

Resilient Urban Centres and Surrounds

Nature-based solutions for climate
resilient Mekong communities,
environments and economies

Background Paper

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1. Executive summary

Cities in the greater Mekong region are growing rapidly – growth rates of 3–5% each year are higher than the world average. By 2030, more than 40% of the region’s population is expected to live in urban areas.

These larger urban areas are driving economic growth, but how these cities manage their growth will determine the future health, wealth and wellbeing of communities and environments in the greater Mekong region. At the same time, climate change is increasing the pressures facing these rapidly growing urban centres. It is also critical to recognise that cities impact, and are impacted by, their surrounding catchments. Conventional approaches to urban water management relying on large scale ‘grey’ infrastructure solutions alone cannot deliver the social, environmental and economic outcomes greater Mekong region communities desire at a cost that they can afford.

Creating climate resilient urban centres and surrounding areas requires a broader solution set. Nature-based solutions (NbS) – also known as ‘green’ infrastructure solutions – are increasingly being integrated into urban planning to provide more cost-effective and flexible approaches to address the challenges of creating resilient urban centres. Using water management as a catalyst,

better integrated ‘green’ and ‘grey’ infrastructure solutions respond to the contextual features and priorities of the community and environment being considered. As part of an integrated socio-technical approach, they can support climate resilient growth and improved quality of life.

The benefits of NbS and their contribution to social, environmental and economic outcomes is multifaceted, place based and often not well understood or integrated into investment decisions. As socio-technical solutions, delivering innovative NbS at scale requires:

- an enabling policy, regulatory and research environment
- an informed and empowered community
- a capable, collaborative and accountable private sector.

The Resilient Urban Centres and Surrounds (RUCAS) program uses water management as a catalyst to promote urban climate resilience in 4 greater Mekong countries – Thailand, Viet Nam, Cambodia and Lao PDR. The program will support each partner country through 4 stages:

1. Engage greater Mekong country partners on the priorities for action and align the opportunities created by hybrid NbS investments:

The program will engage a wide range of public, private, academic and community stakeholders in each country to understand local issues, priorities and possibilities for their country and the greater Mekong region.

3. Support scaling and wider impact:

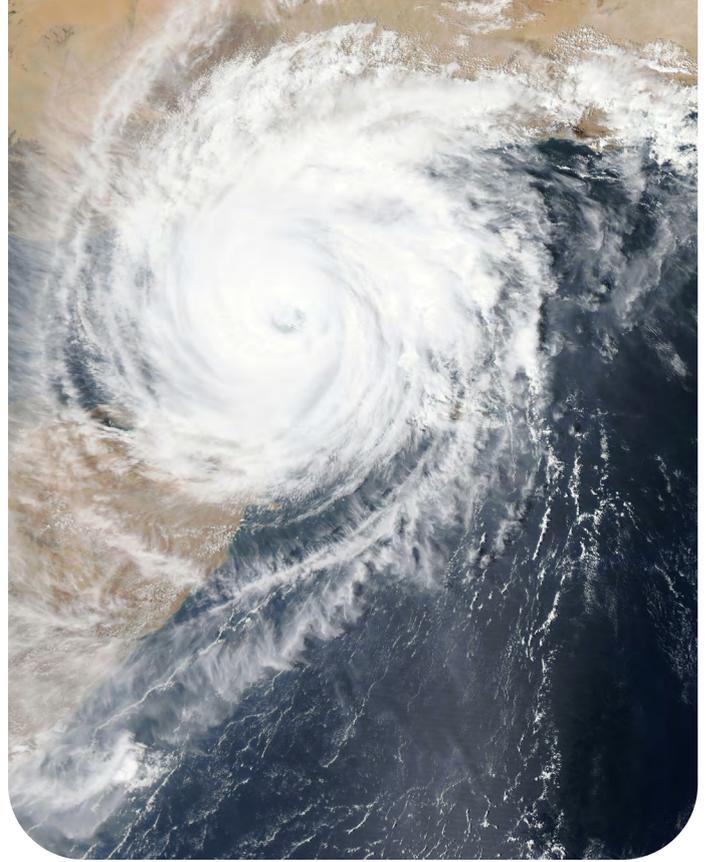
Partners will be supported to scale up application in study locations and beyond by adapting international and local research and resources and identifying pilot opportunities.

2. Demonstrate local application and the economic case for action:

The program will combine local partner insights and international expertise to co-design a case for action. It will show the relevance, design possibilities and economic case for climate resilient NbS in greater Mekong urban communities through local demonstration of concept studies.

4. Leave a lasting legacy of local partnerships and capacity:

Knowledge exchange and training will be designed and delivered in partnership with local public, private and academic institutions. Regional events and online hubs will support wider exchange.



2. Climate change and urbanisation

The most recent report from the Intergovernmental Panel on Climate Change (IPCC) found urban areas are disproportionately affected by climate change. The numbers of people living in urban areas highly exposed to climate change are forecast to increase, with most risk coming from sea level rise, increased tropical storm surge and increased rainfall intensity. Indeed, more than a billion people living in low-lying cities and settlements are expected to be at risk from coastal climate hazards by 2050.¹

But it's not just flooding that is affecting urban populations; they are increasingly exposed to droughts and heatwaves. The IPCC report estimates an additional 350 million people living in urban areas will be exposed to water scarcity from severe droughts if temperatures rise by 1.5°C, rising to 410.7 million at 2°C warming.²

Poor and marginalised people are typically more affected by the negative impacts of climate change and rapid urbanisation. They face greater exposure by living in marginal or unsafe areas, such as on low lying and poorly serviced areas subject to flooding or along unstable riverbanks. They often lack secure tenure rights over land and resources, and the processes of urbanisation can lead to further marginalisation and undermine resilience. They rarely receive investment support that can reduce their exposure to the risks of climate change and urbanisation.

And within poor and marginalised groups, some people are even further disadvantaged. For example, women are often more vulnerable due to the existing socio-economic, political and cultural disadvantages. Young girls are often the most affected and deprived a proper education and productive future. Poor and marginalised households are also less able to absorb and recover from the impact of hazard events and rely on a range of sub-optimal coping mechanisms, with little savings and a lack of access to formal credit mechanisms. During post disaster recovery and reconstruction, women play a special role in sustaining household and community economies and social networks.³

Similarly, ethnic minorities and indigenous peoples experience change most directly, and regularly lose livelihoods and economic options during rapid urbanisation.

Impacts in greater Mekong countries

Asia is particularly affected by the combined challenges of rapid urbanisation and climate change. In most of developing Asia, urbanisation has been accompanied by slums and shelter deprivation, informality, worsening of the living conditions, and increasing risks due to climate change and exclusionary urban forms. According to UN-HABITAT, Asia has 60% of the world's total slum population. In absolute terms, the number of informal dwellers in the developing world is growing. Between 1990 and 2008, the urban share of Asia's poor rose from 15.7% to 21.9%.⁴

Cities in the greater Mekong region are no exception. Urban growth rates of 3–5% each year are higher than the world average. By 2030, more than 40% of the region's population is expected to live in urban areas.⁵ These larger urban areas are driving economic growth, but how these cities manage their growth will determine the future health, wealth and wellbeing of communities and environments in the greater Mekong region.

1 IPCC, 2022, *Climate Change 2022: Impacts, Adaptation, and Vulnerability*, Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge.

2 IPCC, 2022, *Climate Change 2022: Impacts, Adaptation, and Vulnerability*, Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge.

3 K Delfau and P Yeophantong, 2020, *State of Knowledge: Women and Rivers in the Mekong Region*. Oakland, USA: International Rivers.

4 OP Mathur, 2014, *Urban poverty in Asia*, Asian Development Bank, Manila.

5 F Steinberg and J Hakim, 2016, *Urban development in the Greater Mekong Subregion*, Asian Development Bank, Manila.





↑ Ho Chí Minh, Vietnam

The rapid urban growth is often characterised by land and resource appropriation, and the transformation of natural ecosystem functions. These changes have a cumulative effect on the resilience of urban centres.

The demand for energy and resources has increased significantly. For example, demand for energy in Lower Mekong countries is projected to double from 157.8 Mtoe (million tons of oil equivalent) to 319.6 Mtoe between 2010 and 2035.⁶ Similarly, electricity consumption by communities in the Mekong delta increased by 10.7% between 2010 and 2018, and is forecast to rise by 2.6 times by 2030.⁷ Pollution and waste management challenges are increasing, e.g. the Mekong River transports an estimated 40,000 tonnes of plastic to the ocean each year.⁸

At the same time, climate change is increasing the pressures facing these rapidly growing cities. Floods, droughts and rising temperatures now impact greater Mekong communities, putting future growth at risk. For example, seasonal flooding is a natural part of life in greater Mekong countries, playing an important role in sustaining agricultural production in delta areas.⁹ The communities living in floodplains rely on traditional knowledge and experience to manage and benefit from these seasonal floods.¹⁰

However, the nature of floods in countries like Thailand, Viet Nam, Cambodia and Lao PDR has become less predictable in recent years. Sand mining and transformed river flows from dams have altered hydrological flow and ecosystem functions across the greater Mekong region. These changes are affecting cities and peri-urban areas, as well as rural sectors, particularly fishing and agriculture. And these changes are further exacerbated by climate change and weather extremes.

A survey of lower Mekong communities found around 43% of households experienced flooding between 2015 and 2018.¹¹ The average annual cost of floods in the Lower Mekong Basin (LMB) is estimated to cost around US\$60–70 million.¹²

The incidence and severity of droughts in greater Mekong countries is also increasing. Average daily temperatures across Southeast Asia have increased 0.5–1.5°C between 1951 and 2000. By the end of the century, the region is expected to warm another 2–4°C.¹³ The same survey of lower Mekong communities found 39% of households experienced drought in the 3 years between 2015 and 2018 years and 25% of households experienced asset damage and other losses by drought.¹⁴

6 Open Development Mekong, 2022, *Energy*, East-West Management Institute, New York City.

7 T Quang, 2019, 'Electricity consumption in Mekong delta rises', *Saigon News*, Saigon.

8 University of Hull, 2022, *River of plastic*, Hull.

9 E Park, HH Loc, TD Dung, X Yang, E Alcantara, E Merino and VH Son, 2020, Dramatic decrease of flood frequency in the Mekong Delta due to river-bed mining and dyke construction. *Science of The Total Environment*, 138066.

10 M Boyland, 2019, *In pursuit of effective flood risk management in the Mekong Region*, Discussion Brief, Stockholm Environment Institute, Stockholm.

11 Mekong River Commission, 2021, *Social impact monitoring and vulnerability assessment 2018: Report on 2018 baseline survey of the Lower Mekong Mainstream and floodplain areas*, MRC Secretariat, Vientiane.

12 Mekong River Commission, 2012, *The impact and management of flood and droughts in the Lower Mekong Basin and the implication of possible climate change*, Flood Management and Mitigation Programme, Working paper 2011-2015, MRC Secretariat, Vientiane.

13 World Wide Fund for Nature, 2009, *The Greater Mekong and climate change*, Bangkok.

14 Mekong River Commission, 2021, *Social impact monitoring and vulnerability assessment 2018: Report on 2018 baseline survey of the Lower Mekong Mainstream and floodplain areas*, MRC Secretariat, Vientiane.

3. Creating climate resilient urban centres

While rapid urbanisation is increasing the number of people exposed to climate change effects, it also presents an opportunity to adapt urban centres and make them more resilient to climate change. A recent IPCC report highlighted the concept of climate resilient development as a framework for addressing the impacts of climate change and rapid urban growth, particularly for the most marginalised groups.¹⁵

The IPCC defines climate resilient development as combining strategies to adapt to climate change (adaptation) with actions to reduce greenhouse gas emissions (mitigation) to support sustainable development for everyone. It involves integrating action across the different systems that intersect to form urban areas, including energy, industry, health, water, food, urban development, housing and transport. The aim is to manage the complex interactions between these systems to harness opportunities to accelerate safe and fair growth and ensure activity in one system does not cause harm in another.

Because it involves coordinating activities across systems, climate resilient development requires collaboration from everyone in government, the community and the private sector. In this way, co-designed solutions align with local and regional contexts and development pathways.

Experience in Australia and other countries shows climate resilient development can be operationalised through a water sensitive approach (Figure 1). A water sensitive approach puts water at the centre of urban planning, to create solutions that are flexible, adaptable, cost-effective and multifunctional. Specifically, water sensitive approaches combine nature-based and conventional infrastructure solutions. And together with informed communities, they support growth and build resilience to extreme events. Importantly, these approaches take action at a range of scales as part of an integrated portfolio of measures that respond to the unique issues and opportunities of a particular urban area and catchment.¹⁶

Water sensitive approaches bring together nature-based and conventional infrastructure solutions to deliver multiple values at a range of scales



Figure 1: Examples of water sensitive solutions at a range of scales

14 IPCC, 2022, *Climate Change 2022: Impacts, Adaptation, and Vulnerability*, Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge.

16 For more information on water sensitive city approaches see <https://watersensitivecities.org.au>.



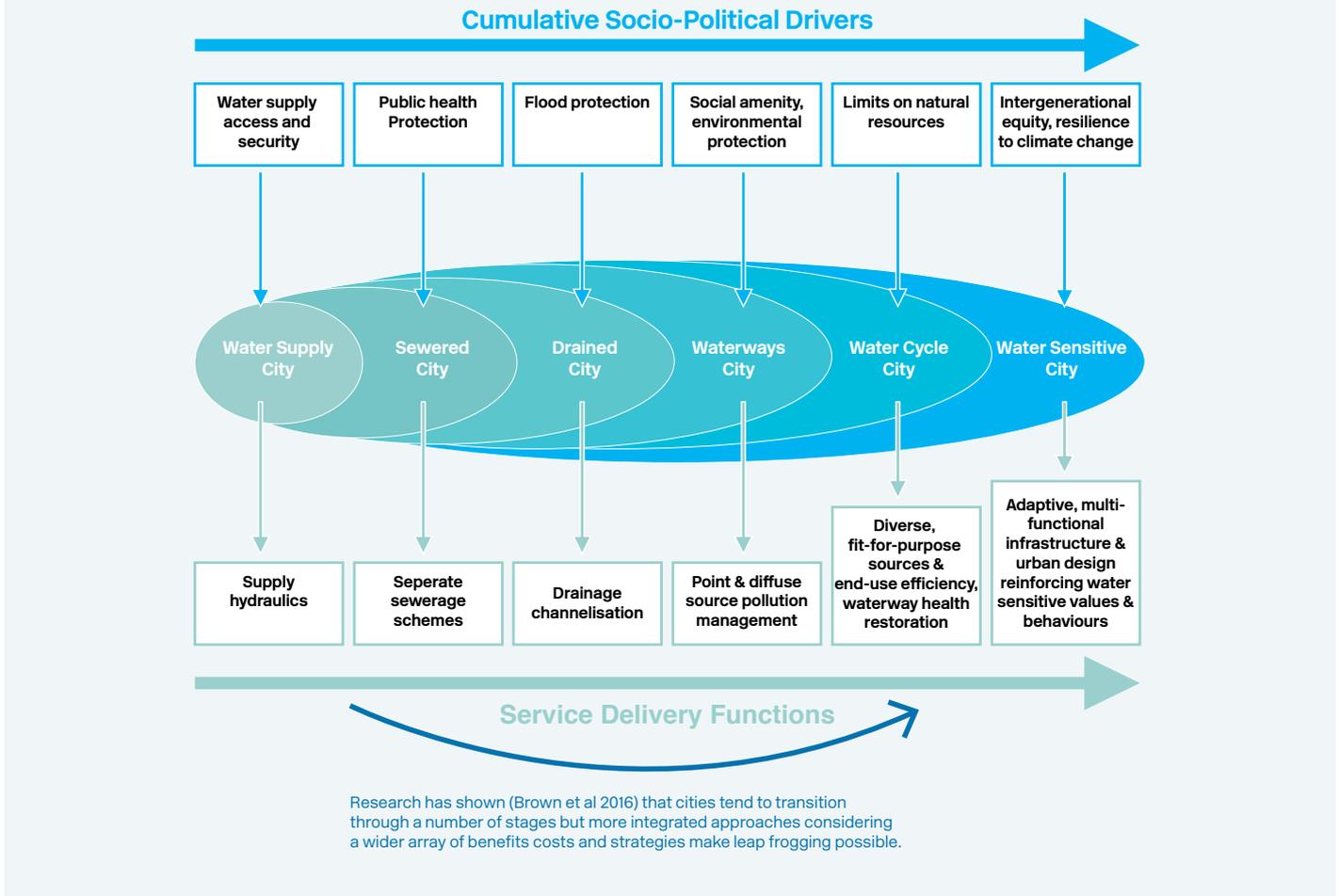


Figure 2: Urban Water Transition Framework¹⁷

Water sensitive approaches provide opportunities for greater Mekong countries to ‘leapfrog’ early states of urban development towards more water sensitive approaches (Figure 2).¹⁸ As greater Mekong countries industrialise and urbanise, cities have an opportunity to ‘leapfrog’ transition stages, by implementing multi-functional, integrated and sustainable approaches across household, precinct, city and catchment scales.

Central to leapfrogging is integrating nature-based solutions (NbS) – also known as ‘green’ infrastructure solutions – with conventional urban water infrastructure. NbS are defined as ‘actions to protect, sustainably manage, and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human wellbeing and biodiversity benefits’.¹⁹ These hybrid solutions respond to the contextual features and priorities of the community and environment and can support climate resilient growth and improved quality of life. A good example is using public open spaces and wetlands to manage stormwater. These areas can treat and store stormwater during storm events, support ecological biodiversity and – if effectively landscaped – can be used for recreation and commercial activity. At scale, they can also influence the local microclimate.

The Resilient Urban Centres and Surrounds program will use water sensitive approaches to ensure urban communities:

- **Take action** to reduce the rate and magnitude of climate change and proactively enhance gender equity, disability and social inclusion outcomes
- **Are ready** for a wide range of extreme events (including flood, drought, fire, extreme heat, landslides) through locally appropriate hybrids of structural measures (e.g. flood protection works, flexible energy and water supply options) and non-structural solutions (early warning systems and planning controls)
- **Respond** effectively via engaged communities and resilient hybrid infrastructure that are supported by appropriately trained and resourced experts who reflect the diversity of the communities they serve
- **Recover quickly** when these events occur in a way that also improves equity, efficiency and long term growth.

17 R Brown, B Rogers and L Werbeloff, 2016, *Moving toward Water Sensitive Cities: A guidance manual for strategists and policy makers*, Cooperative Research Centre for Water Sensitive Cities, Melbourne.

18 R Brown, N Keath and T Wong, 2009, ‘Urban water management in cities: historical, current and future regimes’, *Water Science and Technology*, 59(5).

19 IUCN, nd, *Nature-based solutions*.

4. Our approach

Conventional urban water approaches relying on large scale 'grey' infrastructure solutions alone cannot deliver the social, environmental and economic outcomes greater Mekong region communities desire at a cost that they can afford. The Asian Development Bank estimated the financing gap for water and sanitation infrastructure in South Asia to be around US\$100 billion per year.²⁰

Creating resilient urban centres and surrounds requires a broader solution set that includes NbS. The use of NbS in cities is growing in popularity in the greater Mekong region (Box 1).

Box 1: Nature-based solutions in greater Mekong countries

From July 2020 to November 2021, national and international experts came together to apply nature-based solutions (NbS) in 4 case studies in Thailand and Viet Nam:



The Sukhumvit Green Triangle, Bangkok: A 'green triangle', connecting Benjakitti Park, Lumpini Park and the dense, urban area to the north of Benjakitti Park via a network of multifunctional green space that showcases world class future city solutions in Bangkok.



A cool green central business district for Rayong: Streetscape transformation throughout the central business district, incorporating a network of green assets to improve thermal comfort, mitigate flooding and increase natural infiltration.



Tam Phu Park, Thu Duc City – A multifunctional urban wetland: Transformation of Tam Phu Park in Ho Chi Minh City's Thu Duc City innovation hub into Viet Nam's first Internet of Things enabled multifunctional urban wetland park.



Duong Dong Freshwater Wildlife Conservation Park, Phu Quoc: Enhanced flood management via a multifunctional freshwater wildlife conservation park, presenting a draw for tourists, a recreational space for residents and demonstrating circular economy and sustainability principles.

For each case study, concept designs showed what is possible, and the economic assessment provided the case for further investigation. Each context had unique challenges and opportunities, yet the case studies demonstrated the significant and quantifiable benefits of NbS, and built the case for broader upscaling across the greater Mekong region.

These case studies built on several completed in China and Australia.

²⁰ S Ra and Z Li, 2018, *Closing the financing gap in Asian infrastructure*, ADB South Asia Working Paper Series no. 57, Asian Development Bank, Manila.



And while there is widespread in-principle support to more effectively integrate green, grey and non-structural interventions, NbS application at scale is limited in greater Mekong region countries. Factors constraining its application include:

- limited local capacity to identify and apply NbS and non-structural solutions to local context issues and opportunities
- limited capacity to build the scientific and economic case for change, develop rigorous comparisons of options from a whole-of-community perspective and secure sustainable, lifecycle funding to deliver long term value
- a lack of community or private sector participation and support.

And even when concepts are proven as effective, barriers prevent their upscaling, such as absent or inhibitory policy, strategy and regulatory frameworks. Water management in greater Mekong countries can be complex because river basins often overlay different administrative zones, both within and between countries, increasing the number of parties involved in managing them. Multiple levels of decision making can also have overlapping and competing tasks, policies and responsibilities. Further, policy makers, planners and service delivery agencies may lack the legal authority, institutional capacity, and financial and physical resources to plan and ensure plans are implemented at scale.

Program overview

The Resilient Urban Centres and Surrounds (RUCAS) program uses water management as a catalyst to promote urban climate resilience in 4 greater Mekong countries – Thailand, Viet Nam, Cambodia and Lao PDR. Through local works on-ground, the program will demonstrate how climate resilient NbS can address local issues and build skills that can be applied across the region.

The program will support each partner country through 4 stages (Figure 3).

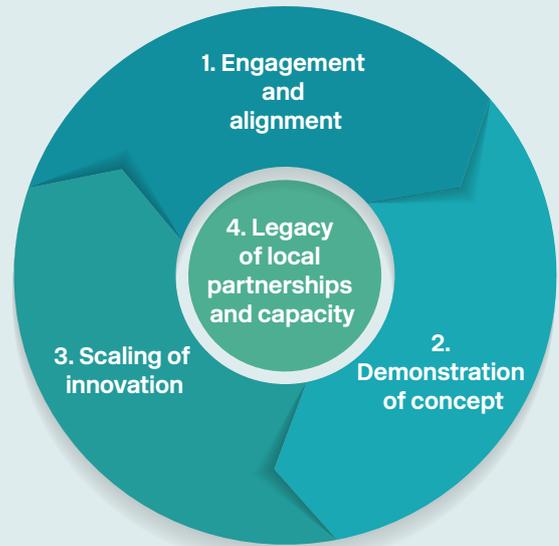


Figure 3: Overview of the program

1. Engage greater Mekong country partners on the priorities for action and align the opportunities created by hybrid NbS investments:

The program will engage a wide range of public, private, academic and community stakeholders in each country to understand local issues, priorities and possibilities for their country and the greater Mekong region.

2. Demonstrate local application and the economic case for action:

The program will combine local partner insights and international expertise to co-design a case for action. It will show the relevance, design possibilities and economic case for climate resilient NbS in greater Mekong urban communities through local demonstration of concept studies.

3. Support scaling of innovation and wider impact: Partners will be supported to scale up application in study locations and beyond by adapting international and local research and resources and identifying pilot opportunities.

4. Leave a lasting legacy of local partnerships and capacity:

Knowledge exchange and training will be designed and delivered in partnership with local public, private and academic institutions. Regional events and online hubs will support wider exchange.

5. Supporting practical application and scaling

This program adds to a growing portfolio of studies demonstrating the flexibility and scalability of NbS and their capacity to be integrated with large conventional solutions and non-structural solutions to support climate resilient development. Local relevance and application will be demonstrated in up to 8 locations (one large city and one regional centre in each country). These studies will also inform development of scaling strategies to support wider application in a locally appropriate way.

In each location, we will identify, value and choose an appropriate mix of climate resilient development strategies for a particular context. This process involves:

- understanding the objectives and functions of the urban area (e.g. flood protection, water security, recreation and amenity, public health, biodiversity, economic development) and how they interact with the wider catchment and regional factors
- understanding the climate hazards affecting the urban area (e.g. floods, droughts, heatwaves) and how those hazards will affect the objectives and functions of the urban area
- developing context-appropriate interventions
- using benefit–cost analysis to identify and compare the direct and indirect benefits, costs and risks of the various interventions and decide on the optimal approach
- determining the distribution of benefits, costs and risks across different locations, different social groups and over time to explore how to fund and finance the optimal approach (Figure 4).

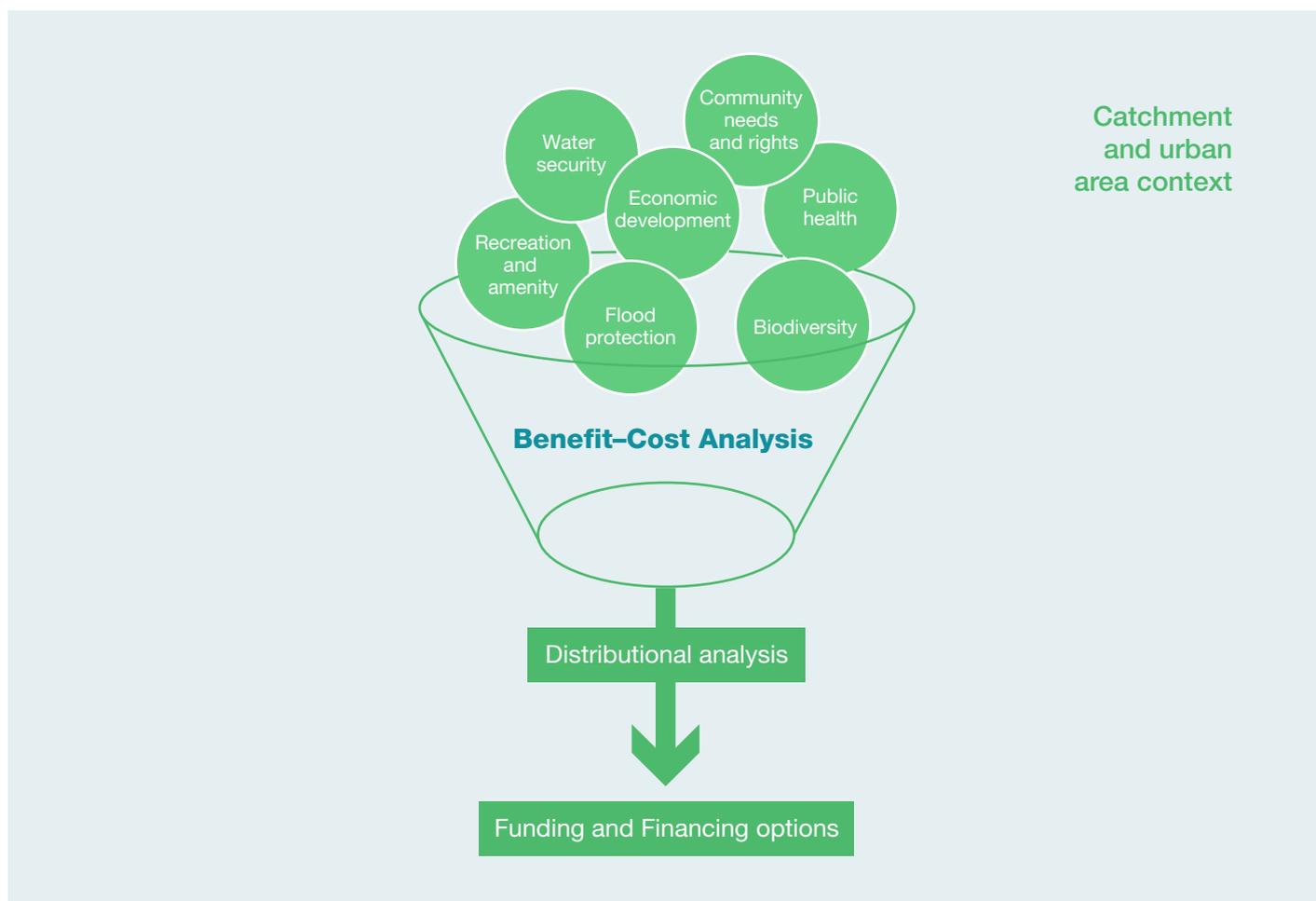


Figure 4: Determining the optimal interventions to support climate resilient development



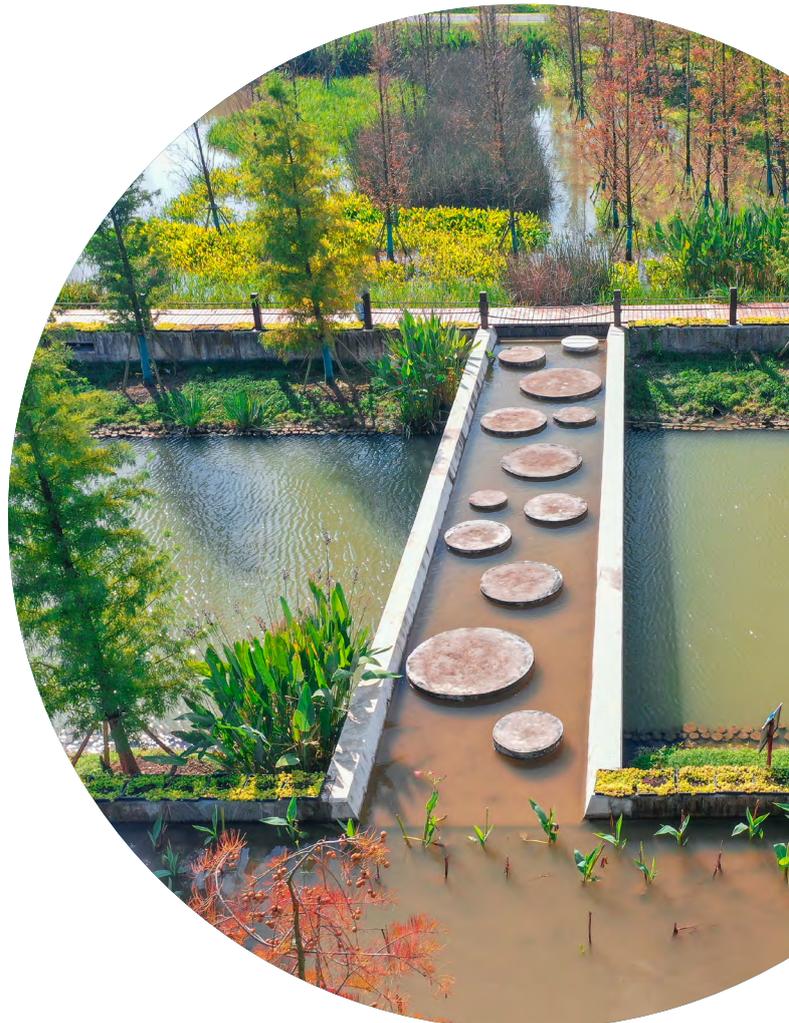


6. Achieving impact through collaboration

The RUCAS program is funded by the Australian Government Department of Foreign Affairs and Trade (DFAT). DFAT, in collaboration with international and national partners, also provides high level oversight for program development and implementation.

We have a team of international and national specialists in water and urban planning, climate adaptation, disaster risk management, nature-based measures, water sensitive urban design, GEDSI (Gender Equality, Disability and Social Inclusion) and community engagement, investment evaluation and economic reform, communications, training and events management.

We know that each urban centre is unique and we welcome partnerships with regional and municipal agencies as well as non-government and private sector organisations. These partners will play a key role in helping identify key issues and upscaling in each location.



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Glossary

Climate resilient urban development	Combines strategies to adapt to climate change (adaptation) with actions to reduce greenhouse gas emissions (mitigation) to support sustainable development for everyone. It involves integrating action across the different systems that intersect to form urban areas, including energy, industry, health, water, food, urban development, housing and transport.
Ecosystem services	The benefits provided to humans through the transformations of resources (or environmental assets, including land, water, vegetation and atmosphere) into a flow of essential goods and services e.g. clear air, water and food.
Gender Equality, Diversity and Social Inclusion (GEDSI)	<p>Inclusion is a process of ensuring everyone is able to participate in decision making related to their infrastructure and service needs. It is also an outcome that is achieved when everyone can have their needs and rights met, even if they are met differently.</p> <p>A GEDSI lens is used to prevent unintended harm, exclusion and further marginalisation of at risk groups, and to promote their rights, equitable opportunities and benefits.</p>
Nature-based solution (NbS)	Actions that intentionally protect, sustainably manage, or restore nature with the additional goal of maintaining ecosystem services that benefit human development.
Resilient Urban Centres and Surrounds (RUCAS)	Program that uses water management as a catalyst to promote urban climate resilience in 4 greater Mekong countries.
Water sensitive city	<p>A place that:</p> <ul style="list-style-type: none">• serves as a potential water supply catchment, providing a range of different water sources at a range of different scales, and for a range of different uses• provides ecosystem services and a healthy natural environment, thereby offering a range of social, ecological and economic benefits• consists of water sensitive communities where citizens have the knowledge and desire to make wise choices about water, are actively engaged in decision making, and demonstrate positive behaviours.

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