



# Healthy Rivers as The Heart of ASEAN Sustainable Cities

Strategy for ASEAN cities to achieve towards sustainability through the health of its rivers

## Team SEA of Hope

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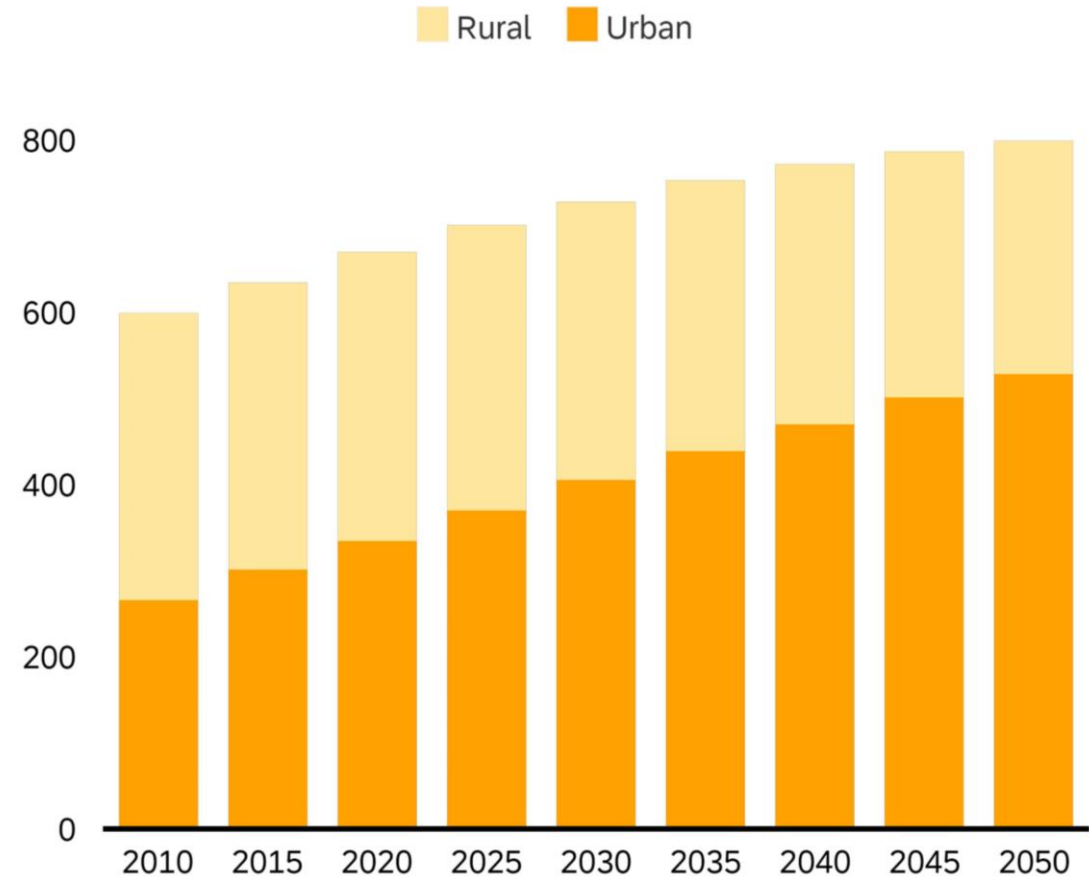


ASEAN   
DATA SCIENCE  
EXPLORERS

Finding 1

# ASEAN urban population is projected to increase rapidly every year

ASEAN population 2010-2050  
in Million



▲ **98.9%**

Projected increase in urban population from 2010 to 2050

**50%**

ASEAN population is living in urban areas in 2020

**70**

Million more people are expected live in urban areas in ASEAN by 2025

As ASEAN urban population will continue to increase rapidly, cities are urgently demanded to achieve sustainability

Source: UN World Urbanization Prospects, 2018

## Finding 2

# Most cities in ASEAN are still far from sustainability

Several key aspects of a sustainable city based on UN SDG Goal 11 & ASEAN Socio-Cultural Economy 2025 Blueprint

Provide Access to  
Clean Water

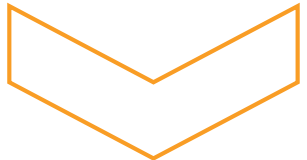


**50%**

ASEAN urban population don't have access to standard water source

Source: Asian Development Bank

Provide Access to  
Green Public  
Space



**6 out of 7**

highly populated cities in ASEAN don't meet green spaces criteria recommended by WHO

Source: Solidiance Asian Green Cities Index 2018

Disaster  
Resilience



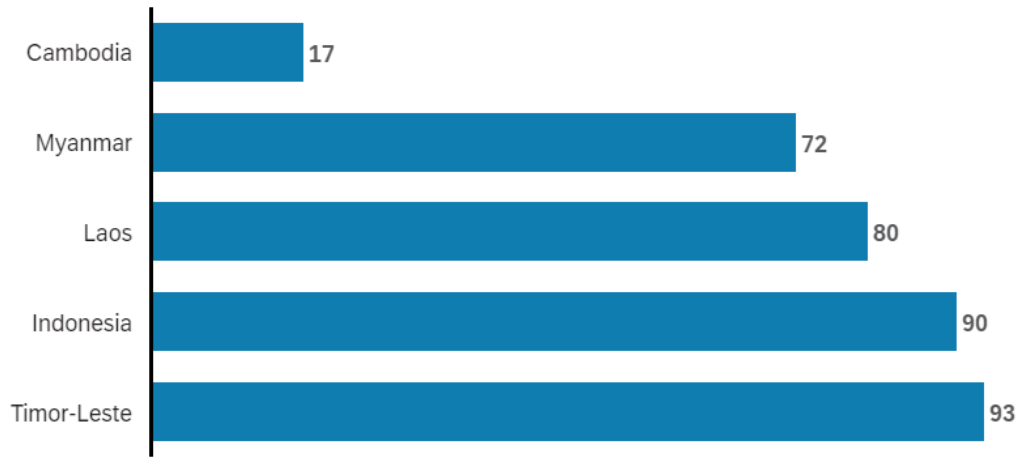
**6 out of 10**

ASEAN countries are classified as highly prone to natural disasters

Source: World Risk Report 2016

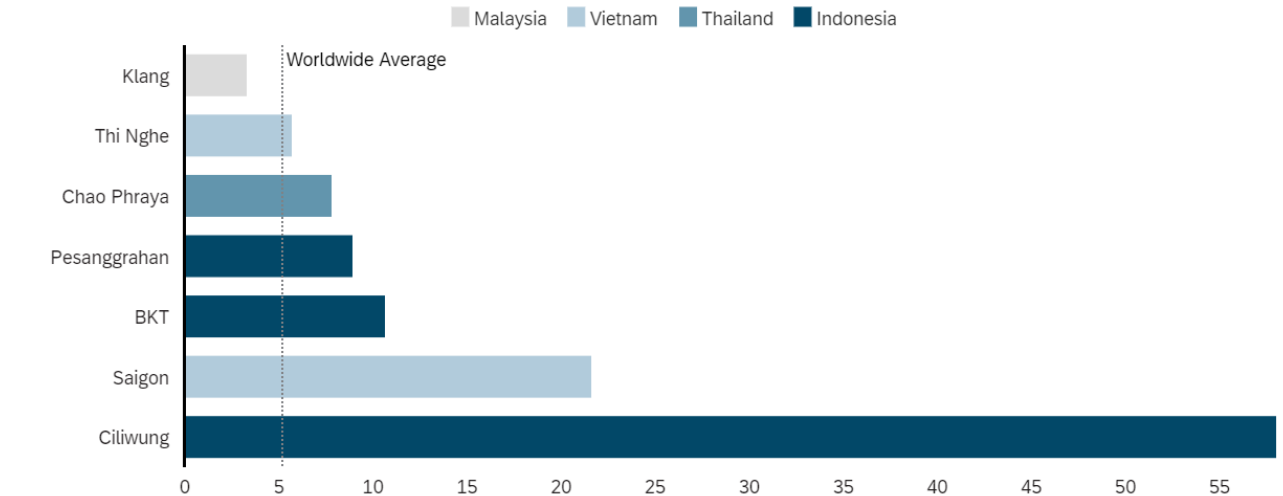
# A lot of ASEAN urban residents rely on groundwater as water source, causing several implications

% households using groundwater in SE Asia countries, 2018

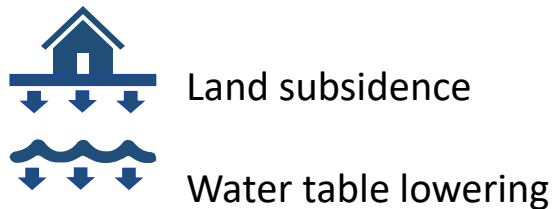


Rivers are estuary to rainwater runoffs, making it the city's natural watershed

Monthly averaged plastic items per hour of SE Asia rivers, 2019  
in thousand items



## Implications of groundwater overexploitation



**25 cm/year**  
In Jakarta

**5 cm/year**  
In Bangkok

Thus cities need to diversify its urban water sources with other sustainable alternatives:

Treated river water and runoffs



But, a lot of rivers that pass through major cities in ASEAN are ones of the most polluted rivers in the world

Water treatment plant cost for highly polluted rivers

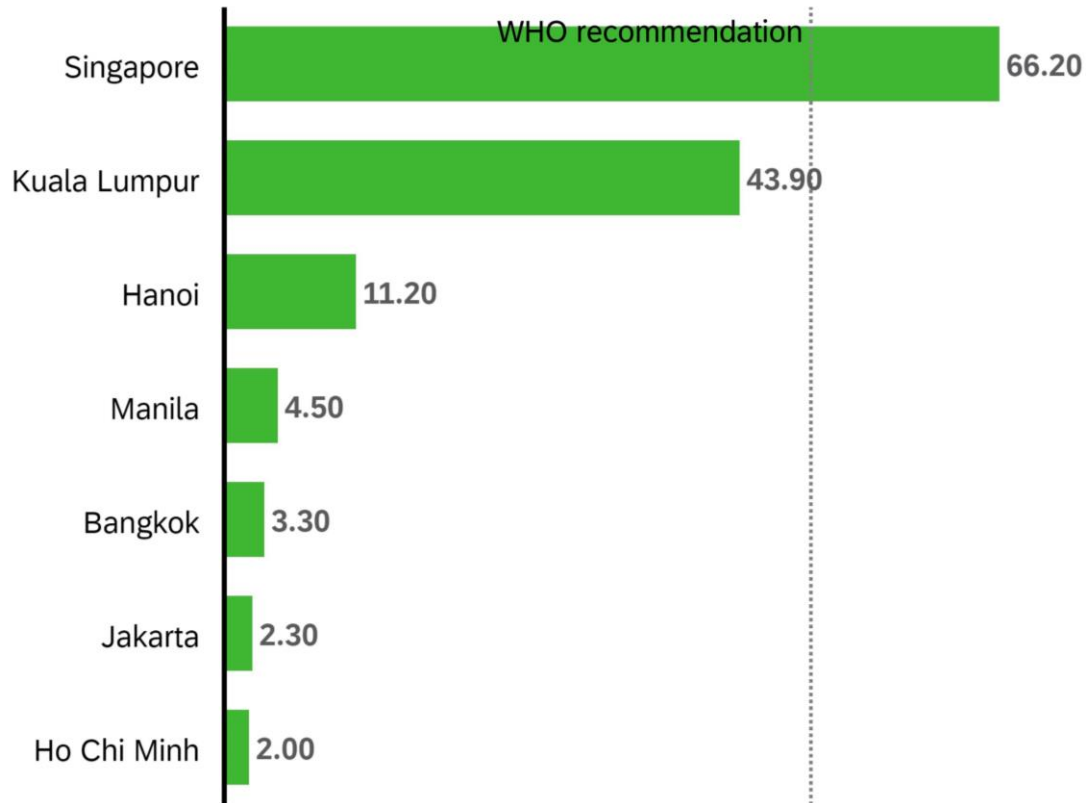


Water treatment plant cost for less polluted rivers

Dredging pollution in rivers can lead to a cheaper and more sustainable alternative to urban water source

# Many ASEAN highly-populated cities don't provide adequate green spaces

## Urban green spaces in SE Asia cities



**50 m<sup>2</sup>**

green spaces per capita is recommended by WHO

Unbalanced urban vs green spaces development have increased annual CO<sub>2</sub> emission by **6.1%**



only **1** out of these **7** ASEAN cities satisfy the recommendation

Utilizing river front as green space corridors can lower city's carbon footprint and create adequate green spaces

Finding 2c: Disaster Resiliency

# Most natural disasters in ASEAN are river-related and predicted to increase in the next years

For the past 10 years in ASEAN countries:

# >10M

people are affected of river-related disasters

# ~50%

natural disasters are river-related

River-related disasters



Floods

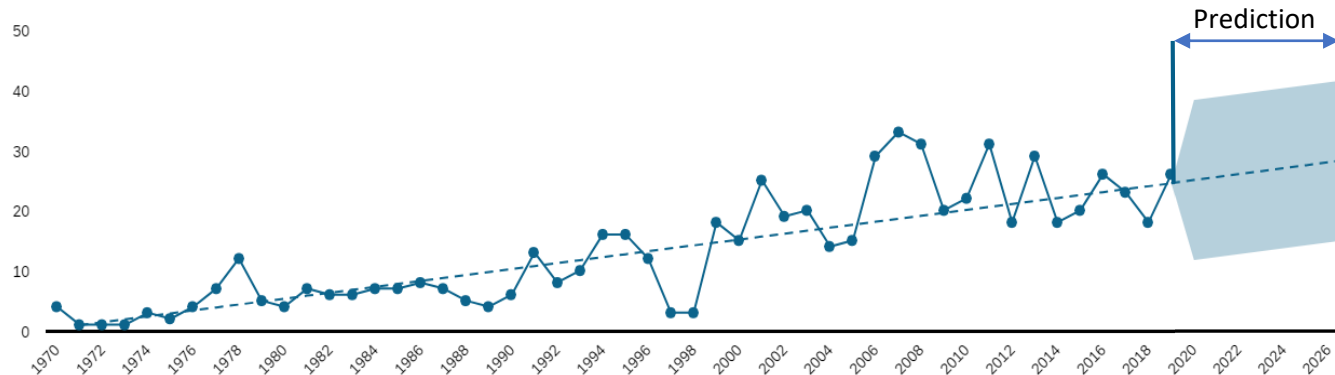


Drought



Landslide in areas adjacent to rivers

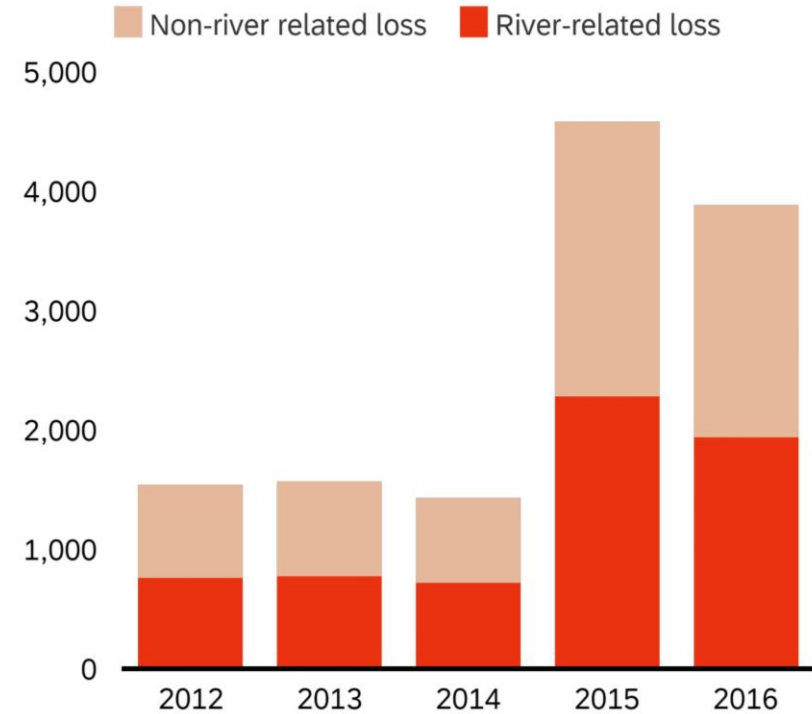
Recorded floods in SE Asia (1970-2019)



Floods disaster occurrence is predicted to increase due to climate change impact

## Direct economic loss attributed to disaster in SE Asia countries\*

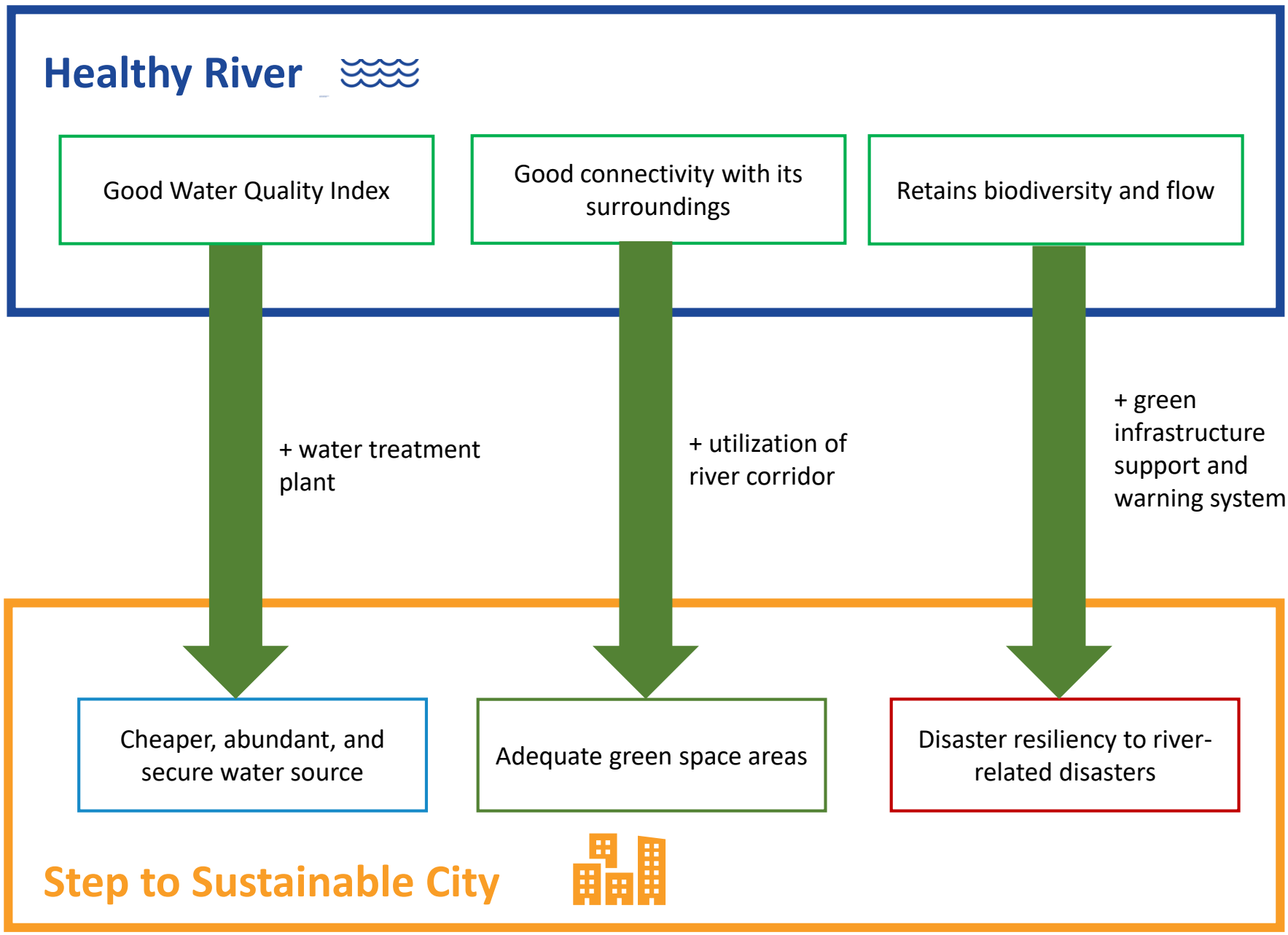
in million US\$



\*Cambodia, Indonesia, Malaysia, Myanmar, Timor-Leste

### Preventing river-related disasters would save more than 50% of economic loss in the upcoming years

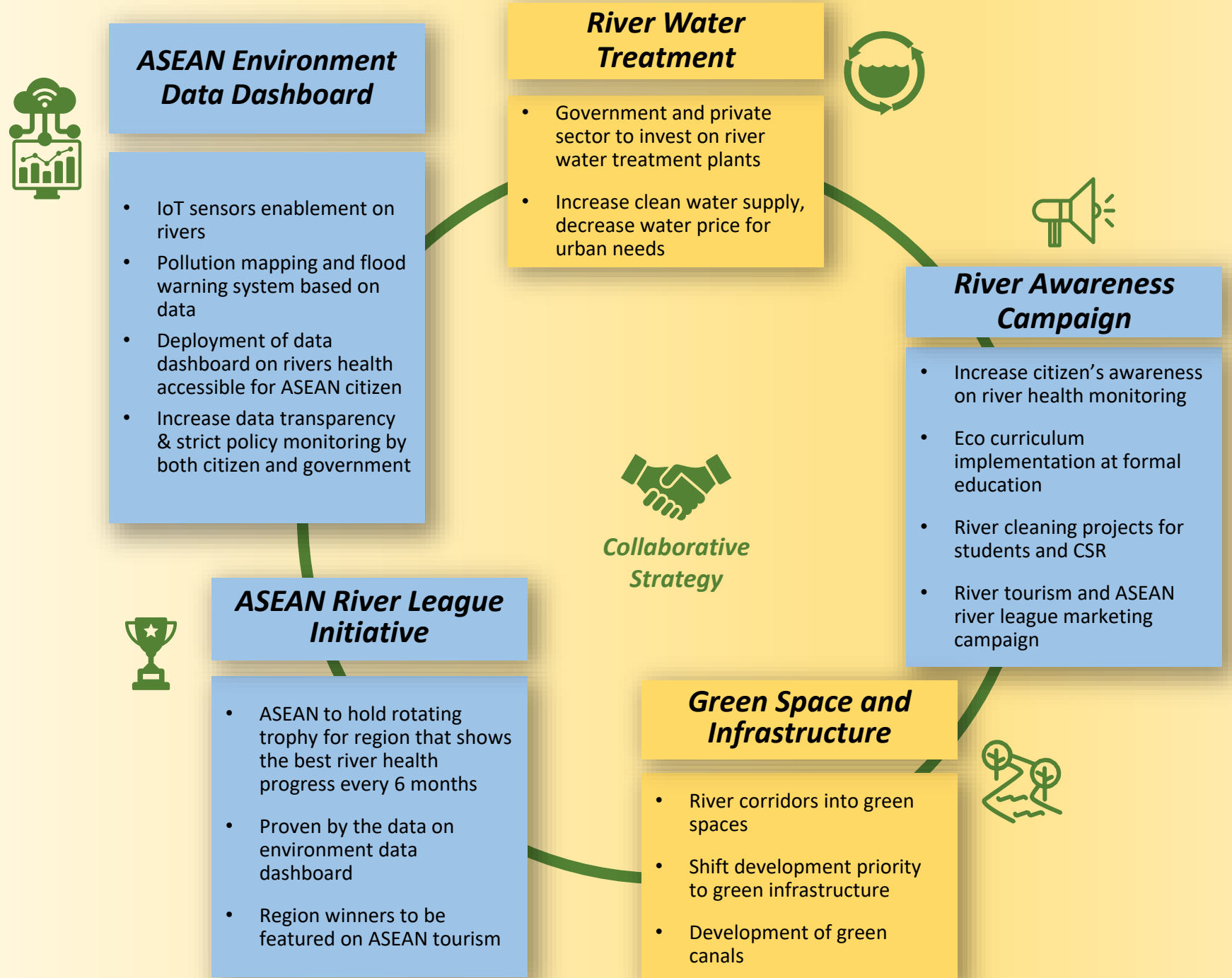
Healthy rivers as the heart pathway to achieve sustainable city



# ASEAN Integrated River Revitalization Strategy

A collaborative revitalization plan that aims to increase awareness, and overall river health in ASEAN to achieve city sustainability

- Short Term Phase (2021-2025)
- Long Term Phase (2021-2030)





# ASEAN Integrated River Revitalization

Aligns with Strategic Measures of

ASEAN Socio-Cultural Economy 2025 Blueprint

## River Water Treatment

*Establish new quality standard for rivers*

*Incite cooperation between public and private sector*

*River as sustainable urban water source*

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## River Awareness Campaign

*Awareness on river healthiness*

*River cleaning projects*

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## ASEAN River League Initiative

*Incentive for regions to improve river quality*

*Incite cooperation between citizen and government*

*Promote green space tourism*

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## ASEAN Environment Data Dashboard

*Data transparency*

*Strict and cooperative policy monitoring*

*Early flood warning system*

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## Green Space and Infrastructure

*Awareness on river as urban spaces*

*River corridor to green spaces*

*Integration with green infrastructures*

*Development of green canals*

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**Healthy River**

*Improvement of River Water Quality*

*Increased river connectivity with urban elements*

*River flow and biodiversity sustained*

- Section A.2: IT for connecting the regional community
- Section C.1: Cooperation on environmental management, environmental education
- Section D.1: Disaster Resilient ASEAN
- Section E.1: Transparent public service in ASEAN

- ASEAN Economic Community 2025 Blueprint
- Section B.1: Fostering a fair competition region
  - Section B.7: Transparency in the public sector
  - Section B.8: Sustainable Economic Development
  - Section C.2: ICT Innovation in Smart City
  - Section C.6: ASEAN Tourism
  - Section D.3: Public private partnership for sustainability
  - Section D.5: Regional Integration Effort

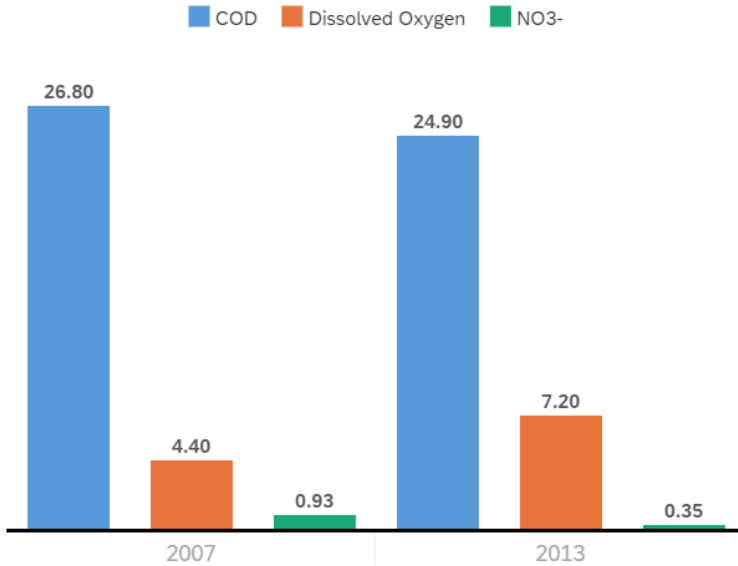


# Kwacza River, Słupsk

Methods used: Green infrastructure integration, river cleaning projects

Water quality parameters of Kwacza river

in mg/liter



Pollutants

COD -7.1%  
NO<sub>3</sub><sup>-</sup> -62.4%



Dissolved O<sub>2</sub> +63.3%

Revitalization considerably improved water quality

# Successful revitalization examples



Protection for up to **200-year** flood event



**5.8 km** green corridor for citizen and wildlife

Revitalization considerably improved city's disaster resiliency and urban green space

# Cheonggyecheon River, Seoul



Methods used: River front as green corridors, green infrastructure integration



Before



After

# References



## Graphs

ASEAN population 2010-2050 [Slide 2]

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% households using groundwater in SE Asia countries, 2018 [Slide 4]

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Monthly averaged plastic items per hour of SE Asia rivers, 2019 [Slide 4]

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Urban green spaces in SE Asia cities [Slide 5]

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Recorded Floods in SE Asia (1970-2019) [Slide 6]

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Direct economic loss attributed to disasters in SE Asia countries [Slide 6]

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Water quality parameters of Kwacza river [Slide 10]

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## Visuals

[https://commons.wikimedia.org/wiki/File:Pittsburgh\\_alleghenyriverpark.jpg](https://commons.wikimedia.org/wiki/File:Pittsburgh_alleghenyriverpark.jpg)

<https://www.landscapeperformance.org/sites/default/files/styles/lightbox/public/Cheonggyecheon-Before.jpg>

<https://www.landscapeperformance.org/sites/default/files/styles/lightbox/public/Cheonggyecheon-After.jpg>

All icons are provided by The Noun Project (<https://thenounproject.com/>) and Microsoft Office

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