The Utility Management Conference™ AWWA | WEF

2020

Innovative Flood Control Emerging from Collaborations

～Evolution of Yokohama Green Infrastructures Accommodating Climate Change～

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City of Yokohama

Innovative Flood Control Emerging from Collaborations

(1) Introduction

(2) Making Use of Green Infrastructures as an Adaptive Measure

(3) Collaboration with Diverse Entities

(4) Developments Moving Forward

(5) Conclusion

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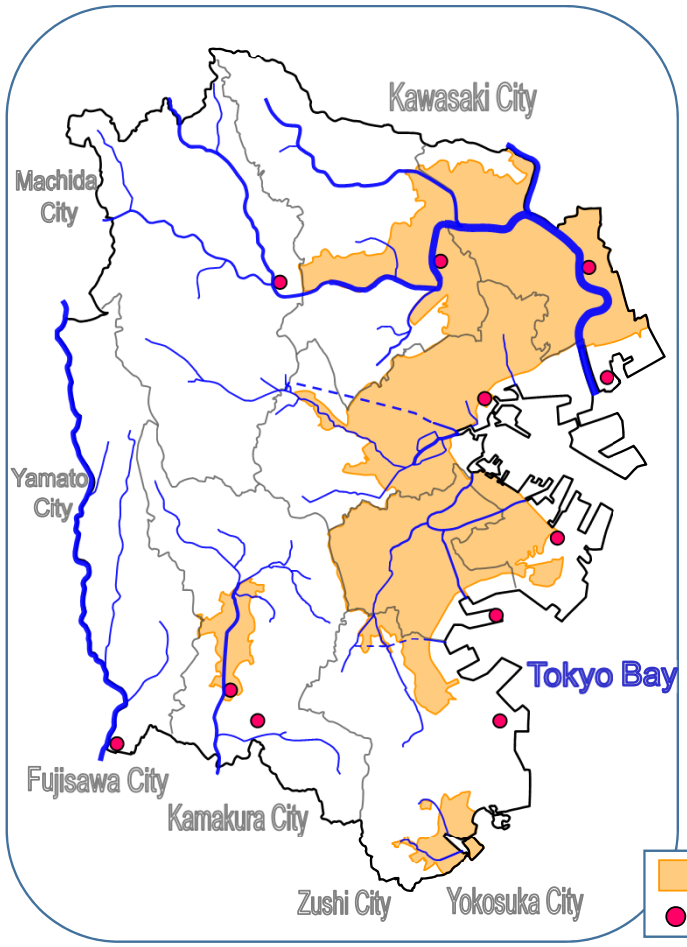
City of Yokohama

City Information	
Land Area	435 km^2
Population	3.7 million

Yokohama City Sewage Works



Yokohama City Los Angeles

Area: Approx. 435 km² **(1,302km²)**

Population: Approx. 3.74 million people

Los Angeles **(4.0 million people)**

Sewage Works

Drainage area: Approx. 400 km²

(Combination: 108 km²

Separation: 292 km²)

Water Reclamation Center: 11 places

Sewer extension: Approx. 11,900 km

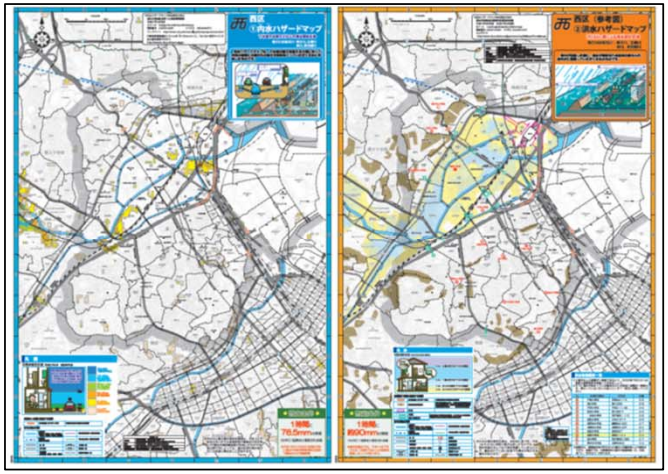
Sewerage coverage: 99.9%

Introduction [Flood Control up to Now]

Examples of Flood Control up to Now

Nippa-Suehiro Trunk Sewer
(tangible measure)

Some 410,000 m^3 of flood control storage sewer



Landside Water Hazard Map
Supports advance of self-help & cooperation
(intangible measure)

Provides public information about flood risk spots and evacuation sites across the entire city

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Introducing Adaptive Measure

Framed in the Yokohama City Action Plan
for Global Warming Countermeasures

Adaptive measure

Minimize or avoid damage
due to the impact of climate change

Mitigation measure

Curb emissions of greenhouse gases,
the cause of climate change

Use as an Adaptive Measure [Introducing Adaptive Measure]

Making use of green infrastructure

Adaptive measure

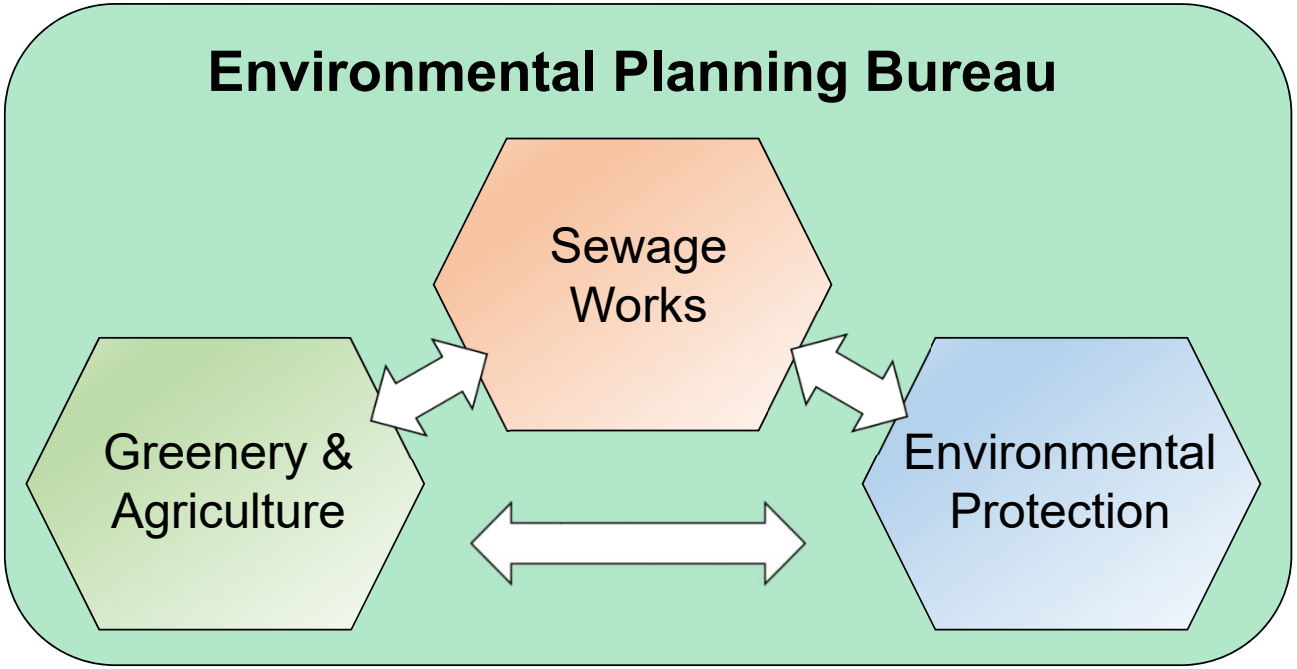
Minimize or avoid damage
due to the impact of climate change

Mitigation measure

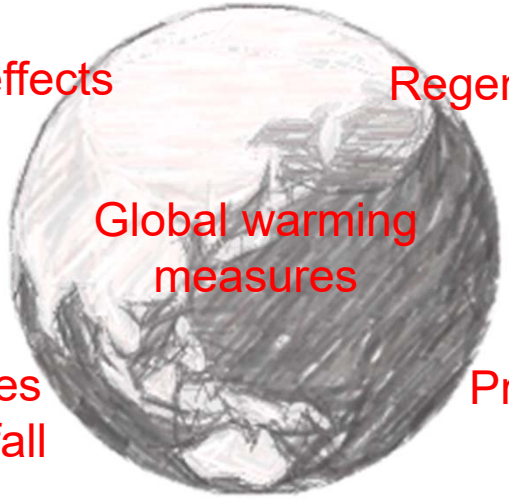
Curb emissions of greenhouse gases,
the cause of climate change

Use as an Adaptive Measure
[Promotion by Environmental Planning Bureau]

The Environmentally related departments that have joined forces to make use of green infrastructures



Use as an Adaptive Measure [Promotion by Sewage Works]



1 Disaster preventions and reductions prepared for earthquakes and heavy rain

New flood control introduced from perspective of adaptability

2 Creating a good water cycle

Sewage Works collaborates with diverse entities to push initiatives forward

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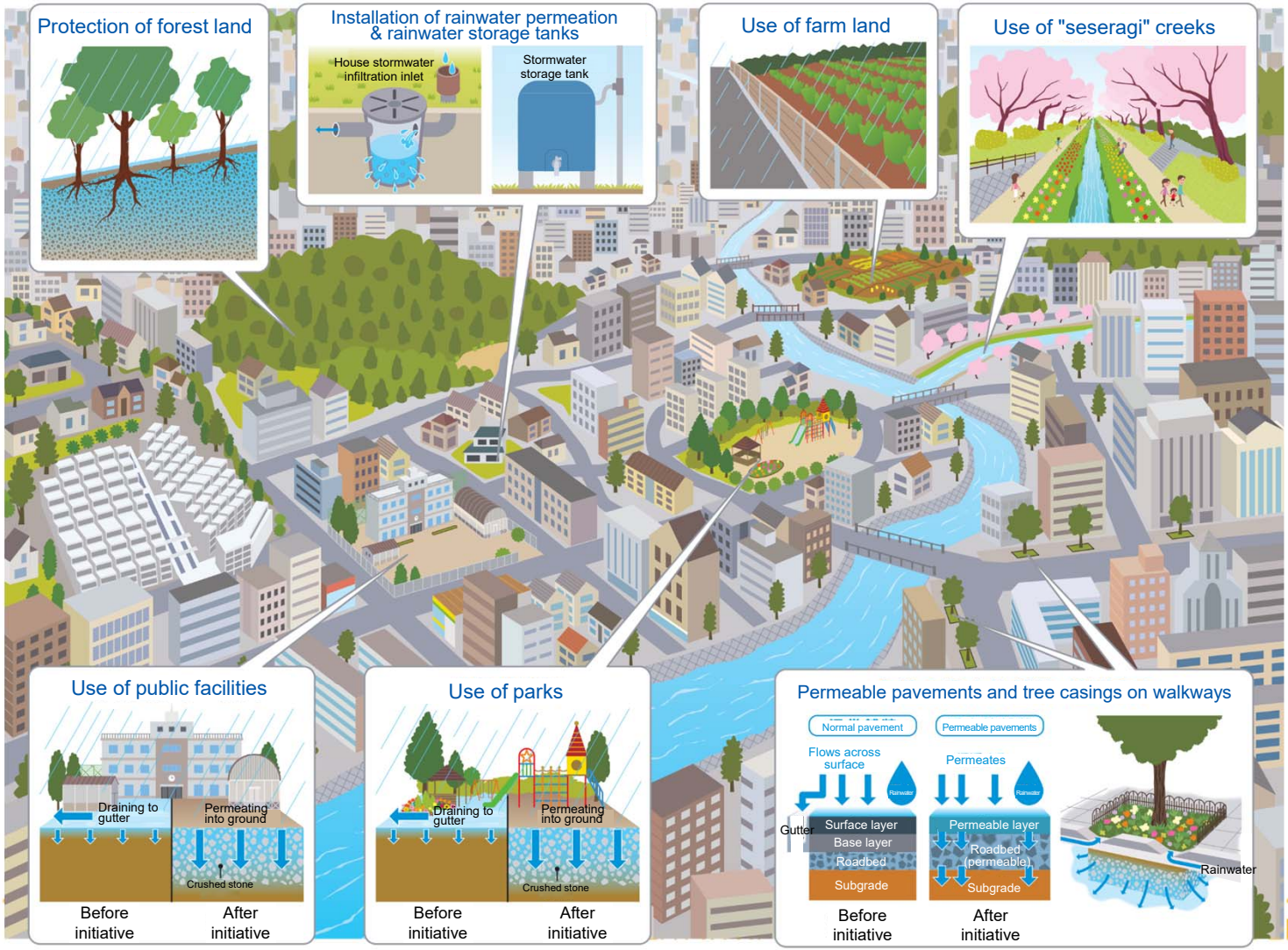
Collaboration with Diverse Entities
[From Upstream to River Mouth]



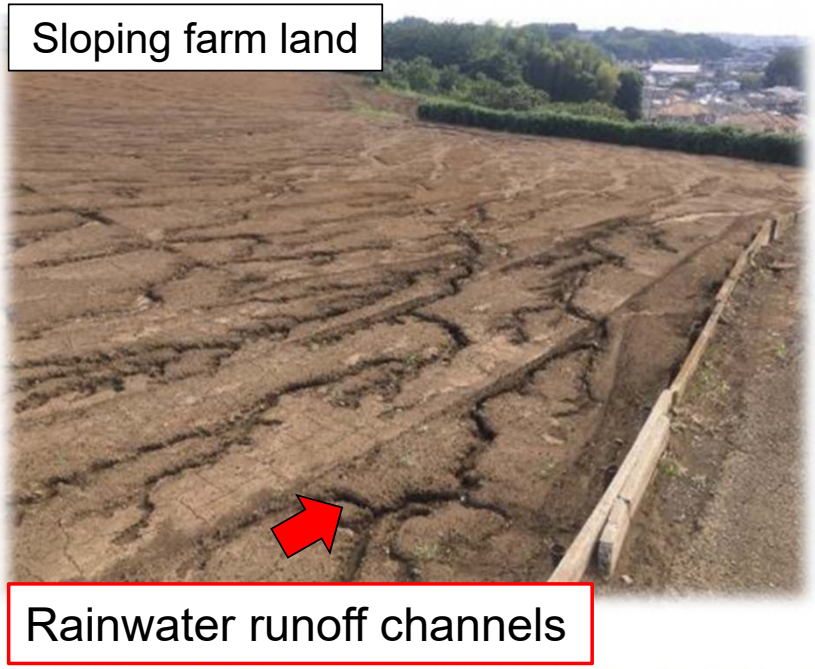
Collaboration with Diverse Entities [Urban Agriculture (1)]

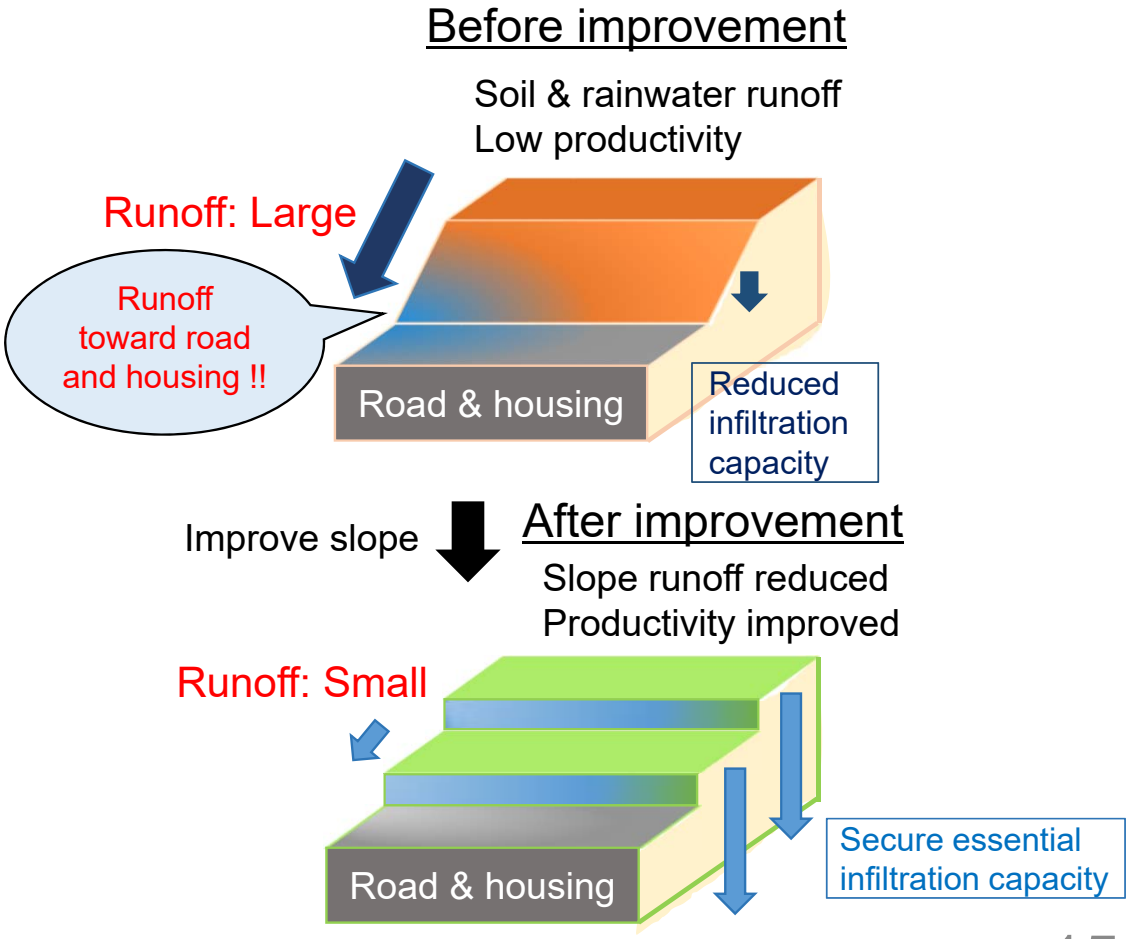
- Repeated plowing causes clogging, forming an impermeable layer deep in the ground
  ⇨ permeability of the soil is reduced
- Breaking up the impermeable layer restores essential permeability and improves agricultural productivity.

The impermeable layer broken up

Collaboration with Diverse Entities [Urban Agriculture (1)]

- Sloping farm land prone to rainwater & soil runoff
- Flatten land and improve infiltration capacity



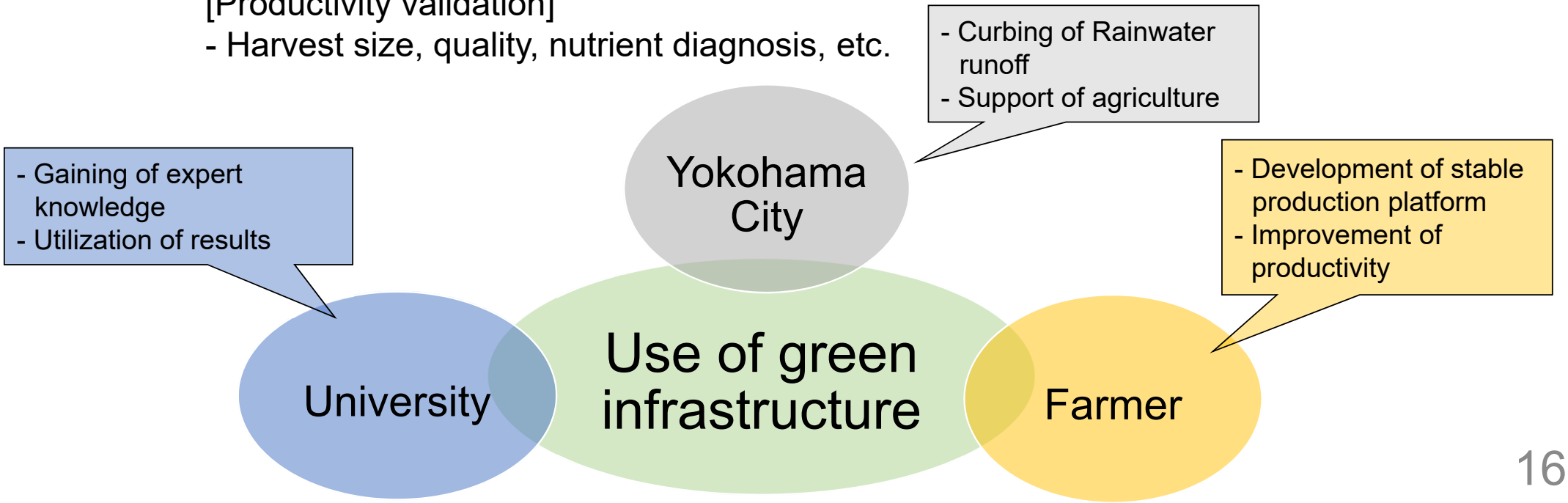


Collaboration with Diverse Entities [Urban Agriculture (2)]

Currently validating benefits to farm land

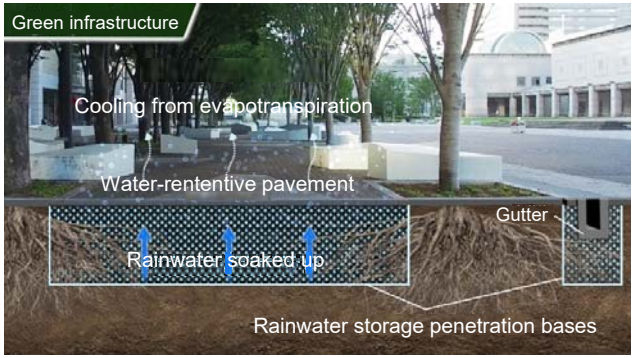
[Infiltration validation]
- Comparison of coefficients related to infiltration and amount of surface runoff, etc.

[Productivity validation]
- Harvest size, quality, nutrient diagnosis, etc.



Collaboration with Diverse Entities [Grand Mall Park]

- Promoting good growth of trees & plants
- Evapotranspiration during fine weather counters heat island effects
- Improves water retention and permeability, which contributes to flood control



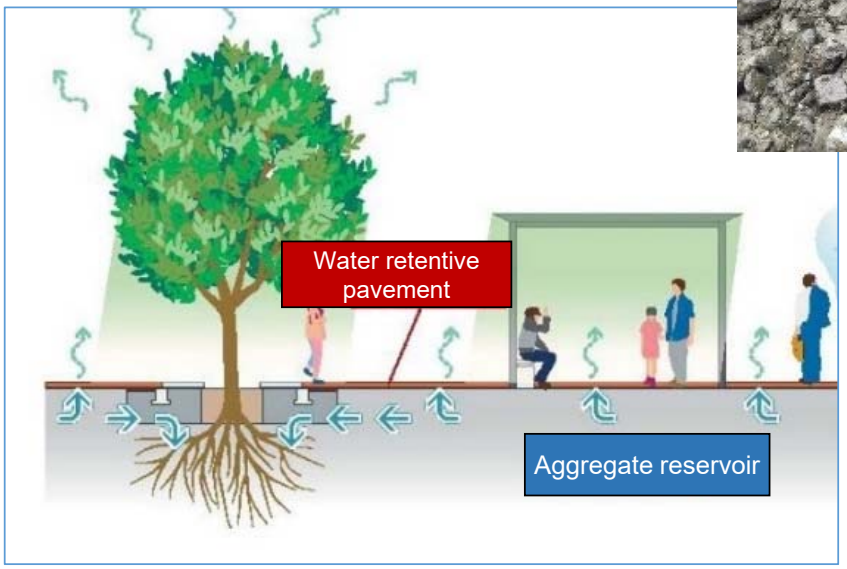
Source: Green Infrastructure Reserch Institute

Collaboration with Diverse Entities [Park Work (2)]

- Improvement coming from the building or renewing of parks provide rainwater retention and permeation in our parks
- Creating places of relaxation for locals

Reservoir aggregate

Park with enhanced permeability



Collaboration with Diverse Entities [Road Work]

Taking the opportunity afforded by renewal work on tree-lined streets as well as work to deal with root lifting, we install aggregate reservoirs and lay permeable pavements, which add to water retention and permeation function of streets.

Before work
(root lifting & impermeable pavement)

Work results

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Developments Moving Forward [Inter-works Collaboration]

The use of green infrastructures

comes from collaborations, which achieve big results

- Each entity undertaking work individually is inefficient

- Consider collaborative methods recognizable for their secondary benefits that contribute to other entities (works)

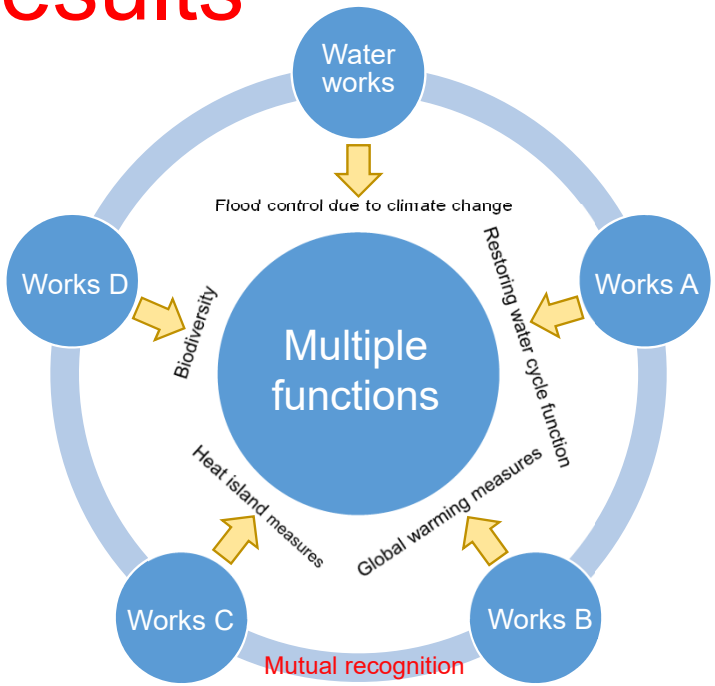
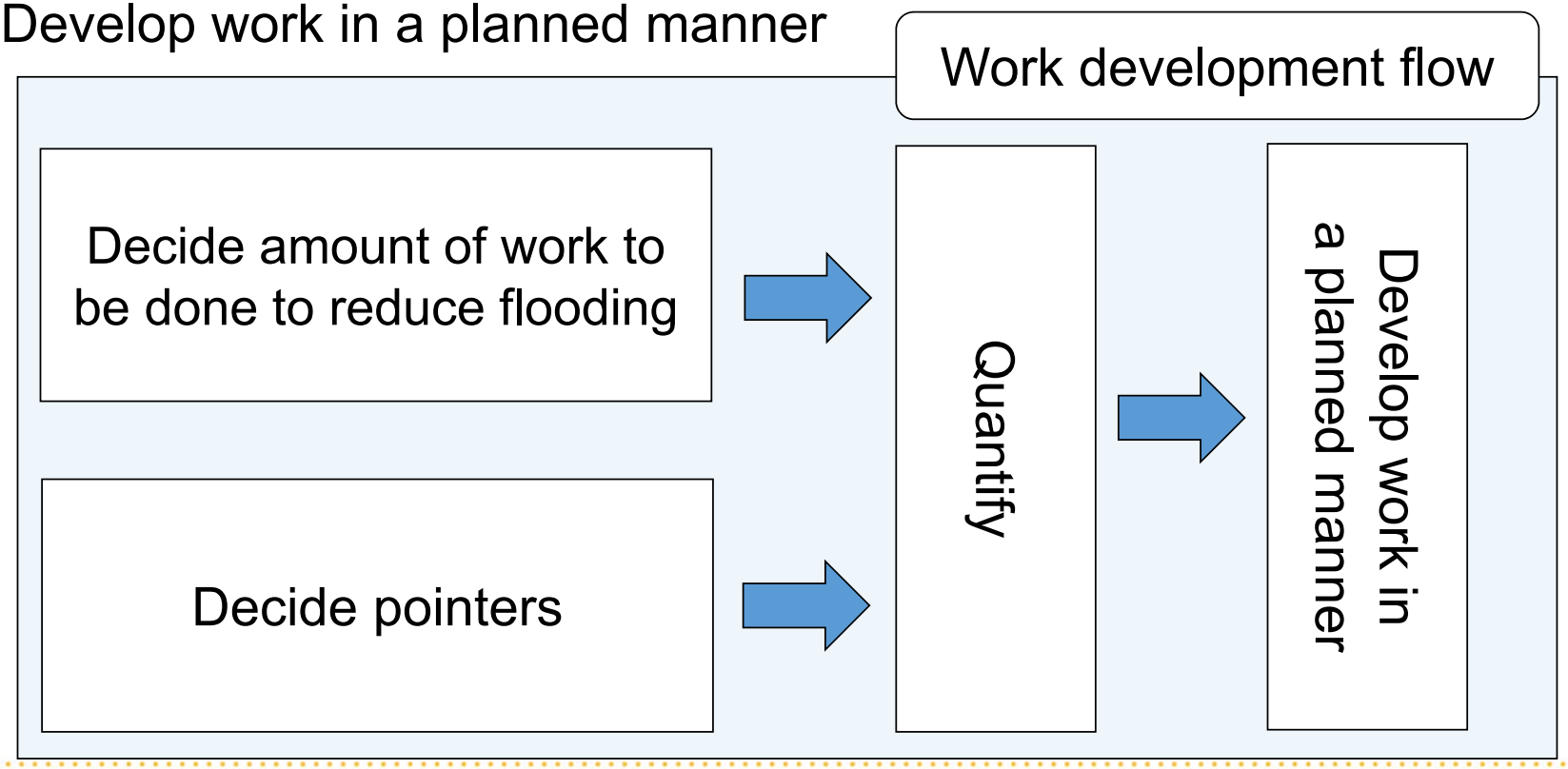


Image of multiple functions and inter-business collaboration

Developments Moving Forward [Visualizing Benefits (1)]

"Difficulty in quantitative evaluation" of benefits is the issue

- Visualizing benefits by using simulations
- Improving accuracy by undertaking model construction
- Develop work in a planned manner

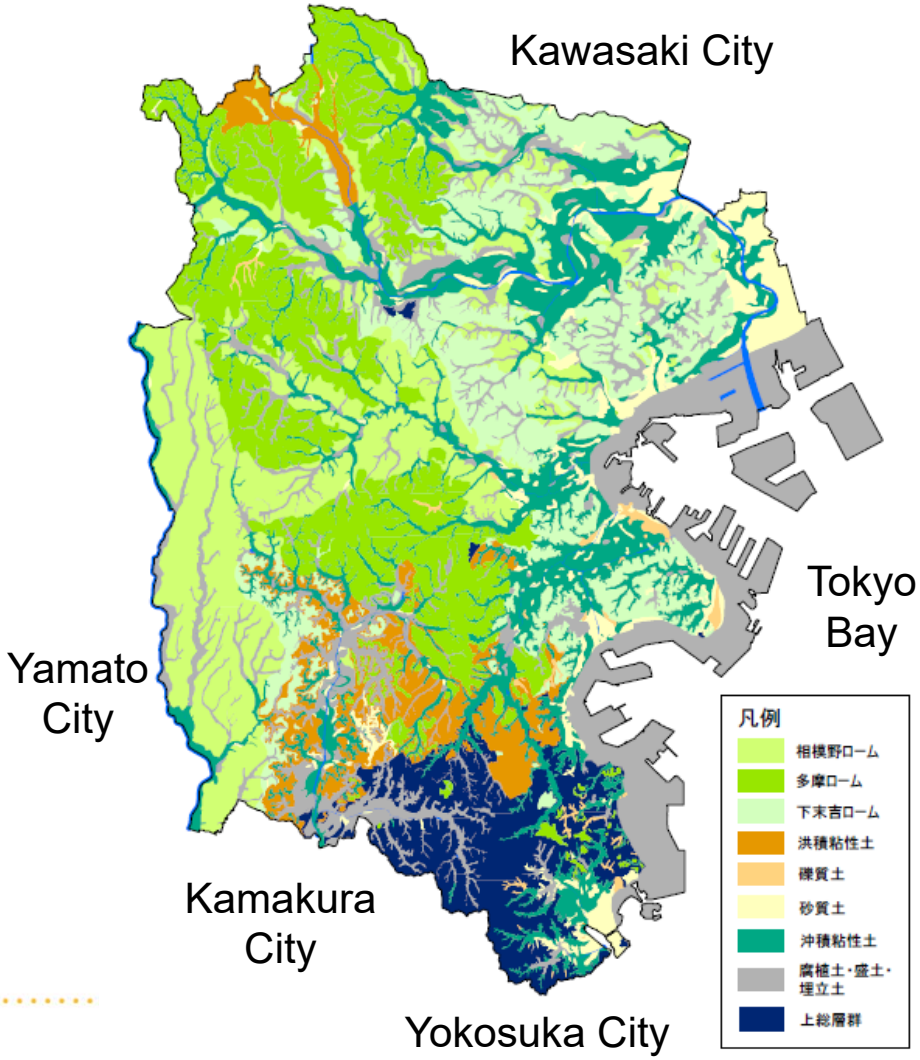


Developments Moving Forward [Visualizing Benefits (2)]

Visualizing infiltration capacity

- Infiltration capacity of the different soil types across the entire city determined

- Benefits of simple flood control can be calculated



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Keys to making use of Yokohama-style
green infrastructures to create a sustainable city
as portrayed in “SDGs Future City Yokohama”

Adaptive Collaborative Continuous

Administrative role

Creating opportunities for
[everyone to participate freely]

Thank you for your kind attention

Kashiokawa River catchment area

Policy Coordination Department
Environmental Planning Bureau
City of Yokohama