In March 2024, Harlingen partners held a start-up meeting for WaL Harlingen, utilizing the eight WaL principles in procuring a contractor for further ideation.

Key workshops and meetings in the Initiation stage:

- Feb 2022 (online): First coalition meeting to introduce the initiative, connect potential partners and recognize shared challenges across Netherlands, Germany, and Denmark, fostering a strong sense of connection.
- May 2022 (Carolinensiel, Germany): Two-day workshop focused on understanding and adapting the WaL approach, to the Wadden context, and conducting design sessions to shape the "Setting the Scene" WaL Wadden report.
- Nov 2022 (Oldenburg, Germany): Kick-off meeting for the EU proposal development, sharing concerns and priorities.
- April 2023 (Leeuwarden, Friesland): An in-person meeting to finalize the EU funding proposal.
- March 2024 (Harlingen, Netherlands): Start-up workshop for WaL Harlingen, marking the beginning of an ideation stage focused on applying the WaL principles.
- March 2024: Start-up workshop for WaL Harlingen in Harlingen.

Building a WaL Wadden Coalition, Carolinensiel Germany, May 2022

CASE STUDY STAGE 1
Leadership for change: The role of Henk Ovink

Since its start, the WaL programme has been dedicated to driving transformative change by introducing an innovative approach —the WaL approach—as an alternative to more conventional practices. Central to enabling this transformation is leadership, particularly the role often described in literature as a "policy entrepreneur" or "champion". It is characterized by driving innovation through navigating complex networks in order to achieve impact (Meijerink and Huitema, 2010; Meijerink and Stiller, 2013).

Henk Ovink, the first Special Envoy for International Water Affairs for the Kingdom of the Netherlands, exemplified this role. His contributions have been pivotal, highlighting the critical importance of leadership both in general and specifically within the context of WaL. Reflecting on this, strategies commonly associated with effective policy entrepreneurs become evident (Meijerink and Huitema, 2010).

Strategy 1: Developing and promoting new ideas

Drawing from his experience with Rebuild by Design, Henk introduced WaL as a design-driven, integrative, and inclusive approach, introducing these novel elements into international water initiatives. He also positioned water as a pivotal element in achieving the Sustainable Development Goals (SDGs). A message that extended beyond WaL into his subsequent roles, as co-organiser of the UN Water Conference and executive director for the Global Commission on the Economics of Water.

Henk engaging in conversations during WaL Asia regional workshop, Singapore 2019

Strategy 2: Building Coalitions

Though initiated by the Dutch government, WaL's success has hinged on global partnerships. In its early stages, Henk and his team secured key collaborators to shape the program's foundation. His coalition-building skills were particularly evident during challenging discussions at the WaL Asia regional workshops, where he kept diverse partners aligned despite differing perspectives. This energy and commitment resonated with the multidisciplinary teams, inspiring contributions and insights that frequently went beyond formal expectations.

Strategy 3: Anticipating and creating new avenues

The WaL programme did not emerge from an existing platform or policy; instead, Henk and his collaborators had to create one. Starting with a clear vision and strategic partnerships, they shaped a platform for action. For instance, insights from the Dutch Environmental Assessment Agency (PBL) study provided a critical window of opportunity, which Henk leveraged to further his vision. Funding for WaL Asia required creativity and determination, navigating complex processes to secure necessary resources.

Policy entrepreneurs play a pivotal role in driving change, and their success often depends on 'sponsors'—individuals or organizations that provide essential resources, expertise, authority, or connections to sustain their efforts (Crosby and Bryson, 2010). In the WaL journey, various sponsors, including RVO, global partners such as UN-Habitat and OECD, local stakeholders, and multidisciplinary design teams, made significant contributions to achieving transformative outcomes. These actors adapted their own processes to support innovation, employing strategies such as engaging communities, revising contracting methods, integrating new policies, and fostering collaboration.

STAGE 2: IDEATION

… produce designs and project proposals

Ideation is the stage of visioning, designing, and formulating designs and project proposals. In this stage, global climate needs and aspirations intersect with local trade-offs, systematic analysis converges with tangible places, and abstract concepts meet actionable solutions, all united by water as a common thread and design as the instrumental tool.

Executive organisations, contractors, and change agents play equally active and crucial roles in this stage. Unlike traditional commissioning, where the executive organisation assumes a supervisory role while the contractor executes the work, in this model, the executive organisation also plays a prominent role in organisation and facilitation to achieve desired outcomes. The executive organisation does not take a step back but, instead, acts as a partner.

Multidisciplinary teams are contracted to develop conceptual designs and project proposals through an interactive, iterative approach that embraces diverse perspectives, ideas, and needs. The scope of work for teams is defined in the previous stage, where challenges are initially defined in the Setting the Scene and Hotspot Analysis reports. The research-by-design framework links research on the existing system across various dimensions; economic, environmental, social, and physical, with an analysis of key challenges in specific contexts. Design iterations lead to comprehensive conceptual designs and project proposals for future urban systems. Drawing inspiration from nature-based solutions, designs aim to bring a multitude of benefits to local contexts and communities.

Change agents in the enabling environment are actively involved in the ideation stage. They co-create visions and project proposals in the workshops, share local knowledge and data, help secure financing, and embed the initiative institutionally.

Workshops are critical for identifying, analysing, and deliberating on challenges and ambitions in an inclusive manner. Design, policy, and finance workshops together form the support track for this stage and connect all different organisations in the initiative. The workshops are crafted as soft spaces, fostering an environment where all participants can openly share their thoughts and feel safe.

All eight WaL principles are reflected in the ideation step. Partners develop comprehensive and integral visions and project proposals, including financing and scaling strategies. They use an inclusive process with multidisciplinary teams, connecting global and local players. In the ideation process, design is prominent as a tool to help understand, communicate, discuss, and develop integrated solutions to water-related challenges.

GUIDANCE

EXECUTIVE ORGANISATIONS

- *Workshops during the ideation stage serve as key milestones, facilitating both the development of design concepts and the engagement of coalition partners.*
- *When selecting teams for the ideation process, prioritize their working approach over what they promise to deliver.The process itself is critical for fostering optimal solutions and ensuring ownership. Additionally, consider team composition as a criterion to promote diversity and inclusion.*
- *Act as a supportive partner to the teams, by creating the conditions necessary for successful proposal development and promoting the WaL approach.*
- *Be flexible and adaptive throughout the process. Embrace changes prompted by new insights and ideas, also when these deviate from original plans or Terms of Reference. Ensure clarity and transparency when adjustments are made.*

CONTRACTORS

- *The contractor develops further analysis, conceptual designs, and project proposals.*
- *Follow research-analysis-design iterations.*
- *Emphasise a diverse and multidisciplinary team composition: blend global talent with regional and local champions, prioritise youth and gender diversity, and incorporate a range of disciplines.*
- *Implement a co-creation approach that integrates the expertise of different professionals, including local Indigenous knowledge with international perspectives.*
- *Take time to actively listen and understand. Don't jump to conclusions or solutions. Managing diverse perspectives requires effort to cross boundaries.*
- *Consider modular design options which provide flexibility and possibilities for phased implementation that combines financing from different sources.*

CHANGE AGENTS

- *The conceptual designs and project proposals are co-created with partners including communities, governments, financiers, and global organisations.*
- *Promote diversity and inclusion by considering factors such as gender, youth engagement, and the involvement of varied disciplines.*
- *Engage, contribute, and make knowledge, perspectives, insights, and data available for the ideation process.*

CASE STUDY STAGE 2

Water as Leverage for Resilient Cities Asia: Support track in the ideation stage

From a total of 39 proposals, WaL Asia selected and contracted six multidisciplinary teams. The teams (contractors) were actively supported by the Dutch government (executive organisation), UN-Habitat, and Partners for Resilience (a global network of civil society organisations), who organised the support track. In total, nine local workshops (three per city) and two regional workshops where all cities and parties came together were held.

The design workshops allowed the research by design work to take place, while building partnerships in a soft space and safe environment. The local and regional working sessions helped create connections with international financial institutions and promoted solutions for uptake in bilateral and multilateral programmes. The support from the executive organisation and its partners made sure that the teams were able to accelerate and deliver the project proposals within a pressure-cooker timeframe of originally nine months. It made the teams feel they were not left on their own. Instead, they felt like they were "part of a movement," as one of the team members said.

The first round of local workshops happened between September and October 2018 in Chennai, Khulna, and Semarang. The teams in these cities worked together and informed partners about the WaL programme. During the second round of local workshops in November and December 2018, conceptual designs were presented, discussed, verified, and explained in each city.

Design workshop in Khulna Bangladesh

The first regional workshop, held in Singapore in December 2018, was a milestone event in the process. In this workshop, the teams presented conceptual designs for each city to international financial institutions and shared lessons learned. The third round of local workshops, focused on implementation, took place in March 2019. They were well attended, and all parties indicated their commitment to seeing the process through. In April 2019, the parties came together in Singapore for the second regional workshop. The teams presented their programmes, discussed criteria for climate adaptation finance, and explored funding opportunities. These workshops were also seen as a moment to exchange lessons learned between cities (Leani, 2021). To help ensure the programme's comprehensive approach stayed in place, the teams defined a roadmap for each city. They identified next steps, defined roles and responsibilities, decided on when to deliver results, and considered further replication and scaling up.

In May 2019, the six teams delivered 24 project proposals in 15 programmes. The proposals included innovative solutions, featuring green infrastructure, and took each city's political, economic, and social structures into account. The WaL Asia programme then transitioned to next stages at the city level.

A third regional workshop focused on the transition phase was planned, but, due to COVID-19, this was postponed and finally cancelled. The WaL processes then focused on support at the city level as opposed to the global and programme level. Participants appreciated the regional workshops, particularly due to the wide range of stakeholders present and the strong learning curves achieved. *(WaL Evaluation)*

CASE STUDY STAGE 2

Water as Leverage for Resilient Cities Asia: Recognized for its innovative commissioning approach

The Dutch national government has received the Dutch Design Award for Best Commissioning for its WaL programme. The jury praised the initiative, stating:

"Water as Leverage (WaL) elevates the Netherlands to an international stage with an approach that is refreshing not only for government agencies. The Rijksoverheid demonstrates that even large global challenges can be seen as opportunities rather than threats. This bold mindset reflects the Netherlands' global reputation, particularly in water management. The urgency is clear, and WaL acts immediately with three concrete pilot projects, while its methodology provides numerous opportunities for scaling up. This reflects a strong belief in the power of design. The jury also sees potential for other knowledge domains to view WaL as a shining example."

At the heart of this success was the innovative commissioning process. The Netherlands Enterprise Agency (RVO) implemented a pre-commercial procurement model, launching an open innovation competition. This approach challenged participants to address societal challenges and develop integrated, inclusive solutions.

CASE STUDY STAGE 2

Water as Leverage Semarang: A comprehensive analysis leading to an integrated vision

When the multidisciplinary team started in Semarang, the capital of Central Java, Indonesia, in 2018, the initial focus was on addressing coastal and urban flooding. However, the team quickly recognized that the problem was more complex—alongside too much water, there was also a serious issue of too little water exacerbating the situation. The ground in Semarang was sinking faster than coastal protection could be built, partly due to industries extracting water from underground sources. Traditional flood protection solutions would not be sustainable long-term.

The multidisciplinary team realised that "the patient needed to be stabilised first before operating."

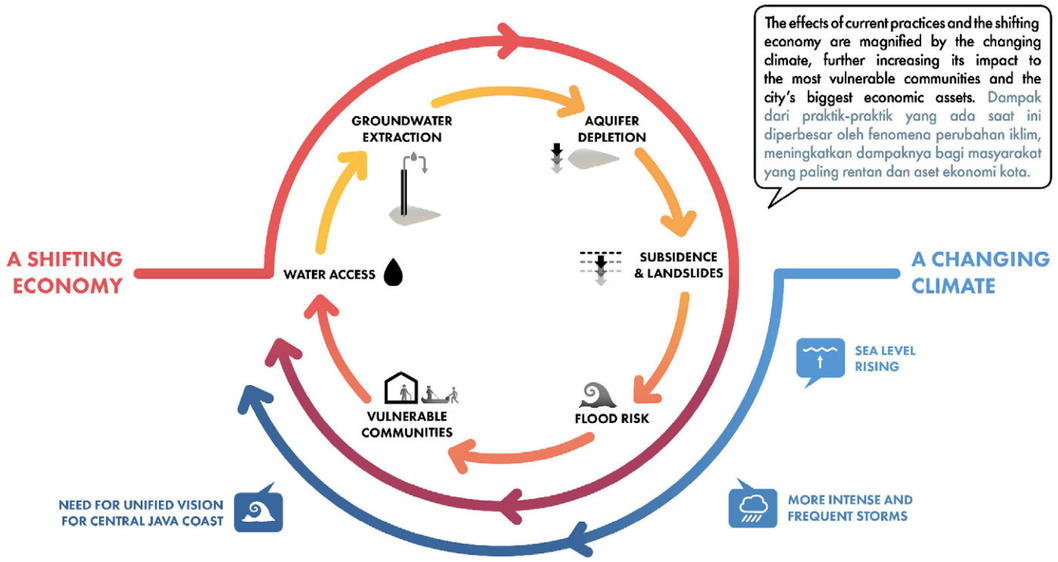
Before levees and drainage infrastructure could be designed, new ways had to be found to reduce the city's dependence on aquifers, which are underground water supplies, by making sure that available water did not just flow into the sea but was used to improve the water supply.

As a result of this analysis, project proposals were developed that involved solutions to manage water flow from the mountains to the coastal areas. These included the use of ponds to retain water, recharge aquifers, and facilitate re-use in kampung villages and industries. Iterating the designs, the team opted for retention ponds in combination with measures to mitigate river flooding, minimize landslide risk, and improve coastal protection. This approach led to the creation of an integrated vision for Semarang, extending from the foothills to the shore.

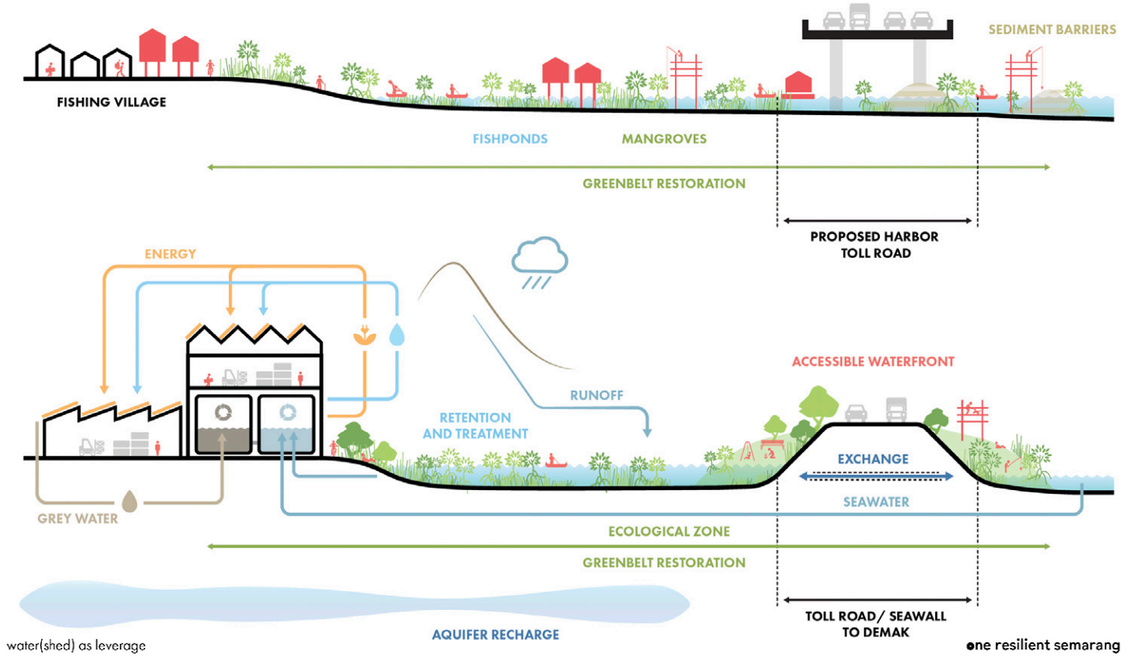
This systemic approach, which encompassed the entire water system, needed to be central to the communication materials for communities and stakeholders, particularly in workshops and events. The team developed graphics that illustrated how various issues were interconnected. Later in the process, visual representations of the design proposal were created that showed how the proposed interventions linked to the city's landscape.

A unified vision for Semarang with 5 core programs

Current cycles of vulnerability exacerbated by Climate change



Proposed plan for a protective and productive coastal zone balancing urban development and ecological restoration, and creating benefits like eco-tourism, fisheries, and carbon sequestration.



STAGE 3: FEASIBILITY

… ensure continuity and viable plans

Urban water resilience projects can only be successful when viable from multiple perspectives, including economic, financial, technical, institutional, social, and environmental perspectives. Feasibility studies are performed to test, proof, compare, and fine-tune project proposals and develop them into implementable plans.

Pre-feasibility studies are usually done first to determine the project's viability and the benefits it will bring. A full feasibility study provides more detail on the resources required for implementation and future operations. Project financing options are context-specific of which identification of investment costs and benefits can serve as a starting point for developing a financial plan and assessing the financial feasibility (Altamirano, 2021). Feasibility studies can be done by the teams that developed the project proposals (see case study WaL Cartagena: integrating full feasibility for smooth implementation), a new contractor, or alternatively by the contractor responsible for construction work (see case study Rebuild by Design: Getting the Big U ready for implementation). The feasibility study is the basis for the plan to cover the approach for the subsequent stages of implementation, operations and maintenance, and scaling. It includes the approach for procurement of a contractor for the construction works as well as monitoring and evaluation framework and strategy.

There are two critical challenges when developing implementable plans. The first is to maintain the comprehensive nature of the project proposals. When financing shortcomings are identified, it is necessary to optimise project costs and functionality, without compromising quality or performance. In such situations, it can be tempting to cut costs by eliminating project elements, often at the expense of the project's comprehensive nature. The second challenge is to keep the coalition of partners involved and engaged even when adjustments to the proposals may be needed (see case study Rebuild by Design: Getting the Big U ready for implementation). When new players are involved in this transition, there is the risk of losing momentum in the process along with ideas and partnerships that were built in the earlier stages.

There are different strategies to navigate such challenges, as shown in the case studies for this stage. These include extending contracts for the multidisciplinary teams to include full feasibility, which ensures consistency, or integrating the designers (from Stage 2 Ideation) in the newly hired teams for feasibility and implementation. Project integrity can be secured through project structuring, risk management, and phasing instead of simply cutting project components. Smaller pilot projects allow for testing construction methods, management practices, and performance, leading to reduced risk (and associated costs) for subsequent larger-scale implementation.

	GUIDANCE
EXECUTIVE ORGANISATIONS	• *Once the project proposals have been developed using an integrated and inclusive approach, the process of bringing the proposals to reality begins.* • *The executive organisation plays a role in securing the connection with the original vision of the project proposals and the WaL approach, including promoting local ownership and facilitating connections with the broad coalition.* • *Transitioning to Stage 3 often involves a change in executive organisation. When a new organisation takes on this role, extra care is required to ensure that the proposal's original vision is carried forward as well as the WaL approach.*
CONTRACTORS	• *The contractor develops the project to become ready for implementation based on feasibility studies.* • *Keep the concepts, richness, and comprehensiveness of the project proposal in the iterations towards developing project implementation plans.* • *Employ feasibility tools and instruments to capture the various (co-)benefits, including nature-based solutions, of the comprehensive project proposals.* • *Include operations and maintenance and scaling aspects when developing project plans, including a monitoring and evaluation framework.*
CHANGE AGENTS	• *Maximise the degree of local ownership and capacity (including intellectual, social, and political capital building) around the project.* • *Continue to be a partner in further detailing and developing of project proposals. Act as a keeper of the original visions and ideas.* • *Continue to provide local data and information to match feasibility with standards, including local, financial, and other standards relevant for the stakeholders.*

CASE STUDY STAGE 3
Water as Leverage Cartagena: Integrating full feasibility for smooth implementation

Design workshop, WaL Cartagena September 2023

The multidisciplinary teams in WaL Asia were asked to develop project proposals up to the level of pre-feasibility. Full feasibility was not required. An important lesson from WaL Asia was that this approach led to a loss of momentum and hampered smooth implementation. New organisations and people got involved; knowledge and ideas had to be transferred. New momentum had to be created for the feasibility studies, contracting, and construction of the infrastructure projects.

WaL Cartagena integrated several lessons from WaL Asia. To avoid losing momentum between project design and implementation, the Dutch government funded an extra step for developing full feasibility studies. Teams were asked to develop four to six conceptual designs, three pre-feasibility studies, and one full feasibility study for a ready-to-tender infrastructure project.

Teams were selected based on criteria such as demonstrated financial and economic knowledge, at the local and global level. Technical engineering expertise was required to conduct the full feasibility studies. In the scoping stage, the executive organisation, the Netherlands Enterprise Agency (RVO), cooperated with project financier Invest International. Invest International is represented in the WaL Cartagena Advisory Board to ensure that the ready-to-tender projects fit their investment programmes.

The experience of WaL Cartagena shows how contracting teams for the full feasibility step can ensure that the teams, and local and governmental stakeholders, remain involved from design ideation to the start of project implementation. In this way, continuity is secured and potential project impact increases.

CASE STUDY STAGE 3
Nature-based solutions: The benefits of mangroves for erosion control

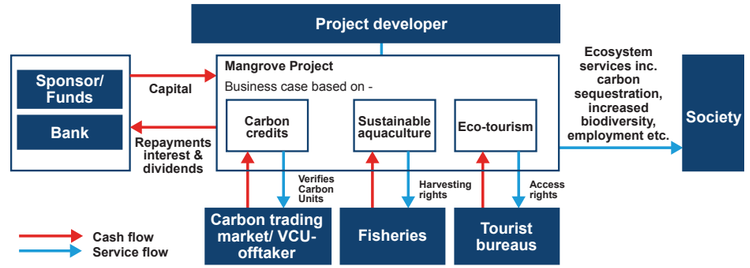
Working with nature-based solutions is an important aspect of WaL initiatives (see case study: Water as Leverage Chennai: Implementation of the Water Balance Pilot). These solutions build on the natural and integral functioning of the water system (see principle Embrace water as an opportunity) and serve multiple benefits. This case study showcases the economic and financial feasibility assessment of mangroves as a nature-based solution for coastal erosion and flood risk. Mangroves help stabilise coastlines in low-lying areas, but practices like farming fish in fishponds in (former) mangrove zones can lead to coastal erosion. Semi-permeable dams support coastline restoration by trapping sediments and creating conditions favourable for mangrove growth. Key benefits include reduced flooding and erosion risk, creation of habitats for mangrove-dependent fish, carbon sequestration, and ecotourism activities.

Table above presents an overview of the costs and benefits of a stylised case: the benefit-cost ratio is very positive, as investment costs are generally quite modest. If there is no, or insufficient, public budget available to cover the required investment and maintenance costs, a blended finance approach or private financing could be possible. The economic assessment provides a starting point to identify potential funding sources and identify cost-sharing possibilities.

Some of the benefits from the economic analysis can generate revenues for private actors:

		Description	USD (millions)
Investment costs	Permeable dams	Planning, installation and maintenance	-0,042
	Mangrove plantation	Installation and maintenance	-0,001
	Opportunity costs	Land taken out of (agricultural) production	-2,7
	Total costs		***-2,7***
Benefits	Fishing/ sustainable aquaculture	Yield from fish and other aquatic species that depend on mangrove ecosystems	0,4
	Flood risk mitigation	Reduced flood risk, including damage to villages and aquaculture ponds	5,6
	Erosion risk mitigation	Value of land and assets otherwise lost (including houses, aqua/agriculture and ecosystem services from natural areas)	14,8
	Carbon sequestration	Carbon sequestered by growing mangrove trees over 10 years	0,8
	Ecotourism	Attractive area to develop ecotourism activities (boating, birding, recreational fishing)	PM
	Total benefits		***21,6***
	Net Present Value		***18,9***
	BCR		***8,0***

Costs and benefits of mangrove restoration (restoration across ~1000 ha), inspired by (Hakim, 2017; Kok et al., 2021). Values in million USD, present value (discount period 30 years; discount rate 5%).



Capital and service flows in a mangrove restoration project financed by private revenues. Adapted from Vital Ports et al. (2021)

sustainable businesses related to the mangrove area (e.g. fisheries, shrimp farms), ecotourism activities, and carbon sequestration. Carbon sequestration can be marketed via carbon credits: there are mandatory compliance markets (e.g. the European ETS system) and voluntary markets to offset or compensate emissions.

The figure above shows a potential financial structure of mangrove restoration in which the mangrove restoration project is managed by a project developer or executive organisation and financed by a bank paid by revenue-generating activities. In the example, private revenues from fisheries and carbon sequestration amount to USD 1.2 million, which is insufficient to cover the total investment costs of USD 2.7 million. In these cases, a blended finance approach with both public and private funding would be needed.

CASE STUDY STAGE 3
Rebuild by Design: Getting the Big U ready for implementation

Rebuild by Design started as a design competition launched by the U.S. Department of Housing and Urban Development (HUD), alongside nonprofits and the philanthropic sector, in response to Hurricane Sandy's severe impact on the U.S. East Coast. The aim was to enhance response, preparedness, and resilience. Teams were selected to join the three-stage competition with the goal of developing "site-specific proposals for locally-implementable and/or regionally-scalable projects." For the winners, a budget was available to enter the fourth stage: implementation of the winning designs by the state and/or local governments. The Big U, a proposal to protect Lower Manhattan from floodwater, storms, and other climate impacts, was one of the winners.

East Side Coastal Resiliency, project area 2 nearly completed

Rebuild by Design, as the executive organisation, managed the first three stages of the competition. A different agency, the City's Department of Design and Construction (DDC), with no background in the initiative, took over this role in the implementation stage and involved a range of other City agencies. All these agencies had to be brought into the vision for a new, multi-functional, and community-driven, climate infrastructure project. They had to find ways to collaborate to bring this vision to implementation, before a federally mandated deadline.

Although the agencies were openly committed to the Big U vision, the looming deadline and complexity of the project often made them instinctively revert to their usual ways of working. For example, when procuring the conceptual design work, a new team had to be hired for the East Side Coastal Resilience (ESCR) section of the Big U, which will mitigate the risk of coastal floods on Manhattan's East Side. The request for proposals was only for engineering firms with an established contract with DDC, which was not the case for any of the Big U members.

Starting with a new team led by an engineering firm meant that there was a risk that many of the ambitions, insights, and relationships developed in the earlier stages would be lost. The contracted company AKRF, however, did include Big U designers in their team, albeit in a rather small consultant role. This way, some continuity between the first three stages and the implementation stage was secured.

As the project progressed, the role of the original designers grew, often at the request of the City, which saw the value of design in navigating the project's complex stakeholder environment.

The transition from competition to implementation changed the dynamics of the community's engagement. During the first three stages, the front-line communities on the Lower East Side co-produced ideas in an intensive collaborative process. In the implementation stage, DDC, while committed to engagement, was also beholden to political constraints. This resulted in more one-directional communication and reduced insights by the community in the difficult deliberations and trade-offs that are an inevitable part of developing the design for a complex project. This limited engagement, including periods of silence, eroded the fragile trust the front-line communities had built with the process. When after a year of silence, the new Mayor announced significant, although not fundamental, changes as his 'new plan,' the community felt bypassed.

Media uproar caused a series of other community organisations and interest groups to enter the fray, further complicating the project's implementation process with additional, sometimes contradictory, demands. In the end, the ESCR project came through largely intact, and the relationship with the front-line communities survived. The foundation of engagement laid during the original Rebuild by Design process proved robust enough. To implement ambitious, multi-functional, and community-supported projects, it is critical to manage the transitions between project stages effectively. Essential relationships are to be continued, and essential project elements should not get lost in the urge to get something done.

One of the success factors in the Big U and its follow-up projects (after ESCR, which is now under constructions, six other projects for other parts of the Big U went into design) was the involvement of Big U's designer in the implementation (including moving from the Netherlands to New York for that role). These projects do not just have technical challenges that can be addressed from afar, but social challenges that require connecting the various actors and systems. In the decade that followed the original Rebuild by Design competition, New York City continues to learn how to do integrated projects better. In most of the follow-up projects, Big U designers still play a role, functioning as sparring partners for the city agencies and communities so that all stakeholders can develop a culture of resilience together.

East Side Coastal Resiliency, project area 1 under construction, Spring 2024

STAGE 4: IMPLEMENTATION

… build the project

The true test of a project proposal lies in its execution. To affect meaningful change, create local impact, and validate the visions outlined in project proposals, projects must be built. In this stage, the project, as planned in the previous stages, is constructed.

The challenge in this stage is to preserve the fundamental features of project proposals while continuing to strengthen the coalitions formed in the previous stages. Often, roles and responsibilities shift to new parties—whether contractors, government bodies, financiers, or consultants—and the risk of departing from the interdisciplinary, inclusive approach championed in earlier stages arises. Handover strategies are imperative. Integrating designers into the implementation phase fosters continuity (see case studies *Rebuild by Design: Getting the Big U ready for implementation* and *WaL Chennai: Implementation of the Water Balance Pilot*). Furthermore, involving implementation partners in the earlier stages helps to prepare for a seamless transition.

Continued engagement with the local community is vital for ensuring continuity and project integrity during implementation. This helps mitigate negative impacts from construction works and builds relationships to ensure continued stewardship from the community, which is needed for stage 5: *Operations and Maintenance*.

Sometimes, due to the scale of project proposals and (importantly) ambitions, projects require a phased or modular approach for implementation. By structuring and executing projects in a modular fashion, each component can be treated as a separate entity, which allows for a learning process. When each component is independently useful, a modular approach is appropriate.

The successful implementation of a project acts as a catalyst for its broader adoption and integration into urban water resilience initiatives. Therefore, it is important to celebrate successful implementation and build momentum to inspire further achievements.

GUIDANCE

EXECUTIVE ORGANISATIONS

- *Construction starts! The executive organisation enables the contractor to do this work.*
- *Shape and secure the connections between the project proposals developed in the ideation and feasibility stages and the implementation stage.*
- *Ensure continuity by engaging the coalition and connecting with new organisations and individuals to secure support for stage 5:* Operations and Maintenance *and stage 6:* Scaling.
- *Showcase the results and added value of the integrated and inclusive approach to facilitate replication and upscaling in the following steps, for example through celebrating successes and results.*

CONTRACTORS

- *The contractor constructs the project.*
- *Ensure seamless connection between the vision, philosophy, and ideas in the project proposal and plan and the actual constructions.*
- *Continue to adapt the design to match the conditions with the local context.*
- *Prepare for an operation and maintenance plan and manual.*

CHANGE AGENTS

- *Engage and contribute to project implementation by being a partner on the ground and anticipating stewardship in the operations and maintenance stage.*
- *Connect to newly involved organisations, such as implementation agencies, to transfer and maintain the project philosophy during implementation.*
- *Provide and host local platforms and locations that allow for and enable project implementation.*

CASE STUDY STAGE 4

New Clark City: How contracting schemes enable implementation of integrated and resilient urban plans

Procurement procedures play a crucial role in the development and implementation of integrated, resilient urban plans. Although these processes are often seen as obstacles due to their tendency to create silos and prioritize risk avoidance, they can become powerful drivers of innovation when set-up effectively.

Currently under development, New Clark City (NCC) will be a smart, green, disaster-resilient city, striving for sustainable economic growth in the rapidly growing greater Manila region. Situated in a Special Economic Zone that includes Clark International Airport, NCC will eventually have 1.2 million inhabitants and some 500,000 jobs, which include a sizable part of the government of the Philippines, universities, and a strong manufacturing sector.

In the early stages of NCC's development, the Asian Development Bank (ADB) was contracted to be the transaction advisor. The ADB was tasked with assisting in the overall evaluation of the city's master plan and running tender processes for suitable public-private partnership projects to attract private sector participation.

As a consultant to the ADB, a design firm assessed the original master plan and developed a Resilience Framework to underpin developments. The assessment concluded that since the city is situated in an ecologically rich greenfield, the area's natural features could play a much larger role in the city's development. The alternative nature-based flood mitigation scheme, using the existing floodplains as a River Park, would be significantly less costly than the originally proposed scheme while providing ecological, recreational, and economic benefits. For the first phase of NCC's development, ADB included these natural park features and other resilience measures in the area development scheme and contracts, binding the contractor to its implementation. The first development was realised a year and a half after its original conception, open in time for the Asian Games. ADB's use of contractual tools resulted in a first phase realisation of the River Park, for the world to see, and set the tone for NCC as a city that is true to its vision.

By directing its procurement methods to achieve the desired outcomes, ADB, as an executive organisation, was able to maintain the project's integrity and set the first phase up for quick implementation. It introduced a process of scaling out these principles as NCC continues to develop.

River Park, New Clark City

CASE STUDY STAGE 4

Water as Leverage Chennai: Implementation of the Water Balance Pilot

Water Balance Pilot at Little Flower Convent School

Chennai, a city on the frontlines of climate change, faces the dual challenges of extreme droughts and floods. Rapid urbanisation necessitates a comprehensive strategy that incorporates water management within a broader economic, social, and cultural context.

Responding to this urgency, OOZE Architects & Urbanists with City of 1000 Tanks Water Alliance, created an integrated citywide water balance strategy under the WaL Asia programme in 2019 to 2020. This strategy intends to reshape Chennai's relationship with water and focuses on process innovation. It seeks to transform wastewater management practices and relocalise water cycles through nature-based solutions while reducing the dependence on water supply from desalination plants.

The Water Balance Pilot at Little Flower Convent School for the Blind and Deaf (LFC) is the first implemented demonstration project that translates the strategy into reality. Using nature-based solutions, the project repaired broken infrastructure and introduced a system to collect rainwater and treat wastewater locally. Treated water replenishes the aquifer, ensuring local water security and climate resilience. The Water Balance Pilot, developed by local companies and funded by the Dutch Partners for Water program through

Water Balance Pilot at Little Flower Convent School

the Netherlands Enterprise Agency (RVO), was implemented with the following key features:

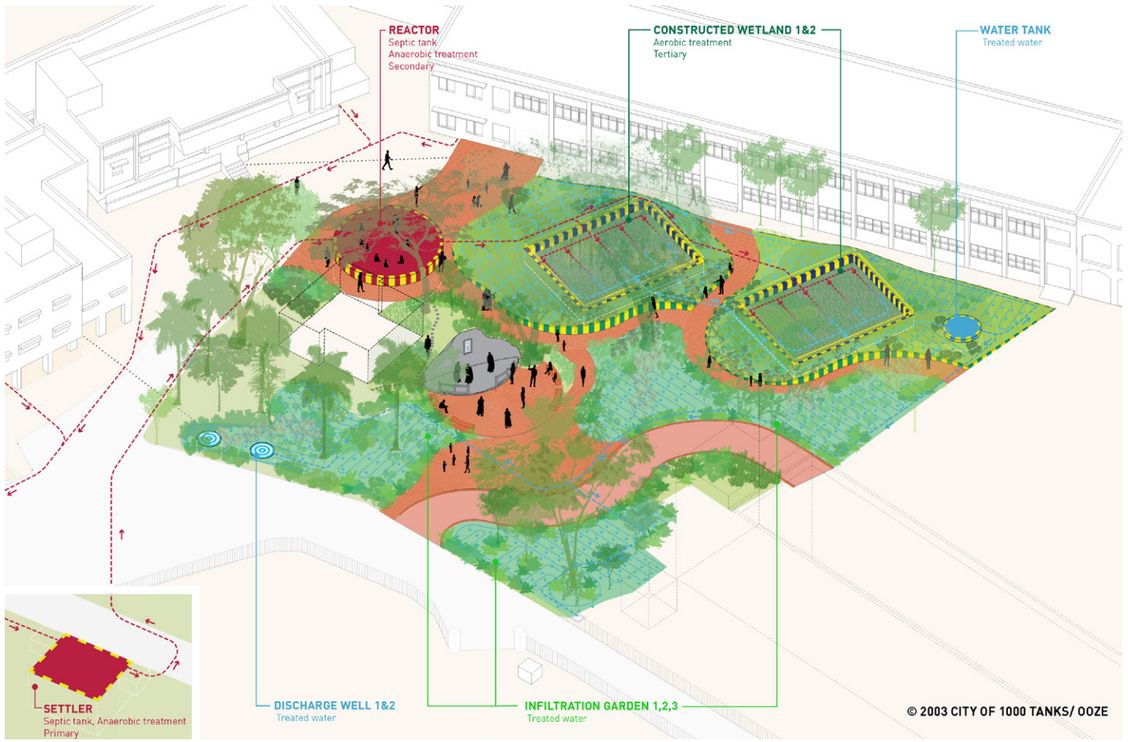
- Retrofitting existing networks and raising awareness before installing new infrastructure. Mapping, reconnaissance, and capacity assessments ensured seamless connections between old and new infrastructure. For example, contractors repaired the old sewer network and cleared blockages to restore the existing infrastructure's functionality.
- Coordination and implementation with LFC to ensure minimal disruption to the school's daily operations.
- Least ecological impact practices. Resources (local skills, expertise, and knowledge) and construction materials were delivered from the shortest distance, encouraging circularity and reducing ecological impact.

Stakeholder engagement and a comprehensive diagnosis of the core problems were critical steps for successful project implementation. The project team engaged with the school's staff, raising their awareness about the value of nature-based solutions and their potential for addressing LFC's water challenges.

The process involved visits to projects in Tamil Nadu and Pondicherry to demonstrate the functionality of nature-based solutions. The team conducted a comprehensive diagnosis of water usage patterns, identifying suitable collection systems, and determining the appropriate locations for recharge wells based on the ground's absorption capacities.

The challenges at LFC, such as insufficient wastewater management and flooding, mirror the broader challenges experienced in Chennai and beyond. Therefore, raising awareness and building capacity has been ongoing. The pilot serves as an open classroom to build ownership and city-wide capacity to implement and sustain nature-based solutions. After the project opened in August 2023, the pilot has been used regularly for capacity building in Chennai. The lessons learned have positioned it as a model for implementation of nature-based solutions worldwide. ***(https://www.cityof1000tanks.org/)***

Overview of the Water Balance Pilot



STAGE 5: OPERATIONS AND MAINTENANCE

… maintain the project, adapt to change

A project is not complete once construction is finished. Operations and Maintenance (O&M) are critical to preserving functionality, adapting to changing conditions, and optimizing performance over time.

Neglecting maintenance significantly reduces infrastructure's ability to perform. Some issues, like clogged pipes and drains, may go unnoticed until they lead to failures during a disaster or require expensive repairs. This is why agencies responsible for certification, including those for insurance purposes, emphasize the importance of robust O&M practices. Effective O&M requires constant vigilance, clear assignment of responsibilities, and adequate resources. Planning for these aspects must begin in the early stages of project development, where they should be integrated into design considerations. However, securing funding for O&M can be challenging, as it often comes from different sources than those used for implementation. Additionally, transferring responsibilities to other agencies can complicate the process, underscoring the need for a well-structured approach from the outset.

Executive organizations are primarily responsible for O&M, but their success depends on collaboration with contractors, local organizations familiar with regional conditions, and community members who directly benefit from the project. These stakeholders play a vital role in monitoring the project's functionality and contributing to maintenance, especially during regular use. Training local communities on specific O&M tasks can significantly enhance the project's sustainability.

O&M also requires an adaptive management approach, as circumstances often change. Climate shifts, such as increased rainfall intensity or prolonged droughts, alterations in project usage, or new scientific insights, can all necessitate adjustments.

For projects involving nature-based solutions, the boundary between implementation and O&M becomes increasingly blurred. As vegetation grows and ecosystems evolve, the construction and development of the project naturally continues into the O&M stage. Consequently, the focus during this stage shifts from maintaining functionality to continuously adapting and optimizing the project to meet changing conditions. While nature-based solutions are inherently more adaptable to change than traditional hard infrastructure like pipes and pumps, their dynamic nature often demands greater effort and attention to ensure they achieve their intended outcomes.

GUIDANCE

EXECUTIVE ORGANISATIONS

- *Contract and involve local organisations, communities, and networks for operations and maintenance to increase local ownership.*
- *Embed (local) expertise for operations and maintenance from stage 2 (*Ideation*) onwards.*
- *Have a plan for adaptive operations and maintenance, including governance, to adapt to changing circumstances.*
- *Ensure proper monitoring and evaluation of the project.*

CONTRACTORS

- *A contractor operates and maintains the project.*
- *Continuously monitor and learn to improve the project and optimise operations and maintenance by incorporating feedback from performance metrics. This is especially true for projects with nature-based elements that continue to develop over time.*
- *Adjust operations and maintenance to local working methods to make use of existing and known practicalities.*
- *Involve local communities in operations and maintenance. In some cases, local communities may take the role of the contractor; in others they function as users. Either way, they play a significant role in the functioning of the project and need to be involved. Training on specific aspects of operations and maintenance may be necessary.*

CHANGE AGENTS

- *Continue to work with the project, providing feedback on its performance and engaging in operations and maintenance processes, including adaptation.*
- *Support workforce development and training programmes.*
- *Involve local people in operations and maintenance to link with the local context.*

CASE STUDY STAGE 5

Nature-based solutions: How monitoring and local community are vital to operations and maintenance in Demak Indonesia

Green infrastructure projects require more continuous investments in maintenance and monitoring, than conventional, grey infrastructure projects. Nature-based solutions develop over time, are less predictable in their performance, and have multiple benefits. It is important to understand how they perform and adapt them to respond to new insights or climate changes. Involving local communities increases the benefits nature-based infrastructure can bring, providing local jobs and education.

In Demak, on Java's north coast, the deforestation of mangroves has put local livelihoods at risk by leaving a subsiding coast exposed to increased erosion and flooding. The aim of the project was to restore the mangrove belt that protected the coast. Mangroves are also highly effective at removing carbon from the air; they store twice as much carbon as salt marshes and up to four times as much as rainforests (Donato et al., 2011). Another benefit of mangroves is that their root systems form a protective, resource-rich habitat for smaller fish and crustaceans, which benefits nearshore fish populations as well as those farther offshore at the reefs.

When the 'Building with Nature' project in Demak, Indonesia, began in 2013, the objective was to test how permeable structures can stimulate sedimentation and support natural mangrove restoration. The project's physical components were complemented by a Coastal Field School, which focuses on building local capacity through knowledge of the natural system, mixed mangrove aquaculture, and alternative livelihoods. Communities learned to implement sustainable aquaculture and livelihood revitalisation measures while pursuing mangrove restoration along the coast and rivers. This new engagement with coastal restoration and aquaculture revitalisation led to commitments to co-creating a sustainable future. Ecosystem services, avoided losses, and local community impacts are difficult to assess in advance and thus render 'bankable' at the outset. The original project was mostly grant funded, with the aim to develop better tools to analyse the benefits and use them to form a stronger basis for intended subsequent programs in Indonesia as well as other countries. Now, through the monitoring of the project, the results of these investments, with the social-economic and capacity building programme layered on top of the physical interventions, are more evident. While it was originally estimated that the 300 hectares of aquaculture ponds would yield a net profit of USD5,000 per hectare annually, the actual profit, as measured by the community, is multiples of that. The direct economic benefits deliver a net-present value of 20 million on an 8-million-dollar total investment. Along with the other benefits of land value, coastal protection, biodiversity, tourism, recreation, and carbon sequestration, it is now clear that the business case for similar projects should be simple to argue.

The investment in monitoring the project and its benefits, along a broad spectrum of physical, social and economic metrics, will make similar projects more 'bankable' and has set up the approach for future replication and scaling. *(https://www.wetlands.org/case-study/building-with-nature-indonesia/)*

Construction of Permeabable structures in Demak Indonesia

CASE STUDY STAGE 5

Rebuild by Design: Operating and maintaining the Big U

Operations and maintenance are to be considered in the earlier stages of project development when developing the design and iteration and optimising the project plans. The Rebuild by Design example of the Big U shows the importance and complexity of considering operations and maintenance early on.

The Big U vision (see case study: Rebuild by Design: Getting the Big U ready for implementation) proposed a necklace of flood protection projects around Lower Manhattan, New York. Each project was designed with the community to provide local benefits. The idea that these projects improved the waterfront was critical for their successful implementation, because it ensured community support for a large new infrastructure project in an already dense city.

After receiving federal funding for the first phase, the East Side Coastal Resilience (ESCR) project, it became clear how, now that capital for the project was organised, operations and maintenance would take central stage in optimising the design. The four-kilometre-long project intersected land controlled by various city agencies, each of whom was worried about taking on extra responsibilities in their already tight operational budgets.

Each agency had their own design guidelines and details to make sure maintenance could be handled well. To assure the various agencies' support for the project, the design development was driven from the outset by operations and maintenance considerations, with the challenge of integrating all the different standards into one coherent design. An element of ESCR that took a long time to resolve was operation of the various floodgates and other moveable infrastructure required. Since such infrastructure was new to New York, with stringent requirements to make sure it was certified against failure, all agencies were reluctant to take responsibility for it.

For years it was unclear which agency would take this on, while the design work had to move forward. It took real courage from the City of New York to advance the design anyway, and not hit pause. In the end, a new executive organisation, the Bureau of Coastal Protection, was created within the administration operate ESCR and the other new coastal infrastructure that needs to be built.

East Side Coastal Resiliency, floodwall with shifting 1ft weave pattern

STAGE 6 - SCALING

… replicate projects, inform policies, drive change

The project development process outlined in this guidance is designed to create projects that generate impact and drive change beyond their immediate scope and location (see principle: Move beyond single projects to drive change).

As such, scaling is a fundamental aspect of the WaL process. While scaling is presented here as the sixth stage, it is integral to every phase of the project lifecycle. In addition to scaling individual projects, we stress the importance of scaling initiatives to enable their replication in other locations, amplifying their reach and impact.

There are three different ways to understand scaling (Moore et al. 2015):

- **Scaling up:** This involves embedding transformative ideas into laws, policies, and institutional frameworks. For example, WaL principles or project proposals can be adopted into local, regional, or national policy plans, ensuring their influence on broader governance structures.
- **Scaling out:** This focuses on replicating and disseminating project concepts. The initial implementation of a project is crucial as it serves as both proof of concept and inspiration. Once successful, the project can be replicated across districts, cities, and even countries, extending its reach and impact.
- **Scaling deep:** This refers to transforming relationships, cultural values, and beliefs. By engaging in transformative projects, stakeholders gain new perspectives on water and urban resilience, fostering a cultural shift.

Scaling efforts should be integrated into every stage of project development. This can be achieved through capacity building, engaging the right stakeholders in workshops and meetings, and creating pathways for project replication. The WaL initiatives' intensive and inclusive engagement process fosters innovative approaches, builds new partnerships, and cultivates collaborative cultures that transform future project development. By documenting and sharing lessons learned, partners not only enhance collective knowledge but also support scaling up, scaling out, and scaling deep.

Scaling is informed by a strong monitoring and evaluation framework. Lessons learned on what did and did not work can be integrated into the scaling efforts, making new projects and initiatives even more effective (see case study: *Water as Leverage Cartagena: Integrating full feasibility for smooth implementation*).

Finally, actively communicating about project development, WaL principles, and the benefits of successful implementation allows partners to raise awareness and inspire others. This outreach encourages engagement with WaL initiatives and promotes the adoption of best practices shaping the enabling environment for inclusive and transformative urban water resilience.

GUIDANCE	
EXECUTIVE ORGANISATIONS	• *Include scaling activities in all stages of project development.* • *Facilitate learning processes, capture learnings, and communicate these with other initiatives, individuals, and organisations including international financial institutions, knowledge institutes, and NGOs.* • *When communicating project learnings and outcomes, use strategies that speak to people's heads and hearts. For example, use photographs, videos and storytelling; build on (local) cultural practice such as plant-watering ceremonies.* • *Develop a strategy for scaling your initiative. Moving from a first initiative to replication requires different resources, partnerships, and strategies.*
CONTRACTORS	• *Include scaling activities in all stages of project development.* • *Capture learnings.* • *Communicate findings and best practices, for example through guidance and communication materials, toolboxes, training materials, and tools.* • *Explore scaling opportunities (including areas for replication and ways to embed learnings in policies, plans, and projects).*
CHANGE AGENTS	• *Include scaling activities in all stages of project development.* • *Capture learnings.* • *Communicate findings, locally, nationally and globally. Bring your experiences and inspiration to the world by using storytelling and innovative communication tools.* • *Explore scaling opportunities (including areas for replication and ways to embed learnings in policies, plans and projects).* • *Continue capacity building and expand the individuals who know and learn about the project by organising events, site visits, etc.* • *Celebrate success!*

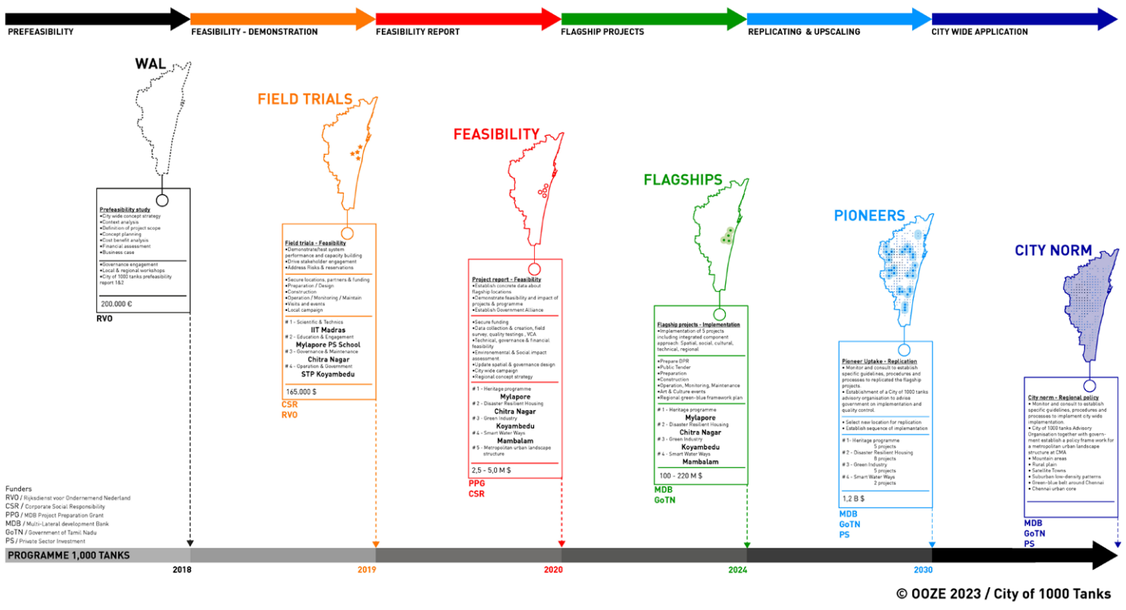
CASE STUDY STAGE 6

Water as Leverage Chennai: Building scaling into each stage of the project development cycle

Together with the City of 1000 Tanks Water Alliance, OOZE Architects & Urbanists created an integrated citywide strategy to enable water resilience across the city of Chennai, India, using nature-based solutions. The project involves an inclusive and incremental process of scaling planned across all project stages. Each stage in project development is an opportunity to engage with direct beneficiaries, forefront local knowledge and needs, co-create solutions, and monitor results to inform future projects. To better understand the needs of local communities, extensive on-ground consultation and spatial surveys were conducted across various beneficiary groups during the prefeasibility phase. For example, focus groups were held with women living in vulnerable communities to identify the everyday impacts of water scarcity and quantify the actual costs of water sourcing.

A citywide strategy for replicating the nature-based solutions components was developed (see figure below). In this strategy, first, field trials are planned to demonstrate and measure the efficacy of the nature-based solutions measures; second, flagship projects will test the implementation of these measures on sites with a specific mix of land-use, beneficiaries, and ownership. Thirdly, flagship projects inform replication across multiple comparable sites. Finally, city-wide implementation is achieved by embedding nature-based solutions in regional policy frameworks.

The Water Balance Pilot (see case study Water as Leverage Chennai: Implementation of the Water Balance Pilot) is the first field trial and was completed in August 2023. The project demonstrates the efficacy of nature-based solutions to harvest rainwater and reuse wastewater to enable water security. The project is enabling awareness and capacity building across beneficiaries and actors. Simultaneously, the project provides insights to experts and potential project developers into usage patterns and operations and maintenance capacities to shape future projects. Such capacity and awareness-building aspects are essential to enable inclusive and economical replication as well as optimisation of the nature-based solutions components.



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CASE STUDY STAGE 6

Water as Leverage Academy: Scaling the WaL approach in Bangkok

The WaL program champions innovation in urban water resilience by implementing WaL initiatives across the globe. To further scale the WaL approach and align with its commitment to the UN Water Action Agenda, the next step is to make the approach—and the lessons learned—accessible for application in other contexts. The WaL Academy will play a key role in supporting and facilitating this process.

The Academy has three aims:

- Evolve Water as Leverage as a living cultural approach—resilient to change, adaptable to different contexts, and proactive in meeting future needs.
- Scale the WaL approach to advance global urban water resilience.
- Inspire a global community to overcome challenges such as fragmented approaches, political divides, and historical patterns of replication in urban water resilience.

In 2024, the WaL Academy Bangkok initiative was organized, consisting of a series of events and workshops. The WaL framework was applied, focusing on addressing the city's water challenges and drawing inspiration from Bangkok's unique experiences. This initiative fostered a collaborative environment among stakeholders to co-create inclusive and climate-adaptive solutions, with a strong emphasis on leveraging nature-based approaches.

Following an initial exploration of hotspots (WaL Library: Bangkok City of Three Water - Hotspot Analysis for Water as Leverage), the first Bangkok workshop took place in July 2024. This collaborative event brought together Thai counterparts, the Dutch Ministry of Infrastructure and Water Management, RVO, the Embassy of the Kingdom of the Netherlands, Deltares, and Landprocess. Building on the findings of the hotspot analysis, the workshop identified critical areas where water and climate-related challenges are affecting the city's biodiversity and living environments.

By embracing the WaL principles, the Academy provides a new lens for addressing Bangkok's water and climate change adaptation challenges and opportunities. During the workshop, Thai stakeholders explored each WaL principle, identifying specific challenges and opportunities to guide and shape future water action.

Water as Leverage Academy in Bangkok

CASE STUDY STAGE 6
Water as Leverage City Champion Challenge

In August 2024, as part of the WaL Multilevel Climate Action Programme, the City Champion Challenge was launched. This initiative aimed to spotlight promising projects with the potential for transformative change, integrating them into the WaL community. By doing so, participants gained increased visibility, expert guidance, and opportunities for knowledge sharing to bring their innovative solutions to life.

The WaL City Champion Challenge adopted an integrated approach to address the impacts of climate change on urban water systems and communities. The challenge focused on critical issues such as flooding, drought, and pollution while promoting innovative, cityled solutions. These initiatives emphasized equity, sustainability, and resilience in urban environments, inspiring others through exemplary water resilience practices.

Urban stakeholders and cities confronting challenges of climate change and urbanization were invited to demonstrate how the WaL principles supported the development of urban water resilience solutions or how these principles could strengthen their initiatives.

A jury of experts from various sectors—including water resilience, urban development, climate adaptation, and community engagement—selected four winning initiatives:

- Kenya: The Kounkuey Design Initiative, which develops community-driven solutions to address water challenges in informal settlements.
- Peru: Aquafondo's Amunas initiative, combining ancestral knowledge with modern techniques to improve water security.
- Spain: Aldayjover's Madrid Metropolitan Forest project, reimagining urban areas through innovative green infrastructure.
- Colombia: Entropía's Quebrada La Torura Parks project, employing ecosystem-based strategies for flood risk mitigation.

The challenge expanded the WaL community and fostered mutual learning among diverse initiatives. It also served as a platform to promote the WaL framework, demonstrating its relevance in addressing complex urban water resilience challenges. By highlighting these exemplary projects, the initiative inspired further global

City Champion Challenge working session, with the four winners, at the World Urban Forum, Egypt, November 2024

Kounkuey Design Initiative / Dallas ASILI (Adaptation Solutions, Inclusive Locally-led infrastructure)

References and Credits

Case studies

Principles

Move beyond single projects to drive system change
Water as Leverage Chennai: How the water balance demonstration project impacts beyond the school alone

Invest early in project development
Water as Leverage Cartagena: Policy and finance workshops

Be inclusive from start to finish
Water as Leverage Chennai: Including youth in Chennai

Design to connect people and inspire action
Water as Leverage Cartagena: Design workshops

Shift from fragmentation to integration
Water as Leverage Wadden: Bringing together different challenges in Harlingen

Embrace water as an opportunity
Water as Leverage Chennai: The cultural value of water: Chennai temple tanks

Ensure projects are bankable
Water as Leverage Semarang: Urban Flood Protection Semarang

Link local actions to global goals
Water as Leverage Academy: Connecting Local and Global at the UN Water conference in New York

Stages

Stage 1: Initiation
- *Water as Leverage for Resilient Cities Asia: How it started*
- *Water as Leverage Wadden: Initiation stage*
- *Water as Leverage: Leadership for change: The role of Henk Ovink*

Stage 2: Ideation
- *Water as Leverage for Resilient Cities Asia: Support track in the ideation stage*
- *Water as Leverage for Resilient Cities Asia: Recognized for its innovative commissioning approach*
- *Water as Leverage Semarang: A comprehensive analysis leading to an integrated vision*

Stage 3: Feasibility
- *Water as Leverage Cartagena: Integrating full feasibility for smooth implementation*
- *Nature-based solutions: The benefits of mangroves for erosion control*
- *Rebuild by Design: Getting the Big U ready for implementation*

Stage 4: Implementation
- *New Clark City: How contracting schemes enable implementation of integrated and resilient urban plans*
- *Water as Leverage Chennai: Implementation of the Water Balance Pilot*

Stage 5: Operations and Maintenance
- *Nature-based solutions: How monitoring and local community are vital to operations and maintenance in Demak Indonesia*
- *Rebuild by Design: Operating & maintaining the Big U*

Stage 6: Scaling
- *Water as Leverage Chennai: Building scaling into each stage of the project development cycle*
- *Water as Leverage Academy: Scaling the WaL approach in Bangkok*
- *Water as Leverage City Champion Challenge*

WaL Library

WaL videos

Local perspectives, global opportunities.
- *Water as Leverage for Resilient Cities Asia.*

WaL Cartagena videos
- *Overview video*
- *Wal Cartagena NY movie*
- *Policy finance workshops in Cartagena*
- *Design workshops 2 Cartagena*
- *Setting the scene Cartagena*
- *Design workshops 3 Cartagena*

WaL documentation (general)

- Water as Leverage for transformative impact (2017) by Dutch special envoy for international water affairs, International Architecture Biennale Rotterdam (IABR), Architecture Workroom Brussels (AWB), supported by the UN/World Bank High Level Panel on Water.
- *Water as Leverage Reflect (2021)*
- *Water as Leverage Call for Action paper (2021)*
- *WaL Cartagena website*

Documentation per stage

Stage 1: Initiation

Hotspots analysis
- *Hotspot analysis NMCG*
- *Bangkok the City of Three Waters. Hotspot Analysis for Water as Leverage*

Setting the scene
- *Setting the Scene WaL Cartagena (movie)*
- *Setting the Scene WaL Wadden*
- *Setting the scene for a call to action, Water as Leverage for Resilient Cities Asia (2018)*
- *Setting the Scene WaL Nakuru*
- *City report Khulna Bangladesh*
- *City report Semarang*
- *City report Chennai*

Tender documents

- *Call for Action WaL Asia*
- *Tender documents WaL Cartagena*

Stage 2 Ideation

Chennai

- *Rise Chennai executive summary report*
- City of 1000 tanks team - *City of 1000 tanks*
- City of 1000 tanks team - *Phase 2 – May 2019 – executive summary*

Khulna

- *Khulna as a water inclusive enclave executive summary report*
- *Natural Drainage Solutions for Khulna City executive summary report*
- *https://www.worldwateratlas.org/narratives/water-as-leverage/wal-in-khulna-khulna-as-a-water-inclusive-enclave/#team*

Semarang

- *One Resilient Semarang executive summary report*
- *Cascading Semarang executive summary report*

Stage 4 Implementation

- *Inauguration of the water balance pilot*
- *BIG U*

Stage 6 Scaling

- *Water as Leverage commitment UN Water Action Agenda*

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This guidance translates the WaL approach - captured from experiences and learnings in previous and ongoing WaL initiatives - into the ‘WaL framework’. Creating the framework and guidance was an exciting journey involving many individuals who, on many ways, contributed to this document and that integrated ‘internal’ insights with ‘external’ perspectives on achieving urban water resilience. The result is the combination of three interacting pathways of guidance development.

Co-creating an understanding of Water as Leverage leading to a framework

Many people and parties have been involved in the various Water as Leverage initiatives in different roles. To integrate and build on various perspectives and experiences workshops were held between September 2023 and January 2024, leading to drafting the Water as Leverage framework with eight principles and six stages.

Data sources: case studies, interviews and WaL materials and literature

The WaL guidance integrates data from four sources. First, the WaL case studies, using both existing materials and new insights from partners. Second, interviews, both new and previously conducted interviews. Third, existing WaL materials were utilized, including WaL Reflect and WaL evaluation reports, project documentation such as tender documents, ‘setting the scene’ reports, project reports from various WaL initiatives and promotional materials like videos and podcasts. Fourth, scientific and research papers related to WaL and relevant subjects were incorporated.

Prototyping and iterating different versions of the guidance

To check the accuracy as well as usability, various iterations of the guidance were shared with a wide group of (WaL) urban experts and potential users for testing and feedback. Drafts of the WaL guidance were tested in workshops to explore practical applications and working methods.

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Colophon

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The WaL Academy
The guidance is a product of the Water as Leverage Academy that intends to:
1. Evolve Water as Leverage as a living cultural approach—resilient to change, adaptable to different contexts, and proactive in meeting future needs.
2. Scale the WaL approach to advance global urban water resilience.
3. Inspire a global community to overcome challenges such as fragmented approaches, political divides, and historical patterns of replication in urban water resilience.