

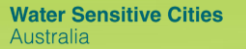
NATURE AND CLIMATE NEXUS

Nature-based Solutions for Urban and Rural Landscapes

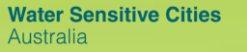
Lecture Series + Project Design Clinic

17–19 September 2024 • Multifunction Halls 2–3 • Hybrid

This training is organized by the **ADB Environment Group** together with the **Water and Urban Development Sector Group**, and **Agriculture, Food, Nature, and Rural Development Sector Office**.



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Case studies from Resilient Urban Centres and Surrounds program



Resilient Urban Centres and Surrounds (RUCaS) for climate resilient communities, environments, and economies in the Greater Mekong region.



Publications



Case studies



Events



Tools



Team

Resilient Urban Centres and Surrounds

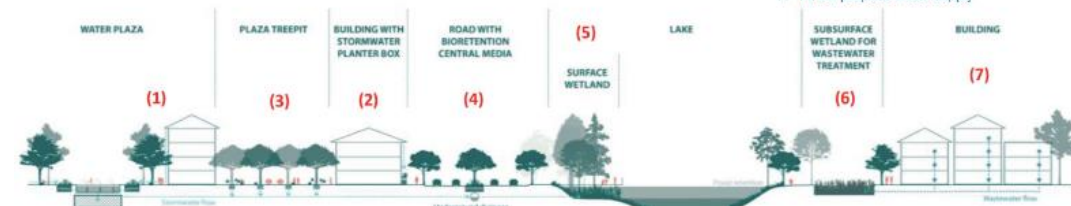
- The impacts of climate change and urban growth on the greater Mekong region are well documented
- Conventional approaches to urban planning and infrastructure investment are unlikely be able to provide the quality of life, economic development people want at a price they can afford and in a way that also retains cultural and environmental values
- Resilient Urban Centres and Surrounds (RUCaS) program aims to:
 - Show the valuable contribution nature based solutions (NbS) can make to urban planning and 'grey' infrastructure
 - build capacity for practical application in very different contexts
 - provide the economic case for further action
- We do this through:
 - Listening and sharing experiences
 - Case studies in large cities and regional centres
 - Scaling strategies and capacity building to support wider application



1. Buildings with spacious water courtyard
2. Buildings without spacious water courtyard

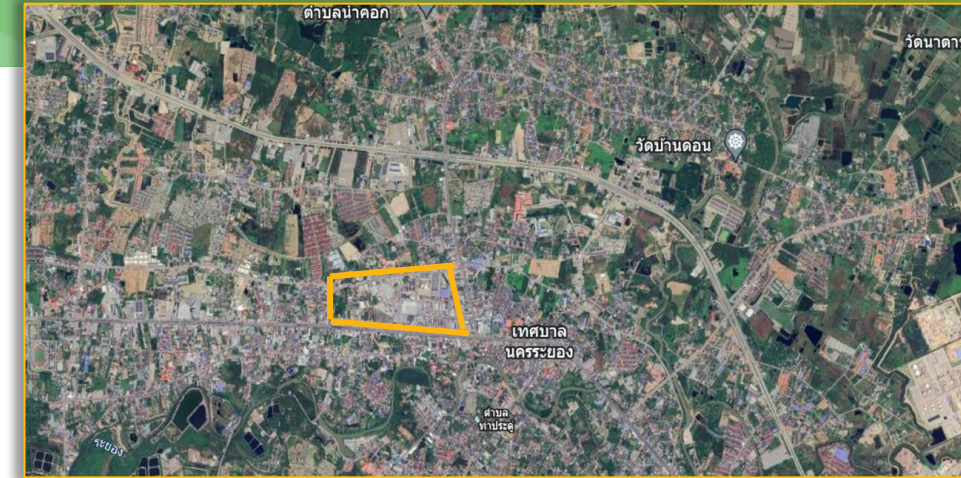
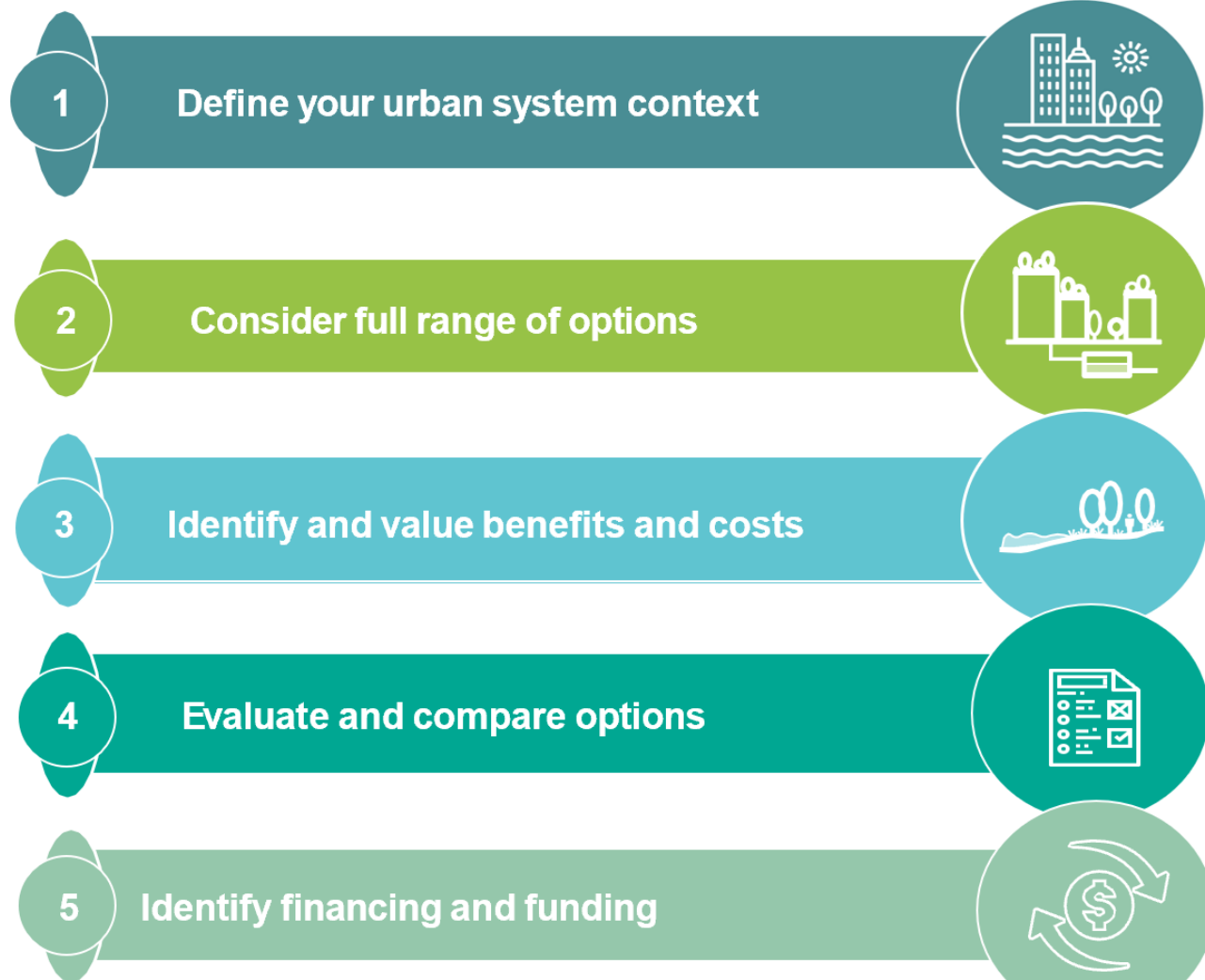
3. Plaza/car parks
4. Roads/passive irrigated landscape

5. Lakefront stormwater wetland
6. Wastewater treatment wetland
7. Fit-for-purpose water supply



A 5 Step process for apply in urban NbS

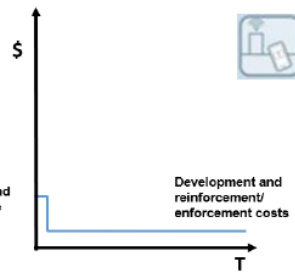
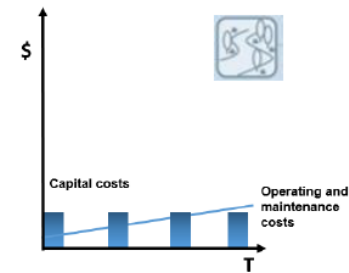
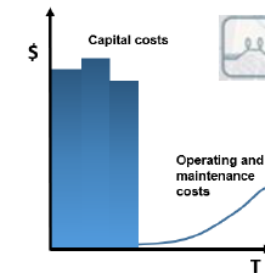
A multidisciplinary, end to end approach



(a) Large structural solution

(b) Nature based solution

(c) Non-structural solution



Overall

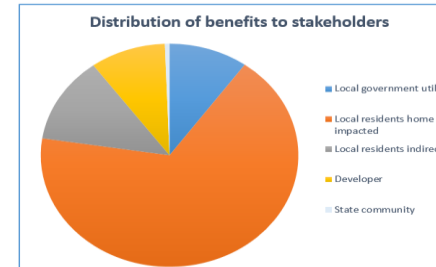
NPV \$26,141,094

BCR 1.26

Project organisation

NPV -\$88,086,493

BCR 0.13



RUCaS Demonstrating application in very different locations



On Nut Urban Forest Park

Bangkok, Thailand

Transforming former industrial waste site for brownfield development



Makkasan Zone C Departure Park

Bangkok, Thailand

Using NbS to enhance public green spaces



Can Tho University

Can Tho, Vietnam

Using NbS to advance flood resilience and community activation



Hanoi University of Civil Engineering

Hanoi, Vietnam

Using NbS to refurbish existing buildings in a built-up area to mitigate heat and improve amenity



Nong Loup lan Marsh

Vientiane, Lao PDR

Enhancing NbS functions for communities, environment, and wider city benefits



Ban Mano Wetland

Luang Prabang, Lao PDR

Preserving wetlands' heritage for households and economic growth



A cool green Street 2

Battambang, Cambodia

Integrating NbS in city street for cooling and economy



Akreiy Ksatr wetland living

Phnom Penh, Cambodia

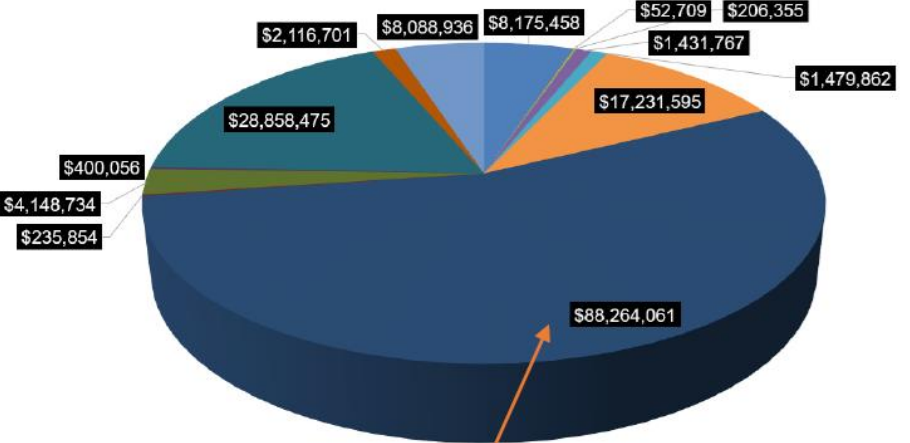
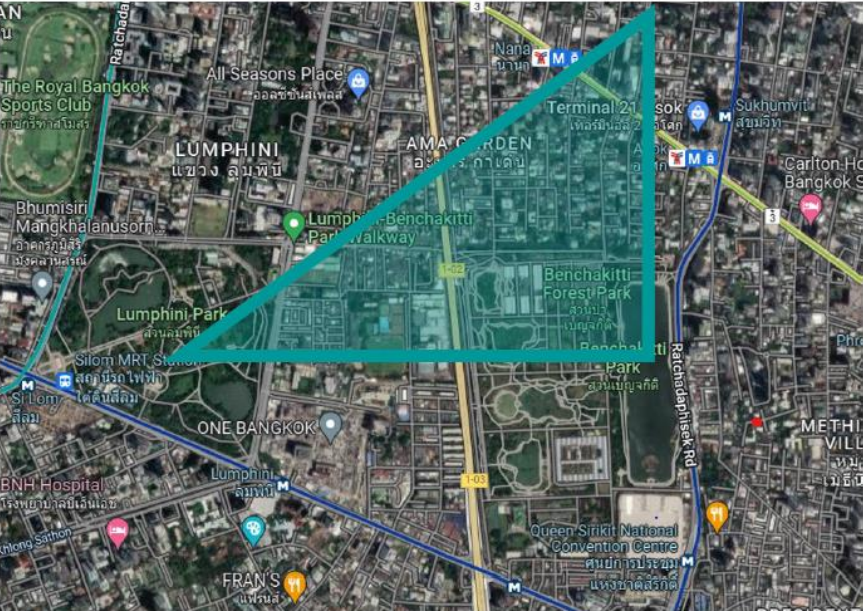
Using NbS to protect wetlands amid urban development

NbS in a high density city

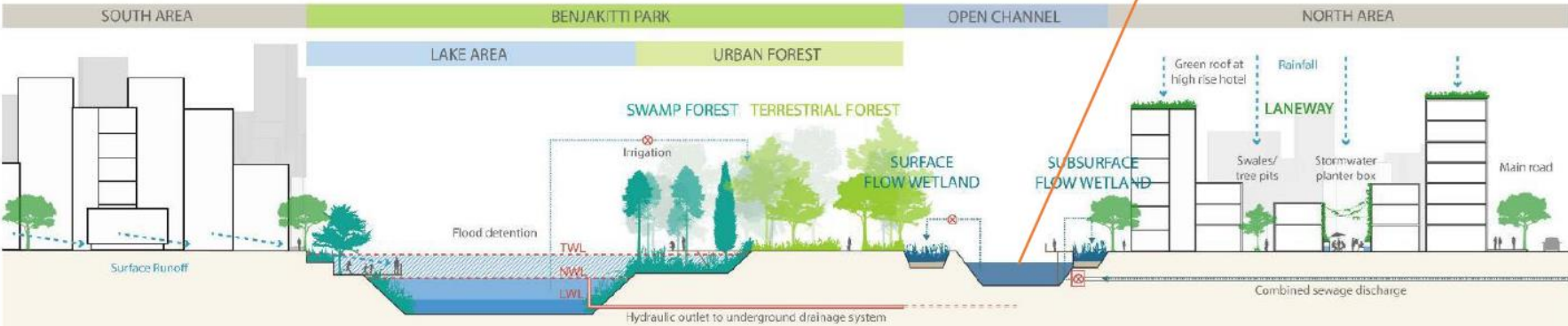


NbS in a high density city, different scales of action

Sukhumvit, Thailand

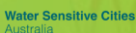


- Reduction in cleaning after flood events
- Reduction in electricity for AC units due to improved microclimate
- Residents' maintenance of services
- Reduction in costs for wastewater treatment
- Reduction in park maintenance costs from water retention and reuse
- Improvements in canal water quality
- Improvements in amenity along canal
- Visitors' recreation in the park
- Increased number of guests in hotel
- Increased customers in shops and kiosks
- Flood mitigation downstream
- Reduction in cost of car repairs from floodwater for commuters
- Reduction in travel time during flood events for commuters



NbS in a high density city, different scales of action

Sukhumvit, Thailand



Canal: before

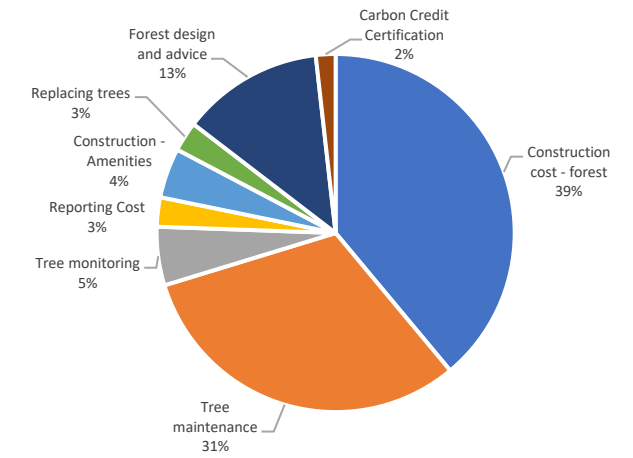
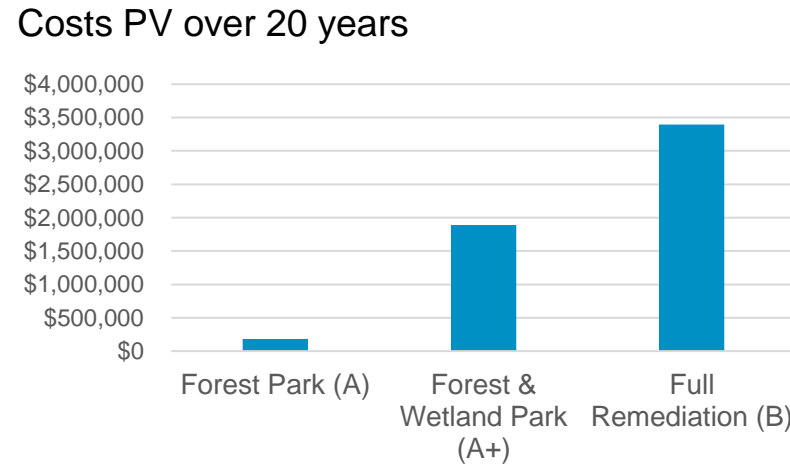
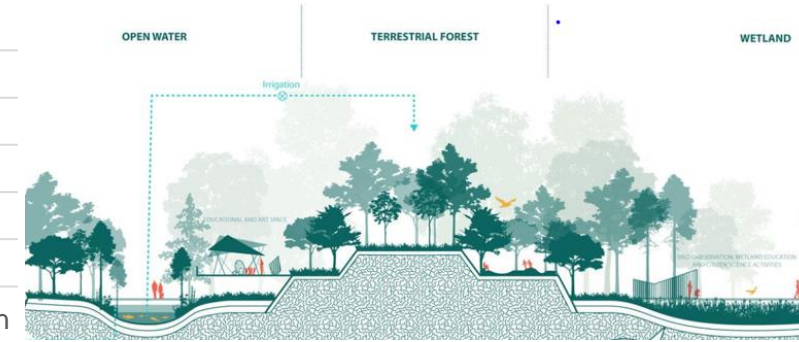
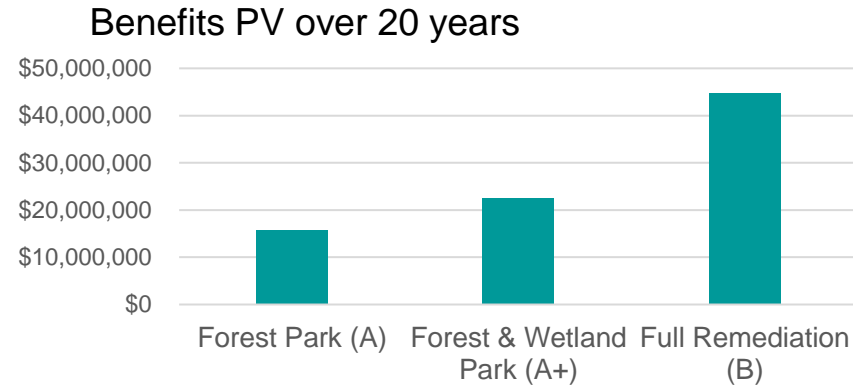


Canal: after NBS



NbS in a high density city, reactivating wastelands

On Nut Forest Park, Thailand



Case study -> Partnerships and priorities for upscaling

NbS in secondary cities



Ban Mano Wetland

Vision Statement:

THE VISION OF THIS CASE STUDY IS TO CREATE A COMMUNITY-BASED PRODUCTIVE SANCTUARY OF SUSTAINABILITY AND COMMUNITY DEVELOPMENT WHILE BEING FINANCIALLY VIABLE AND ENVIRONMENTALLY RESPONSIBLE

In collaboration
with:



Site analysis

- The heritage area of Luang Prabang has no sewerage network and relies on septic tanks
- Wastewater is discharged directly into the ponds, canals, and streams
- Ponds are a mix of public and private land

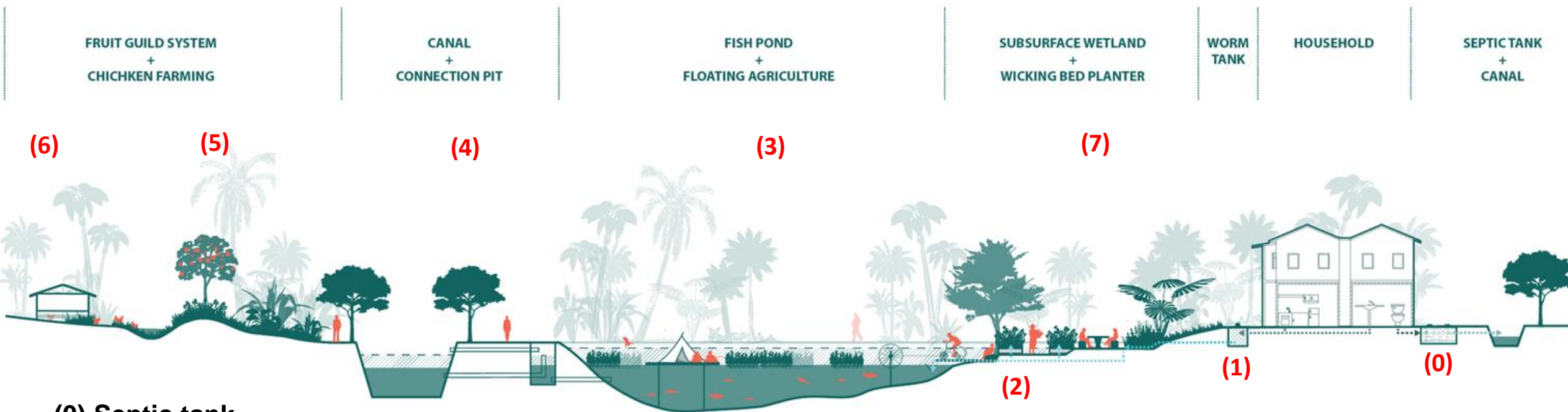
Challenges

- Drainage system blocking up and flooding
- Heritage overlays and diverse ownership (public/private)
- Food production impacted; health risk
- Vulnerability to river flooding with dam operations

Opportunities

- Managing as an integrated system
- Restoration can deliver benefits for both private and public
- Improvement in pond system can provide benefits to vulnerable groups.

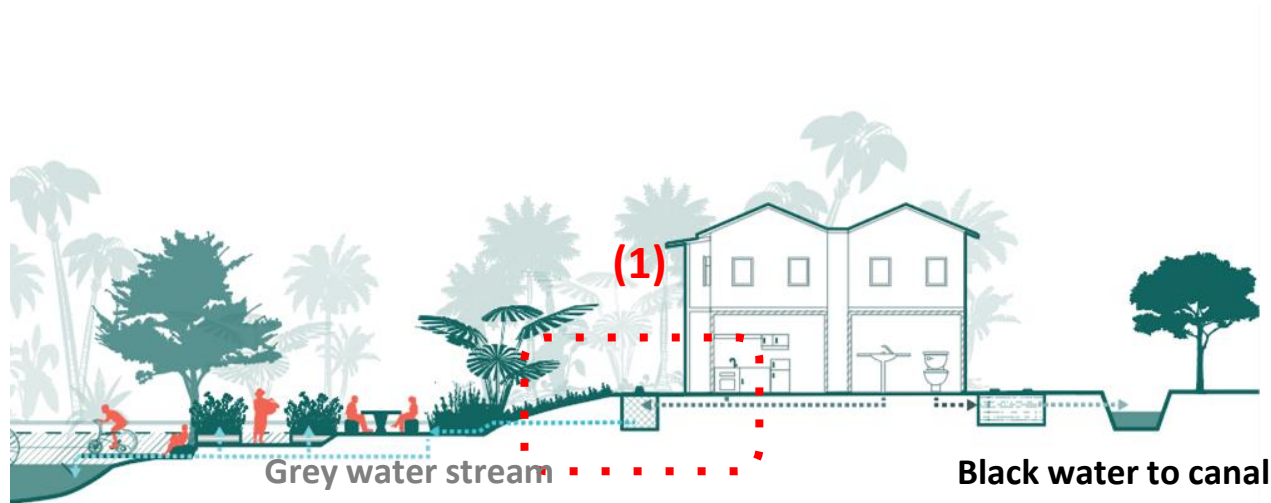
Resilience Strategy for the World Heritage Pond restoration



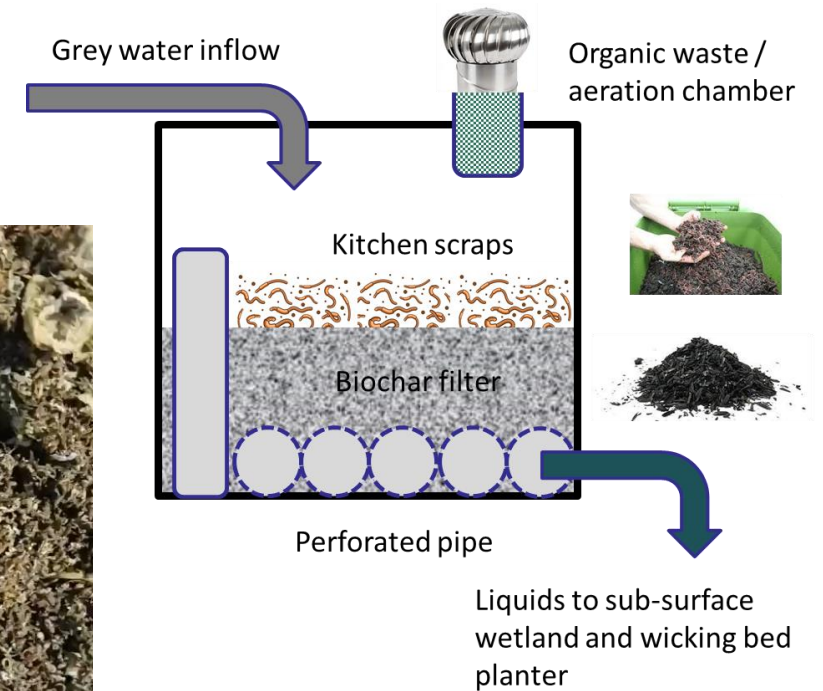
- (0) Septic tank
- (1) Biochar worm filter
- (2) Terraced sub-surface wetland and wicking bed
- (3) Floating garden beds and fishpond
- (4) Water regulation pit
- (5) Vegetated swale and berm guild
- (6) Chicken coop composting system
- (7) Social engagement space

A self-sustaining and resilient food producing landscape

Worm filter



- a) Grey water and black water are separated at household
- b) Blackwater from toilet goes to septic tank with effluent discharge into nearby canal
- c) Grey water is filtered through a worm filter by gravity
- d) Take advantage of the vertical distance between house ground level and pond water level



Terraced sub-surface wetland + wicking bed planter



(2)

Clean water discharge to pond

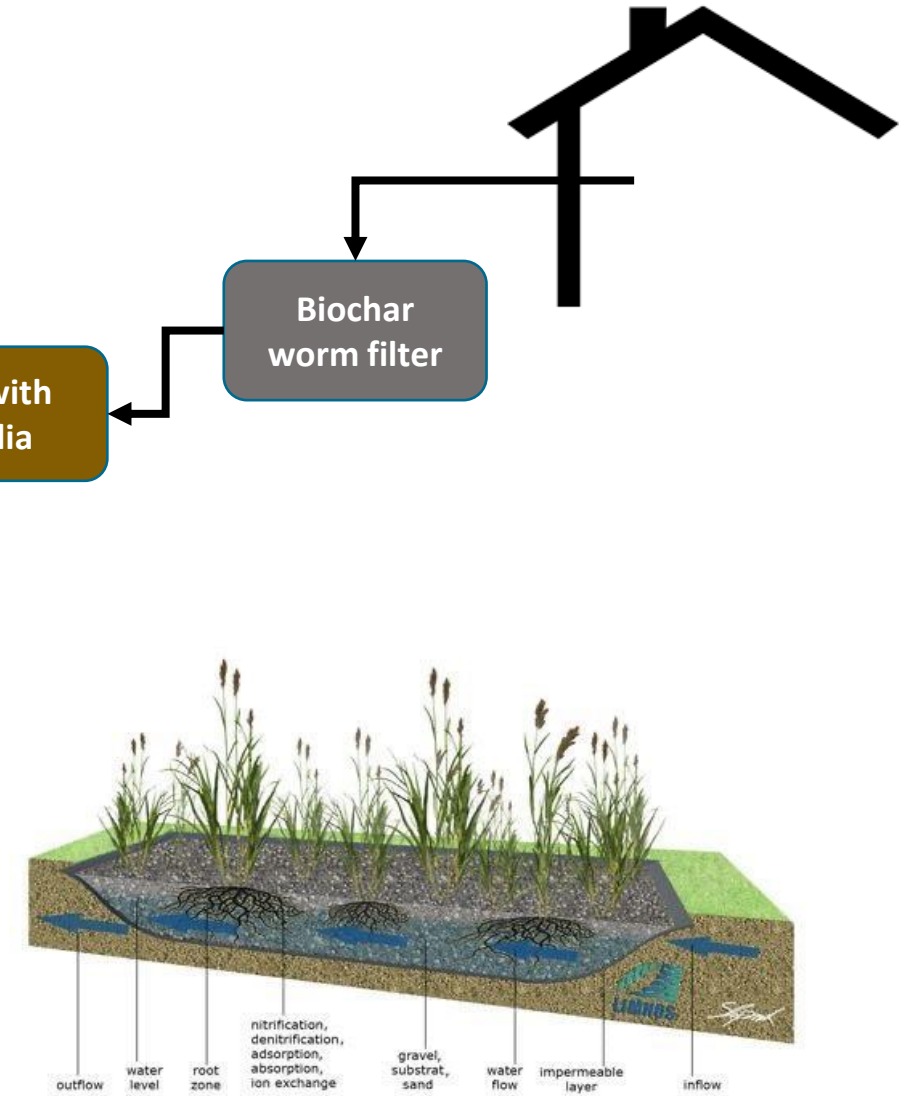
Wicking bed planter

Sub-surface wetland with biochar planting media

Biochar worm filter

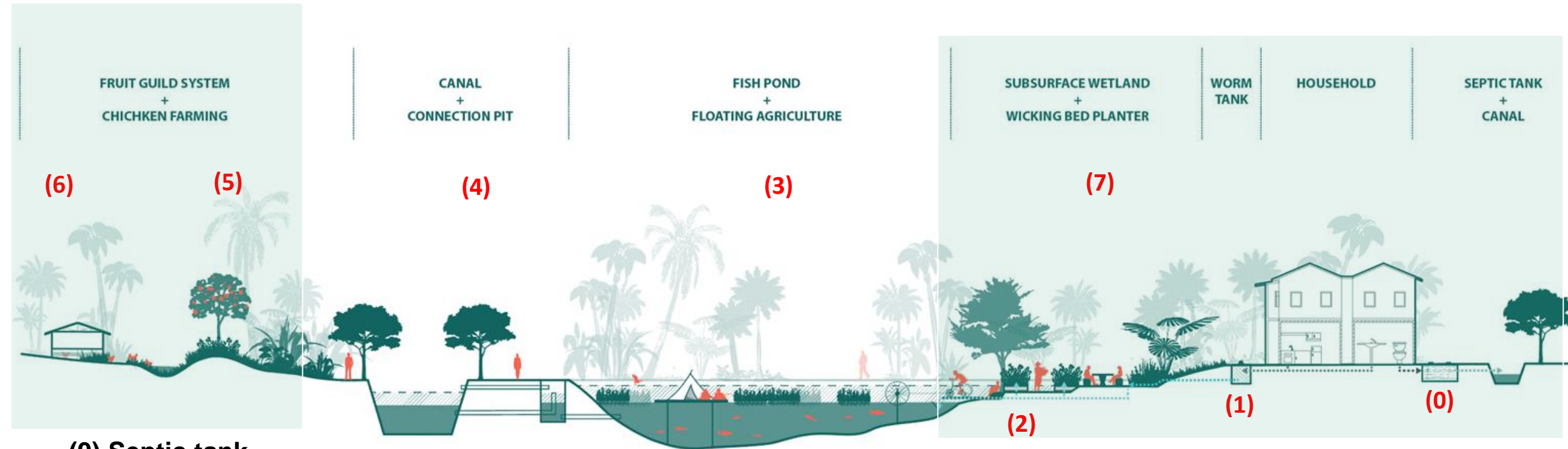


<https://www.abc.net.au/gardening/how-to/building-a-wicking-bed/9435452>



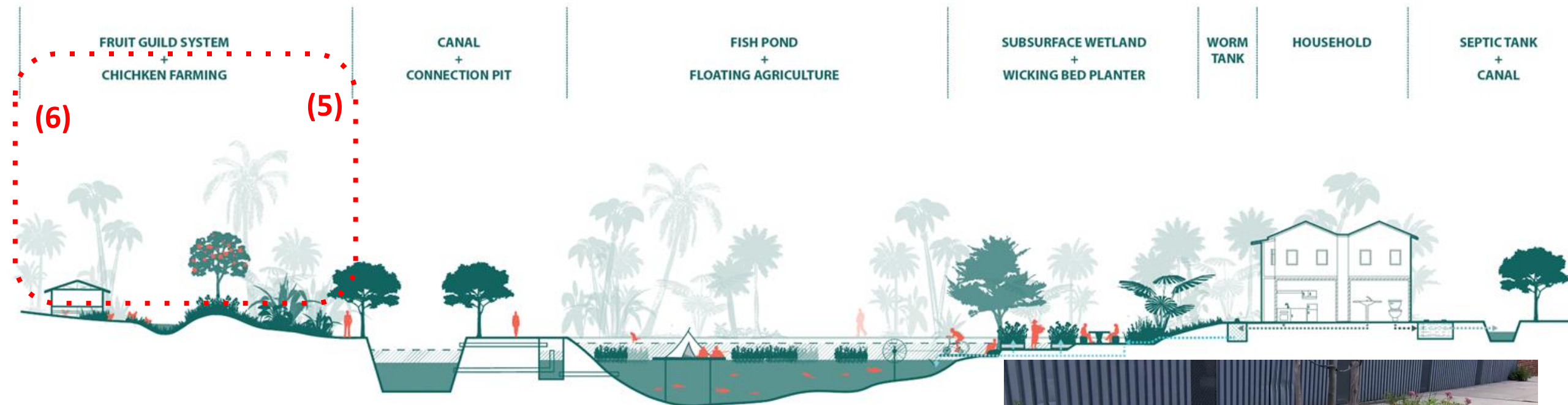
<https://www.pinterest.com.au/pin/438960294908737830/>

Resilience Strategy for the World Heritage Pond restoration

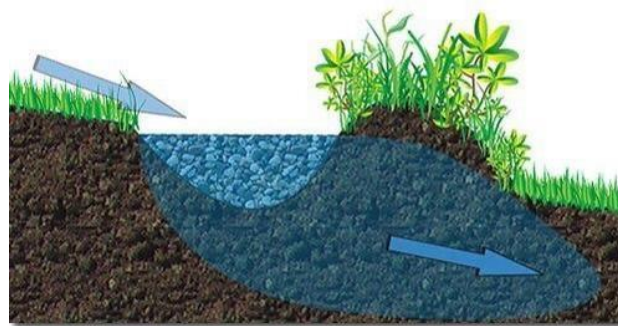


- (0) Septic tank
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- (5) Vegetated swale and berm guild
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Vegetated swale and berm



Runoff is temporarily held in the swale to create a pond that forces water to infiltrate through the soil which irrigate the berms with nutrients before discharge into the canal in the form of sub-surface flow



Before



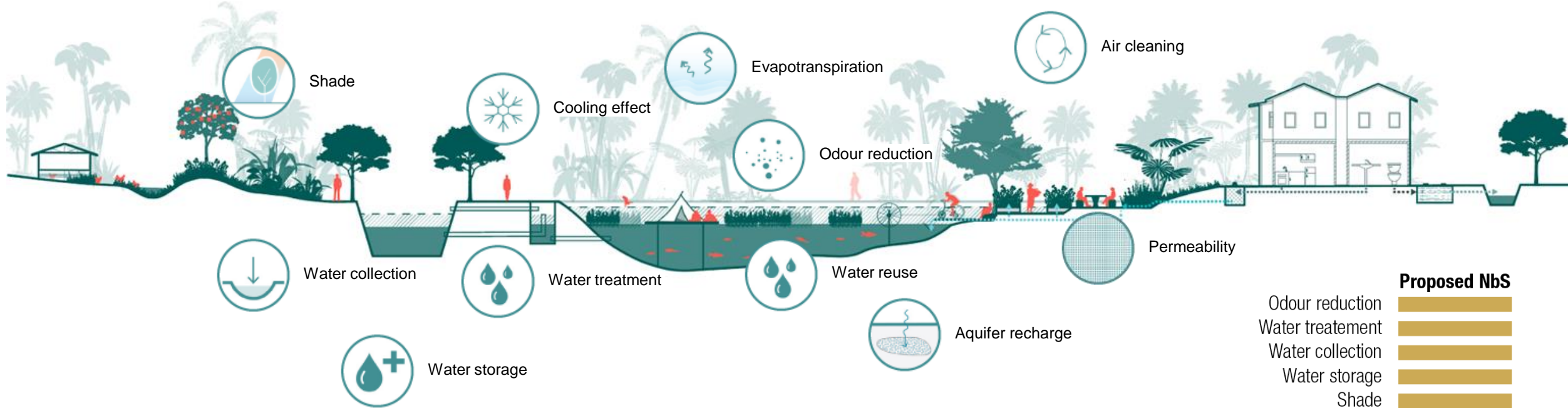
After

(7)



- (0) Septic tank
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Resilience Strategy – cross section



Economic analysis

- 7 modular strategies
- 3 combinations (2 private, 1 public pond)
- BCR of 8, NPV over 20 years of \$US >230,000

	Proposed NbS
Odour reduction	██████████
Water treatment	██████████
Water collection	██████████
Water storage	██████████
Shade	██████████
Evapotranspiration	██████████
Cooling effect	██████████
Air cleaning	██████████
Water reuse	██████████
Soil cleaning	██████████
Aquifer recharge	██████████
Permeability	██████████

NbS in a per-urban area



Nong Loup Ian Marsh

Vision Statement:

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Global
Green Growth
Institute



Site analysis

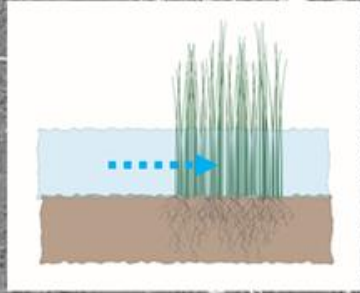
- 24-ha wetland located in Vientiane's west in Sikhottabong District
- Communities include areas of dense urban households, along with peri-urban areas with small-scale household farming
- Wetland is under pressure from land sale and wetland occurring throughout Vientiane

Opportunities

- Continued flood management role of the marsh by slowing and storing water draining from the upstream catchment towards the Mekong
- Harness productive function of the wetlands – farming, fishing, etc
- Improve water quality
- Promote community participation to enhance

Challenges

- Flood storage reduced due to sedimentation
- Some encroachment and infilling is already occurring in and around the marsh and wetland
- Some households and businesses discharge grey and black wastewater directly into drains and ditches



Stormwater Wetland **Inflow** **Sedimentation Pond (GPT)**

Septic effluent **Food Forest**

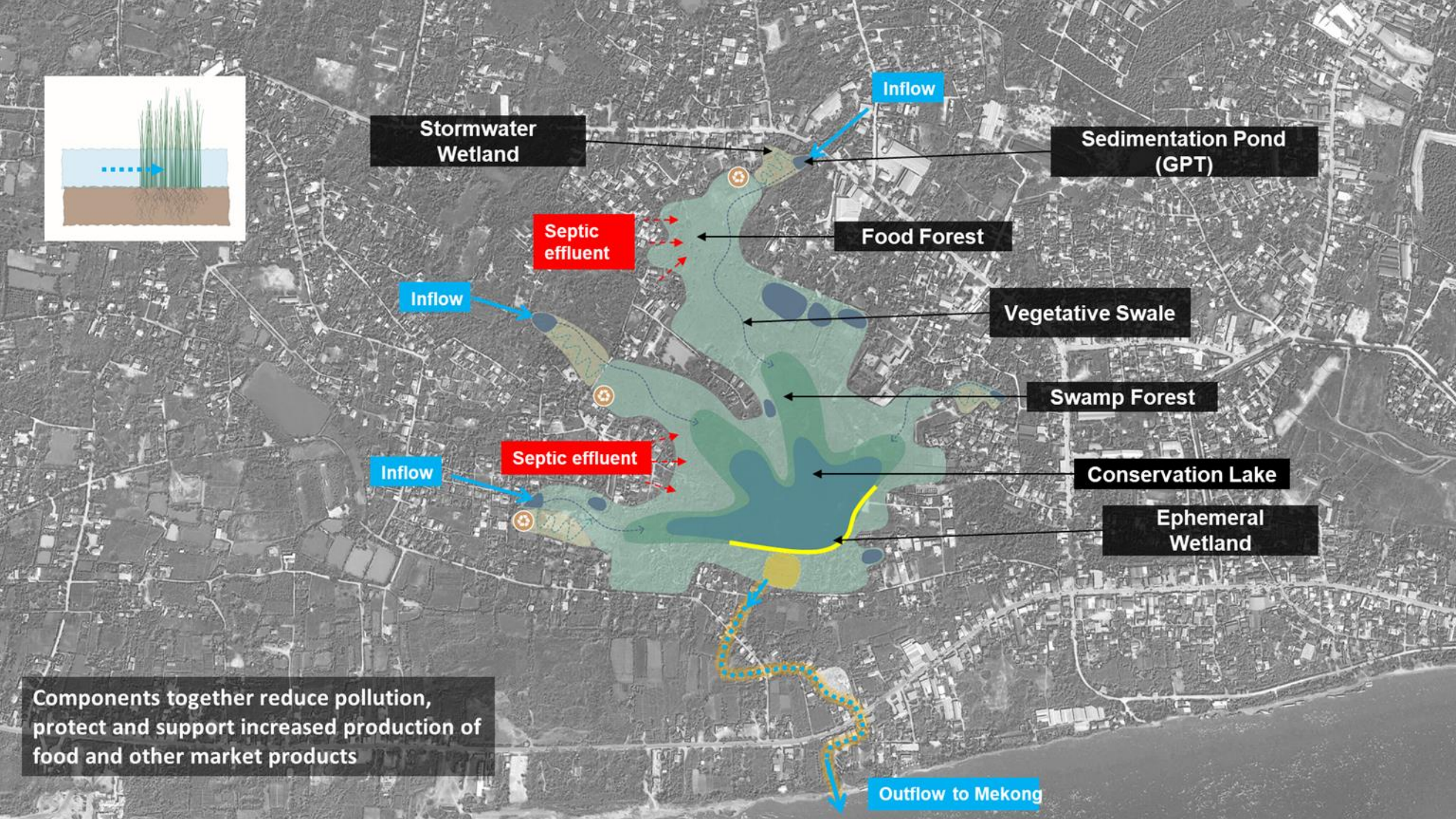
Inflow **Vegetative Swale**

Inflow **Septic effluent** **Swamp Forest**

Conservation Lake
Ephemeral Wetland

Components together reduce pollution, protect and support increased production of food and other market products

Outflow to Mekong

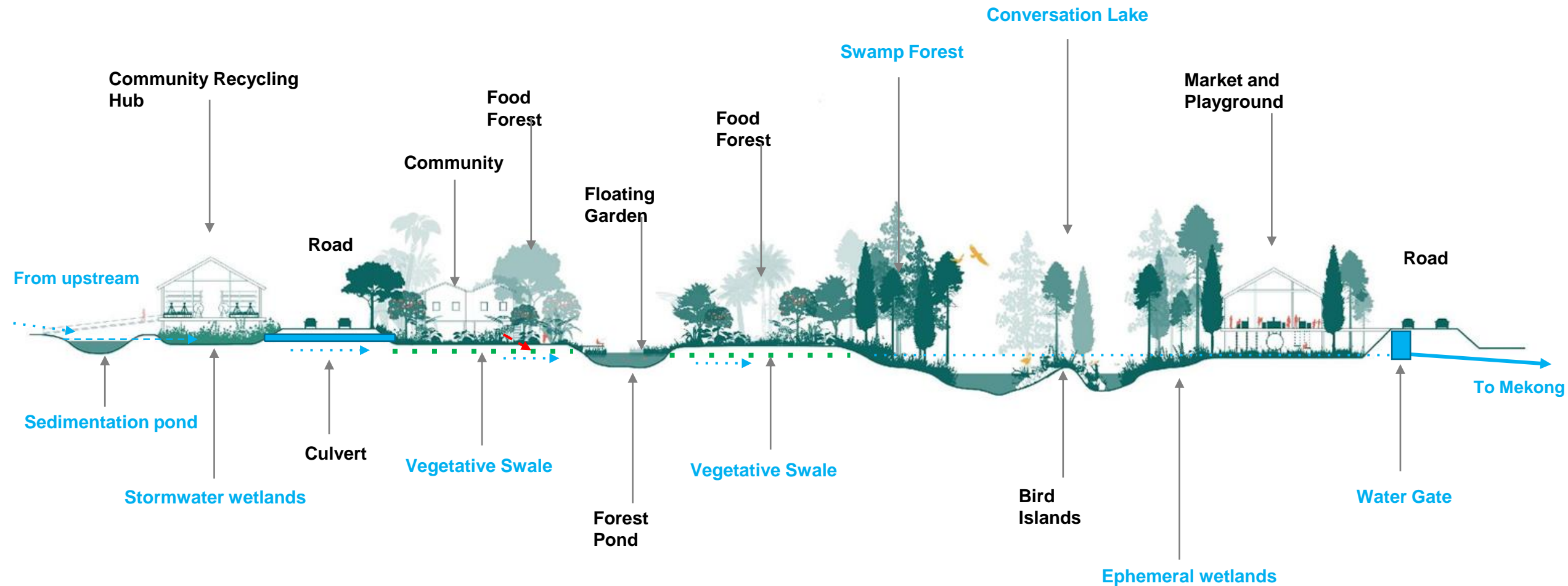


Functional zones within the Nong Loup lan marsh

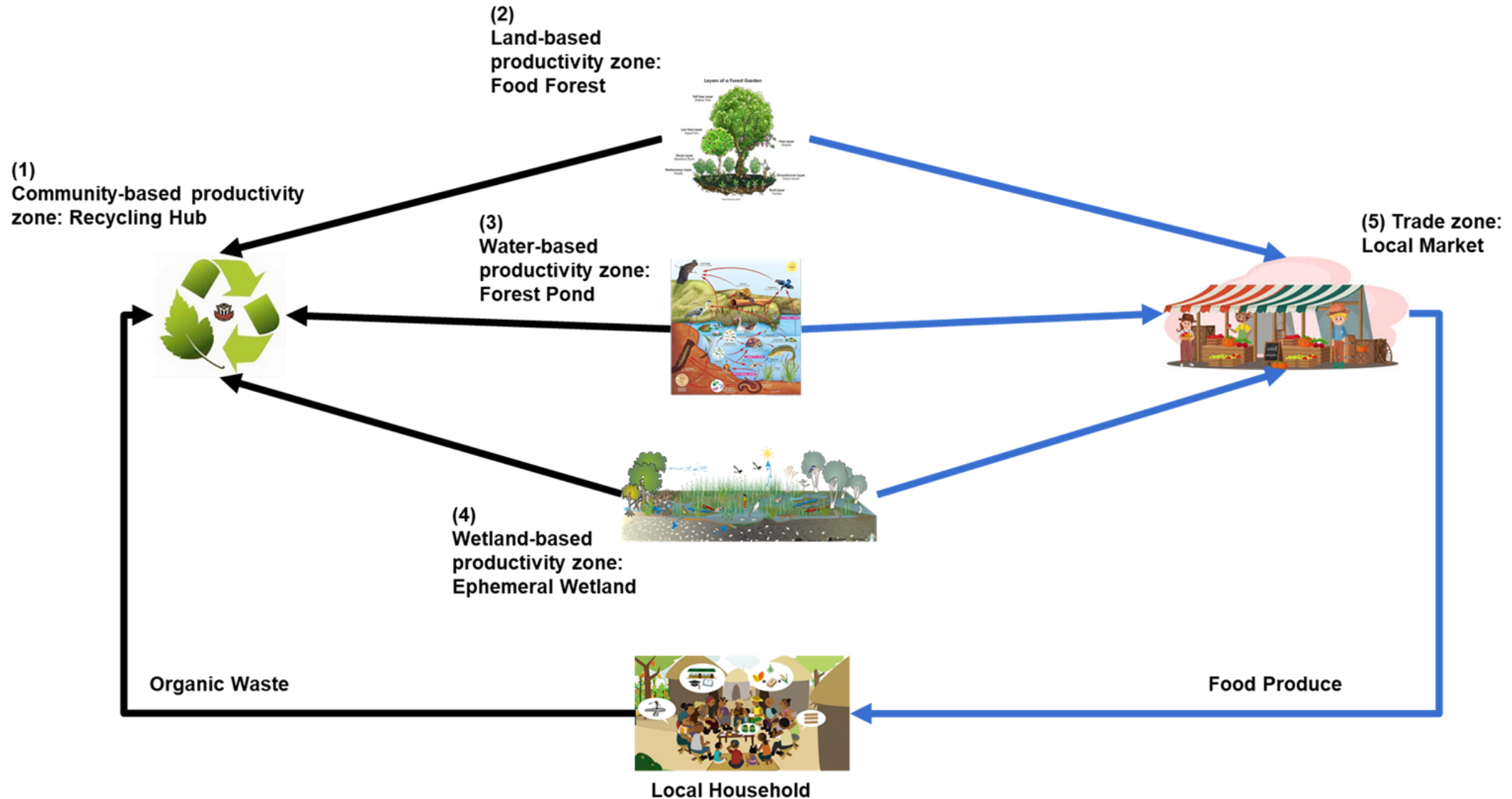


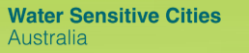
	Zones	Components
1	Water quality management zones	Sedimentation pond, constructed wetlands (surface flow)
2	Flood management zone	Vegetated swale and creek drainage for conveyance and swamp forest for flood attenuation
3	Land-based productivity zone	Food forest, 7 layers and livestock
4	Water-based productivity zone	Rice fields, forest fish pond with aquaculture, hydroponics over fish pond using floating beds
5	Wetland-based productivity zone	Constructed wetlands, ephemeral wetlands, submergible wetlands
6	Community-based productivity zone	Composting, chicken coops, worm farm, vegetable garden, mushroom sheds
7	Biodiversity conservation zone	Wild fish, bird islands
8	Recreational market zone	Community park, café, eco-tourism

NbS to support water management and productivity



Enhancing production in Nong Loup Ian Marsh





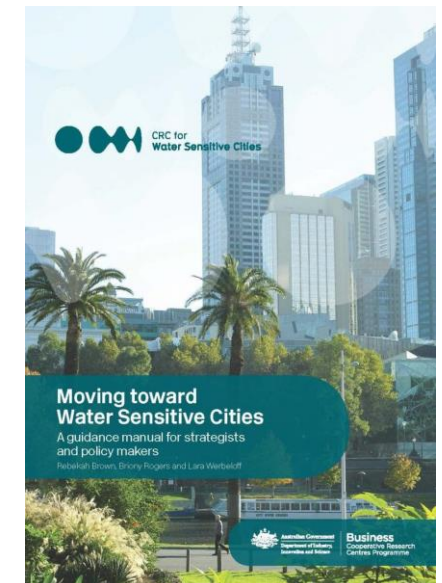
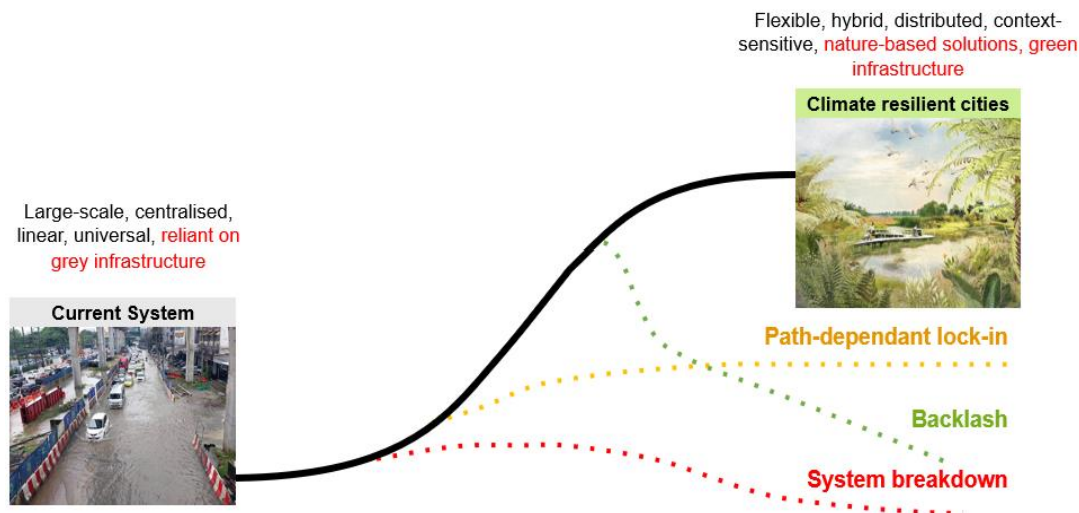
Scaling-up



Scaling up

A Research based approach

“Transitions management as a process... should involve a series of actions to align and influence critical stakeholders and build shared commitment to transition, to organise platforms for collaboration and innovation, and to coordinate strategic and operational transformations in practice” (CRCWSC, 2021, p.5)



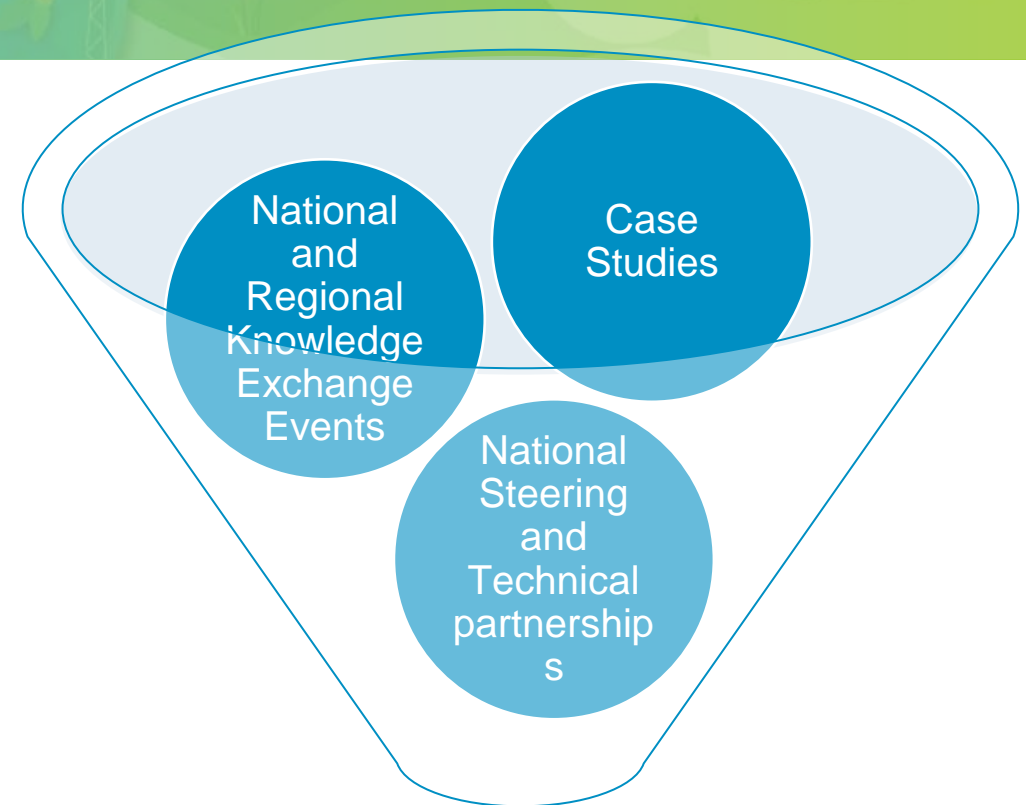
Source: [TMR A4-1_MovingTowardWSC.pdf](#)
(watersensitivecities.org.au)

Identifying Scaling Strategy priorities - process

What is it: Outlines enabling factors that can increase uptake of urban NbS that supports climate resilience

Purpose: Provides guidance and possible areas of focus/investment at the national level on approaches to scale NbS in urban area; supports mainstreaming of NbS

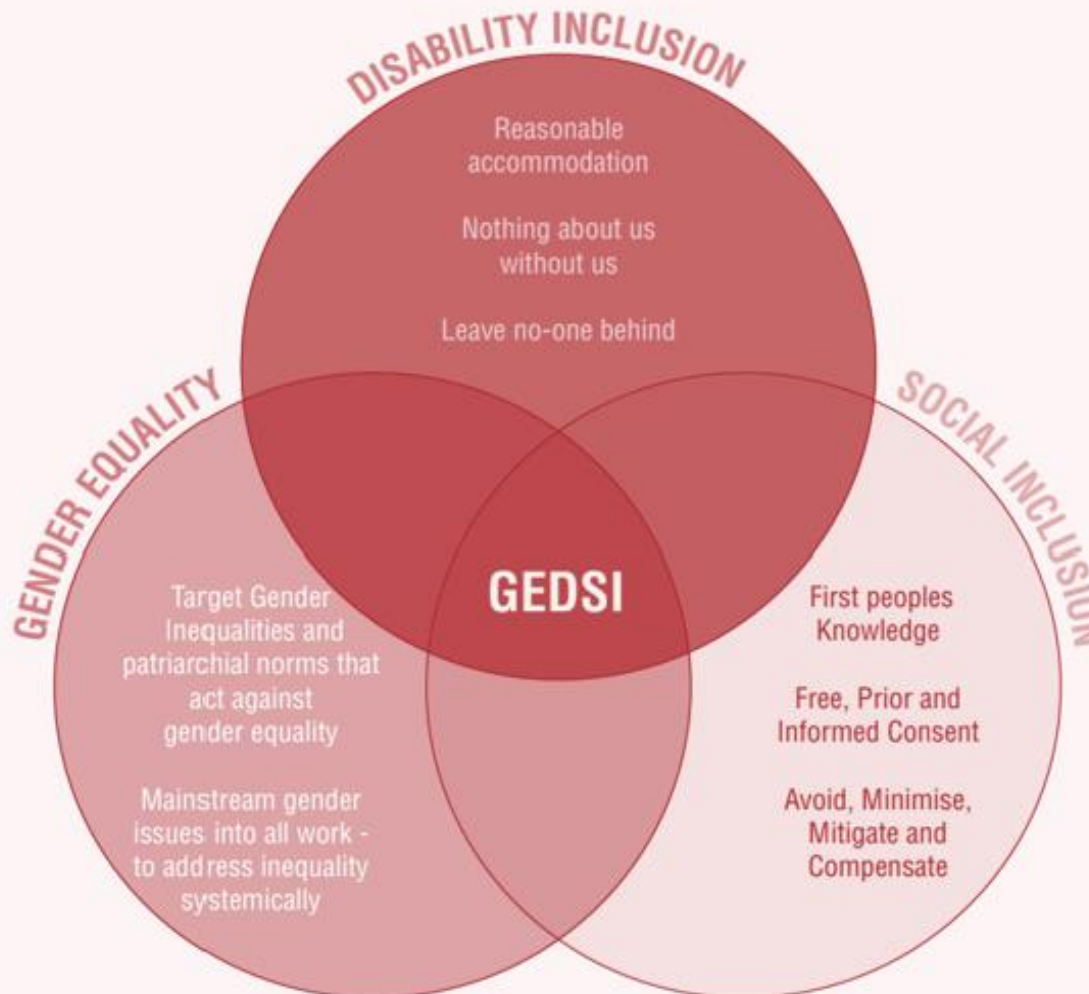
How it can be used (and by who): To incorporate NbS in planning, design and implementation of climate resilient urban (water) infrastructure



Better use of parks and future green space from what might now be brown field or unused sites; Preserving and connecting existing to natural systems.

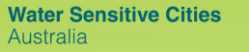
4. GEDSI Principles

The following principles and commitments are central to our work. This is developed to align with Australian Government strategies and policy (Figure 2).⁶



6 Gender: DFAT (2016). *Gender equality and women's empowerment strategy*. Canberra; Disability: DFAT (2015). *Development for all 2015–2020: Strategy for strengthening disability-inclusive development in Australia's aid program*. Canberra; Social inclusion: various including: DFAT (2021). *Indigenous diplomacy agenda*. Canberra.

Figure 2. Linked commitments – shared approaches that centre GEDSI outcomes



THANK YOU

