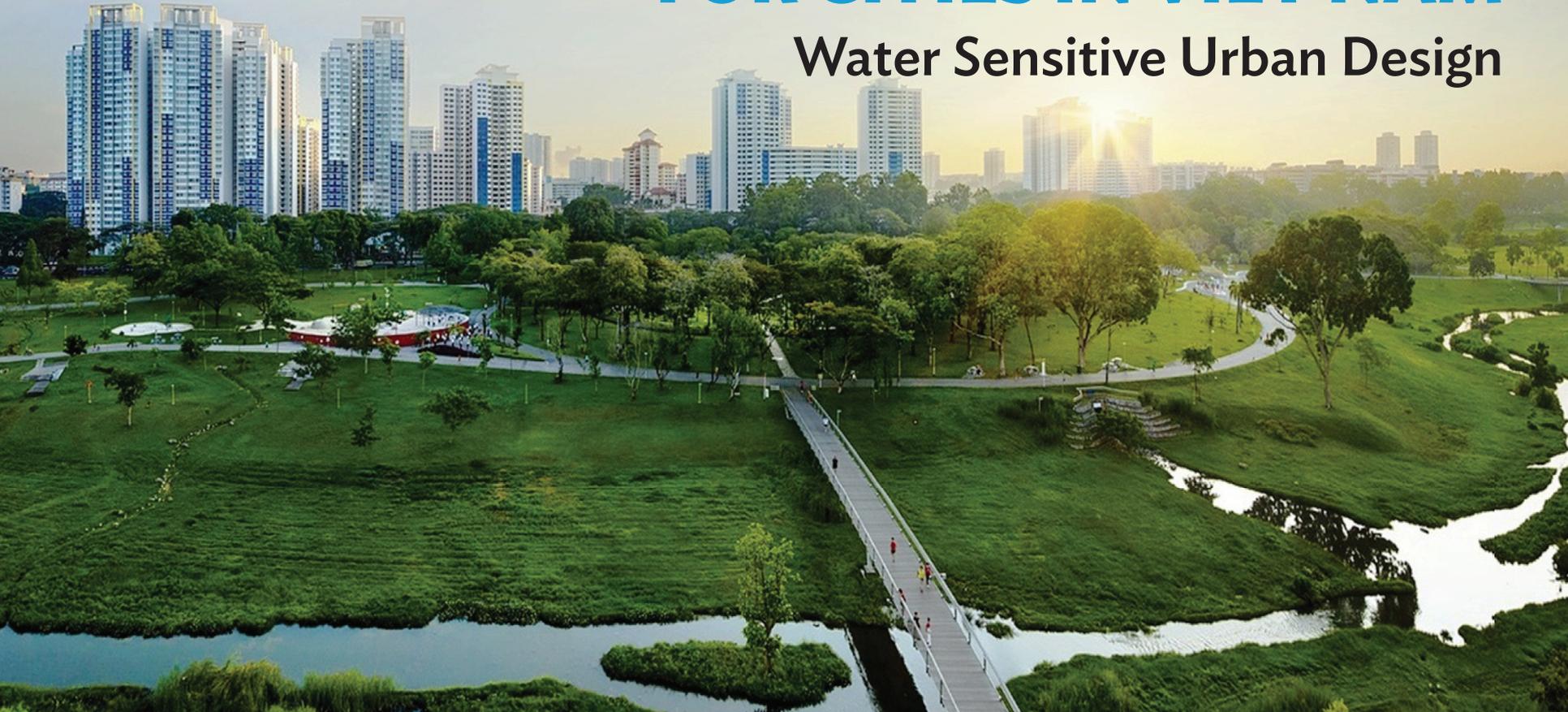


# NATURE-BASED SOLUTIONS FOR CITIES IN VIET NAM

## Water Sensitive Urban Design



URBAN CLIMATE  
CHANGE RESILIENCE  
TRUST FUND  
Asian Development Bank



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## Acknowledgments

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On the cover: Bishan–Ang Mo Kio Park—a symbol of Singapore’s success in sustainable landscape and urban design.

All photos in the booklet are by ADB and Ramboll Studio Dreiseitl, unless specified.



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# Background

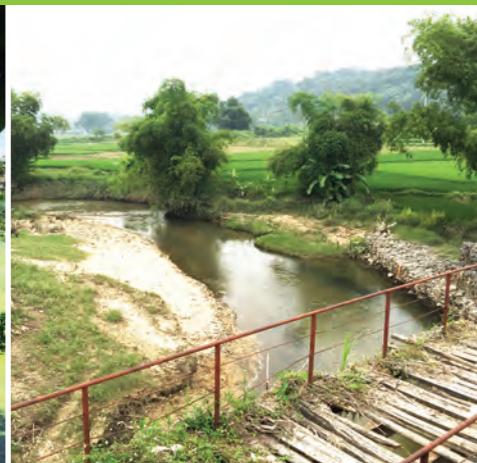
Water sensitive urban design (WSUD) is a relatively new urban development approach in developing Asian cities. Its application involves the integration of water cycle management with the built environment through urban planning and design. Specifically, it integrates water flows in urban landscaping and considers all aspects of the urban water cycle—including storage, reuse, treatment, retention, and infiltration of runoff water—as a valuable urban resource.

WSUD is a component of nature-based solutions which use the natural environment (e.g., soil, water, plants) to respond to diverse environmental, economic, social, and climate

challenges. This design works with nature to make use of water in creating urban built environments that are healthy and more livable. WSUD provides diverse measures including wetlands, vegetated swales, bioretention basins or artificial lakes, rain gardens, green roofs, permeable pavements, infiltration wells, and cleansing biotopes. These can either complement or replace gray infrastructure depending on the specific purposes and localized contexts.

The WSUD concept and tools are flexible enough to be inserted in different types of urban development. Among others, parks and open spaces are ideal locations for WSUD integration.

With ADB assistance, Vinh Yen, Hue, Ha Giang, and Ho Chi Minh City will integrate nature-based solutions through the rehabilitation of their ponds, parks, and rivers, thereby greatly increasing their sustainability and climate resilience.



By attracting people closer to water and nature, WSUD helps cities transform their spaces into vibrant centers of community life. The probable increase of land values and tax revenues and newly created jobs can possibly offset the cost of developing and maintaining WSUD.

This innovative approach could be most suitable for expanding cities in Viet Nam and Southeast Asia, which are exposed to climate change-induced disasters and environmental degradation. Potentially contributing to urban sustainability, WSUD could be an efficient solution that Vietnamese cities can tap into to enhance urban environments and the quality of life of urban dwellers.

The Asian Development Bank (ADB) and the Urban Climate Change Resilience Trust Fund, in collaboration with Ramboll Studio Dreiseitl, support the WSUD approach and have partnered to produce this publication—an output of an ongoing effort to make cities more prosperous, resilient, and livable. The integration of WSUD in Vietnamese cities is being undertaken by the ADB-supported Secondary Green Cities Development Project and the proposed Ho Chi Minh City Climate Resilient Urban Services Project. The Secondary Green Cities Development Project is also supported by the Global Environmental Facility and three secondary cities—Vinh Yen, Hue, and Ha Giang—all participate in the Global Platform for Sustainable Cities, which aims to promote integrated solutions for sustainable cities.

Site visits, technical discussions, and brainstorming sessions were conducted from July to December 2018 to improve the urban design of the four Vietnamese cities.

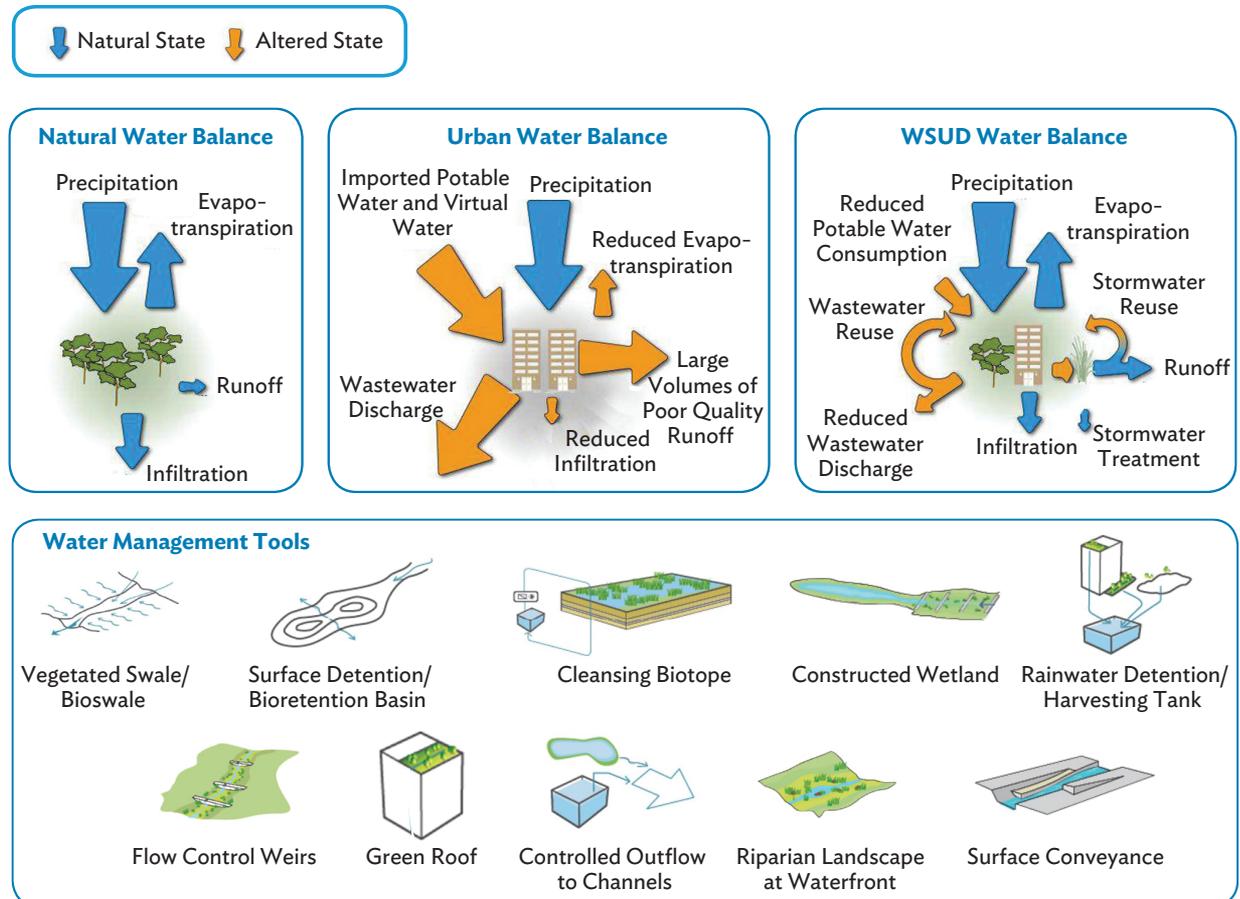


# What Is Water Sensitive Urban Design?

## Basic Concept

WSUD involves the integration of water cycle management with the built environment through urban planning and design.

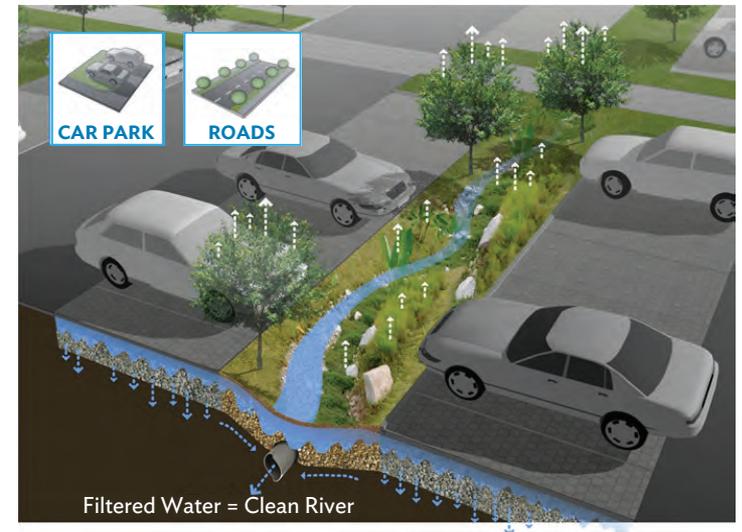
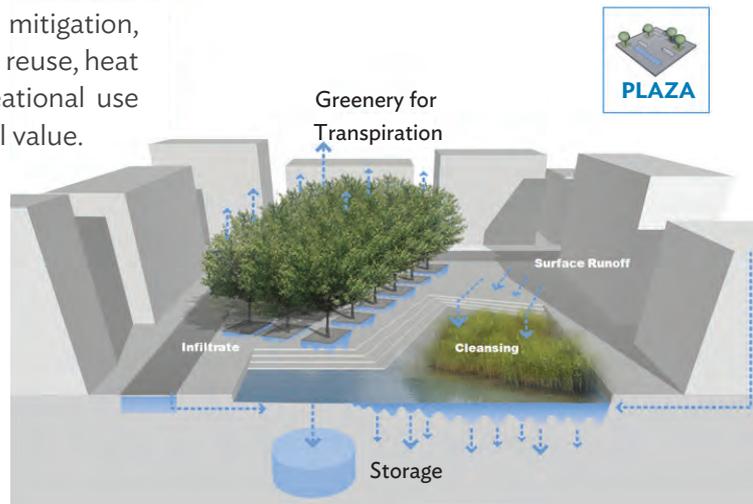
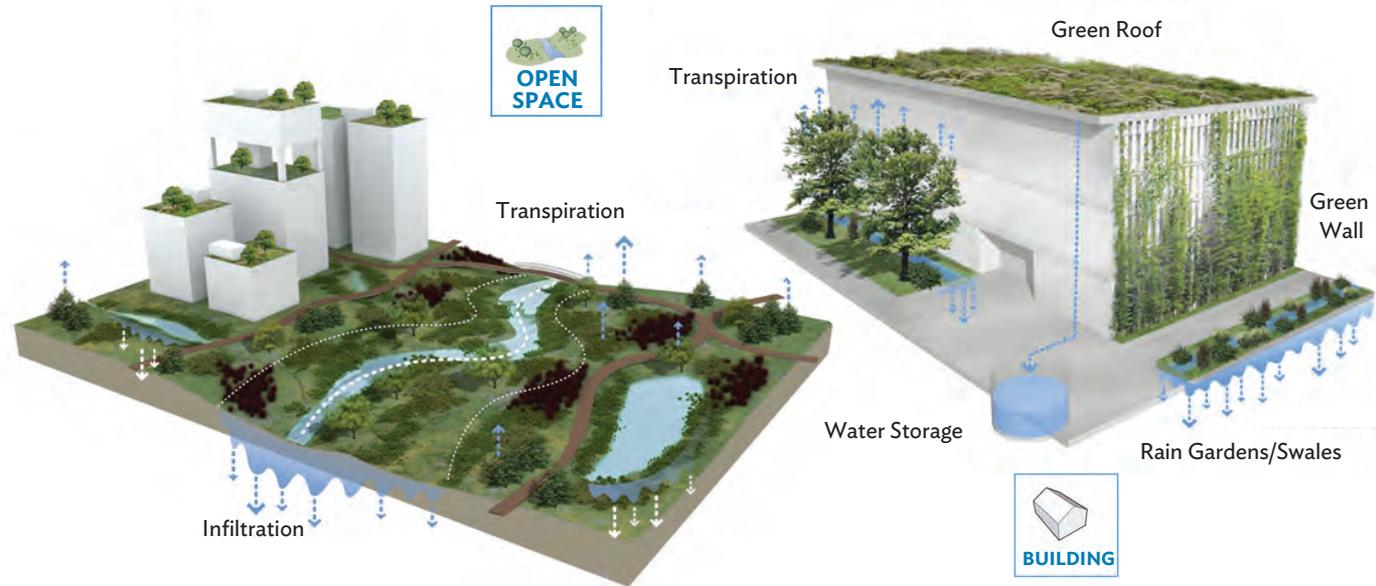
It is an ecosystem-based adaptable concept for long-term urban planning and mimics the water balance of nature. It could enhance livability values for city dwellers and improve urban biodiversity. WSUD tools include designing vegetated swales, wetlands, bioretention basins or artificial lakes, rain gardens, green roofs, permeable pavements, infiltration wells, and cleansing biotopes.



Source: A. Hoban and T.H.F. Wong, 2006. *WSUD Resilience to Climate Change*. Paper presented at the first Australian National Hydropolis Conference. Perth. 8–11 October.

## Applications

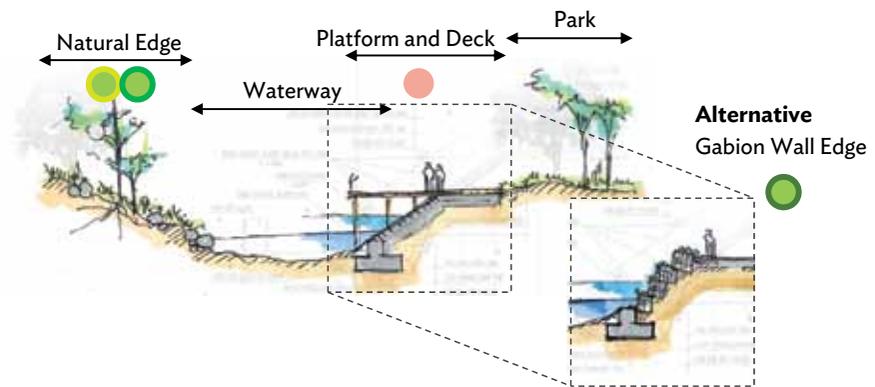
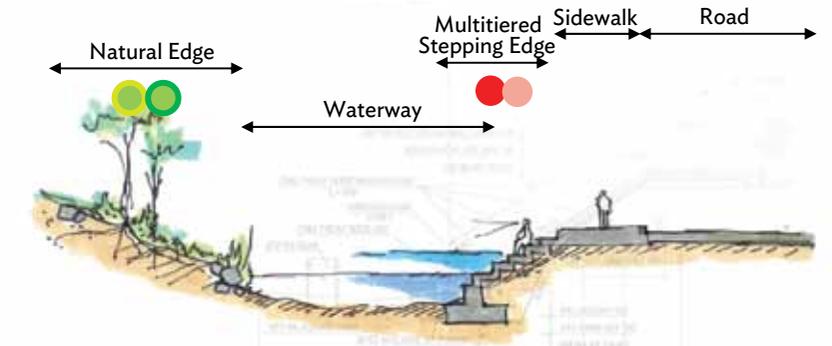
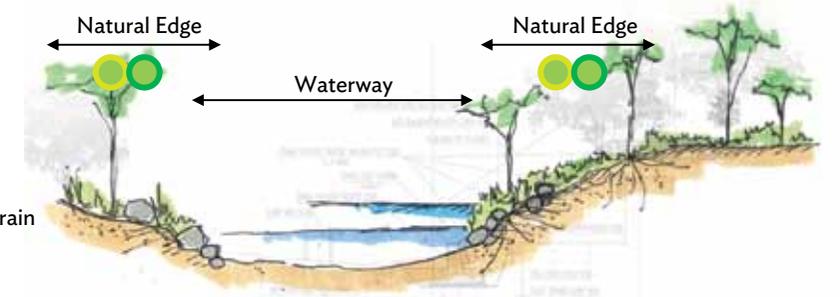
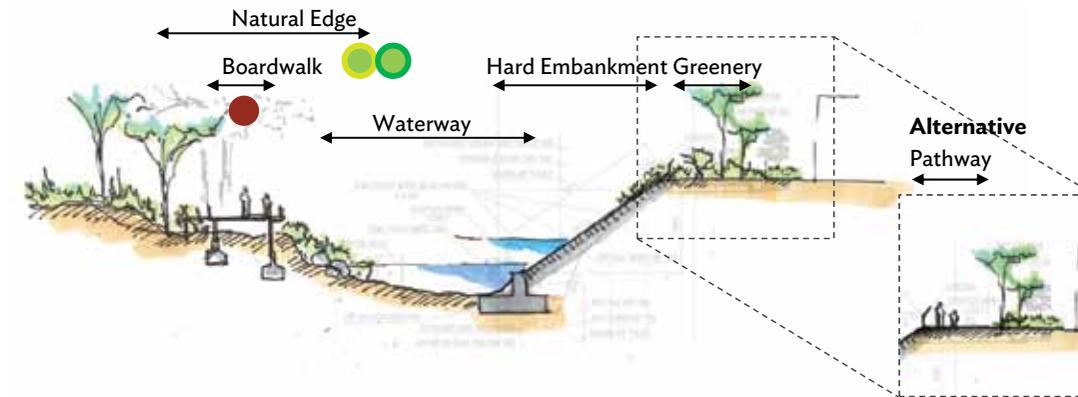
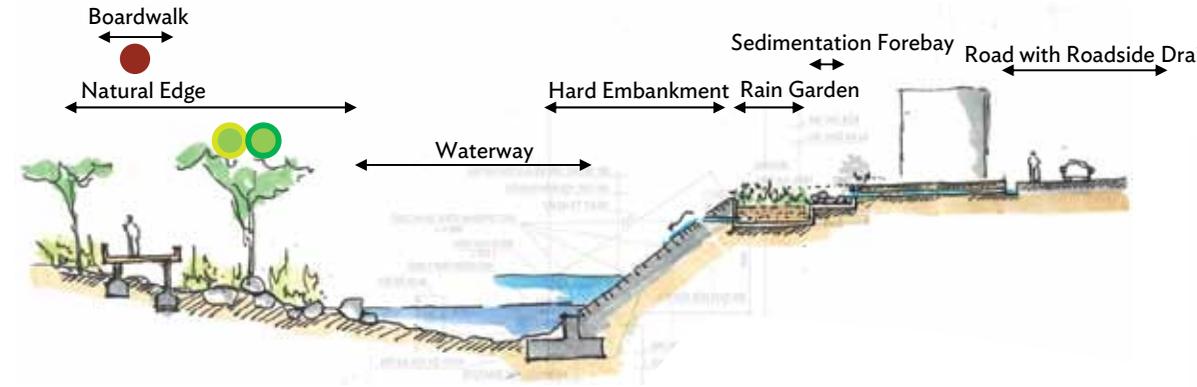
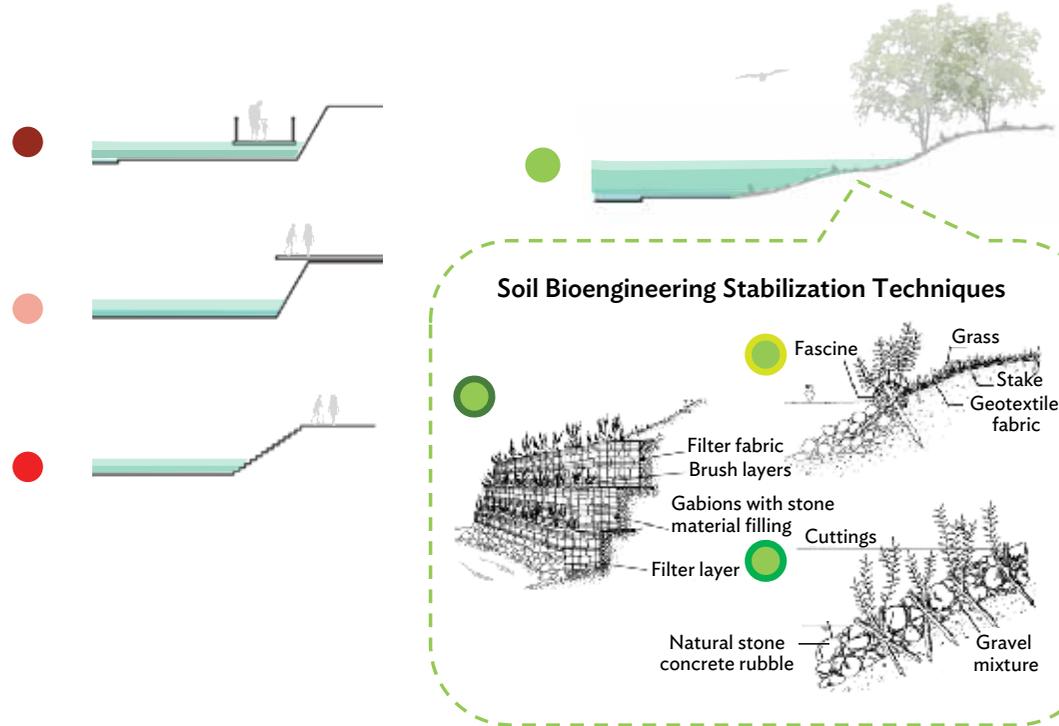
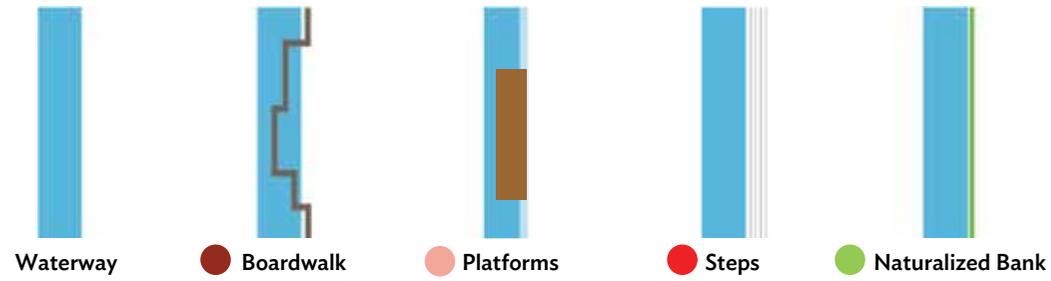
The WSUD concept and tools are flexible enough to be inserted in different types of urban development. Large open space with waterways, a building unit, civic plaza, and hardscapes (car park and roads) are typical options for application. In any case, a softscape plays a significant role in storing, treating, and conveying water for various purposes: flood mitigation, runoff harvesting and reuse, heat mitigation, and recreational use with added ecological value.



# Key Water Sensitive Urban Design Components

## Multi-edge Treatment Types

One of the important factors in WSUD is the use of multi-edge treatment. Edge refers to the perimeter of the water, such that a water's edge is the intersection between people, water, and aquatic wildlife. It is critical to create a diverse sectional profile along the edge of the water to have added social and ecological values. The following typologies are some of the schematics for designing a lively waterfront environment.





Kindergarten pupils visit the Bishan–Ang Mo Kio Park in Singapore to learn about local biodiversity since the park has now become home to numerous species of flora and fauna.

## Benefits of Water Sensitive Urban Design



Mitigates the risk of climate hazards such as flooding and droughts



Improves water quality



Restores and enhances urban ecosystem and biodiversity



Improves community well-being and healthy living environment



Conserves water



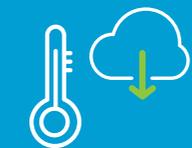
Controls soil erosion and sedimentation



Stimulates local economies and creates new jobs by creating recreation and tourism services



Increases land value and government revenues



Mitigates urban heat island effect



Contributes to climate change mitigation by increasing carbon sequestration



Enhances sustainable use of energy and urban resources



Helps revitalization of neglected areas and urban regeneration



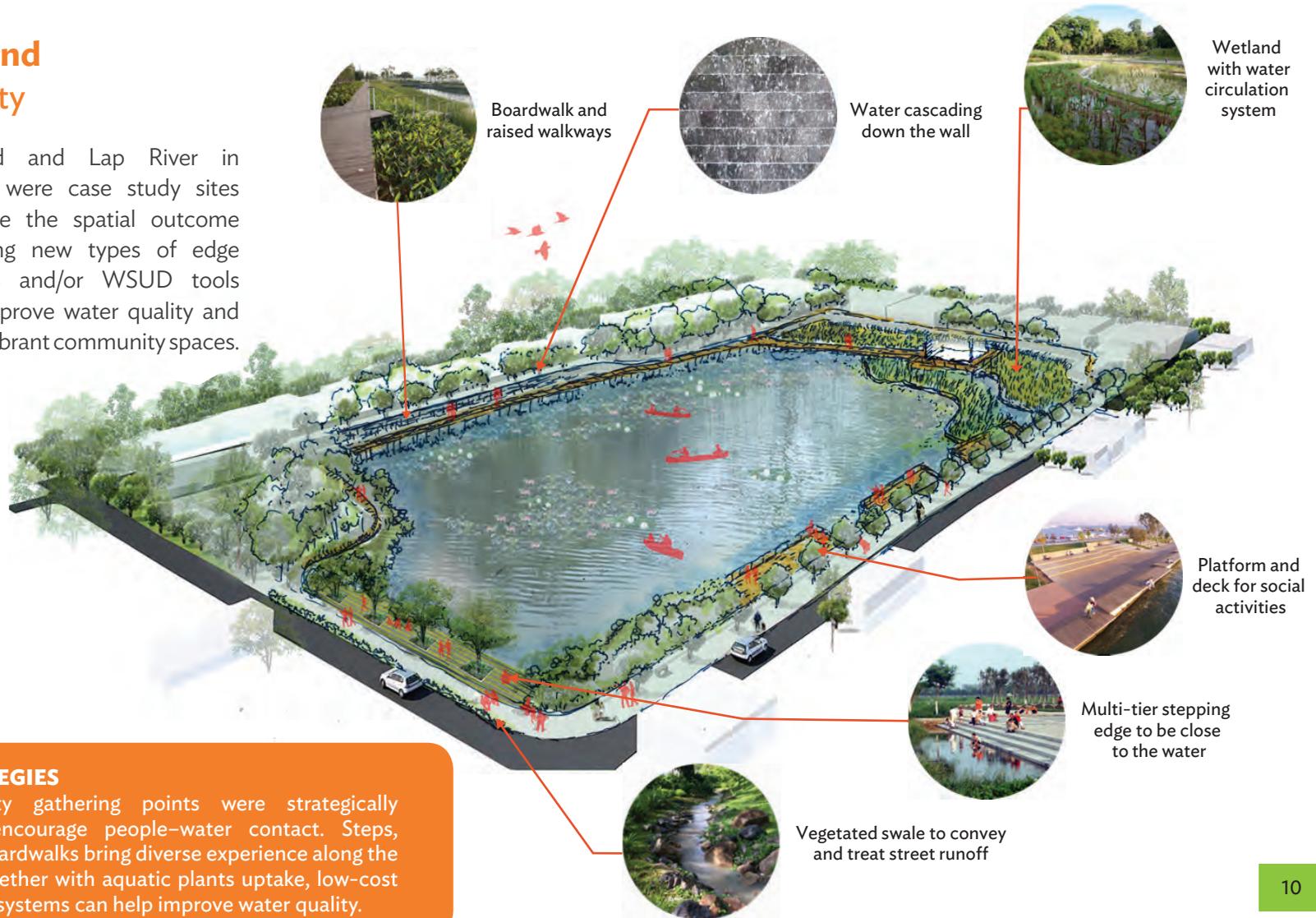
**HUE CITY.** Due to the surrounding hard embankment and years of receiving a mix of stormwater and domestic wastewater, Lap River and ponds in the city suffer from poor water quality. The river has become narrow, inhibiting flow and accumulating heavy sedimentation; the ponds, because of lack of daily water recirculation, are reduced to standing water. The way the embankment is built also discourages people from interacting with the water or natural environment.

There is great potential in Hue to adopt new types of edge treatments and other WSUD tools to help improve the water quality and create a more vibrant community space.

# Creating Lively Spaces for People and Nature

## Sen Pond Hue City

Sen Pond and Lap River in Hue City were case study sites to visualize the spatial outcome of adopting new types of edge treatments and/or WSUD tools to help improve water quality and generate vibrant community spaces.



### DESIGN STRATEGIES

More community gathering points were strategically introduced to encourage people-water contact. Steps, platforms, and boardwalks bring diverse experience along the water's edge. Together with aquatic plants uptake, low-cost water circulation systems can help improve water quality.

# Lap River Hue City



## DESIGN STRATEGIES

View decks are introduced at potential public gathering spots. A major stretch of natural green edge is suggested to be preserved for existing trees and ecological values. In addition, riprap and gabions are introduced at suitable locations which need strong slope reinforcement.

**HO CHI MINH CITY.** Tham Luong-Ben Cat-Nuoc Len canal is important for Ho Chi Minh City. It goes through eight districts and has a direct influence on the lives of more than 2 million residents.

Go Vap Cultural Park, which is approximately 37 hectares, is unique for a very densely populated metropolitan area such as Ho Chi Minh City; but it is currently underutilized. Hard embankments along the entire canal could solve several issues such as bankside erosion, illegal encroachment, and traffic congestion. However, it would be an obsolete approach with many drawbacks, including ineffective use of space due to the resulting separation between water and people.

Instead, the design of Go Vap Cultural Park could be optimized to create an attractive river park for the community as well as a floodplain park that could help to lower the flood level during storm events.

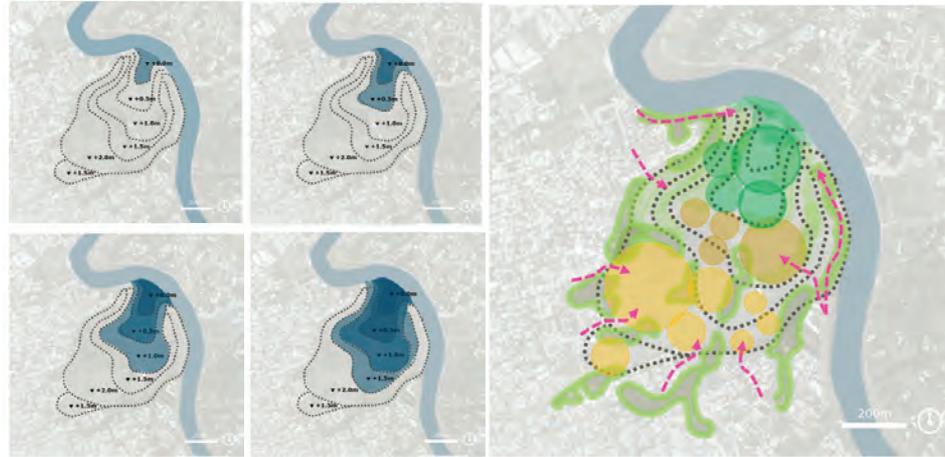
Tan Binh Industrial Zone also has the potential to shift from an industrial zone to a residential zone with high-quality living standards, which could address flooding, pollution, and traffic congestion.



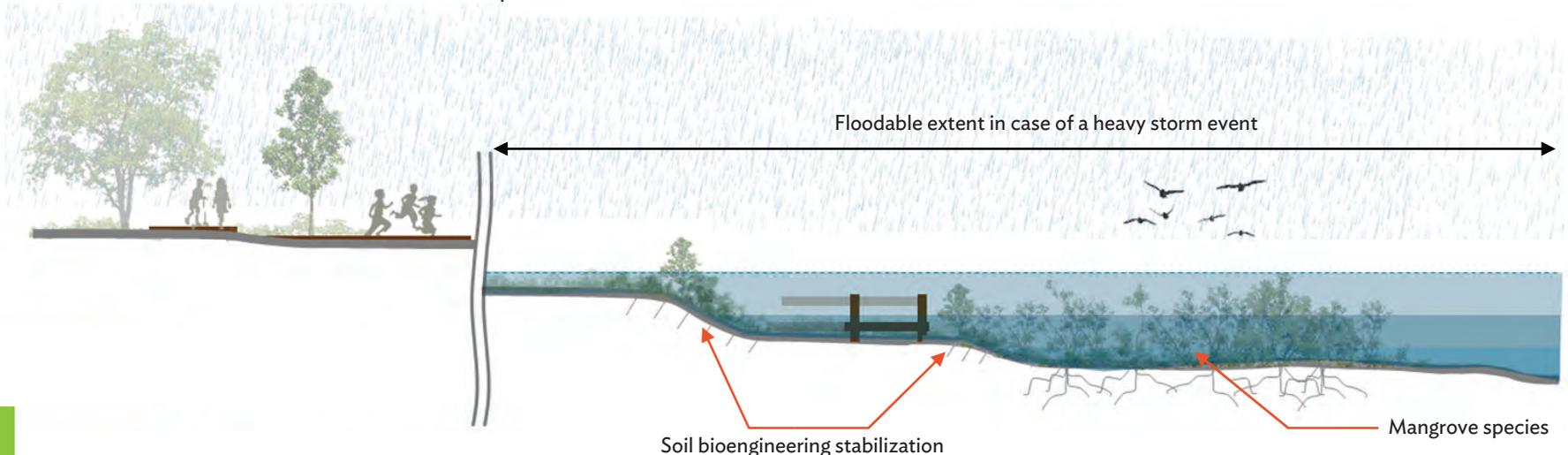
# Mitigating Flood Risks

## Go Vap Cultural Park Ho Chi Minh City

The suggestion for Go Vap Cultural Park is to create an attractive and river-interactive park for the community, as well as a floodplain park, which could help to lower local flood levels during storm events. A reconfigured topography will also serve as a framework for diverse activities and planting designs.



Topography of the park is designed to slope down toward the water, with multilevel floodplains.

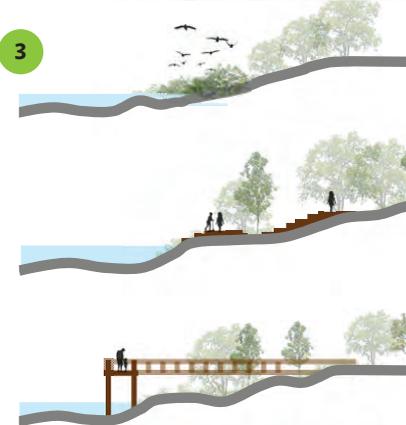
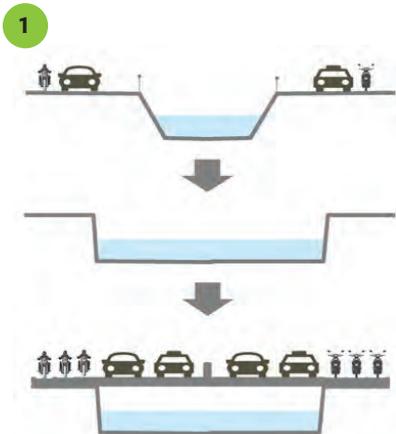
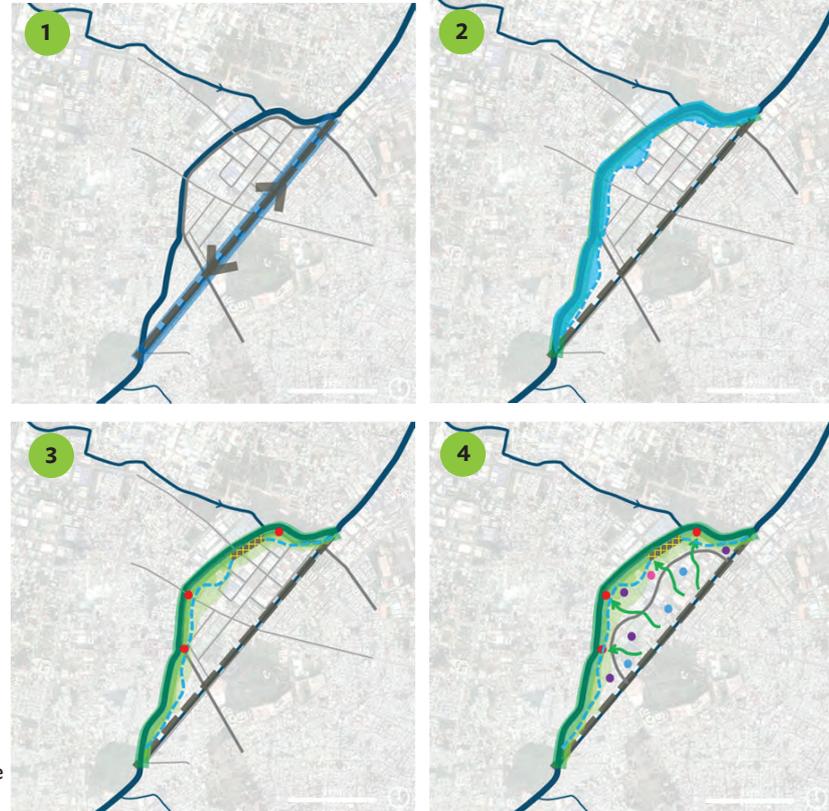


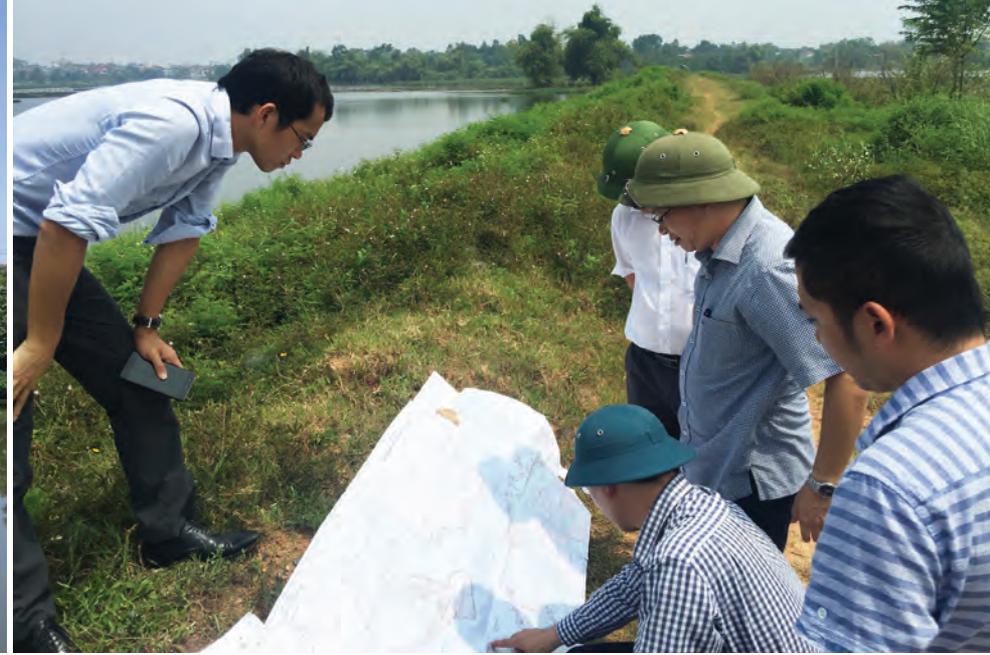
# Supporting Urban Regeneration

## Tan Binh Riverside Ho Chi Minh City

Tan Binh Industrial Zone has the potential to convert light industrial land use into a residential neighborhood with high-quality living standards by deploying principles of WSUD, relieving issues of flooding, pollution, and traffic jams.

- 1 PHASE 1:**  
Upgrade canal to take full capacity of water conveyance, and build an arterial road above for better land optimization.
- 2 PHASE 2:**  
Define boundaries of dry, dry/wet, and wet. Floodproof development with ample water frontage.
- 3 PHASE 3:**  
Rejuvenate waterway and upgrade the riparian environment applying the WSUD concept.
- 4 PHASE 4:**  
Implement WSUD tools throughout the site, with multiple connections to the waterfront.





Green and resilient urban infrastructure services in Vinh Yen, Hue, and Ha Giang will be improved through the Secondary Green Cities Development Project.





Brainstorming workshop on water sensitive urban design in Ha Giang.

# Key Lessons for Water Sensitive Urban Design Implementation

Although the concept of WSUD has emerged as a new urban solution around the world, Vietnamese cities are not yet familiar with it. There are barriers observed in carrying out WSUD, as the approach is different from conventional hard engineering urban designs, and its benefits are yet to be demonstrated in Viet Nam.

The following are key lessons for the successful implementation of WSUD in the cities of Viet Nam.

## Political Leadership and Planning

- A strong and committed political leadership and good coordination among relevant agencies will be indispensable to make WSUD work.
- Piecemeal implementation of WSUD leads to poor outcomes. A clear, city-wide vision and goal of WSUD should be set out.
- WSUD measures are multifunctional. A comprehensive and integrated strategy/master plan should be developed to explore social, economic, climate, and environmental benefits.
- Integrate nature-based solutions and the WSUD into urban planning guidelines and regulations.

## Communication and Participation

- Community participation from the design to implementation of WSUD measures is a key factor in ensuring success.
- A consensus recognizing rehabilitating and expanding water systems in cities as an essential foundation for building urban resilience, is needed. Awareness on the advantages of WSUD should be communicated to the public.
- For widespread implementation, use of WSUD should be incentivized to the private sector and urban dwellers.

## Knowledge and Design

- International knowledge and design should be leveraged for local context.
- Highly capable local consultants and contractors should be engaged to upscale local knowledge and capacity.
- Design should be kept simple so it is easy to maintain.
- Demonstration projects will help stakeholders and developers to see and experience WSUD benefits.

# International Cases





- 1 Cheonggyecheon Stream, Seoul, Republic of Korea.** A restored 11-kilometer-long stream in the middle of the city. Benefits include improving the recreational value of the area and mitigating the urban heat island effect.
- 2 Tianjin Cultural Park, Tianjin, People's Republic of China.** Benefits include improving stormwater management and reducing temperature extremes.
- 3 Tanner Springs Park, Portland, United States.** Benefits include protecting urban wetlands and improving stormwater management.
- 4 Bishan-Ang Mo Kio Park, Singapore.** Benefits include protecting the urban river system and improving the area's recreational value.

## **Nature-Based Solutions for Cities in Viet Nam**

### *Water Sensitive Urban Design*

Water Sensitive Urban Design integrates water cycle management into the built environment. It can help cities become more livable, reduce the risk of flooding, and transform urban spaces into vibrant centers of community life. This publication introduces Water Sensitive Urban Design and its benefits, discusses examples from Viet Nam, and highlights lessons on implementation. It has been produced by the Asian Development Bank and the Urban Climate Change Resilience Trust Fund in collaboration with Ramboll Studio Dreiseitl.

### **About the Asian Development Bank**

ADB is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty. Established in 1966, it is owned by 68 members—49 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.



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