Responding to urban water challenges in Southeast Asia

Introducing polycentric management approaches to create resilient, water-sensitive cities

POLYURBAN WATERS

Published by
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About the PolyUrbanWaters Project and this report

This publication is an output of the research and development project "Polycentric Approaches to the Management of Urban Water Resources in Southeast Asia – A Localization of the Sustainability Goals of Agenda 2030 and the New Urban Agenda at the City/Municipality Level" (PolyUrbanWaters, 01LE1907A-C). This project is sponsored by the German Federal Ministry of Education and Research (BMBF) as part of the FONA program Sustainable Development of Urban Regions (NUR).

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Layout: www.gegenfeuer.net

Language editing: Carol Haynes

Print: Umweltdruckerei

Unless stated otherwise, graphics and photos were generated by the PolyUrbanWaters team, with the support of Gegenfeuer.
Cover photo by luuvstudio.

ISBN 978-3-00-068447-0

Please cite as:
Dekker, G., Gutterer, B., McNamara, I., Westermann, J., Wilk-Pham, A. (2021). *Responding to urban water challenges in Southeast Asia. Introducing polycentric management approaches to create resilient, water-sensitive cities* (B. Gutterer, P. Misselwitz & L. Ribbe, Eds.). BORDA e.V.

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Technische Universität Berlin
Habitat Unit

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Forschung für Nachhaltigkeit

Responding to urban water challenges in Southeast Asia

Introducing polycentric management approaches to create resilient, water-sensitive cities

Interim Report

Polycentric approaches to the management of urban waters

Strategies and instruments for the localization of the Sustainable Development Goals and the New Urban Agenda for cities in Southeast Asia

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List of Acronyms

ADB	Asian Development Bank
AD/ART	Anggaran Dasar / Anggaran Rumah Tangga (Article of Association / Bylaws)
AIT	Asian Institute of Technology
AKSANSI	Association of all Indonesian CBOs for Sanitation
ASEAN	Association of Southeast Asian Nations
BAPPEDA	Local Planning Agency (Indonesia)
BBWS	Regional Office for River Management (Indonesia)
BLUD	Regional Public Service Agency (Indonesia)
BOD	Biochemical Oxygen Demand
CBO	Community-Based Organization
CBS	Community-Based Sanitation
CIUS	Cambodian Institute for Urban Studies
COD	Chemical Oxygen Demand
COVID	Corona Virus Disease
CRCWSC	Cooperative Research Centre for Water Sensitive Cities
CSDGs	Cambodian Sustainable Development Goals
DEM	Digital Elevation Models
DEWATS	Decentralized Wastewater Treatment System
DIY	Special Region of Yogyakarta
DLH	Environmental Department (Indonesia)
DONRE	Department of Natural Resources and Environment (Vietnam)
DPSIR	Drivers-Pressures-State-Impact-Response
FAO	Food and Agriculture Organization
FS	Faecal Sludge
FSM	Faecal Sludge Management
GDP	Gross Domestic Product
GIS	Geographical Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GMS	Greater Mekong Subregion
HDI	Human Development Index
IPAL	Instalasi Pengolahan Air Limbah (Wastewater Treatment Plant, Indonesia)
IPLT	Instalasi Pengolahan Lumpur Tinja (Faecal Sludge Treatment Plant, Indonesia)
IWA	International Water Association
IWRM	Integrated Water Resource Management
KIP	Kampong Improvement Program
MoC	Ministry of Construction (Vietnam)
MoI	Ministry of Interior (Indonesia)
MOHA	Ministry of Home Affairs (Indonesia)
MoNRE	Ministry of Natural Resources and Environment (Indonesia)
MoP	Ministry of Planning (Cambodia)
MoPH	Ministry of Public Health (Indonesia)
MoPW	Ministry of Public Works (Indonesia)
MPWT	Ministry of Public Works and Transport (Cambodia)
NBS	Nature-Based Solution(s)
NGO	Non-Governmental Organization

NSDEP	National Socio-Economic Development Plan (Laos)
NSDP	National Strategic Development Plan (Cambodia)
NSPK	Norms, Standards, Procedures and Criteria
NUA	New Urban Agenda
O&M	Operation and Maintenance
ODA	Official Development Assistance (Vietnam)
OECD	Organisation for Economic Co-operation and Development
OPI	Office for Planning and Investment (Laos)
OSS	On-site Sanitation System
PDAM	Local government-owned drinking water supplier (Indonesia)
PAMDES	Community-based clean water provision (Indonesia)
PDR	People's Democratic Republic
PERPAMDES	Perkumpulan PAMDES / Association of Village Managed Water Supply Systems (Sleman)
PPC	Provincial People's Committee (Vietnam)
PPP	Public-Private Partnership
RCG	Sub Decree on Numbers of Councillors
REC	Regional Economic Corridor City
RGC	Royal Government of Cambodia
RPJMN	National Medium-Term Development Plan (Indonesia)
RPJP/M	Regional Long-Term and Medium-Term Development Plans (Indonesia)
RPP	Rencana Pembangunan dan Pelaksanaan, Development and Implementation Plan (Indonesia)
RT	Official Local Community Council in Sleman
RTRW/RDTR	Spatial and Detailed Plans (Indonesia)
SDC	Swiss Agency for Development and Cooperation
SDG	Sustainable Development Goals
SDSN	Sustainable Development Solutions Network
SEA	Southeast Asia
SEC	Southern Economic Corridor
SNA	Sub-National Administrations (Cambodia)
SMARTC	Specific, Measurable, Achievable, Realistic, Time-bound and Costed
SOE	State-Owned Enterprises
SPAM	Government Projects for Drinking Water Supply (Indonesia)
SPAL	Saluran Pembuangan Air Limbah. Wastewater Drainage (Indonesia)
TSS	Total Suspended Solids
TKD	Tanah Kas Desa (Indonesia) (Village owned and managed land)
UGM	Universitas Gadjah Mada (Indonesia)
UNDP	United Nations Development Programme
UPTD	Regional Technical Implementation Unit (Indonesia)
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
SKPD/UPTD	Regional Technical Implementation Unit (Indonesia)
VAWR	Vietnam Academy for Water Resources
VNR	Voluntary National Review
VSDG	Vietnam SDG
WB	World Bank
WWTP	Wastewater Treatment Plant

Introduction

Cities in Southeast Asia (SEA) are exceedingly diverse, ranging from hubs of the global economy to small marketplaces in remote areas. Most countries in SEA, despite large regional disparities at the beginning of the 2020s, have made significant achievements on a number of indicators in the Agenda 2030 Sustainable Development Goal (SDGs) framework. For example, significant progress has been made in achieving SDG 4 (quality education) and SDG 9 (industry, innovation and infrastructure). The region has also achieved considerable success on the SDG 6 (clean water and sanitation) indicator for "Access to safe drinking water services" in the last decade. However, little progress has been made on almost all other water-related subgoals, as is also the case with SDG 11 (sustainable cities and communities) and SDG 13 (climate action) [1].

The success of Agenda 2030 will mainly be decided in cities. By 2050, nearly 70% of humans are expected to live in urban areas, making urbanization one of the 21st century's most transformative trends, and intensifying the economic, social, environmental and cultural challenges and opportunities. In its shared vision for a better and more sustainable future, the New Urban Agenda (NUA) underlines the importance of water for the development of cities and human settlements. Urban planning processes should incorporate integrated water resources planning and management, considering urban-rural linkages, at the local and territorial scales, ensuring the participation of multiple sectors, stakeholders, and communities. The NUA calls for strengthening the role of small and intermediate cities in enhancing food security and nutrition systems, providing access to sustainable, affordable, adequate, resilient, and safe housing, infrastructure and basic needs services, and facilitating effective trade links across the urban-rural continuum [2].

Many secondary and tertiary cities and towns in SEA are experiencing rapid but quite often insufficiently planned and managed developments which result in major challenges: the sustainable protection of water resources; the reduction of vulnerability to climate change and disaster risks; and the effective provision of water-related public services for all citizens. In other words, they are struggling to establish more livable, climate change-resilient and inclusive cities. Often insufficiently equipped with institutional capacities, effective management and financing models, adequate administrative mandates and effective procedures, many city administrations in SEA find it difficult to develop and maintain efficient and sustainable water infrastructure, to ensure the comprehensive provision of water related public services, and to protect their water resources. Furthermore, the impact of the COVID-19 pandemic on urban residents has drawn more attention to the spatial and socio-economic aspects of cities [3].

There is increasing agreement among urban development decision makers, scholars and practitioners that classical models of urban planning and water-related infrastructure development alone cannot meet the development challenges of these cities. They no longer reflect the cities' realities, needs and capacities. Current planning approaches and implementation schemes for these cities should be rethought. The management of urban water resources should be removed from a solely sector-focused approach and understood as a cross-cutting issue of overall urban development. Infrastructure development should rely on flexible, integrated and financially sustainable modular approaches that can adapt to the development and needs of cities over time. New governance structures at city and neighborhood level involving city administrations, communities, citizens, the private sector, civil society institutions and academia should allow a polycentric management of water resources. This required comprehensive urban transformation may be guided by concepts such as "water-sensitive cities" [4] or "water-wise cities" [5].

Although multiple approaches, instruments and experiences for the development of water-sensitive cities are already available worldwide, these are either completely lacking for secondary and tertiary cities in the SEA region or only exist in isolated cases. This need is addressed by the practice-oriented, interdisciplinary research project "Polycentric approaches to the management of urban water resources in Southeast Asia" (PolyUrbanWaters). Here, cities, academic institutions and civil society organizations from Cambodia, Germany, Indonesia, Laos, Thailand and Vietnam are working together with the aim of developing approaches and instruments for the establishment of water-sensitive secondary and tertiary cities in the region. By these means, the project contributes to the localization of the SDGs and the NUA by supporting processes that define, implement and monitor local-level strategies to reach global, national, and subnational targets.

This report publishes the results of the Definition Phase (2019–2020) of the PolyUrbanWaters project, which is funded by the German Federal Ministry for Education and Research (BMBF). Based on intensive consultation processes with partner cities in SEA, the project partners developed a concept for the Research and Development Phase of the project (2021–2025) and examined experiences and trends of sustainable urban development in the region in its regulatory, technological, economic, administrative, institutional and ecological dimensions. The work presented here:

- contextualizes polycentric approaches to urban water management as a relevant cross-sectoral instrument for localizing Agenda 2030 and the NUA, especially for secondary and tertiary cities in Southeast Asia;
- introduces a conceptual framework for how the integration of innovative urban planning approaches with urban water resources management can contribute to the establishment of water-sensitive cities in the context of rapid urban transformation processes and limited institutional capacities;
- identifies main features of how planning and implementation processes for water-sensitive cities can be configured and which prerequisites should be created on the local and national levels;
- presents the research design of the PolyUrbanWaters project, which has the main goal of developing scalable and transferable instruments for polycentric water-sensitive urban development, the validity of which will be tested at the local level; and
- includes analyses (elaborated by PolyUrbanWaters network partners) of framework conditions and experiences that are relevant for a water-sensitive transition of secondary and tertiary cities in SEA.

Further project results and updates are available on the website www.polyurbanwaters.org.

Bangkok, Berlin, Bremen, Cologne, Hamburg, Hanoi, Phnom Penh, Sleman, Solo, Vientiane, Yogyakarta

March 2021

Pengantar
Bahasa Indonesia

Kota-kota di Asia Tenggara sangat beragam, berkembang dengan pesat dengan rentang cakupan mulai dari pusat-pusat kegiatan ekonomi global sampai ke tingkatan sentra perdagangan lokal/tradisional di wilayah terpencil. Meskipun ada kesenjangan antar-daerah yang lebar diawal dasawarsa ketiga abad ke-21, sebagian besar negara di Asia Tenggara telah berhasil dalam pencapaian yang signifikan dalam beberapa indikator Agenda 2030 pada kerangka kerja *Sustainable Development Goals* (*SDGs*) atau Tujuan Pembangunan Berkelanjutan (TPB). Sebagai contoh, beberapa negara menunjukkan kemajuan yang berarti dalam mencapai TPB 4 (pendidikan berkualitas) dan TPB 9 (industri, inovasi, dan prasarana). Pada dasawarsa terakhir, Asia Tenggara juga dinilai cukup berhasil dalam mencapai indikator TPB 6 (air bersih dan sanitasi layak) untuk "akses ke layanan air minum aman". Beberapa kemajuan yang cukup berarti juga telah diraih di hampir semua sub-tujuan dalam TPB yang berkaitan dengan air dan pengelolaannya. Kondisi yang sama juga didapati pada pencapaian TPB 11 (kota dan permukiman yang berkelanjutan) sekaligus TPB 13 (penanganan perubahan iklim) [1].

Keberhasilan pencapaian Agenda 2030 akan sangat ditentukan oleh perkembangan yang terjadi di kota. Pada tahun 2050 nanti, sekitar 70% populasi dunia diprediksikan akan tinggal terutama di wilayah perkotaan sehingga urbanisasi akan menjadi salah satu tren perpindahan penduduk pada abad ke-21. Hal ini berdampak pada makin meningkatnya tantangan sekaligus peluang di bidang ekonomi, sosial, lingkungan, dan budaya. Dalam visi bersamanya untuk mewujudkan masa depan yang lebih baik dan lebih berkelanjutan, *The New Urban Agenda* (*NUA*) atau Agenda Baru Perkotaan menekankan pentingnya air bersih untuk membangun kota dan permukiman. Proses perencanaan perkotaan harus mempertimbangkan perencanaan dan manajemen sumber daya air yang terintegrasi dengan mempertimbangkan aspek interaksi desa-kota dalam skala lokal dan daerah, guna memastikan peran serta dari berbagai sektor, pemangku kepentingan dan masyarakat. *NUA* mewajibkan penguatan peran kota kecil dan kota sedang dalam meningkatkan sistem ketahanan pangan dan gizi, memberikan akses ke perumahan, prasarana dan layanan kebutuhan dasar yang berkelanjutan, terjangkau, memadai, andal dan aman, serta memfasilitasi hubungan perdagangan yang efektif antara kesatuan desa-kota [2].

Banyak kota sekunder dan tersier di wilayah Asia Tenggara berkembang dengan pesat namun seringkali kurang terencana dan terkelola dengan baik yang berakibat pada munculnya tantangan besar; yang berkaitan dengan perlindungan berkelanjutan terhadap sumber daya air, mitigasi kerentanan terhadap perubahan iklim dan risiko bencana, serta layanan publik yang efektif terkait penyediaan air bersih untuk seluruh penduduk. Dengan kata lain, kota-kota

tersebut kesulitan mewujudkan kota inklusif yang lebih layak huni serta tahan terhadap perubahan iklim. Seringkali karena kurangnya kapasitas institusi, manajemen keuangan yang efektif, wewenang pemerintahan yang memadai serta prosedur yang efektif, banyak pemerintahan kota di wilayah Asia Tenggara kesulitan dalam membangun dan memelihara prasarana air bersih yang efisien secara berkelanjutan; termasuk didalamnya memastikan terselenggaranya penyediaan layanan terkait air bersih secara menyeluruh sekaligus melindungi sumber daya air yang ada.

Para pengambil keputusan, akademisi dan praktisi pembangunan perkotaan makin sepakat bahwa perencanaan kota dan pembangunan prasarana air bersih yang konvensional saja tidak dapat mengatasi persoalan pembangunan di kota-kota yang ada. Perencanaan pembangunan tersebut tidak lagi mencerminkan realita, kebutuhan dan kapasitas yang sebenarnya. Pendekatan perencanaan dan skema pelaksanaan yang ada sekarang perlu dipertimbangkan ulang. Manajemen sumber daya air perkotaan harus dipisahkan dari pendekatan yang semula hanya berfokus pada satu sektor dan selanjutnya harus sejatinya dipahami sebagai persoalan lintas sektor dalam pembangunan perkotaan secara keseluruhan. Pembangunan prasarana harus didasarkan pada pendekatan modular yang fleksibel, terintegrasi dan stabil secara finansial; yang mampu beradaptasi dengan pembangunan dan kebutuhan kota yang semakin berkembang seiring berjalannya waktu. Struktur tata kelola pemerintahan baru di tingkat kota dan daerah yang melibatkan pemerintah daerah, masyarakat, warga, sektor swasta, organisasi masyarakat sipil dan akademisi harus memungkinkan terciptanya manajemen polisentris terhadap sumber daya air yang ada. Perubahan pembangunan perkotaan menuju arah yang lebih baik atau transformasi perkotaan komprehensif termaksud ini dapat didasarkan pada konsep seperti “kota ramah air” [3] atau “kota bijak air” [4].

Meskipun sudah ada berbagai pendekatan, instrumen dan pengalaman terkait pembangunan kota ramah air ini di seluruh dunia, namun aspek-aspek ini sama sekali belum ditemukan di kota sekunder dan tersier di wilayah Asia Tenggara; atau hanya dapat ditemukan pada kasus-kasus tertentu saja. Kebutuhan atas pemecahan persoalan ini dijawab oleh suatu proyek yang bernama “Pendekatan Polisentris terhadap Manajemen Sumber Air Perkotaan di Asia Tenggara” yang berorientasi pada pengalaman dan pelaksanaan di lapangan serta penelitian lintas disiplin ilmu dan implementasinya. Dalam proyek ini, kota, institusi akademik dan organisasi masyarakat sipil dari Kamboja, Jerman, Indonesia, Laos, Thailand dan Vietnam bekerja sama guna mengembangkan pendekatan dan instrumen untuk terwujudnya konsep kota sekunder dan tersier ramah air di wilayah Asia Tenggara.

Melalui pendekatan dan instrumen tersebut, proyek ini berkontribusi terhadap penerapan Tujuan Pembangunan Berkelanjutan serta Agenda Baru Perkotaan di wilayah setempat yang mendukung semua proses yang menetapkan, melaksanakan serta memantau strategi tingkat daerah untuk mencapai target daerah, nasional dan global.

Laporan ini mencantumkan hasil dari Fase Definisi (2019–2020) proyek *PolyUrbanWaters* yang didanai Kementerian Pendidikan dan Riset Federal Jerman dan bisa diakses oleh masyarakat yang berminat pada topik ini. Berdasarkan proses konsultasi intensif dengan kota-kota mitra di Asia Tenggara, mitra proyek telah menyusun konsep untuk Fase Penelitian dan Pengembangan proyek ini (2021–2025) dan mengkaji pengalaman sekaligus tren dalam pembangunan perkotaan yang berkelanjutan di Asia Tenggara dalam aspek regulasi, teknologi, ekonomi, pemerintahan, lembaga dan lingkungan. Laporan ini mencakup:

- kontekstualisasi pendekatan polisentris terhadap manajemen air bersih perkotaan sebagai instrumen lintas sektor yang relevan untuk implementasi Agenda 2030 dan Agenda Baru Perkotaan di wilayah setempat; terutama untuk wilayah perkotaan sekunder dan tersier di Asia Tenggara;

- penyajian kerangka kerja konseptual untuk menunjukkan bagaimana integrasi antara pendekatan dalam perencanaan perkotaan yang inovatif dan manajemen sumber daya air perkotaan mampu berkontribusi pada pembangunan kota ramah air dengan proses transformasi perkotaan yang cepat dan kapasitas institusi yang terbatas;

- identifikasi aspek-aspek utama terkait bagaimana proses perencanaan dan pelaksanaan untuk mewujudkan kota ramah air dapat disusun dan prasyarat yang harus dipenuhi di tingkat daerah dan nasional;

- penyajian desain penelitian proyek *PolyUrbanWaters* yang tujuan utamanya adalah pengembangan instrumen terukur untuk pembangunan perkotaan ramah air yang polisentris, yang validitasnya akan diuji di tingkat lokal; dan

- analisis (yang diuraikan oleh mitra jaringan *PolyUrbanWaters*) terhadap kondisi dan pengalaman dalam kerangka kerja ini yang sesuai dengan peralihan menuju kota ramah air untuk kota sekunder dan tersier di wilayah Asia Tenggara.

Hasil dan pembaruan lainnya terkait proyek ini tersedia di situs web www.polyurbanwaters.org.

Bangkok, Berlin, Bremen, Köln, Hamburg, Hanoi, Phnom Penh, Solo, Vientiane, Yogyakarta

Februari 2021

សេចក្តីផ្តើម

Khmer

បណ្តាទីក្រុងនៅអាស៊ីអាគ្នេយ៍កាន់តែមានលក្ខណៈចម្រុះខុសៗគ្នា ចាប់ពីមជ្ឈមណ្ឌលសេដ្ឋកិច្ចសកលរហូតដល់ទីផ្សារតូចៗនៅតំបន់ដាច់ស្រយាល។ បើទោះជាមានគម្លាតខុសគ្នារវាងតំបន់មួយទៅតំបន់មួយទៀត នៅដើមទសវត្សរ៍ទី៣ នៃសតវត្សរ៍ទី២១ ក៏ដោយ ប្រទេសភាគច្រើននៅអាស៊ីអាគ្នេយ៍ បានសម្រេចនូវសមិទ្ធផលគួរឱ្យកត់សម្គាល់នៃសូចនាករជាច្រើនក្នុងក្របខ័ណ្ឌរបៀបវារៈឆ្នាំ២០៣០នៃគោលដៅអភិវឌ្ឍន៍ប្រកបដោយចីរភាព។ ឧទាហរណ៍ កន្លងមក មានវឌ្ឍនភាពគួរឱ្យកត់សម្គាល់ក្នុងការសម្រេច គោលដៅអភិវឌ្ឍន៍ប្រកបដោយចីរភាព (SDG) ទី ៤ (ការអប់រំប្រកបដោយគុណភាព) និងគោលដៅអភិវឌ្ឍន៍ប្រកបដោយចីរភាព (SDG) ទី ៩ (ឧស្សាហកម្ម នវានុវត្ត៍ និងហេដ្ឋារចនាសម្ព័ន្ធ)។ តំបន់នេះក៏សម្រេចបានជោគជ័យជាច្រើនជុំវិញគោលដៅអភិវឌ្ឍន៍ប្រកបដោយចីរភាព (SDG) ទី ៦ (ទឹកស្អាត និងអនាម័យ) នោះគឺ “ការទទួលបានសេវាទឹកផឹកប្រកបដោយសុវត្ថិភាព” នៅក្នុងទសវត្សរ៍ចុងក្រោយនេះ។ ប៉ុន្តែ សម្រាប់គោលដៅរងស្ទើរតែទាំងអស់ដទៃទៀតពាក់ព័ន្ធនឹងទឹកស្អាត មានការសម្រេចបានវឌ្ឍនភាពតិចតួចប៉ុណ្ណោះ តួយ៉ាង ដូចជាករណីគោលដៅអភិវឌ្ឍន៍ប្រកបដោយចីរភាព (SDG) ទី ១១ (ទីក្រុង និងសហគមន៍ប្រកបដោយចីរភាព) និង គោលដៅអភិវឌ្ឍន៍ប្រកបដោយចីរភាព (SDG) ទី ១៣ (សកម្មភាពបរិស្ថាន) [1] ជាដើម។

ជោគជ័យនៃរបៀបវារៈឆ្នាំ ២០៣០ ត្រូវសម្រេច នៅទីក្រុង។ ត្រឹមឆ្នាំ ២០៥០ មនុស្សជាតិ ៧០% នឹងរស់នៅតំបន់ប្រជុំជន ដែលធ្វើឱ្យនគរូបនីយកម្មក្លាយជានិន្នាការមួយ ក្នុងចំណោមនិន្នាការដែលនាំមកនូវការផ្លាស់ប្តូរធំៗជាងគេក្នុងសតវត្សរ៍ទី ២១ ហើយនាំមកនូវបញ្ហាប្រឈមក៏ដូចជា ឱកាសសេដ្ឋកិច្ច សង្គម បរិស្ថាន និងវប្បធម៌ជាច្រើនផងដែរ។ នៅក្នុងចក្ខុវិស័យរួម ដើម្បីនាគត់កាន់តែប្រសើរ និងកាន់តែមានចីរភាព របៀបវារៈថ្មីនៃទីក្រុង (NUA) គូសបញ្ជាក់ពីសារៈសំខាន់នៃធនធានទឹកសម្រាប់ការអភិវឌ្ឍទីក្រុងនិងតំបន់តាំងទីលំនៅរបស់មនុស្ស។ ដំណើរការធ្វើផែនការទីក្រុងគួរបញ្ចូលការធ្វើផែនការ និងការគ្រប់គ្រងធនធានទឹកជាមួយគ្នា ដោយត្រូវធ្វើការពិចារណាពីទំនាក់ទំនងរវាងតំបន់ប្រជុំជន និងតំបន់ជនបទ ទាំងនៅកម្រិតមូលដ្ឋាន និងកម្រិតដែនដីទាំងមូល និងធានាឱ្យមានការចូលរួមពីវិស័យអ្នកពាក់ព័ន្ធ និងសហគមន៍នានា។ របៀបវារៈថ្មីនៃទីក្រុង (NUA) អំពាវនាវឱ្យមានការពង្រឹងតួនាទីរបស់ទីក្រុងដែលមានទំហំតូច និងមធ្យម ក្នុងការធ្វើឱ្យកាន់តែប្រសើរនូវប្រព័ន្ធសន្តិសុខស្បៀង និងអាហារូបត្ថម្ភ តាមរយៈការផ្តល់លទ្ធភាពឱ្យប្រជាពលរដ្ឋអាចទទួលបានហេដ្ឋារចនាសម្ព័ន្ធលំនៅដ្ឋាន ដែលមានចីរភាព តម្លៃសមរម្យ គ្រប់គ្រាន់ ធន់ និងប្រកបដោយសុវត្ថិភាព ក៏ដូចជា សេវាដែលអាចឆ្លើយតបចំពោះតម្រូវការជាមូលដ្ឋានរបស់ពួកគេ និងបង្កភាពងាយស្រួលដល់ការតភ្ជាប់ទំនាក់ទំនងពាណិជ្ជកម្មដោយមានប្រសិទ្ធភាព ចាប់ពីតំបន់ប្រជុំជន រហូតដល់តំបន់ជនបទ [2]។

ទីក្រុង និងទីប្រជុំជនកម្រិតទី ២ និងកម្រិតទី ៣ ជាច្រើននៅអាស៊ីអាគ្នេយ៍ កំពុងមានការរីកចម្រើនយ៉ាងឆាប់រហ័ស ប៉ុន្តែជារឿយៗ ការអភិវឌ្ឍដោយគ្មានផែនការ និងគ្មានការគ្រប់គ្រងឱ្យបានគ្រប់ជ្រុងជ្រោយ បង្កឱ្យមានបញ្ហាប្រឈមធំៗជាច្រើន ដូចជា ការការពារធនធានទឹកប្រកបដោយចីរភាព ការកាត់បន្ថយភាពងាយរងគ្រោះដោយសារការប្រែប្រួលអាកាសធាតុ និងហានិភ័យគ្រោះមហន្តរាយ និងការផ្តល់សេវាសាធារណៈពាក់ព័ន្ធនឹងទឹកស្អាតប្រកបដោយប្រសិទ្ធភាព ដល់ប្រជាពលរដ្ឋគ្រប់រូប ជាដើម។ និយាយម្យ៉ាងទៀត ទីក្រុង និងតំបន់ប្រជុំជនទាំងនេះជួបការលំបាកក្នុងការកសាងនូវទីក្រុងដែលមានលក្ខណៈបរិយាបន្ន ផ្តល់នូវលក្ខណៈអំណោយផលសម្រាប់ការរស់នៅរបស់ប្រជាពលរដ្ឋ និងធន់ទៅនឹងការប្រែប្រួលអាកាសធាតុ។ រដ្ឋបាលទីក្រុងជាច្រើននៅអាស៊ីអាគ្នេយ៍ជួបការលំបាកក្នុងការអភិវឌ្ឍ និងថែទាំហេដ្ឋារចនាសម្ព័ន្ធផ្គត់ផ្គង់ទឹកប្រកបដោយប្រសិទ្ធភាព និងចីរភាព ដើម្បីធានាឱ្យមានការផ្តល់សេវាសាធារណៈពាក់ព័ន្ធនឹងធនធានទឹក បានគ្រប់ជ្រុងជ្រោយ ក៏ដូចជាការពារធនធានទឹករបស់ពួកគេ ព្រោះតែរដ្ឋបាលទាំងនេះពុំមានសមត្ថភាពស្ថាប័នគ្រប់គ្រាន់ ពុំមានគម្រូគ្រប់គ្រង និងផ្តល់ហិរញ្ញប្បទានប្រកបដោយប្រសិទ្ធភាព និងពុំមានការកំណត់តួនាទីរដ្ឋបាល និងនីតិវិធីប្រកបដោយប្រសិទ្ធភាព។ [3]

អ្នកធ្វើសេចក្តីសម្រេចចិត្តពាក់ព័ន្ធនឹងការអភិវឌ្ឍទីក្រុង បញ្ញវន្ត និងអ្នកជំនាញនានាកាន់តែយល់ស្របគ្នាថា គម្រូធ្វើផែនការទីក្រុងដែលធ្លាប់អនុវត្តកន្លងមក ព្រមទាំងការអភិវឌ្ឍហេដ្ឋារចនាសម្ព័ន្ធពាក់ព័ន្ធនឹងធនធានទឹកតែឯង មិនអាចឆ្លើយតបចំពោះបញ្ហាប្រឈមពាក់ព័ន្ធនឹងការអភិវឌ្ឍទីក្រុងទាំងនេះឡើយ។ របៀបអភិវឌ្ឍន៍ទាំងនេះ លែងឆ្លុះបញ្ចាំងពីតថភាពតម្រូវការ និងសមត្ថភាពរបស់ទីក្រុងទៀតហើយ។ គួរមានការគិតពិចារណាឡើងវិញពីអភិក្រមដែលប្រើប្រាស់សម្រាប់ធ្វើផែនការ និងអនុវត្តផែនការនាពេលបច្ចុប្បន្នសម្រាប់ទីក្រុងទាំងនេះ។ ការគ្រប់គ្រងធនធានទឹកនៅក្នុងទីក្រុង គួរដកចេញពីអភិក្រម ដែលផ្តោតលើវិស័យតែមួយ ហើយត្រូវចាត់ទុកថាជាបញ្ហាអន្តរវិស័យដែលពាក់ព័ន្ធនឹងការអភិវឌ្ឍទីក្រុងទាំងមូល។ ការអភិវឌ្ឍហេដ្ឋារចនាសម្ព័ន្ធគួរប្រើប្រាស់អភិក្រមក្នុងទម្រង់ជាម៉ូឌុលដែលមានលក្ខណៈក្តោបរួម ទន់ភ្លន់ និងអាចធានាបាននូវចីរភាពហិរញ្ញវត្ថុ ដែលអាចកែសម្រួលឱ្យស្របតាមនិន្នាការនៃការអភិវឌ្ឍ និងតម្រូវការនានារបស់ទីក្រុង។ រចនាសម្ព័ន្ធអភិបាលកិច្ចថ្មីរបស់ទីក្រុង និងរបស់សហគមន៍ដែលមានការចូលរួមពីរដ្ឋបាលក្រុង សហគមន៍ប្រជាពលរដ្ឋ វិស័យឯកជន សង្គមស៊ីវិល និងស្ថាប័នសិក្សាស្រាវជ្រាវ គួរផ្តល់លទ្ធភាពឱ្យគេអាចគ្រប់គ្រងធនធានទឹកបែបតាមបែបពហុមណ្ឌល (Polycentric)។ ការផ្លាស់ប្តូរមុខមាត់ទីក្រុងគ្រប់ទិដ្ឋភាពទាំងអស់ អាចអនុវត្តតាមទស្សនទានផ្សេងៗ ដូចជា “ទីក្រុងដែលគិតគូពីបញ្ហាទឹក” [4] ឬ “ទីក្រុងដែលមានភាពឈ្លាសវៃក្នុងការដោះស្រាយបញ្ហាទឹក” [5]។

បើទោះជាមានអភិក្រម ឧបករណ៍ និងបទពិសោធន៍ជាច្រើន ដែលគេអាចយកមកប្រើប្រាស់សម្រាប់អភិវឌ្ឍន៍ទីក្រុងដែលគិតគូពីបញ្ហាទឹកនៅទូទាំងសកលលោកក៏ដោយ អភិក្រម ឧបករណ៍ និងបទពិសោធន៍ទាំងនេះនៅមិនទាន់គ្រប់គ្រាន់សម្រាប់ទីក្រុងកម្រិតទី ២ និងទីក្រុងកម្រិតទី ៣ នៅតំបន់អាស៊ីអាគ្នេយ៍ឡើយ ឬមានតែសម្រាប់ករណីដាច់ដោយឡែកពីគ្នាតែប៉ុណ្ណោះ។ គេអាចឆ្លើយតបចំពោះបញ្ហានេះបាន តាមរយៈការអនុវត្តគម្រោងស្រាវជ្រាវអន្តរវិស័យផ្តោតលើការអនុវត្តជាក់ស្តែង ដែលមានឈ្មោះថា “អភិក្រមនៃការគ្រប់គ្រងតាមបែបពហុមណ្ឌល (Polycentric) សម្រាប់គ្រប់គ្រងធនធានទឹកក្នុងទីក្រុងនៅអាស៊ីអាគ្នេយ៍”។ នៅទីនេះ ទីក្រុង ស្ថាប័នសិក្សាស្រាវជ្រាវ និងអង្គការសង្គមស៊ីវិលមកពីប្រទេសកម្ពុជា អាល្លឺម៉ង់ ឥណ្ឌូនេស៊ី ឡាវ ថៃ និងវៀតណាម កំពុងធ្វើការងាររួមគ្នា ក្នុងគោលបំណងអភិវឌ្ឍនូវអភិក្រម និងឧបករណ៍ដែលគេអាចយកមកប្រើប្រាស់សម្រាប់បង្កើតទីក្រុងកម្រិតទី ២ និងកម្រិតទី ៣ ដែលគិតគូពីបញ្ហាទឹកនៅក្នុងតំបន់នេះ។

តាមរយៈការប្រើប្រាស់មធ្យោបាយទាំងនេះ គម្រោងនេះរួមចំណែកដល់ការធ្វើមូលដ្ឋាននីយកម្មគោលដៅអភិវឌ្ឍន៍ប្រកបដោយចីរភាព (SDG) និងរបៀបវារៈថ្មីនៃទីក្រុង តាមរយៈការគាំទ្រដល់ដំណើរដែលកំណត់អនុវត្ត និងពិនិត្យតាមដានយុទ្ធសាស្ត្រនៅកម្រិតមូលដ្ឋានដើម្បីឈានទៅសម្រេចទាំងនៅកម្រិតសកល ថ្នាក់ជាតិ និងថ្នាក់ក្រោមជាតិ។

របាយការណ៍នេះផ្សព្វផ្សាយជូនសាធារណជនដែលចាប់អារម្មណ៍អំពីលទ្ធផលនៃដំណាក់កាលកំណត់ពីសកម្មភាព (២០១៩-២០២០) នៃគម្រោងគ្រប់គ្រងធនធានទឹកនៅតំបន់ប្រជុំជនតាមបែបពហុមណ្ឌល (PolyUrbanWaters) ក្រោមការឧបត្ថម្ភថវិកាពីក្រសួងអប់រំ និងស្រាវជ្រាវនៃសហព័ន្ធអាល្លឺម៉ង់។ ផ្អែកតាមដំណើរការពិគ្រោះយោបល់ជាមួយនឹងទីក្រុងជាដៃគូនានានៅអាស៊ីអាគ្នេយ៍ ដៃគូគម្រោងបានរៀបចំនូវទស្សនទានមួយ សម្រាប់ដំណាក់កាលស្រាវជ្រាវ និងអភិវឌ្ឍន៍នៃគម្រោងនេះ (២០២១-២០២៥) និងបានធ្វើការពិនិត្យលើបទពិសោធន៍ និងនិន្នាការនៃការអភិវឌ្ឍទីក្រុងប្រកបដោយចីរភាពនៅក្នុងតំបន់ ចេញពីជ្រុងលិខិតបទដ្ឋានគតិយុត្ត បច្ចេកវិទ្យា សេដ្ឋកិច្ច រដ្ឋបាល ស្ថាប័ន និងអេកូឡូស៊ី។ ការងារដែលបង្ហាញដូចតទៅនេះ៖

- បានកែសម្រួលអភិក្រម (Polycentric) សម្រាប់គ្រប់គ្រងធនធានទឹកនៅតំបន់ទីក្រុង ឱ្យស្របតាមឧបករណ៍អន្តរវិស័យដែលពាក់ព័ន្ធនានា ដើម្បីប្រើប្រាស់សម្រាប់ធ្វើមូលដ្ឋាននីយកម្មរបៀបវារៈឆ្នាំ ២០៣០ និងរបៀបវារៈថ្មីនៃទីក្រុង ជាពិសេស សម្រាប់តំបន់ប្រជុំជនកម្រិតទី ២ និងកម្រិតទី ៣ នៅអាស៊ីអាគ្នេយ៍
- បង្ហាញពីក្របខ័ណ្ឌទស្សនទាន ដែលបង្ហាញឱ្យឃើញពីរបៀបដែលការបញ្ចូលអភិក្រមធ្វើផែនការទីក្រុងបែបនវានុវត្តន៍ទៅក្នុងការគ្រប់គ្រងធនធានទឹកក្នុងទីក្រុង អាចរួមចំណែកដល់ការកសាងទីក្រុងដែលគិតគូពីបញ្ហាទឹក ក្នុងបរិបទនៃដំណើរការអភិវឌ្ឍន៍ទីក្រុងដ៏ឆាប់រហ័ស និងក្នុងកាលៈទេសៈដែលសមត្ថភាពស្ថាប័ននៅមានកម្រិតនៅឡើយ
- កំណត់ពីមុខងារសំខាន់ៗដែលអាចកែសម្រួលសម្រាប់ដំណើរការធ្វើផែនការ និងអនុវត្តទីក្រុងដែលគិតគូពីបញ្ហាទឹក ហើយដែលគួរយកមកប្រើប្រាស់ ដើម្បីកំណត់ពីបុរេលក្ខខណ្ឌសម្រាប់ថ្នាក់មូលដ្ឋាន និងថ្នាក់ជាតិ
- បង្ហាញពីការរចនាការស្រាវជ្រាវគម្រោង (PolyUrbanWaters) ដែលមានគោលដៅចម្បងអភិវឌ្ឍន៍នូវឧបករណ៍អភិវឌ្ឍន៍ទីក្រុងគិតគូពីបញ្ហាទឹកបែបពហុមណ្ឌល (Polycentric) ដែលអាចយកទៅអនុវត្តនៅទីកន្លែងផ្សេងទៀត ដែលនឹងមានការធ្វើតេស្តផ្ទៀងផ្ទាត់នៅកម្រិតមូលដ្ឋាន
- បញ្ចូលការវិភាគ (ផ្តល់ដោយដៃគូនៃគម្រោង PolyUrbanWaters) លើលក្ខខណ្ឌនៃក្របខ័ណ្ឌ និងបទពិសោធន៍នានាដែលពាក់ព័ន្ធនឹងការផ្លាស់ប្តូរទីក្រុងកម្រិតទី ២ និងកម្រិតទី ៣ នៅអាស៊ីអាគ្នេយ៍ឱ្យក្លាយជាទីក្រុងដែលគិតគូពីបញ្ហាទឹក។
- ព័ត៌មានបន្ថែមទៀតអំពីលទ្ធផលគម្រោង និងព័ត៌មានបច្ចុប្បន្នភាពនានាអាចរកបានលើគេហទំព័រ www.polyurbanwaters.org.

បាងកក ថែកឡាំង ប្រីមែន គូឡាឡាំពួ ហ៊ែមប៊ឺក ហាណូយ ភ្នំពេញ
សូឡ យូកយាកាតា វៀងចន្ទន៍

ខែ កុម្ភៈ ឆ្នាំ ២០២១

ພາສາລາວ
Lao

ບັນດາຕົວເມືອງຢູ່ອາຊີຕະເວັນອອກສ່ຽງໃຕ້ (SEA) ແມ່ນມີຄວາມຫຼາກຫຼາຍທີ່ສຸດ ເຊິ່ງເລີ່ມຕັ້ງແຕ່ຕົວເມືອງເປັນສູນກາງທາງດ້ານເສດຖະກິດໂລກ ຈົນເຖິງຕົວເມືອງທີ່ມີພຽງແຕ່ຕະຫຼາດນ້ອຍໃນເຂດຫ່າງໄກສອກຫຼີກ. ເຖິງ ແມ່ນວ່າ, ສ່ວຍຫຼາຍແລ້ວບັນດາປະເທດທີ່ຢູ່ອາຊີຕະເວັນອອກສ່ຽງໃຕ້ ແມ່ນ ກັບລັງປະສົບກັບຄວາມຫຼຸດໂຕນກັນຫຼາຍທາງດ້ານເສດໃນລະດັບພາກພື້ນ ໃນຊ່ວງຕົ້ນທົດສະວັດທີສາມຂອງສັດຕະວັດທີ ๔๑, ແຕ່ກໍ່ຍັງມີຫຼາຍປະເທດ ສາມາດບັນລຸໄດ້ ຫຼາຍຕົວຊີວັດໃນກອບຂອງວາລະ ๔๐ມ໐ ຂອງເປົ້າໝາຍ ການພັດທະນາແບບຍືນຍົງ (SDGs). ຕົວຢ່າງເຊັ່ນ, ມີຄວາມຄືບໜ້າທີ່ສຳ ຄັນໃນການບັນລຸໄດ້ SDG ๔ (ການສຶກສາທີ່ມີຄຸນນະພາບ) ແລະ SDG ๙ (ອຸດສາຫະກຳ, ນະວັດຕະກຳ ແລະ ພື້ນຖານໂຄງລ່າງ). ແລະ ໃນທົດສະວັດ ສຸດທ້າຍ, ຍັງໄດ້ປະສົບຜົນສຳເລັດສູງ ໃນການບັນລຸໄດ້ຕາມເປົ້າໝາຍ SDG๖ (ນ້ຳສະອາດ ແລະ ສຸຂາພິບານ) “ການເຂົ້າເຖິງການບໍລິການນ້ຳດື່ມ ສະອາດ ແລະ ປອດໄພ”. ແຕ່ກໍ່ຍັງມີບາງຕົວຊີ້ວັດທີ່ມີຄວາມຄືບໜ້າບໍ່ຫຼາຍ ສ່ວນຫຼາຍແລ້ວແມ່ນກ່ຽວຂ້ອງກັບເປົ້າໝາຍຍ່ອຍໃນດ້ານທີ່ກ່ຽວກັບນ້ຳ , ເຊັ່ນກໍລະນີຂອງ SDG ๑๑ (ຄວາມຍືນຍົງຂອງຊຸມຊົນ ແລະ ຕົວເມືອງ) ແລະ SDG ๑๓ (ການດຳເນີນການ ກ່ຽວກັບດິນຟ້າອາກາດ) [๑].

ນອກຈາກນີ້, ຜົນສຳເລັດສຳຄັນຂອງວາລະ ๔๐ມ໐ ແມ່ນເກີດຂຶ້ນໃນບັນດາ ຕົວເມືອງໃຫຍ່. ເຊິ່ງຄາດຄະເນວ່າພາຍໃນປີ ๔๐๕๐, ເກືອບ ๗๐% ຂອງ ມະນຸດ ແມ່ນຕ້ອງການອາໄສຢູ່ເຂດຕົວເມືອງ, ດັ່ງນັ້ນ, ທ່າອ່ຽງຂອງການ ປ່ຽນແປງຫຼາຍທີ່ສຸດໃນສັດຕະວັດທີ ๔๑ ຈະແມ່ນການຫັນປ່ຽນເປັນຕົວ ເມືອງຫຼາຍຂຶ້ນ, ເຊິ່ງເຮັດໃຫ້ມີການເພີ່ມທະວີຄວາມເຂັ້ມແຂງໃນດ້ານ ເສດຖະກິດ, ສັງຄົມ, ສິ່ງແວດລ້ອມ, ໂອກາດ ແລະ ສິ່ງທ້າທາຍດ້ານວັດທະ ນະທຳຫຼາຍຂຶ້ນ. ໃນວິໃສທັດຮ່ວມກັນເພື່ອອະນາຄົດທີ່ຍືນຍົງ ແລະ ດີຂຶ້ນ ຂອງວະລະການພັດທະນາຕົວເມືອງສະບັບໃໝ່ ແມ່ນໄດ້ເນັ້ນໜັກກ່ຽວກັບ ຄວາມສຳຄັນຂອງນ້ຳ ເພື່ອການພັດທະນາຕົວເມືອງ ແລະ ການຕັ້ງຖິ່ນຖານ ຂອງມະນຸດ. ດັ່ງນັ້ນ, ຂະບວນການວາງແຜນຜັງເມືອງຈຳເປັນຕ້ອງມີການວາງ ແຜນ ແລະ ການຄຸ້ມຄອງແຫຼ່ງນ້ຳ ເຊິ່ງຕ້ອງໄດ້ພິຈາລະນາເຖິງຜົນທີ່ຈະເກີດ ຂຶ້ນຕໍ່ກັບພື້ນທີ່ຕົວເມືອງ ແລະ ຊຸມຊົນຍົດ ໃນລະດັບທ້ອງຖິ່ນ ແລະ ພາກພື້ນ . ເພື່ອຮັບປະກັນການມີສ່ວນຮ່ວມຂອງພາກສ່ວນຕ່າງໆ, ຜູ້ມີສ່ວນກ່ຽວຂ້ອງ ແລະ ຊຸມຊົນ ດັ່ງນັ້ນ, ວາລະການພັດທະນາຕົວເມືອງສະບັບໃໝ່ ຈຶ່ງໄດ້ ຮຽກຮ້ອງໃຫ້ສ້າງຄວາມເຂັ້ມແຂງດ້ານພາລະບົດບາດຂອງຕົວເມືອງນ້ອຍ , ກາງ ແລະ ໃຫຍ່, ໃຫ້ສາມາດເຂົ້າເຖິງທີ່ຢູ່ອາໄສ, ພື້ນຖານໂຄງລ່າງ ແລະ ການບໍລິການທີ່ມີຄວາມຍືນຍົງ, ລາຄາບໍ່ແພງ, ພຽງພໍ, ໝັ້ນຄົງທົນທານ , ມີຄວາມປອດໄພ ແລະ ອຳນວຍຄວາມສະດວກໃນການເຊື່ອມໂຍງດ້ານ ການຄ້າຢ່າງມີປະສິດທິພາບ ແລະ ມີຄວາມຕໍ່ເນື່ອງລະຫວ່າງຕົວເມືອງ ແລະ ຊົນນະບົດ [๔].

ມີຫຼາຍໆຕົວເມືອງອັບດັບສອງ ແລະ ຕົວເມືອງນ້ອຍ ໃນອາຊີຕະເວັນອອກ ສຽງໃຕ້ ກຳລັງປະສົບກັບການຂະຫຍາຍ ຕົວຂອງຕົວເມືອງແບບໄວວາ ແຕ່ ຍັງຂາດການວາງແຜນ ແລະ ການຄຸ້ມຄອງການພັດທະນາທີ່ດີພໍ ເຊິ່ງສິ່ງຜົນ ໃຫ້ມີສິ່ງທ້າທ້າຍຄັນຫຼາຍຢ່າງເກີດຂຶ້ນເຊັ່ນ: ການປົກປ້ອງແຫຼ່ງນ້ຳແບບຍືນ ຍົງ; ການຫຼຸດຄວາມສ່ຽງຕໍ່ການປ່ຽນແປງດິນຟ້າອາກາດ ແລະ ຄວາມສ່ຽງ ດ້ານໄພພິບັດ; ແລະ ການສະໜອງການບໍລິການສາທາລະນະທີ່ກ່ຽວຂ້ອງ ກັບນ້ຳ ທີ່ມີປະສິດຕິພາບສຳລັບທຸກຄົນ. ເວົ້າອີກຢ່າງໜຶ່ງ, ລັດຖະບານຍັງ ມີເງື່ອນໄຂບໍ່ພຽງພໍ ທີ່ຈະສ້າງສ້າງຕົວເມືອງໜ້າຢູ່, ສາມາດປັບຕົວໄດ້ຕໍ່ກັບ ການປ່ຽນແປງດິນຟ້າອາກາດ ແລະ ຕົວເມືອງທີ່ເປັນຂອງທຸກຄົນ. ເຊິ່ງສ່ວນ ຫຼາຍແລ້ວໜ່ວຍງານຈັດຕັ້ງປະຕິບັດຍັງບໍ່ມີຄວາມພ້ອມທາງດ້ານຄວາມອາດ ສາມາດ, ຮູບແບບການຄຸ້ມຄອງ ແລະ ການເງິນທີ່ມີປະສິທິພາບ, ລະບຽບ ການບໍລິຫານທີ່ພຽງພໍ ແລະ ວິທີການທີ່ມີປະສິດທິພາບ. ການບໍລິຫານ ຄຸ້ມຄອງຕົວເມືອງໃນອາຊີຕະເວັນອອກສ່ຽງໃຕ້ ເຫັນວ່າມີຄວາມຫຍຸ້ງຍາກ ທີ່ຈະພັດທະນາ ແລະ ບົວລະບັດຮັກສາພື້ນຖານໂຄງລ່າງດ້ານນ້ຳໃຫ້ມີປະ ສິທິພາບ ແລະ ມີຄວາມຍືນຍົງ ທີ່ຮັບປະກັນການສະໜອງການບໍລິການ ສາທາລະນະທີ່ກ່ຽວກັບນ້ຳ ແລະ ປ້ອງກັນແຫຼ່ງນ້ຳຂອງຂອງຕົນເອງ.

ຜ່ານມາຜູ້ຕັດສິນນັ້ນຫາ, ນັກວິຊາການ ແລະ ຜູ້ຈັດຕັ້ງປະຕິບັດໂຕຈິງ ເລີ່ມມີ ຄວາມເຫັນກ່ຽວກັບການພັດທະນາຕົວເມືອງຄ້າຍຄືກັນວ່າ ໃນສ້າງຮູບແບບ ການວາງແຜນຜັງເມືອງ ແລະ ການພັດທະນາພື້ນຖານໂຄງລ່າງກ່ຽວກັບນ້ຳ ແບບເກົ່າທີ່ເຄີຍປະຕິບັດມານັ້ນ ແມ່ນບໍ່ສາມາຮັບມືກັບສິ່ງທ້າທາຍໃນການ ພັດທະນາຂອງບັນດາຕົວເມືອງໄດ້ ເພາະວ່າຮູບແບບການພັດທະນາ ແບບເກົ່າ

ນັ້ນ ບໍ່ສະທ້ອນໃຫ້ເຫັນຄວາມເປັນຈິງ, ຄວາມຕ້ອງການ, ຄວາມອາດສາມາດ ຂອງຕົວເມືອງ. ດັ່ງນັ້ນ, ພາກສ່ວນທີ່ກ່ຽວຂ້ອງຄວນພິຈາລະນາຄືນໃໝ່ ເຖິງ ວິທີການວາງແຜນ ແລະ ແຜນການຈັດຕັ້ງປະຕິບັດໃນປະຈຸບັນ ລວມທັ ງ ວິທີການການຄຸ້ມຄອງແຫຼ່ງນ້ຳໃນຕົວເມືອງທີ່ເໝັ້ນສະເພາະແຕ່ພາກສ່ວນ ໃດພາກສ່ວນໜຶ່ງນັ້ນຄວນລຶບລ້າງອອກ ແລະ ສ້າງຄວາມເຂົ້າໃຈຕໍ່ບັນຫາ ການພັດທະນາຕົວເມືອງແບບຮອບດ້ານ. ການພັດທະນາພື້ນຖານໂຄງລ່າ ງ ຕ້ອງສາມາດດັດປັບໄດ້, ເຊື່ອມສານ ແລະ ມີຮູບແບບດຳເນີນງານດ້ານການ ເງິນທີ່ຍືນຍົງ ເຊິ່ງສາມາດດັດປັບໃຫ້ແໜດເໝາະການພັດທະນາ ແລະ ຄວາມ ຕ້ອງການຂອງຕົວເມືອງໃນແຕ່ລະໄລຍະໄດ້. ນອກຈາກນີ້ ຍັງຄວນພິຈາລະນາ ໃນການສ້າງໂຄ່ງຮ່າງການຄຸ້ມຄອງແບບໃໝ່ໃນລະດັບຕົວເມືອງ ແລະ ເມືອງ ທີ່ຢູ່ອ້ອມແອ້ມ ເຊິ່ງລວມມີອຳນາດການປົກຄອງເມືອງ, ຊຸມຊົນ, ປະຊາຊົນ, ພາກສ່ວນເອກະຊົນ, ສະຖາບັນດ້ານສັງຄົມຕ່າງໆ ແລະ ສະຖາບັນການສຶກສາ . ເຊິ່ງພາກສ່ວນເຫຼົ່ານີ້ຄວນເຫັນດີ ແລະ ອະນຸຍາດ ໃຫ້ນຳໃຊ້ຮູບແບບການ ພັດທະນາແບບໃໝ່ໂດຍການໃຊ້ວິທີການຄຸ້ມຄອງແຫຼ່ງນ້ຳແບບບໍ່ລວມສູນ. ໃນການປ່ຽນແປງຂອງຕົວເມືອງແບບຮອບດ້ານ ແມ່ນອາດອີງໃສ່ບັນດາແນວ ຄວາມຄິດຕໍ່ໄປນີ້ເຊັ່ນ “ຕົວເມືອງທີ່ຄຸ້ມຄອງນ້ຳໄດ້ແບບຮອບດ້ານ (water-sensitive cities)” [3] ຫຼື “ການຄຸ້ມຄອງນ້ຳໃນຕົວເມືອງແບບສະຫຼາດ (water-wise cities)” ເປັນແນວທາງໃນການປະຕິບັດ [4]. ເຖິງແມ່ນວ່າຈະມີຫຼາຍວິທີການ, ເຄື່ອງມື ແລະ ປະສົບການໃນການການ ພັດທະນານ້ຳໃນຕົວເມືອງ ທີ່ມີຢູ່ໃນທົ່ວໂລກແລ້ວ ແຕ່ຍັງບໍ່ທັນແໜດເໝາະ ໃນບາງດ້ານ ສຳລັບຕົວເມືອງອັນດັບສອງ ແລະ ຕົວເມືອງນ້ອຍ ໃນຂົງເຂດ ອາຊີຕະເວັນອອກສ່ຽງໃຕ້. ເຊິ່ງບັນຫານີ້ ແມ່ນຈະໄດ້ຮັບການແກ້ໄຂໂດຍ ການຄົ້ນຄວ້າແບບວິຊາການຂອງໂຄງການ “ວິທີການຄຸ້ມຄອງນ້ຳໃນຕົວເມືອງ ດ້ວຍຮູບແບບບໍ່ລວມສູນ ຢູ່ອາຊີຕະເວັນອອກສ່ຽງໃຕ້” ໃນນີ້ລວມມີບັນດາ ຕົວເມືອງ, ສະຖາບັນ, ອົງການຈັດຕັ້ງສາກົນ ຈາກກຳປູເຈຍ, ອິນໂດເນເຊຍ, ລາວ, ໄທ ແລະ ຫວຽດນາມ ທີ່ຈະຮ່ວມກັນພັດທະນາວິທີການ ແລະ ເຄື່ອງມື ສຳລັບການຄຸ້ມຄອງນ້ຳ ເພື່ອສ້າງຕົວເມືອງອັນດັບສອງ ແລະ ຕົວເມືອງນ້ອຍ ທີ່ຢູ່ໃນພາກພື້ນ.

ດ້ວຍວິທີການທີ່ກ່າວນີ້, ໂຄງການຈະປະກອບສ່ວນໃນການນຳເອົາ ເປົ້າໝາຍ ການພັດທະນາແບບຍືນຍົງ ແລະ ວາລະການພັດທະນາຕົວເມືອງສະບັບໃໝ່ ມາຈັດຕັ້ງປະຕິບັດຢູ່ໃນທ້ອງຖິ່ນ ໂດຍການສະໜັບສະໜຸນບັນດາກິດກຳຕ່າງ ໆທີ່ຈະກຳນົດການຈັດຕັ້ງປະຕິບັດ ແລະ ການຕິດຕາມ ການຈັດຕັ້ງປະຕິບັດ ໃນຂັ້ນທ້ອງຖິ່ນ ເພື່ອບັນລຸໄດ້ເປົ້າໝາຍລະດັບຊາດ, ອະນຸພາກພື້ນ, ແລະ ລະດັບໂລກ.

ນີ້ແມ່ນບົດລາຍງານຜົນໄດ້ຮັບຈາກໄລຍະກຳນົດເປົ້າໝາຍ (2019–2020) ຂອງໂຄງການຄຸ້ມຄອງນ້ຳແບບບໍ່ລວມສູນ (PolyUrbanWaters), ໃຫ້ ທຶນຊ່ວຍເຫຼືອໂດຍກະຊວງສຶກສາທິການ ແລະ ການຄົ້ນຄ້ວາ (BMBF), ເຊິ່ງໄດ້ເຜີຍແຜ່ບົດລາຍງານນີ້ ໃຫ້ຜູ້ທີ່ສົນໃຈ. ອີງຕາມການປຶກສາຫາລືກັນ ຢ່າງຕັ້ງໜ້າລະຫວ່າງຕົວເມືອງທີ່ເປັນຄູ່ຮ່ວມມືກັນໃນອາຊີຕະເວັນອອກສ່ຽງ ໃຕ້, ທີ່ໄດ້ຮ່ວມກັນກຳນົດແນວຄວາມຄິດທີ່ຈະນຳໄປປະຕິບັດໃນໄລຍະການ ຄົ້ນຄວ້າ ແລະ ພັດທະນາຂອງໂຄງການ (2021–2025) ແລະ ດຳເນີນ ການຖອດຖອນບົດຮຽນຈາກບັນດາກະລະນີສຶກສາ ແລະ ທ່າອ່ຽງຂອງ ການພັດທະນາຕົວເມືອງແບບຍືນຍົງໃນດ້ານລະບຽບການ, ເຕັກໂນໂລຊີ , ເສດຖະກິດ, ການບໍລິຫານ, ສະຖາບັນ, ແລະ ນິເວດວິທະຍາ, ເຊິ່ງໄດ້ສັ ງ ລວມໜ້າວຽກດັ່ງນີ້:

- ກຳນົດກອບແນວທາງໃນການນຳເອົາ ວິທີການຄຸ້ມຄອງນ້ຳໃນຕົວ ເມືອງແບບບໍ່ລວມສູນ ມາເປັນເຄື່ອງມືສຳລັບການພັດທະນາຕາມວາລະ ຊ20ມ0 ແລະ ວາລະການພັດທະນາຕົວເມືອງສະບັບໃໝ່, ໂດຍເນັ້ນໃສ ຕົວເມືອງອັນດັບສອງ ແລະ ຕົວເມືອງນ້ອຍ ທີ່ຢູ່ໃນຂົງເຂດອາຊີຕະເວັນ ອອກສ່ຽງໃຕ້.
- ນຳສະເໜີຜົນທີ່ຈະໄດ້ຮັບຈາກ ກອບແນວຄວາມຄິດສຳລັບວິທີການ ເຊື່ອມສານນະວັດຕະກຳຂອງວິທີການວາງແຜນຜັງເມືອງ ເຂົ້າກັບການ ຄຸ້ມຄອງນ້ຳໃນຕົວເມືອງ ເພື່ອສ້າງຕົວເມືອງສາມາດຄຸ້ມຄອງນ້ຳໄດ້ ແບບຮອບດ້ານ ພາຍໃຕ້ຮູບແບບຂອງຕົວເມືອງທີ່ມີການປ່ຽນແປງ ແບບໄວວາ ແລະ ໜ່ວຍງານຄຸ້ມຄອງທີ່ມີຄວາມອາສາມາດຈຳກັດ.
- ກຳນົດກິດຈະກຳຫຼັກ ໃນດ້ານການວາງແຜນ ແລະ ຈັດຕັ້ງປະຕິບັດ ວຽກງານການຄຸ້ມຄອງນ້ຳໃນຕົວເມືອງ ແບບຮອບດ້ານ ທີ່ສາມາດ ກຳນົດໄດ້ວ່າຮູບແບບໃດ ແລະ ຂໍ້ກຳນົດໃດທີ່ຄວນສ້າງຂຶ້ນໃນລະດັບ ທ້ອງຖິ່ນ ແລະ ລະດັບຊາດ.
- ນຳສະເໜີຮູບແບບການຄົ້ນຄວ້າ ຂອງໂຄງການຄຸ້ມຄອງນ້ຳແບບບໍ່ລວມ ສູນ, ເຊິ່ງມີເປົ້າໝາຍຫຼັກ ທີ່ຈະພັດທະນາເຄື່ອງມືທີ່ສາມາດດັດປັບໄດ້ ສຳລັບການຄຸ້ມຄອງນ້ຳໃນຕົວເມືອງແບບຮອບດ້ານດ້ວຍຮູບແບບ ບໍ່ລວມສູນ, ເຊິ່ງຈະມີການທົດສອບຄວາມຖືກຕ້ອງຂອງເຄື່ອງມືໃນ ລະດັບທ້ອງຖິ່ນ ແລະ
- ນຳສະເໜີຜົນຂອງການວິໄຈ (ທີ່ກຳນົດໂດຍເຄືອຂ່າຍຄູ່ຮ່ວມມື PolyUrbanWaters) ໃນດ້ານເງື່ອນໄຂຂອບເຂດວຽກ ແລະ ຂໍ້ມູນ ທີ່ຕິດພັນກັບການຄຸ້ມຄອງນ້ຳແບບຮອບດ້ານ ຢູ່ຕົວເມືອງອັນດັບ ສອງ ແລະ ຕົວເມືອງນ້ອຍໃນອາຊີຕະເວັນອອກສ່ຽງໃຕ້.

ຜົນໄດ້ຮັບ ແລະ ຄວາມຄືບໜ້າເພີ່ມເຕີມສາມາເຂົ້າເບິ່ງໄດ້ທີ່ເວັບໄຊ້ສ www.polyurbanwaters.org.

ບາງກອກ, ເປີລິນ, ເບຣເມັນ, ໂຄໂລນ, ຣໍາເບີກ, ຮາໂນ່ຍ, ພະນົມເປັນ, ໂຊໂລ, ຈອກາກາຕາ, ນະຄອນຫຼວງວຽງຈັນ,

ກຸມພາ 2021 February 2021

คำแปล
Thai

ภูมิภาคเอเชียตะวันออกเฉียงใต้ (SEA) ประกอบด้วยเมืองต่าง ๆ ที่มีความหลากหลายเป็นอย่างมาก เพราะมีตั้งแต่เมืองระดับศูนย์กลางเศรษฐกิจโลกไปจนถึงเมืองที่มีเพียงตลาดชุมชนเล็ก ๆ ในพื้นที่ห่างไกล ถึงแม้ว่าภูมิภาคนี้เผชิญกับปัญหาความเหลื่อมล้ำทางเศรษฐกิจอยู่มาก เมื่อเปรียบเทียบระหว่างประเทศสมาชิกภายในภูมิภาคเดียวกันในช่วงต้นทศวรรษที่ 3 ของศตวรรษที่ 21 แต่ประเทศส่วนใหญ่ก็สามารถดำเนินกิจกรรมจนบรรลุผลตามตัวชี้วัดอย่างมีนัยสำคัญ ตามเป้าหมายการพัฒนาที่ยั่งยืน (SDGs) ค.ศ. 2030 (พ.ศ. 2573) ยกตัวอย่างเช่น สามารถบรรลุเป้าหมาย SDG 4 (คุณภาพการศึกษา) และ SDG 9 (อุตสาหกรรม นวัตกรรม และโครงสร้างพื้นฐาน) ได้ นอกจากนี้ในช่วงทศวรรษที่ผ่านมาเอเชียตะวันออกเฉียงใต้ยังสามารถบรรลุเป้าหมาย SDG 6 (น้ำสะอาดและสุขาภิบาล) ในตัวชี้วัดด้าน “การเข้าถึงบริการน้ำดื่มที่ปลอดภัย” อย่างไรก็ตามพบว่าการดำเนินการตามเป้าหมายย่อยอื่นที่เกี่ยวข้องกับน้ำส่วนใหญ่มีความคืบหน้าเพียงเล็กน้อย เช่น เป้าหมาย SDG 11 (เมืองและชุมชนที่ยั่งยืน) และ SDG 13 (การดำเนินการด้านสภาพภูมิอากาศ) [1]

นอกจากนี้ พบว่าการดำเนินการส่วนใหญ่ที่ตอบโจทย์วาระการพัฒนาที่ยั่งยืน ค.ศ. 2030 (พ.ศ. 2573) มักเกิดขึ้นในเขตเมือง มีการคาดการณ์ว่าภายในปี ค.ศ. 2050 (พ.ศ. 2593) มนุษย์ส่วนใหญ่เกือบ 70% จะอาศัยอยู่ในเขตเมือง ดังนั้นแนวโน้มการเปลี่ยนแปลงสำคัญที่จะพบได้บ่อยมากในศตวรรษที่ 21 นี้คือ “นครภิวัตน์” หรือการพัฒนาเมือง (urbanization) และปรากฏการณ์นี้จะนำมาซึ่งความท้าทายและโอกาสทางเศรษฐกิจ สังคม สิ่งแวดล้อม และวัฒนธรรมที่มีนัยสำคัญยิ่งขึ้น วาระการพัฒนาเมืองใหม่ (New Urban Agenda – NUA) กำหนดวิสัยทัศน์ร่วมในการสร้างอนาคตที่ดีและยั่งยืนยิ่งขึ้น พร้อมเน้นย้ำถึงความสำคัญในการจัดการน้ำ เพื่อการพัฒนาเมืองและการตั้งถิ่นฐานของมนุษย์ ดังนั้น เมื่อมีการวางผังเมืองจำเป็นจะต้องวางแผนและจัดการทรัพยากรน้ำอย่างบูรณาการ โดยคำนึงถึงผลกระทบที่จะเกิดต่อพื้นที่เมืองและพื้นที่ชนบท ทั้งในระดับท้องถิ่นและระดับประเทศ เพื่อให้มั่นใจว่าผู้มีส่วนได้ส่วนเสีย ชุมชน และภาคส่วนต่าง ๆ ได้มีส่วนร่วมอย่างกว้างขวาง โดยวาระการพัฒนาเมืองใหม่เรียกร้องให้เมืองขนาดเล็กและขนาดกลางเข้ามามีบทบาทในการช่วยสร้างความมั่นคงทางอาหารและโภชนาการ ช่วยจัดหาและสร้างที่อยู่อาศัย โครงสร้างพื้นฐาน ตลอดจนให้บริการเพื่อตอบสนองความต้องการขั้นพื้นฐานที่ยั่งยืนในราคาที่จับต้องได้ เพียงพอต่อการดำรงชีวิต ใช้งานได้นาน และปลอดภัย ตลอดจนดำเนินการเพื่อส่งเสริมให้เกิดวงจรการค้าที่มีประสิทธิภาพและมั่นคงระหว่างพื้นที่เมืองกับพื้นที่ชนบท [2]

เมืองรองประเภททุติยภูมิและตติยภูมิหลายเมืองในเอเชียตะวันออกเฉียงใต้กำลังเผชิญปัญหาจากการเติบโตอย่างรวดเร็ว ในขณะที่เมืองเหล่านี้ยังขาดการวางแผนและการจัดการที่ดีเพียงพอ ปรากฏการณ์นี้ส่งผลให้เมืองต้องเจอกับความท้าทายที่สำคัญหลายประการ ได้แก่ การอนุรักษ์ทรัพยากรน้ำอย่างยั่งยืน การลดความเสี่ยงจากการเปลี่ยนแปลงทางสภาพภูมิอากาศและภัยพิบัติ และการบริการน้ำสาธารณะสำหรับประชาชนอย่างมีประสิทธิภาพ กล่าวอีกนัยหนึ่งก็คือ ผู้มีอำนาจยังไม่มีศักยภาพเพียงพอที่จะสร้างเมืองให้มีคุณภาพเพียงพอสำหรับการอยู่อาศัยของประชาชน ให้ทนต่อความเปลี่ยนแปลงทางสภาพภูมิอากาศ และให้มีความเป็นเมืองของทุกคนที่สามารถตอบโจทย์ทุกความต้องการ บ่อยครั้งจึงพบว่าตัวองค์กรที่บริหารเมืองเองนั้นขาดความพร้อมในการเข้ามาบริหาร ไม่มีแนวทางในการจัดการและการบริหารการเงินที่ดีเพียงพอ ตลอดจนไม่มีข้อบังคับสำหรับการปกครองและขั้นตอนการดำเนินการที่รัดกุม ทำให้องค์กรเหล่านี้ประสบปัญหาด้านการพัฒนา จึงไม่สามารถคงประสิทธิภาพของโครงสร้างพื้นฐานสำหรับการให้บริการน้ำให้มีความยั่งยืนได้ ไม่สามารถสร้างกลไกการบริการน้ำสาธารณะที่ครบวงจรได้ และไม่สามารถอนุรักษ์แหล่งทรัพยากรน้ำที่ตนมีไว้ได้ [3]

ที่ผ่านมา ผู้มีอำนาจในการกำหนดนโยบาย นักวิชาการ ตลอดจนผู้ปฏิบัติงานด้านการพัฒนาเมืองเริ่มเห็นตรงกันว่ารูปแบบการวางผังเมืองและการพัฒนาโครงสร้างพื้นฐานที่เกี่ยวข้องกับน้ำแบบเดิมที่เคยใช้อยู่นั้นคงไม่เพียงพออีกต่อไป เพราะเมืองต้องเผชิญกับความท้าทายรูปแบบใหม่ดังที่กล่าวข้างต้น เพราะแบบแผนแบบเดิมนั้นไม่สอดคล้องกับสภาพจริง ความต้องการ และศักยภาพของเมือง ดังนั้นผู้ที่เกี่ยวข้องควรคิดใหม่ทำใหม่ โดยการปรับกระบวนทัศน์ในการวางแผนและเปลี่ยนแผนปฏิบัติงานที่ใช้อยู่เดิมให้สอดคล้องกับปัญหา เนื่องจากการจัดการทรัพยากรน้ำสำหรับเมืองไม่ควรจะถูกบริหารแบบแยกส่วน (sector-focused) แต่ควรถูกควบรวมไว้ในแผนการบริหารแบบบูรณาการเพื่อให้เกิดการพัฒนาเมืองแบบองค์รวม โดยต้องคำนึงว่าเมื่อมีการพัฒนางานส่วนใดจำเป็นจะต้องคำนึงถึงประโยชน์ที่จะเกิดกับงานส่วนอื่นด้วย (cross-cutting) ส่วนการพัฒนาโครงสร้างพื้นฐานควรดำเนินการไปทีละส่วนอย่างยั่งยืน (sustainable modular) โดยคำนึงถึงศักยภาพในการปรับเปลี่ยนในภายหลังให้สอดคล้องกับแนวทางการพัฒนาและความต้องการของเมืองในอนาคต นอกจากนี้ควรพิจารณากำหนดโครงสร้างการเมืองปกครองใหม่ ที่ครอบคลุมไปถึงการปกครองในภาคส่วนต่าง ๆ ที่เกี่ยวข้องกับเมือง ชุมชน ประชาชน ภาคเอกชน ภาคประชาสังคม และสถาบันการศึกษา ควรเป็นไปในลักษณะที่เอื้อต่อการจัดการทรัพยากรน้ำร่วมกัน (polycentric) โดยการพัฒนาเมืองที่รอบด้านดังที่กล่าวข้างต้นนั้นอาจอาศัยแนวคิด เช่น “เมืองรักษ์น้ำ” (water-sensitive cities) [4] หรือ “เมืองรักน้ำ” (water-wise cities) [5] มาเป็นแนวทางในการดำเนินการ

ถึงแม้จะสามารถเข้าถึงข้อมูลด้านยุทธศาสตร์ เครื่องมือ และกรณีศึกษาในการพัฒนาเมืองรักษ์น้ำได้ทั่วไปจากทั่วทุกมุมโลก แต่พบว่ายังขาดองค์ความรู้ที่จำเป็นต้องใช้สำหรับการจัดการเมืองทุติยภูมิและตติยภูมิในเอเชียตะวันออกเฉียงใต้ หรือถ้ามีก็เป็นกรณีศึกษาแยกที่ไม่ครอบคลุมเพียงพอ เพื่อตอบโจทย์ดังกล่าว จึงมีการริเริ่มโครงการวิจัยสหวิทยาการเชิงปฏิบัติการเพื่อหา “แนวทางร่วมในการบริหารจัดการทรัพยากรน้ำในเขตเมืองสำหรับภูมิภาคเอเชียตะวันออกเฉียงใต้” ขึ้น โดยภายใต้โครงการนี้ผู้บริหารเมือง สถาบันการศึกษา และองค์กรภาคประชาสังคมจากประเทศกัมพูชา เยอรมนี อินโดนีเซีย ลาว ไทย และเวียดนาม มีโอกาสได้ทำงานร่วมกันเพื่อคิดค้นแนวทางและเครื่องมือเพื่อรองรับการสร้างเมืองรองรักษ์น้ำ (เมืองทุติยภูมิและเมืองตติยภูมิ) ภายในภูมิภาค

ด้วยวิธีการนี้ โครงการจึงมีส่วนช่วยในการน้อมนำเป้าหมายการพัฒนาที่ยั่งยืน (SDGs) และวาระการพัฒนาเมืองใหม่ (NUA) มาสร้างผลงานเชิงปฏิบัติในระดับท้องถิ่น โดยการสนับสนุนภารกิจต่าง ๆ ที่ศึกษา ปฏิบัติงาน และติดตามผล จากการดำเนินกลยุทธ์ในท้องถิ่นเพื่อบรรลุเป้าหมายระดับโลก ระดับประเทศ และระดับภูมิภาคย่อย

รายงานนี้จึงขอใช้โอกาสในการนำเสนอผลจากขั้นกำหนดโครงการ ค.ศ. 2019-2020 (พ.ศ. 2562–2563) ของโครงการโพลีเออร์แบนวอเตอร์ส (PolyUrbanWaters) ซึ่งได้รับทุนสนับสนุนจากกระทรวงการศึกษาและการวิจัย ประเทศเยอรมนี สู่สาธารณชนที่สนใจ และหลังจากที่ได้จัดประชุมเข้มเพื่อหารือกับเมืองพันธมิตรในเอเชียตะวันออกเฉียงใต้ ผู้มีส่วนได้ส่วนเสียในเมืองพันธมิตรจึงได้ร่วมกันพัฒนากรอบแนวคิดเพื่อนำไปใช้ในขั้นการวิจัยและพัฒนา ค.ศ. 2021–2025 (พ.ศ. 2564-2568) ต่อไป และเริ่มดำเนินการศึกษากรณีศึกษาและแนวโน้มในมิติด้านกฎระเบียบ เทคโนโลยี เศรษฐกิจ การปกครอง สถาบัน และนิเวศวิทยา เพื่อนำมาใช้สำหรับการพัฒนาเมืองอย่างยั่งยืนให้แก่ภูมิภาค โดยงานที่นำเสนอมีลักษณะดังนี้

- กำหนดบริบทแนวทางร่วมในการบริหารจัดการทรัพยากรน้ำในเขตเมือง เพื่อสร้างเครื่องมือสำหรับการใช้งานร่วมกันสำหรับการดำเนินงานให้บรรลุเป้าหมายตามวาระการพัฒนาที่ยั่งยืน ค.ศ. 2030 (พ.ศ. 2573) โดยเฉพาะในมิติของเมืองทุติยภูมิและตติยภูมิในเอเชียตะวันออกเฉียงใต้
- นำเสนอประโยชน์ที่จะได้รับจากกรอบแนวคิดในการบูรณาการแนวทางการวางผังเมืองด้วยนวัตกรรมเข้ากับการจัดการทรัพยากรน้ำในเขตเมือง ในการสร้างเมืองรักษ์น้ำภายใต้บริบทที่เมืองเผชิญกับการเปลี่ยนแปลงอย่างรวดเร็วแต่องค์กรที่มีอำนาจในการจัดการมีขีดศักยภาพที่จำกัด
- กำหนดภารกิจหลักในด้านการวางแผนและดำเนินงานเมืองรักษ์น้ำ ตลอดจนศึกษาปัจจัยสนับสนุนที่ต้องดำเนินการก่อนในระดับท้องถิ่นและระดับประเทศเพื่อให้สามารถปฏิบัติงานตามภารกิจหลักดังกล่าวได้
- นำเสนอวิธีวิจัยสำหรับโครงการโพลีเออร์แบนวอเตอร์ส โดยมีเป้าหมายหลักคือการสร้างเครื่องมือที่ปรับเปลี่ยนได้ตามขนาดของงาน เพื่อการร่วมจัดการน้ำในการพัฒนาเมืองรักษ์น้ำ โดยจะมีการทดสอบความเที่ยงตรงของเครื่องมือในระดับท้องถิ่น
- นำเสนอผลวิเคราะห์ (โดยพันธมิตรในเครือข่ายโพลีเออร์แบนวอเตอร์ส) ในด้านเงื่อนไขและข้อมูลเชิงปฏิบัติที่เกี่ยวข้องกับกรอบงานเพื่อการเปลี่ยนผ่านสู่เมืองรักษ์น้ำสำหรับเมืองทุติยภูมิและตติยภูมิในเอเชียตะวันออกเฉียงใต้

ศึกษาผลและข้อมูลล่าสุดของโครงการเพิ่มเติมบนเว็บไซต์ www.polyurbanwaters.org.

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Giới thiệu
Vietnamese

Các thành phố ở khu vực Đông Nam Á (SEA) rất đa dạng từ các trung tâm của kinh tế toàn cầu tới các thị trường nhỏ ở các vùng sâu vùng xa. Hầu hết các quốc gia tại Đông Nam Á, dù có sự chênh lệch lớn trong vùng vào đầu thập niên thứ 3 của thế kỷ 21, giờ đây đã đạt được những thành tựu đáng kể về một số chỉ số trong khuôn khổ mục tiêu phát triển bền vững của chương trình nghị sự 2030, ví dụ có những tiến bộ đáng kể trong Mục tiêu phát triển bền vững số 4 (chất lượng giáo dục) và mục tiêu phát triển bền vững số 9 (công nghiệp, đổi mới và cơ sở hạ tầng). Khu vực Đông Nam Á cũng đạt được các thành tựu đáng kể với mục tiêu phát triển bền vững số 6 (nước sạch và vệ sinh), tức là chỉ số về "tiếp cận với các dịch vụ nước uống an toàn" trong thập kỷ trước. Tuy nhiên, hầu hết các chỉ tiêu phụ về nước lại hầu như chưa đạt được, cũng tương tự như mục tiêu phát triển bền vững số 11 (các thành phố và cộng đồng bền vững) và số 13 (hành động phòng chống biến đổi khí hậu) [1].

Thành công của Chương trình Nghị sự 2030 sẽ chủ yếu do các thành phố quyết định. Đến năm 2050, theo dự kiến gần 70% dân số sẽ sống tại các khu vực đô thị, điều này khiến cho công cuộc đô thị hóa được coi là một trong các xu hướng dịch chuyển lớn nhất của thế kỷ 21, nó đồng thời cũng làm gia tăng các thách thức cũng như cơ hội về kinh tế, xã hội, môi trường và văn hóa. Với tầm nhìn cho một tương lai tốt đẹp và bền vững hơn, Chương trình Nghị sự đô thị mới đã nhấn mạnh đến tầm quan trọng của nước trong việc phát triển của các thành phố và các khu định cư cho con người. Quá trình quy hoạch đô thị nên xét đến công tác quy hoạch và quản lý các nguồn tài nguyên nước tổng hợp cũng như sự kết nối giữa nông thôn và thành thị ở quy mô địa phương và lãnh thổ, đảm bảo rằng có sự tham gia của các cơ quan liên ngành, các bên liên quan và cộng đồng. Chương trình Nghị sự đô thị mới (NUA) kêu gọi nâng cao vai trò của các thành phố vừa và nhỏ nhằm đạt được chu trình an ninh lương thực và dinh dưỡng, cung cấp khả năng tiếp cận các dịch vụ nhà ở an toàn, với chi phí hợp lý, phù hợp, có khả năng chống chịu và bền vững, hệ thống cơ sơ hạ tầng, các dịch vụ và nhu cầu cơ bản và thúc đẩy các mối liên kết thương mại hiệu quả xuyên suốt giữa thành thị – nông thôn [2].

Rất nhiều đô thị loại hai và loại ba ở khu vực Đông Nam Á đang phát triển rất nhanh nhưng công tác quy hoạch và quản lý lại chưa bài bản, vì vậy đã tạo ra những thách thức không nhỏ trong việc bảo vệ các nguồn nước bền vững; giảm tổn thất do biến đổi khí hậu và rủi ro thiên tai gây ra; cung cấp hiệu quả các dịch vụ về nước cho mọi công dân. Nói cách khác, họ đang nỗ lực để tạo ra các thành phố đáng sống, có khả năng chống chịu với biến đổi khí hậu và phát triển toàn diện. Tuy nhiên do những yếu kém về mặt thể chế và công tác quản lý cũng như chưa có được các mô hình tài chính và quy trình hiệu quả và thẩm quyền đầy đủ nên các chính quyền đô thị khó có thể phát triển và duy trì được hệ thống cơ sở hạ tầng

nước bền vững và hiệu quả nhằm đảm bảo việc cung cấp các dịch vụ nước công cộng một cách toàn diện cũng như bảo vệ các nguồn tài nguyên nước của mình [3].

Các cơ quan ra quyết định về phát triển đô thị, các học giả và các chuyên gia trong ngành đều nhất trí rằng các mô hình cổ điển về quy hoạch đô thị và phát triển hạ tầng nước là chưa đủ để có thể đáp ứng được những thách thức phát triển của các thành phố này. Chúng không phản ánh được thực tế, nhu cầu và năng lực của các thành phố. Các phương pháp quy hoạch đô thị hiện tại và các kế hoạch thực hiện cho các thành phố này nên được xem xét lại. Việc quản lý các nguồn tài nguyên nước nên loại bỏ phương pháp tiếp cận tập trung đơn ngành và cần phải hiểu nó là một vấn đề xuyên suốt đa ngành trong phát triển đô thị nói chung. Phát triển hạ tầng nên dựa theo phương pháp tiếp cận từng phần một cách linh hoạt, có sự lồng ghép và bền vững về mặt tài chính, có thể thích ứng với sự phát triển và nhu cầu của các thành phố theo thời gian. Các cơ quan quản lý mới ở cấp thành phố và các cấp có liên quan (cụ thể là chính quyền thành phố, các cộng đồng, người dân, khu vực tư nhân, các tổ chức hội dân sự và giới học thuật) nên cho phép quản lý nguồn tài nguyên nước theo hướng phân cấp phân quyền. Các ý tưởng như "các thành phố có nguồn nước đảm bảo và an toàn" [4] và "thành phố có hệ thực vật tiêu hao ít nước" [5] có thể giúp định hướng cho quá trình chuyển đổi đô thị toàn diện.

Các phương pháp tiếp cận, các công cụ và kinh nghiệm về phát triển các thành phố có nguồn nước đảm bảo và an toàn thì có nhiều và đã được áp dụng rộng rãi trên thế giới nhưng đó không phải là trường hợp của các đô thị loại hai và ba tại khu vực Đông Nam Á, họa chăng nếu có thì cũng chỉ ở một số trường hợp cá biệt. Nhu cầu này được đáp ứng thông qua dự án nghiên cứu liên ngành dựa vào định hướng thực hành "Tiếp cận đa ngành trong quản lý các nguồn nước đô thị tại Đông Nam Á". Ở đây, các thành phố, các cơ quan nghiên cứu và các tổ chức xã hội dân sự từ Campuchia, Đức, Inđônêxia, Lào, Thái Lan và Việt Nam làm việc cùng nhau với mục tiêu phát triển các cách tiếp cận và các công cụ cho việc xây dựng các đô thị loại hai và ba có nguồn nước đảm bảo và an toàn tại khu vực Đông Nam Á.

Với ý nghĩa trên, dự án góp phần hỗ trợ xây dựng và triển khai các mục tiêu phát triển bền vững của Liên Hợp Quốc và Chương trình Nghị sự Đô thị mới thông qua việc hỗ trợ các quá trình từ xác định, thực hiện đến giám giát các chiến lược tại cấp địa phương để đạt được các mục tiêu cấp vùng, quốc gia và toàn cầu.

Báo cáo này đưa ra kết quả trong Giai đoạn xác định (2019–2020) của dự án Quản lý nguồn nước đô thị đa ngành được tài trợ bởi Bộ Giáo dục và Nghiên cứu của Cộng hòa Liên bang Đức (BMBF) đã được công bố.

Dựa trên các quy trình tham vấn chuyên sâu với các thành phố đối tác tại Đông Nam Á, các đối tác của dự án đã xây dựng một bản đề cương cho giai đoạn Nghiên cứu và Phát triển của dự án (2021–2025) và xem xét các kinh nghiệm cũng như xu hướng phát triển đô thị bền vững trong khu vực về các khía cạnh như quy chế, công nghệ, kinh tế, hành chính, thể chế và sinh thái. Các công việc đã được thể hiện như sau:

- Bối cảnh hóa các phương pháp tiếp cận đa ngành về quản lý nguồn nước đô thị như một công cụ đa ngành trong việc địa phương hóa Chương trình Nghị sự 2030 và Chương trình đô thị mới, đặc biệt là cho các khu vực đô thị loại hai và ba tại Đông Nam Á;

- Chỉ ra các khung khái niệm về việc làm thế nào để tích hợp được các cách tiếp cận quy hoạch đô thị cải tiến vào công tác quản lý các nguồn tài nguyên nước để có thể đóng góp vào việc thiết lập các thành phố có nguồn nước đảm bảo và an toàn trong bối cảnh tốc độ đô thị hóa nhanh và năng lực thể chế hạn chế;

- Xác định các nội dung chính như làm thế nào để xây dựng quy hoạch và thực hiện các quy trình cho các thành phố có nguồn nước đảm bảo và an toàn và các điều kiện tiên quyết cho các cấp từ địa phương tới trung ương;

- trình bày thiết kế nghiên cứu về dự án Quản lý nguồn nước đô thị đa ngành với mục tiêu chính là phát triển các công cụ có thể nhân rộng cho việc phát triển đô thị có nguồn nước đảm bảo và an toàn, và tính phù hợp của việc này sẽ được kiểm tra tại cấp địa phương; và

- Bao gồm các phân tích (được xây dựng bởi các đối tác trong mạng lưới của dự án Quản lý nguồn nước đa ngành) về các điều kiện khung và các kinh nghiệm liên quan trong việc chuyển đổi sang đô thị có nguồn nước đảm bảo và an toàn đối với các thành phố cấp hai và ba tại Đông Nam Á.

Các kết quả khác và các cập nhật của dự án hiện có sẵn trên trang web của dự án www.polyurbanwaters.org.

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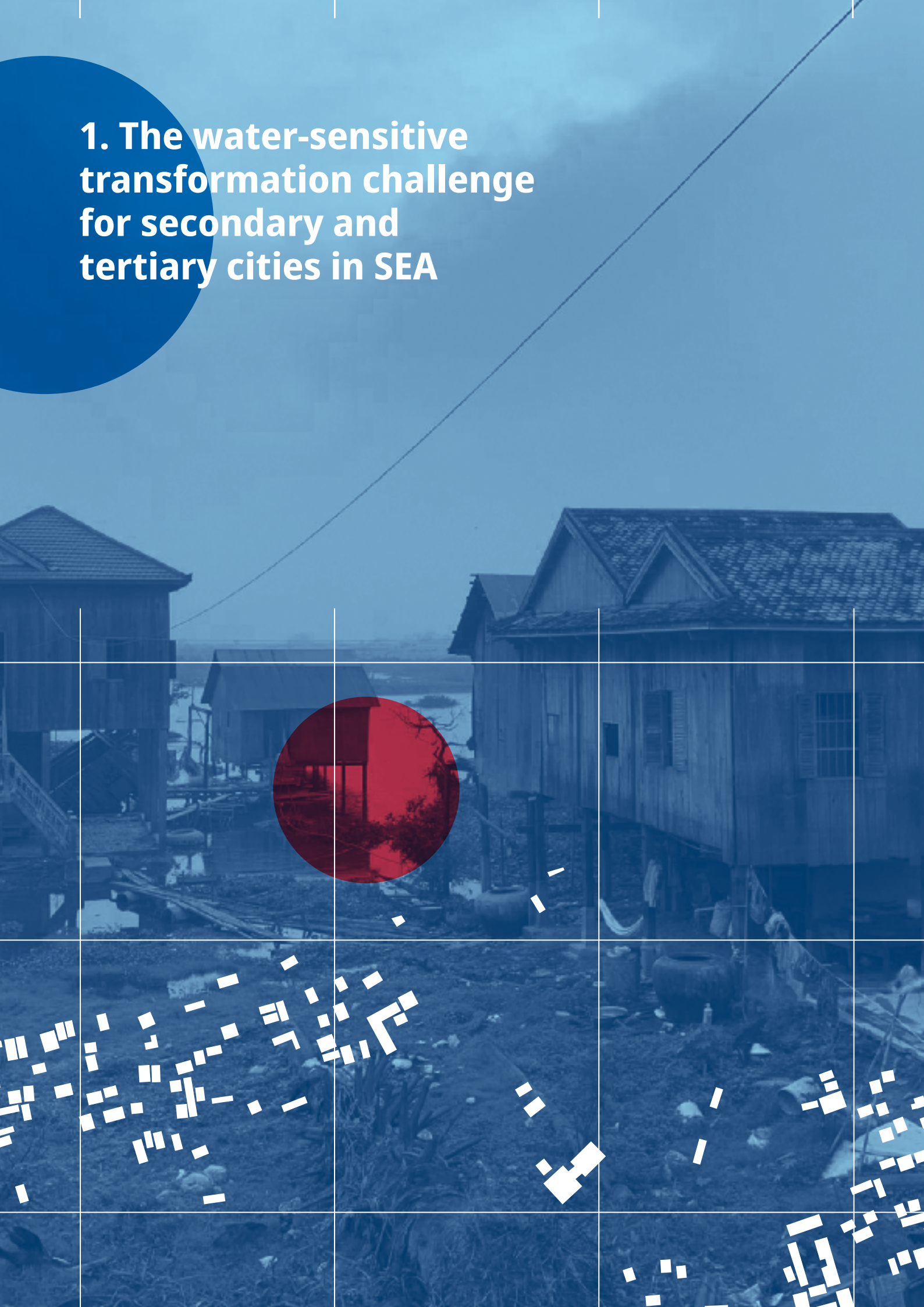
Tháng 3 năm 2021

1. The water-sensitive transformation challenge for secondary and tertiary cities in SEA



1.1 Cities – Decisive for the achievement of global and national agendas

Since 2007, the majority of the global human population has been living in urban environments and it is estimated that by 2050, more than two-thirds of all humans will live in cities [6]. While cities are vibrant centers of growth and innovation, there are also many drawbacks associated with cities; they use enormous resources even though they only occupy two percent of global land mass. Cities account for over 60% of global material consumption, more than two-thirds of the world's energy, and over 70% of the world's CO_2 emissions [7].

Growing cities heavily impact their surrounding environments with these increasing demands and their resource requirements. Especially heavy pressure is placed on water resources within and in proximity to cities. Industrial activity, intensified agriculture and domestic waste pollute water bodies. Increasing water demand typically leads to an unsustainable depletion of remaining unpolluted water sources. Additionally, in rapidly urbanizing areas, many cities struggle to provide service and infrastructure needs such as piped water and sanitation, thus adding pressure on publicly accessible water sources. To maintain the expected growth of cities while simultaneously increasing living standards and higher resource demands per capita, the question arises: how to prepare for a doubled urban population by 2050?

Global agreements such as the SDGs and the NUA have outlined holistic visions of sustainable futures for urban areas, but their localization in the diverse set of urban realities is a challenging task. The comprehensive transformation processes of urban development must be initiated and implemented across sectors through well-focused, transparent and consistent decisions at the various political scales, from national, regional and city administrations to the neighborhood level. This huge task requires suitable instruments that aid in rethinking urban space, creating new models of urban development, and supporting their translation into urban reality.

The vital importance of SDG 11 (sustainable cities and communities) and SDG 6 (clean water and sanitation for all) for the overall implementation of Agenda 2030 and the NUA is more than evident. Like all SDGs, they cannot be addressed individually, but only in the context of other SDGs such as poverty eradication (SDG 1), equality (SDG 10), climate action (SDG 13), and ensuring healthy lives (SDG 3). Therefore, multilevel governance frameworks should create institutionalized mechanisms for vertical and horizontal collaboration and coordination that are enshrined in broad consultative processes. Decentralization policies and processes in SEA have opened a window of opportunity for such processes within the subnational governments to take a stronger role in implementing SDGs at the local level.

1.2 Secondary and tertiary cities in SEA as drivers for economic, social and ecological change

SEA is one of the fastest growing regions worldwide in terms of economic growth, industrialization, population growth and urbanization. In 2019 the population of the region was 662 million [8], which is expected to grow to 723 million by 2030 [9]. Large populations, urban-centric economic growth and activities, and socio-economic opportunities are the major drivers of rapid urbanization in SEA. The challenges of the region's fast developing cities have in many cases created a mismatch between rapid urban growth and the required investment in water-related infrastructure, services and environmental management.

The average growth rate of GDP per capita at 3.8 per cent per annum over the period 2000–2017 was double the world growth rate [1]. In recent decades, SEA has achieved a high degree of market development on national and regional levels and of integration in global markets and supply chains. An overall rapid transformation of SEA's economies can be observed. Lower-middle income countries within SEA such as Cambodia, Laos and Myanmar attract foreign investment mainly from China for infrastructure development and industry. Thailand, Malaysia, Vietnam and Indonesia are major players in the global market supply of high-quality products. These developments go hand in hand with the emergence of an increasingly competitive service sector that fuels further economic and urban transformation.

It is expected that the COVID-19 crisis, despite its negative economic and social impacts and its disruptive forces, will finally provide a further boost to digitalization that will foster higher productivity and loss of low-qualification jobs coupled with the emergence of new industries and services. The Regional Comprehensive Economic Partnership (RCEP) treaty for Asia and the Pacific is expected to further boost economic and urban development.

With these economic dynamics, primary cities such as Bangkok, Jakarta and Ho Chi Minh City grew through large migratory movements, as they promised jobs and a better life. In recent years, cities that were until recently quieter and easier to manage such as Phnom Penh are today witnessing a boom in real estate, industrial parks and vehicle ownership. Thus, the discussion about sustainable urban development has long been focused mainly on these megacities.

Less attention was paid in this national and international discussion to the so-called secondary and tertiary cities, which nowadays play an increasingly important role in the national economies and in the economic integration of the SEA region. 65% of SEA's population live in cities smaller than 500,000 residents [10].

In SEA's secondary and tertiary cities, the dynamic growth and development of new residential, commercial and industrial areas is just as visible as the emergence of modern educational facilities, a tourist infrastructure and an enormous increase in traffic. These cities are home to provincial governments or district or sub-district administrations, are regional trading centers for goods and services, are increasingly the target of migration from rural areas, and are undergoing rapid transformations in rural and rural/urban transition zones. This is accompanied by a far-reaching transformation of social structures and socio-cultural patterns, which, not least due to the intensive use of new information and communication technologies in many of the until recently remote small-town areas, is linking up with the production patterns of their economic actors and the consumption patterns of their citizens in large urban centers.

Overall, the whole socio-economic landscape of secondary and tertiary cities has changed over the last decades. Contrary to popular perception, migrants from rural areas are not necessarily poor. Citizens expect good living conditions, not only in economic terms, but in also terms of the provision of public services (health, education, energy, water). Urban populations and communities may retain linkages to "traditional" socio-cultural patterns, but these are contextualized in a new urban style of living.

Fig. 1: Secondary and tertiary cities – here Kratié in Cambodia – are knots of dynamic economic and social development that have to manage a rapidly increasing complexity

As rapid and profound as these transformation processes may be, the inadequacy of many governance schemes and underfinancing of public budgets prevent many secondary and tertiary cities in SEA from creating strong urban systems and thus, they are unable to achieve a balanced regional socioeconomic development that protects public goods and commons. Unplanned development of residential and commercial areas, uncontrolled land use changes in the urban-rural continuum, rapidly increasing generation of solid waste, fragmented provision of public services and patchy infrastructure development may counteract many achievements of recent years. These cities have to perform increasingly complex functions and manage rapidly increasing complexity in order to assure framework conditions for a more sustainable development of the urban space.

Sleman, located in Java, Indonesia, and partner city of the PolyUrbanWaters project, and has been undergoing a deep urban and socio-economic transformation in recent years. What was previously a mainly rural area has become a national center of higher education with numerous universities and is undergoing dynamic development of its tourism and service industries. The project's second partner city is Sam Neua, the capital of the Houaphan Province in northeastern Laos, located close to the Vietnamese border. This city will most probably become a future hub of economic integration, with national and international investors already active today in infrastructure projects and various business activities. It is to be expected that other investors will follow suit. The project's third partner city, Kratié in Cambodia, may experience a similar development if the country's economic integration continues as it has in recent years (for a detailed description of the partner cities, see Chapter 4).

1.3 Current features of water governance in secondary and tertiary cities in the SEA region

Water provides an excellent example of the challenges in localizing Agenda 2030 and the NUA in secondary and tertiary cities. Water is highly interlinked with the whole urban system. Cities have historically been built next to rivers, which provide the necessary water resources. Freshwater supply for domestic and industrial use drives the development of cities and determines their ability to grow. Sanitation and environmental flows shape the health of societies while water governance encompasses it all and shapes power dynamics, which are based on the most important resource of all: water.

Cities have to simultaneously address multiple water challenges such as fulfilling their growing populations' demands for potable water and sanitation while planning for increased flooding events and challenging water scarcity situations. This is particularly evident in transitional zones (i.e., the encroachment towards rural space) of fast-growing urban areas, which can only be supplied to a limited extent by current systems. Rapid population growth leads increasingly to higher urban density, lack of usable space and rapid rural-to-urban transition, resulting in a lack of necessary urban infrastructures and consequent deterioration of the quality of living spaces. Rapid and frequently unplanned developments, in combination with insufficient financial and capacity-related support, place significant pressures on ecosystems, add to water pollution, and can disrupt natural water cycles.

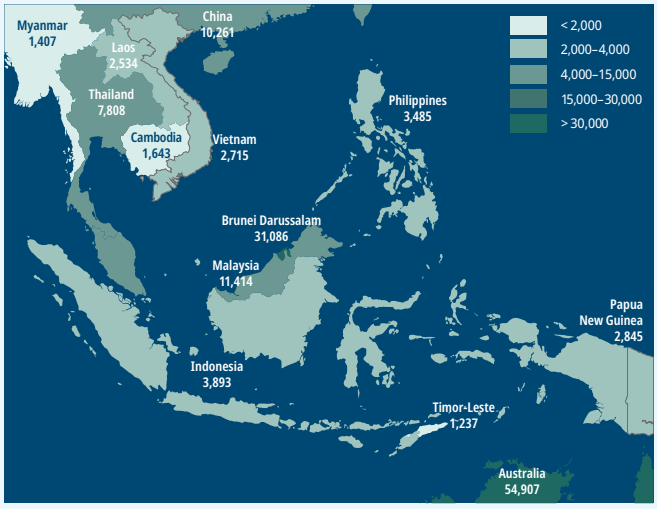
A rapid rate of urbanization, coupled with unplanned development, accelerates supply gaps in water-related municipal public services as well as the overexploitation of groundwater and surface water resources. Highly centralized and sectoral urban planning approaches, together with insufficient institutional capacities and structural underfunding, struggle to capture the complex and fast-changing interface between water management and urban development that is needed to sustainably address long-term changes.

Climate change is projected to lead to intensified weather extremes in the SEA region (most notably, more pronounced dry and wet seasons), which, without proactive water management, is expected to drastically worsen existing water-related concerns in the region. Floods are already the most frequent natural disaster event in SEA, and precipitation of higher intensity and frequency

Fig. 2–5: National level statistics in SEA for HDI (Adapted from: [11]), GDP per capita (Adapted from: [12]), water stress (Adapted from: [13]) and ND-GAIN Index (i.e., vulnerability to climate change) (Adapted from: [14])

Human Development Index, 2018

GDP per capita, 2018 (US $)



can exacerbate these events considerably. Historically, droughts have not been common in SEA, but this is changing. In recent years SEA, especially Vietnam, Cambodia and Thailand, have suffered from hydrological and agricultural droughts, stemming from both hydro-climatological and hydro-political reasons. Furthermore, more intense dry seasons can affect water quality negatively through higher relative concentrations of pollutants in water bodies, and by creating more ideal conditions for algae and bacteria growth through an increase in water temperatures and a decrease in streamflow during low-flow periods [15][16].

Figures 2–5 present national level statistics of the Human Development Index (HDI)[1], the GDP[2] per capita, the level of water stress[3] and the ND-GAIN Index (climate vulnerability and adaptation readiness to improve resilience)[4] in the SEA region. This provides a general background to the situation in SEA (medium HDI, low water stress, climate vulnerability and adaptation readiness), but also demonstrates the heterogeneity throughout the region (e.g., Malaysia has a GDP per capita almost 10 times that of some other countries in SEA). These national level statistics provide a strong starting point to our understanding of the region, but do not always tell the full story due to variations within a country. For example, parts of Thailand near Bangkok have water stress values higher than 80% while the country as a whole is in the range of 20% to 40% [13].

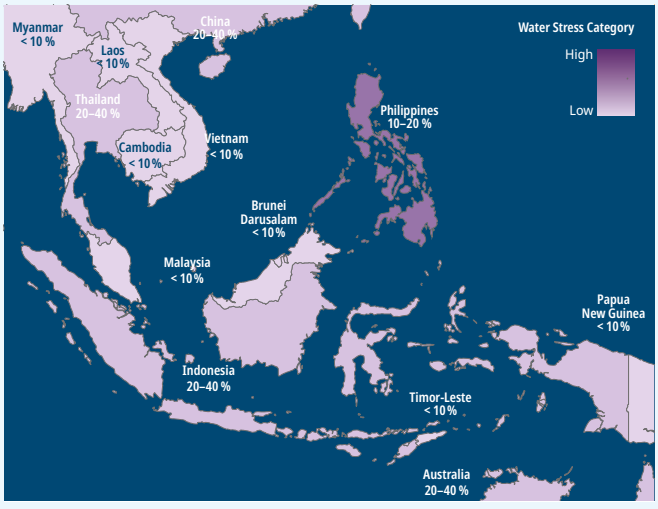
1 HDI measures the average achievement of human development based on three dimensions: a long and healthy life, being knowledgeable and having a good standard of living. Ranges are: 0.0 to 0.5 (low); 0.5 to 0.8 (medium); and 0.8 to 1.0 (high).

2 GDP measures the sum of marketed goods and services produced within the borders of a country.

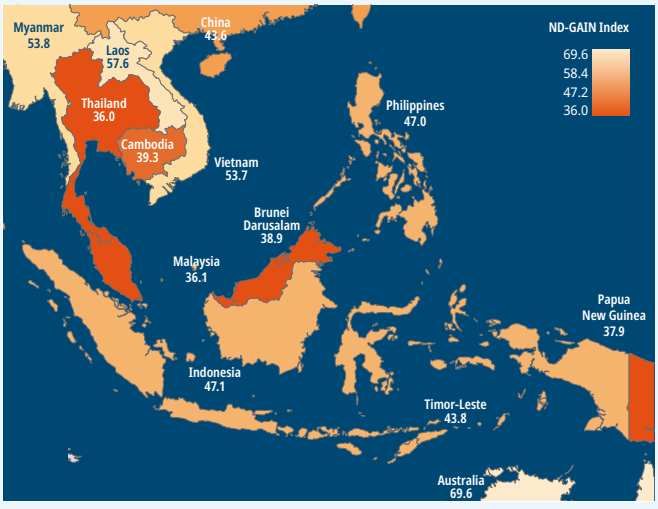
3 According to the FAO, water stress is determined as the ratio of total fresh water withdrawn to the total renewable freshwater resources in a country.

4 ND-GAIN measures climate vulnerability and adaptation readiness to improve resilience. The score ranges between 1 (lowest) to 100 (highest). The highest value achieved (Norway) was 76.7.

Water Stress, 2015 (%)



ND-GAIN Index, 2018

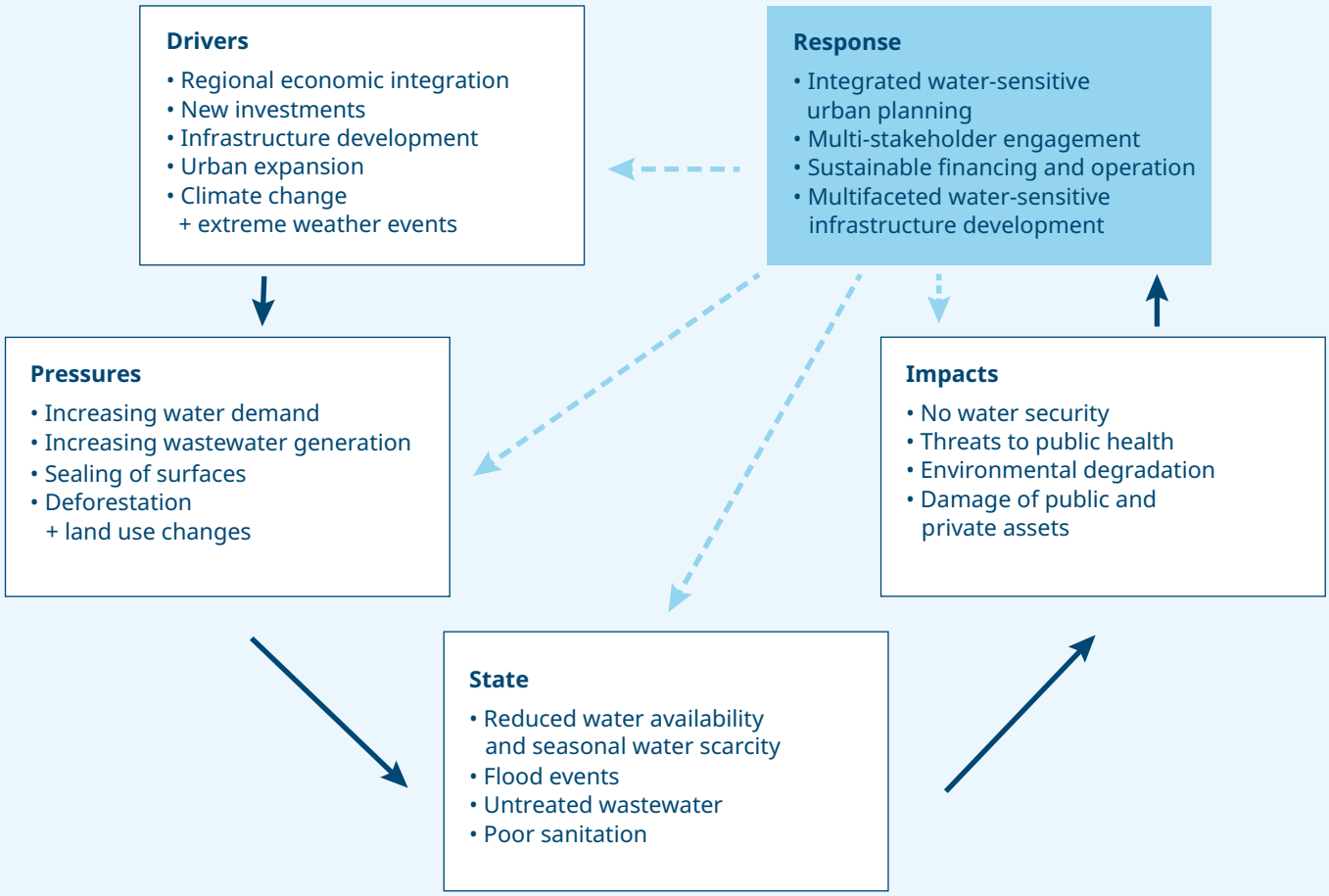


Across SEA, the quantity of groundwater extracted is rising due to concerns about the quality of surface water, population growth, increased access to pumps and water shortages during dry seasons. The quality of surface waters in the upper-middle income countries of SEA is strongly affected by the region's development. This is especially prominent in Indonesia, where 70% of rivers are considered polluted, primarily by pollutants from domestic sources [17]. In contrast, surface water resources in Cambodia and Laos are generally considered to be still of good quality; however, there are water quality concerns in areas of urban proximity and intensified agricultural activity, particularly in the dry season [18].

Good water governance is key for the performance of the water sector in the region. Effective governance at national, local and community level and respective capacities are essential for the development of sustainable cities. It is not only essential for ensuring reliable and effective water services to the population, but also to establish the sector's financial sustainability. Transparent government policies on tariffs, service levels, operator performance, and incentives are lacking. Water in many countries remains an instrument of local politics. Fighting corruption is a key challenge in reforming the water sector and ensuring effective provision of water services for the urban poor [19].

Secondary and tertiary cities are struggling to establish reliable financing schemes for investments, operation and maintenance of water infrastructure. At the same time, they are also experiencing how necessary the implementation of full-cost water pricing schemes is, and how far there is still to go in many places. In particular, the question is how the 2030 Agenda motto "No one left behind" can be realized within an efficient water sector.

Fig. 6: DPSIR assessment of a representative secondary city in SEA



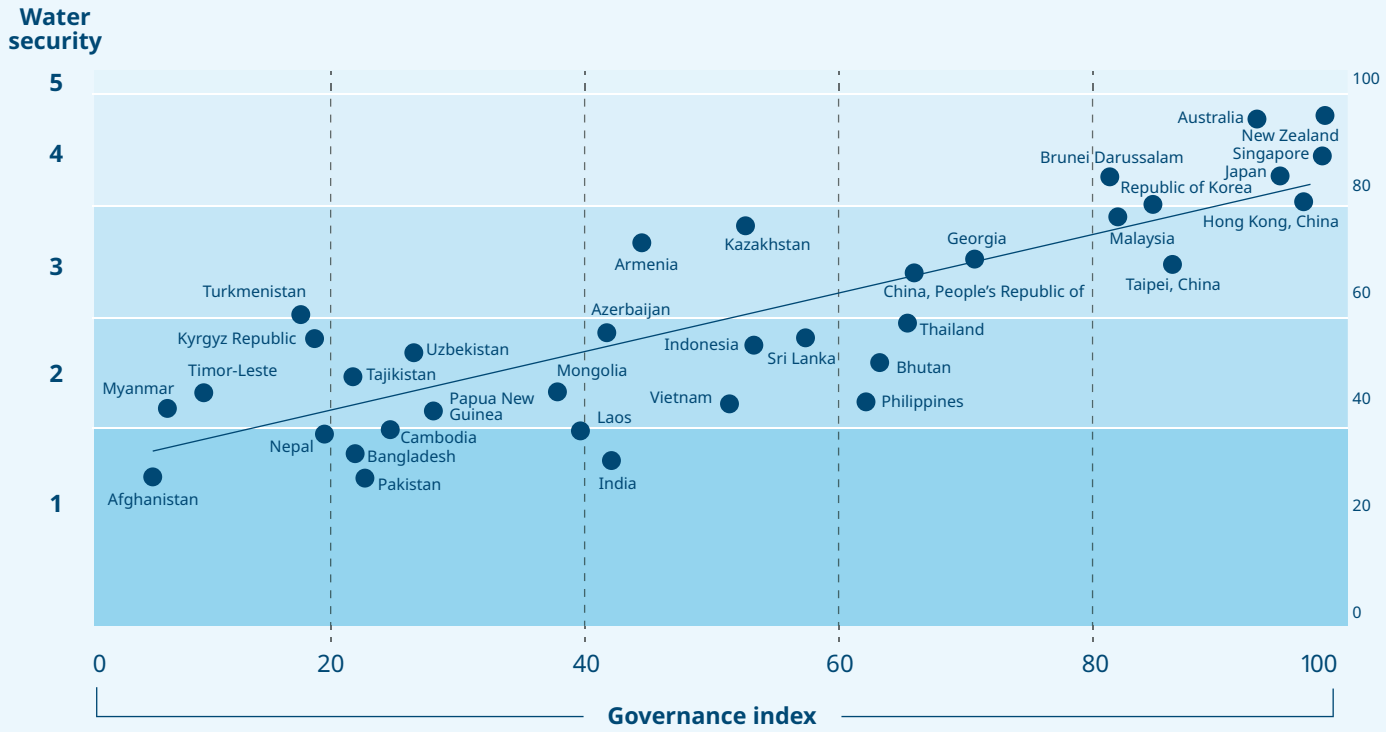


Fig. 7: Correlation between governance index and water security at the national level [20]

Significant progress in sanitation was achieved in SEA between 1990 and 2015. The rate of improved sanitation increased from 48% to 72%, the coverage rate of shared sanitation increased from 6% to 10%, unimproved sanitation decreased from 15% to 7% and open defecation from 31% to 11%, yet challenges remain. Throughout the region, septic tanks – often poorly built – are the most common form of urban sanitation facilities because only a small percentage of households are connected to sewage systems [21]. Overall, septage management in the region is rather poor [22]. A lack of proper facility management can often lead to leakages and the polluting of adjacent water bodies, groundwater or even the well used by the same household, depending on the proximity of both facilities. In most secondary and tertiary cities, effluents flow directly into often open stormwater drains in the streets and subsequently discharge untreated into rivers passing through the cities. This is especially the case when heavy rains occur. The required capital costs for investments in sophisticated sewage treatment plants and sewage systems are beyond the financial means of many cities, without even considering the high cost for maintenance and operation (e.g., energy for activated sludge treatment and pumping).

Despite the progress made thus far, the development of effective municipal public services remains a huge task. The challenge is evident in Indonesia, where only 2% of the population is connected to centralized sewage systems, a level far below countries such as Singapore and Thailand. The Indonesian National Medium Term Development Plan 2015–2019 envisaged that access to improved sanitation should be raised from 60.9% to 100% during this period. The plan called for 90% of this supply to be covered by so-called on-site systems (improved septic tanks), 5% by centralized sewage disposal and 5% by small-scale sewage treatment plants (communal systems). But the path to reaching these targets is more challenging than expected [23]. For the next medium-term plan (2020–2024), Indonesia has set new national targets, which are 0% of the population practicing open defecation and 90% having access to improved sanitation. To achieve these targets, the Government of Indonesia will need to provide additional access to improved sanitation for 67 million people at an estimated cost of USD 12.24 billion [24].

1.4 Water-sensitive and water-wise cities as strategic concepts for urban resilience

UNESCAP identifies several key determinants for cities to meet the vision of the NUA and successfully localize the SDGs in the Asia-Pacific region. These include: more sustainable integrated urban and territorial planning; stronger multilevel governance and capacities for resilience; adaptable technological innovations with systematic data collection and analysis; and adequate and predictable long-term financing.

In some cities in Asia and the Pacific, these visions are embraced through novel concepts of urban design by integrating water as a cross-sectoral opportunity for sustainable urban development. Today, Singapore is a global leader in the integration of nature with architecture and urban planning. Cities such as Hong Kong and Shenzhen or different mega projects that aim to create “sponge cities” and “forest cities” are examples of this trend.

Fig. 8: Shenzen is one of the mega cities that explores the benefits of designing with nature [25]

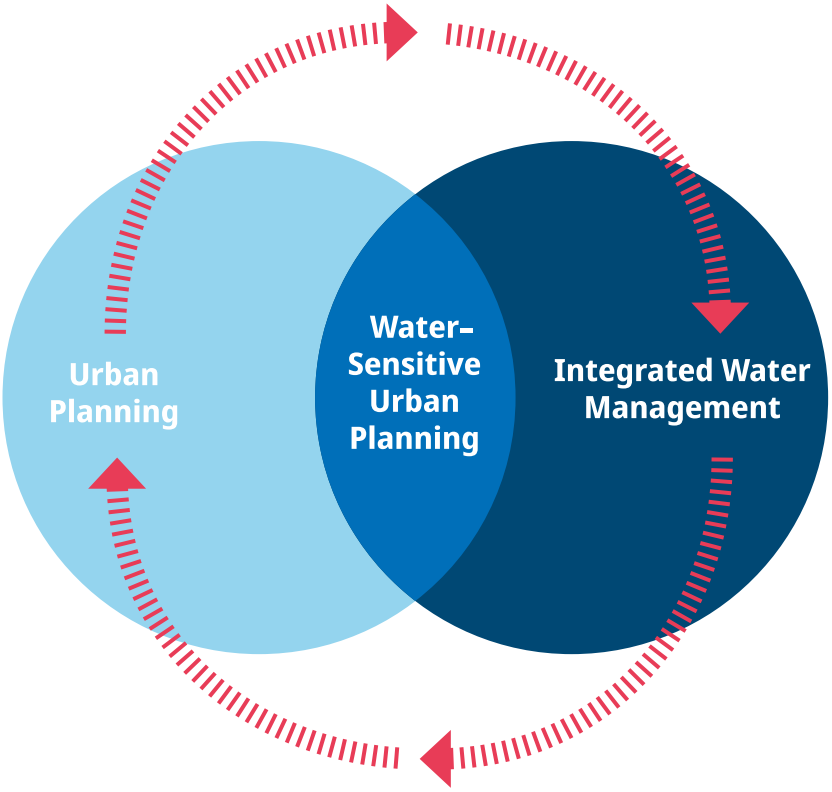


Fig. 9: Representation of the nexus between urban planning and integrated water management

The "water-sensitive cities" or "water-wise cities" concepts are potential guides for the specification of resilience and the water-relevant urban transformations of secondary and tertiary cities in SEA.

> *'Water-wise' behaviour means that leadership culture, governance arrangements, professional capacity and innovative technology are all aligned with the objective of maximising sustainable urban water outcomes. Sustainable urban water management means that all water within the city (including reservoir and aquifer water, desalinated water, recycled water and stormwater) is managed in a way that recognises the connection between services, urban design and the basin, with an approach that maximises the achievement of urban liveability outcomes, and resilience to unexpected social, economic or bio-physical shocks, while replenishing the environment [26].*

A water-sensitive city can be described as one that is resilient, livable, productive, and sustainable. CRCWSC define three pillars of a water-sensitive city [27]:

- **Cities act as water supply catchments**, providing a range of different water sources at a range of different scales, and for a range of different uses.
- **Cities provide ecosystem services** and a healthy natural environment, thereby offering a range of social, ecological, and economic benefits.
- **Cities comprise 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 behaviors related to water.

The concept of urban resilience aims to encourage cities to assess, plan and act in order to prepare for and respond to hazards and shocks. Given the central role of water in various shocks, either as a primary or secondary factor, the management of urban water resources is vital to resilience. In theory, preparedness for both slow-onset and fast-onset shocks, either expected or unexpected, can

allow cities to be better able to protect and enhance people's lives, secure development progress, protect the local environment and invest in positive change.

Although urban resilience has become a key sensitizing concept in urban development contexts, UNESCAP argue for the Asia and Pacific region that: *"The great challenge of resilience is that it is still a relatively abstract concept to many decision-makers. Due to its multi-sectoral nature, resilience is still difficult to frame and relatively complex to understand how it differs from more classic public policy tools. In parallel, the concept suffers from the 'catch-all syndrome', by which resilience appears to cover every aspect of urban governance and as a result suffers from a paralysis whereby it ends up covering nothing at all."* [28]

"[Urban resilience is] the measurable ability of any urban system, with its inhabitants, to maintain continuity through all shocks and stresses, while positively adapting and transforming toward sustainability" [29].

Over the past decades, numerous approaches have been developed to strengthen the resilience of the water sector so that it can meet the multiplicity of water-related needs and challenges. The comprehensive concept of Integrated Water Resource Management (IWRM) was promoted in Agenda 21 and the World Summit on Sustainable Development in Rio de Janeiro in 1992 [30]. The Global Water Partnership (GWP) defines IWRM as *"a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems." [31]*

Fig. 10: Components of integrated urban water resources management

To embed IWRM in a broader, SDG-oriented urban planning process, secondary and tertiary cities in SEA may refer to successful urban development models in the region. In the 1960s, the region had some of the lowest per capita incomes worldwide. At that time, Singapore, South Korea, Malaysia and Thailand had started to successfully modernize and to develop their cities. "Water" became part of a wider narrative around notions of common wellbeing, modernity and nation-building. The development of new sanitation infrastructure was addressed cross-sectorally as being an integral part of other development programs such as pro-poor housing, urban renewal, and primary education and public health initiatives. Leadership at national, regional and local level, synchronized public policy, and institutional coordination have been key elements for these success stories.

"[Development teams] must also, at least once a week, have what I call 'morning prayers' where all departmental officers get together and instead of writing tedious minutes on files to each other, they settle their departmental differences together, in a coordinated way, in front of the maps in their operations rooms." [32]

1.5 Polycentric, water-sensitive urban development for secondary and tertiary cities in SEA

Polycentric approaches to the management of urban waters can allow secondary and tertiary cities in SEA to proactively shape their processes of transformation towards water-sensitive cities. As a multi-layered concept, polycentric approaches reflect the various development dynamics of cities in their natural, climatic, economic, social, cultural, financial and legal dimensions. Polycentric approaches foster mechanisms and a culture for effective co-production and multi-stakeholder engagement between local government agencies, planners, utilities, communities, households, the private sector and civil society, and thus provide an indispensable prerequisite for the sustainability and long-term maintenance of implemented solutions.

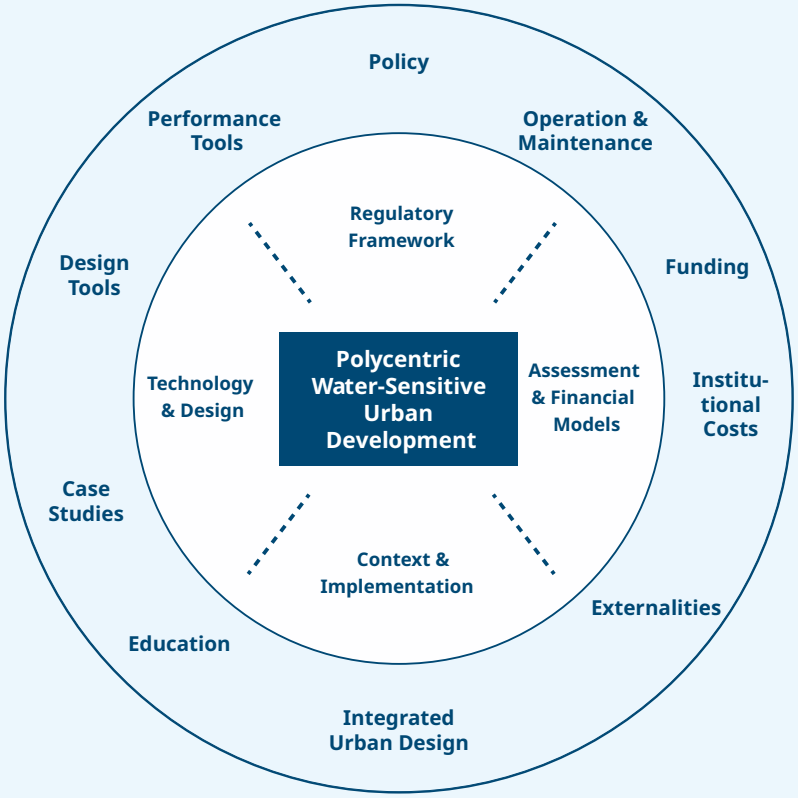


Fig. 11: Key components for integrating polycentric water-sensitive urban design into urban development projects (Adapted from: [33])

In this sense, polycentric approaches:

- help local government and relevant stakeholders to make informed decisions on the most adequate development pathway for their cities and determine suitable solutions;
- reflect the dimensions of adequate spatial and urban planning, technology and infrastructure development, financing, and effective management of private and public assets;
- refer to ground realities and follow the UN principle of progressive implementation, so that they are not guided by ideal-typical but by realistic models of sustainable urban infrastructure development;
- are based on local technological, organizational and institutional capacities and socio-ecological systems within the cities;
- support the development of tailor-made, flexible and resilient combinations of green, blue and hybrid infrastructure solutions that allow cities to adapt to complex system challenges and changing environments in a cost-effective and sustainable manner;
- incorporate the multifunctionality of space in the context of ecosystem services, societal needs (e.g., public spaces) and infrastructure services;
- support the combined decentralized and centralized infrastructures in accordance with their functionality, effectiveness and sustainability and in a way that can be progressively further developed over long time horizons;
- support the process of co-creation and co-management of water-related development infrastructure, neighborhoods and of public spaces; and
- create favorable conditions for a more effective allocation of public funds, for a substantial financial participation of all stakeholder groups, and for the identification of bankable projects and of private investment opportunities.

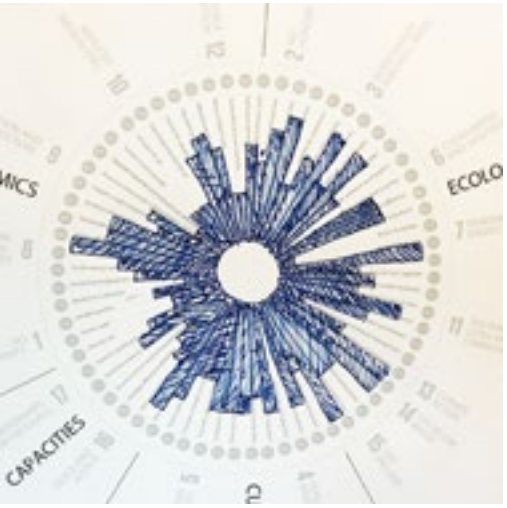


Fig. 12–13: The urban planning tool "SDG wheel", which is composed of indicators of the 17 SDGs, can help cities analyze their respective level of sustainable development

1.6 Challenges in shaping governance frameworks for polycentric, water-sensitive urban transformation

National governance frameworks for localization of Agenda 2030

Secondary and tertiary cities require adequate governance structures to shape their water-sensitive transformation. A far-sighted, focused, transparent, and accountable leadership is indispensable; city mandates have to be strengthened and cross-sectoral cooperation within cities is essential. Effective governance requires participatory processes that include communities, the private sector, civil society and academia. Cities need the appropriate capacities and instruments, which are indispensable for active urban design and effective urban management [2][34][35][36][37].

SDG-oriented urban planning at city level may create disclosure on strategic elements of urban development and give decision makers a better understanding of the impacts of water-related infrastructure development in its multidimensionality (health, eco-systems, livability in cities, etc.). It may open the perspective of city managers from a purely output-driven decision making towards a more impact-driven decision making that invites affected or concerned departments to participate in the process.

Countries in SEA have made and continue to make comprehensive efforts to decentralize public administrative structures, which are noticeable to varying degrees at the level of secondary and tertiary cities. But still today, in some countries key decisions for these cities are mainly taken at the national and provincial level, and the cities and provinces are given comparatively weak mandates.

Decentralization policies may also pose new challenges. The study elaborated by the Vietnam Academy of Water Resources (see Chapter 3.8) shows how challenging it is for cities and municipalities to localize the Vietnamese Agenda 2030. In recent years, national development plans have been tailored to address the SDGs. The classification of Vietnam as a lower middle-income country has triggered comprehensive restructuring of public governance structures and decentralization processes for the provincial and local government levels. This requires new mandates that still need to be translated into effective administrative practice and budgeting procedures. Here, the cities are emphatically asking themselves how (water) related infrastructure development can be financed sustainably, and whether and to what extent they can attract private-sector investors, for example in the form of private-public partnerships.

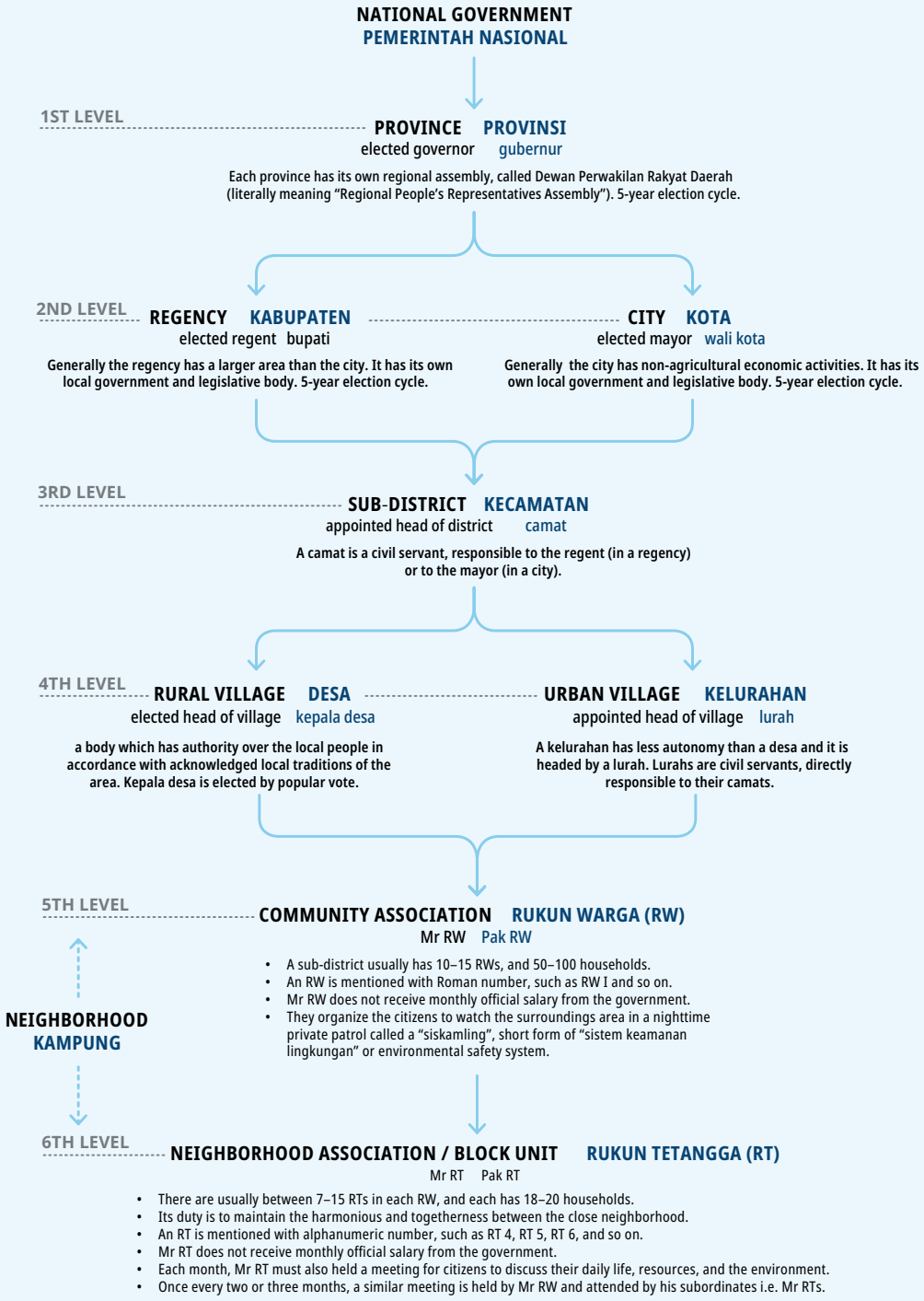
The contribution from the Asian Institute of Technology (see Chapter 3.7) addresses the need for and importance of consistent policy frameworks (e.g., mandates, norms and standards) to establish favorable framework conditions for the development of effective infrastructure and provision of public services. In Thailand, fragmented mandates and roles at the national government level, poorly defined responsibilities in city administrations and unrealistic standards for wastewater discharge are major obstacles to the development of an effective wastewater infrastructure and of markets for wastewater-related investments and services. This case study provides valuable insights into the need to elaborate favorable framework conditions in particular SEA countries, not only for the management of waste/used water, but also for the development of integrated urban water management systems and more comprehensive approaches to integrated urban development in the sense of SDG localization.

Many planning frameworks remain highly centralized and sectoral, and are designed to fit within established planning cycles. These urban planning approaches struggle increasingly to capture the complex and fast-changing interface between water management and urban development needs while addressing long-term challenges such as climate change. Urban and territorial

planning processes should be based on decision-making processes that make use of spatial visions, strategies and plans [38]. These processes vary widely across the SEA region and respond to institutional, regulatory, technical and participatory mechanisms and procedures defined at the national level and executed locally.

For example, Indonesia's emerging planning framework is aimed at accommodating more strategic investment in the infrastructure of a system of cities while accommodating diverse planning agendas for local sustainable development. By 2025, Indonesian cities should follow basic livability principles; by 2035, they should be environmentally sustainable and resilient in the face of natural and human-made disasters; and by 2045, they should be truly prosperous, technologically smart and economically competitive.

Fig. 14: Decentralization policy in Indonesia: public governance structure



The contribution from the Gadjah Mada University (see Chapter 3.2) describes how the decentralization policy of Sleman's city administration opens up entirely new spaces for urban planning and allows a new quality of local governance. At the same time, the analysis highlights the challenges for the city administration in implementing this new scope for municipal policy options in the face of dynamic urban development driven by a variety of factors and actors.

Fig. 15: Decentralization opens new windows for sustainable urban development: The photo shows the Kalibuntung riverside revitalization in Sleman, Indonesia, which aims to increase the livability of river banks for the community

Water governance at local level

The long-observed poor performance of water supply and sanitation in SEA can be attributed to an extent to poor governance structures at local level. Local government structures need to find their role mainly as regulators while utilities have to improve their performance and strengthen their capacities. There remains a lack of transparent government policies on tariffs, while service levels, operator performance, and incentives are also lacking. Water tariffs are still too often politically determined, rendering them an obstacle to effective service provision. Local government and utilities need to be accountable to households, communities and civil society. Without their participation and acceptance, robust financing schemes and a well-performing water sector are barely achievable.

Cities benefit greatly from having highly professionalized urban water management structures. This is tantamount to a complex capacity-building process of service structures at city and neighborhood level (refer to the study from Hamburg Wasser, Chapter 3.4).

As urban development proceeds, a significant amount of organizational capacity development is required in order to ensure that the regulations and decisions of the local government permanently serve the relevant interfaces. The establishment of a multi-layered system that permanently integrates the relevant stakeholders into the relevant processes is therefore indispensable.

In order to mitigate the structural weakness of the water sector, especially in urban-rural transition zones, community-based water supply and sanitation models have been promoted in the region in recent decades. For a transitional period, these approaches are an important starting point for the comprehensive development of water-relevant local infrastructure and water services.

The technical and organizational know-how of community-based organizations (water supply, wastewater treatment) is at a rather low level. Extensive modernization measures for the development of well-performing water infrastructure can probably only be partially implemented by these groups. The analysis of the national program for the promotion of community-based sanitation systems carried out by the Indonesian Association of Community-Based Organizations for Sanitation (AKSANSI) for the management of communal wastewater management systems (see Chapter 3.6) describes concrete examples that show the potentials, strengths and limitations of such models of co-production between communities, government agencies and utilities.

Research and state-of-the-art case studies demonstrate that water infrastructure (water pipes, drainage systems, etc.) and waste disposal schemes should be integrated into path concepts and into the design or creation of public spaces. This requires cross-sectoral cooperation with the various specialist departments of city administrations and a high degree of participation from local stakeholders. As the experiences of the State Government of Bremen, Germany (see Chapter 3.5) show, this is particularly true for climate change adaptation measures in neighborhoods and at household level. The challenges in establishing water-sensitive communities in Indonesia is the subject of the study elaborated by the NGO Kota Kita (see Chapter 3.3).

The analysis from the Cambodian Institute of Urban Studies (see Chapter 3.1) identifies the need for specific urban planning instruments and capacity development at city administration level. Here, it becomes clear that intersectoral planning processes require reliable data for the effective coordination of effective flood, water, sewage and waste management within other relevant parameters of urban development.

Fig. 16: Community-based water supply scheme scheme in Sleman Regency, Indonesia

1.7 Conceptual considerations for the polycentric, water-sensitive transformation of secondary and tertiary cities in SEA

For water-sensitive planning, cities need to address the diverse functions of water in the urban space. These should be linked to green spaces, which can fulfill diverse functions such as recreational areas, crop cultivation, biodiversity enhancement, flood mitigation and temperature buffering simultaneously. Healthy urban water systems keep cities healthy, safe, and livable. Water thus forms a cross-sectional topic that integrates several areas such as climate protection, quality of life, resource and energy efficiency, and is clearly linked to urban planning. The link between the COVID-19 pandemic and the context of the built environment also highlights the need for generating synergies between public health and water-sensitive urban and regional planning [3].

The area-wide development and sustainable maintenance of "traditional" grey wastewater management infrastructure will typically far exceed its institutional and financial capabilities and can only partially meet the challenges cities face today. For example, comprehensive sewer systems and centralized wastewater treatment plants will unlikely be able to keep up with the rapid growth of cities, and the systems will be overburdened, especially in view of the expected increasing frequency of heavy rainfall and the associated flooding – a trend that is expected to intensify with future climate change impacts.

If secondary and tertiary cities in SEA aim to effectively localize the SDGs and the NUA, they are challenged to leapfrog early stages of classical infrastructure development processes as indicated in the Urban Water Transitions Framework categories "water supply city", "sewered city" and "drained city". Such stages have been mainly based on grey structure development, while the later stages "waterways city", "water cycle city" and "water-sensitive city" contextualize "water" as a cross-sectoral topic.

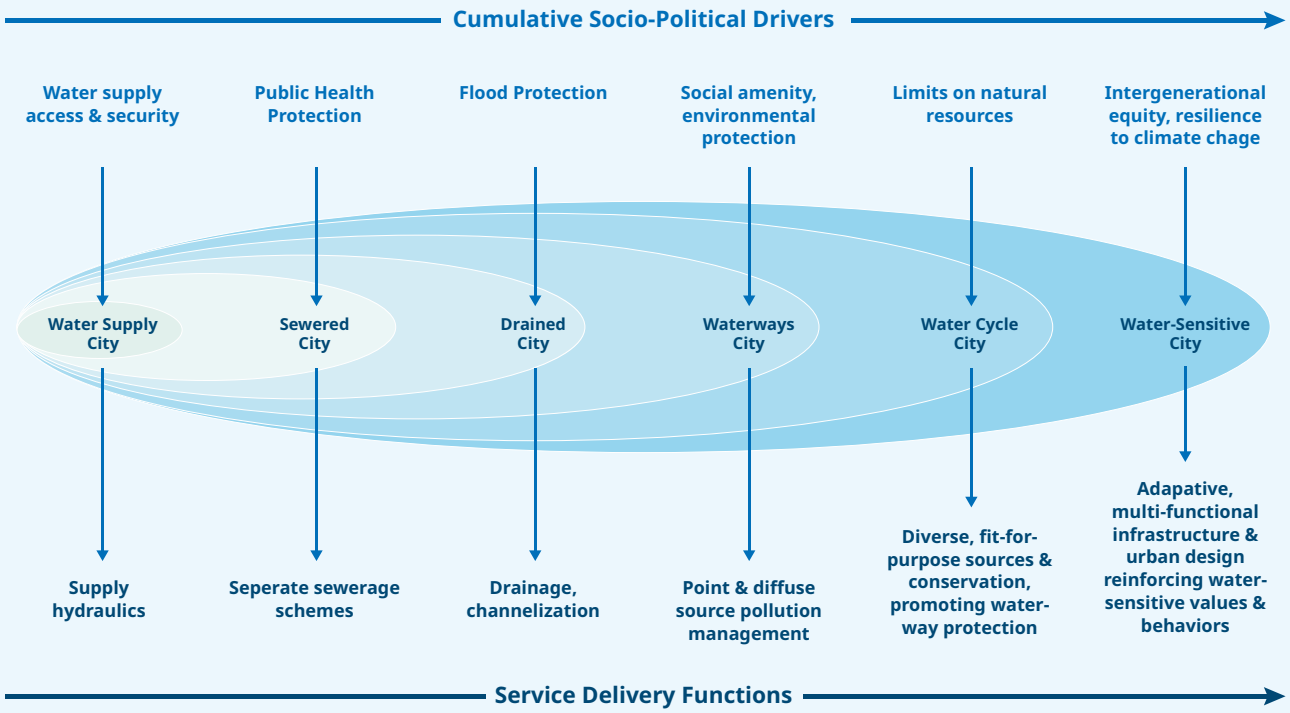


Fig. 17: Urban water transitions framework (Adapted from: [39])

In addition to a consistent policy framework, national governments must define adequate standards in terms of progressive implementation for infrastructure development (e.g., wastewater standards) that reflect the local institutional and financial capacities of their urban areas. In accordance with the local conditions, grey, blue and green solutions should be combined within a hybrid approach that goes beyond just infrastructure and hardware development.

UNESCAP calls for the role of nature and natural systems in urban resilience to be recast [28]. Within the vision of water-sensitive cities in SEA, the role of nature-based solutions (NBS), both in their functionality and acceptance, is vital. NBS are *"actions which are inspired by, supported by or copied from nature ... [with] ... the aim to help societies address a variety of environmental, social and economic challenges in sustainable ways"* [40].

NBS is an umbrella term that encompasses concepts such as green and blue infrastructure, ecosystem-based adaptation and ecosystem services. In tangible terms, NBS in the urban context are developments such as green roofs, unsealed floodplains, public parks, sanitation systems, rain gardens and many other solutions that can simultaneously provide environmental, social and economic benefits.

In the context of urban water management, NBS function differently to traditional infrastructural solutions in a spatial sense: they describe a decentralized approach rather than a centralized approach to urban water resource management and fully embrace the concept of multifuctional spaces. Decentralized and distributed water systems can be planned within an integrated water management concept and can include a number of structural and non-structural solutions to achieve water-sensitive urban design objectives [41]. Decentralized systems may be integrated with existing or upcoming centralized systems to form a resilient hybrid network or alternatively offer a stand-alone solution where the provision of centralized systems is not feasible.

The natural water balance is affected by human activity, especially in urban areas. Infrastructure development that focuses purely on output (e.g., the area-wide supply of water to the population and industry) leads to a dynamic development of wastewater volumes that – without adequate infrastructure development – affects public health and the environment. Pollutants entering water bodies lead to a reduction in water quality, and with the sealing of urban spaces and a reduction in water infiltration, cities are more vulnerable to flooding.

The first panel of Fig. 18 illustrates a simplified natural water balance while the second panel shows how the natural process is altered by the physical aspects of a city. The third panel demonstrates how the implementation of water-sensitive infrastructure, such as NBS, is intended to mimic the water balance of nature to the greatest possible extent. Beyond the pure physical alteration of the water cycle (as presented here in Fig. 18), socio-economic factors determine the distribution of water within the urban system and need to be taken into account when designing water-sensitive cities.

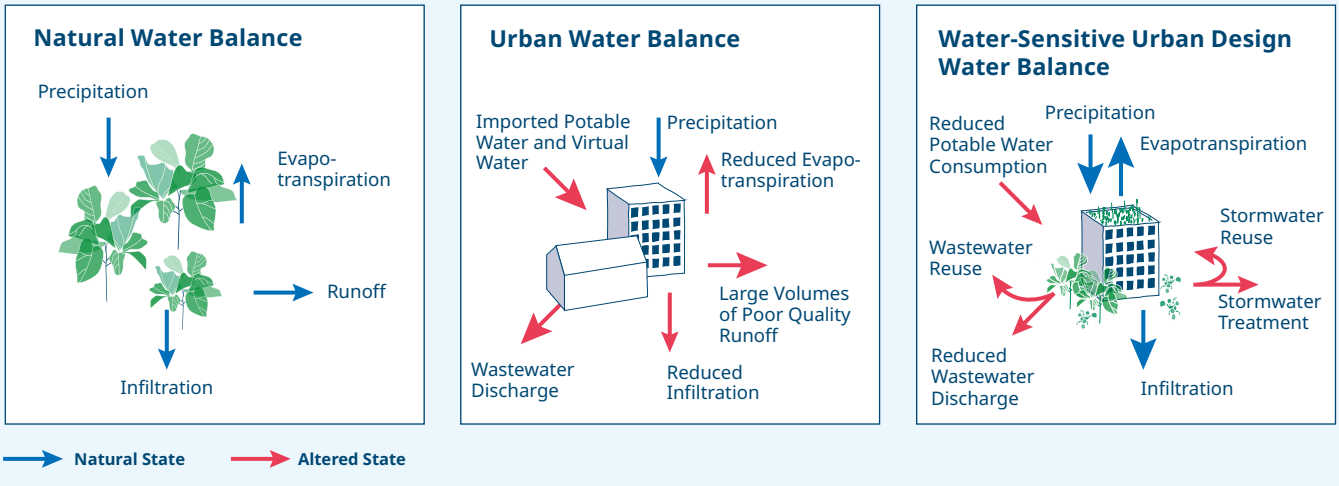


Fig. 18: Comparison of how a typical city and water-sensitive city affect the natural water balance

1.8 Potential approaches for polycentric water-sensitive transformation in urban areas in SEA

Polycentric approaches for the management of urban waters form a holistic concept that in its modularity, a) reflects existing ground realities, e.g., institutional and financial capacities; b) allows cities to adapt their urban systems to quickly changing framework conditions and environments; c) generates a cross-sectoral perception of cities' resources and the dynamic transformation of their production and consumption patterns; and d) facilitates cooperation between multiple sectors and various stakeholder groups.

The PolyUrbanWaters project will specify technical and methodological modules and tools for a polycentric water-sensitive transformation (see Chapter 2). In the following sections, a number of exemplary approaches are presented that may be used for a specific configuration in accordance with the situation, needs, interests and capacities of a given city.

Vision and scenario building

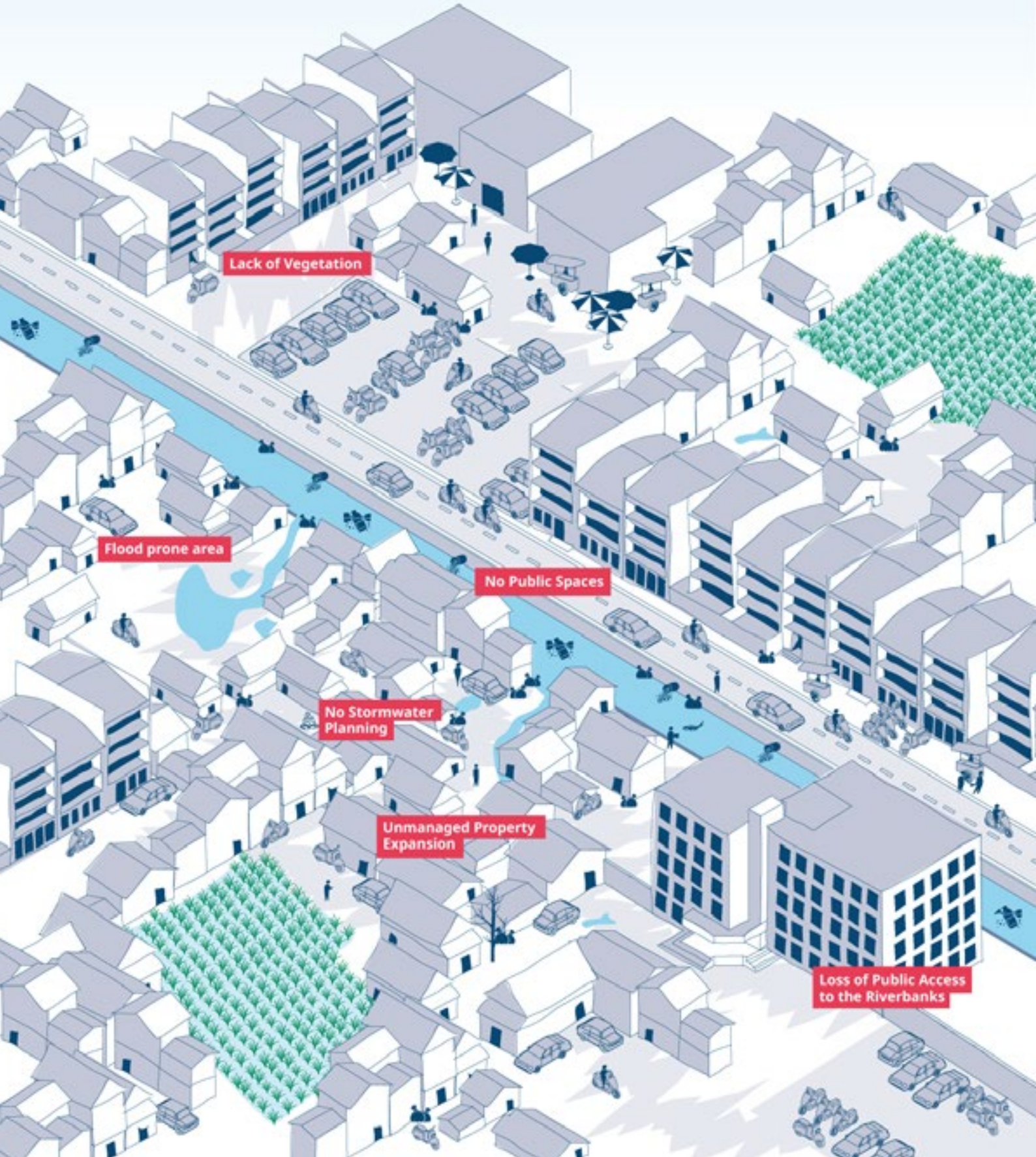
In SEA, an increasing number of cities develop their own vision of desirable development. For example, the PolyUrbanWaters partner city in Laos, Sam Neua, has developed the vision of a "green, clean, peaceful and beautiful" city.

Through the participation of different stakeholder groups, such a vision can be further concretized through scenario building. Scenarios can help urban decision-makers to define the general lines of urban development policy. Such scenarios should elaborate models that assess the dynamics of future urban development, existing and upcoming vulnerabilities, and existing and upcoming needs of the city. Different development models can analyze their economic, social and ecological implications, along with their respective contributions to the localization of SDGs.

Deriving from this analysis, an action plan with prioritized measures may be elaborated. This process also supports the elaboration of consistent bankable projects.

Scenario
Business as Usual

Fig. 19: Example of vision building "Water for the Future" that illustrates the implications of two urban development models



Scenario
Water-Sensitive City

Fig. 20: Within polycentric management of urban waters, multiple sectors work together through strategic projects for cross-sectoral co-production.

Water-sensitive design of undeveloped areas

In its current development stage and in contrast to many metropolitan cities, secondary and tertiary cities often still possess a valuable asset that is essential for rapid development towards water-sensitive cities: undeveloped public and private spaces. Such spaces may be used as structuring elements for a water-sensitive urban planning process that aims to address the multidimensionality of the SDGs.

These open spaces enable the comprehensive water-sensitive design and development of new urban districts: public spaces; public facilities such as administrative buildings, schools, universities, hospitals and sports facilities; residential areas; industrial settlements and commercial areas; and mixed-use development.

Fig. 21: Many secondary and tertiary cities still possess a valuable asset for proactively shaping sustainable city development: undeveloped private and public spaces

Fig. 22: Water-sensitive design of public spaces and public buildings in the city

Green Roofs
+ increased biodiversity
+ stormwater runoff reduction
+ building insulation and amenity
+ reduced urban heat effects

Grey Water Recycling
+ reduced nutrient loads
+ alternative water source
+ reduced pressure on potable water sources

Vertical Greening
+ increased biodiversity
+ stormwater runoff reduction
+ building insulation and amenity
+ reduced urban heat effects

Inclusive Planning
+ local neighborhood initiatives
+ sustainable implementation
+ maintenance of proposed solutions

Rainwater Harvesting
+ water conservation
+ cost effective
+ reduced soil erosion
+ reduced pollution of water bodies

Constructed Wetlands
+ increased biodiversity
+ attractive public spaces
+ reduced carbon footprint

Riverbank Restoration
+ managed aquifer recharge
+ alternative water supply and storage
+ water-sensitive public spaces
+ flood attenuation

Greening Interventions
+ increased biodiversity
+ improved micro climate
+ improved quality of public spaces

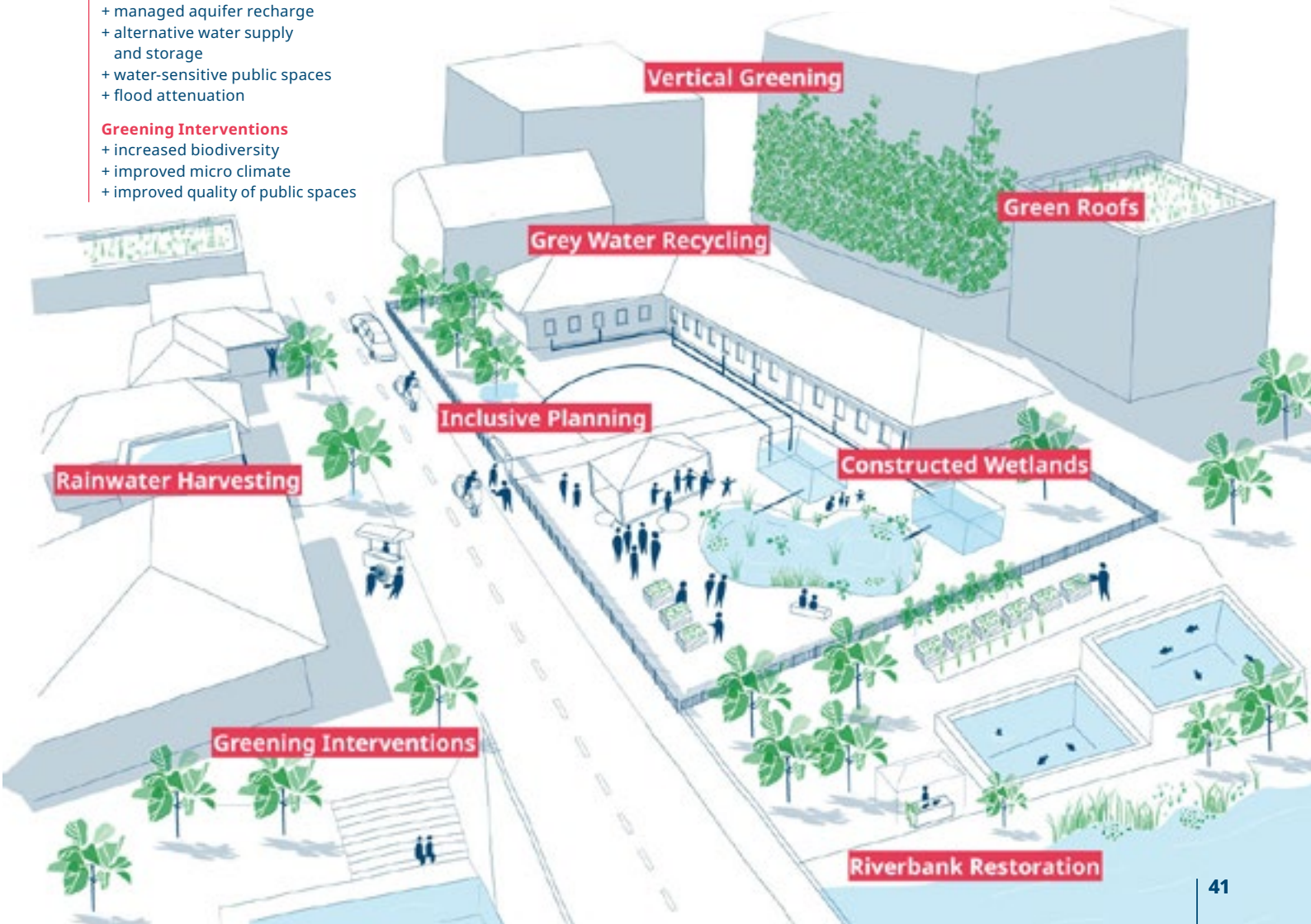
Water-sensitive design of public building complexes

The water-sensitive redesign of, for example, a municipal community center with an adjacent row of retail stores, requires a joint co-production process between the relevant municipal authorities (planning, public works, environment, public real estate), architects and landscape designers, investors, the water utility and end users (citizens, civil society organizations, retailers) in the early stages of the planning process. Sustainable use concepts, water and waste management concepts, and the associated responsibilities and financing modalities should be defined during the planning phase.

Water-sensitive community development along riverbanks

Cities in SEA are increasingly making efforts to protect the water in inner-city rivers and streams. These rivers are particularly affected by the discharge of domestic and industrial wastewater and the dumping of waste. Here, the renaturation of the mostly inhabited riverbanks can be accompanied by a fundamental rehabilitation of water-relevant infrastructure in residential and industrial areas. Decentralized approaches to wastewater and rainwater management and the water-sensitive redesign of private homes and public spaces should play a major role in this development.

The success of renaturation measures in and near residential areas is particularly dependent on the active participation of local residents. Existing development has often not followed a consistent development plan. Without participatory processes in place, the redevelopment of existing buildings and extensive infrastructural redevelopment can cause considerable social tensions. Without the ownership of local residents and communities, sustainable maintenance of the redesigned riverbeds and infrastructure is unlikely.

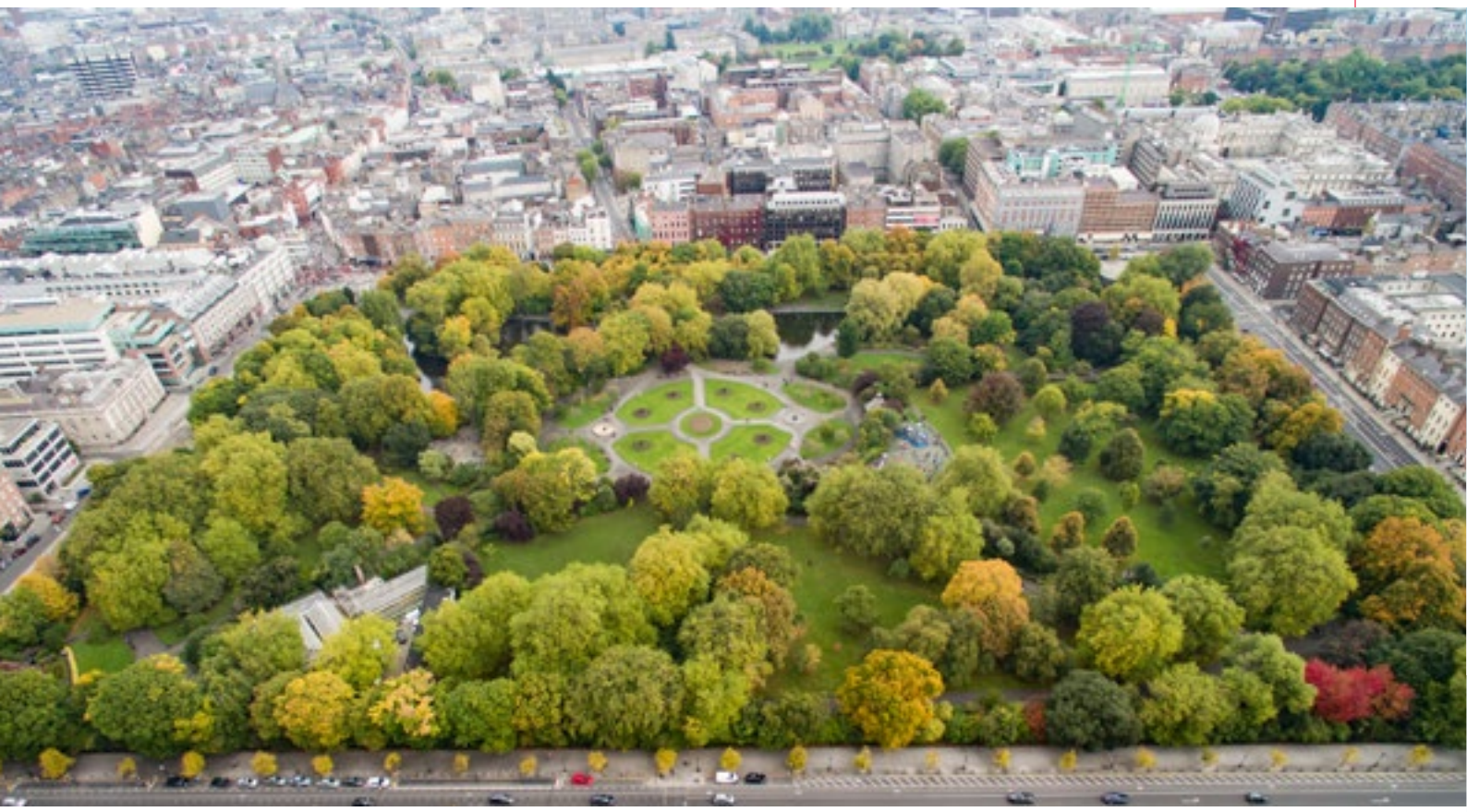


Water-sensitive design of public spaces

Places for public use such as parks, city lakes, river meadows, playgrounds and sports facilities are strategic points for water-sensitive urban development. In addition to being enabling spaces for special forms of water-sensitive landscaping, they also serve as anchor points for the development of nearby residential areas and infrastructures. Secondary and tertiary cities often do not have very dense development, meaning that seldom-used open spaces, especially in the urban-rural transition zones, can be proactively defined by spatial and urban planning as future water-sensitive public spaces. In many cities around the world, such proactive planning has already been supported by the acquisition of privately owned land through public purchase.

Fig. 23–24: Water-sensitive community-based governance schemes should be founded on the transparency and accountability of all involved stakeholders

Fig. 25: Example of a public space with a permeable surface is St. Stephen's Green in Dublin, Ireland [42]



Water-sensitive urban design for the development of eco-tourism

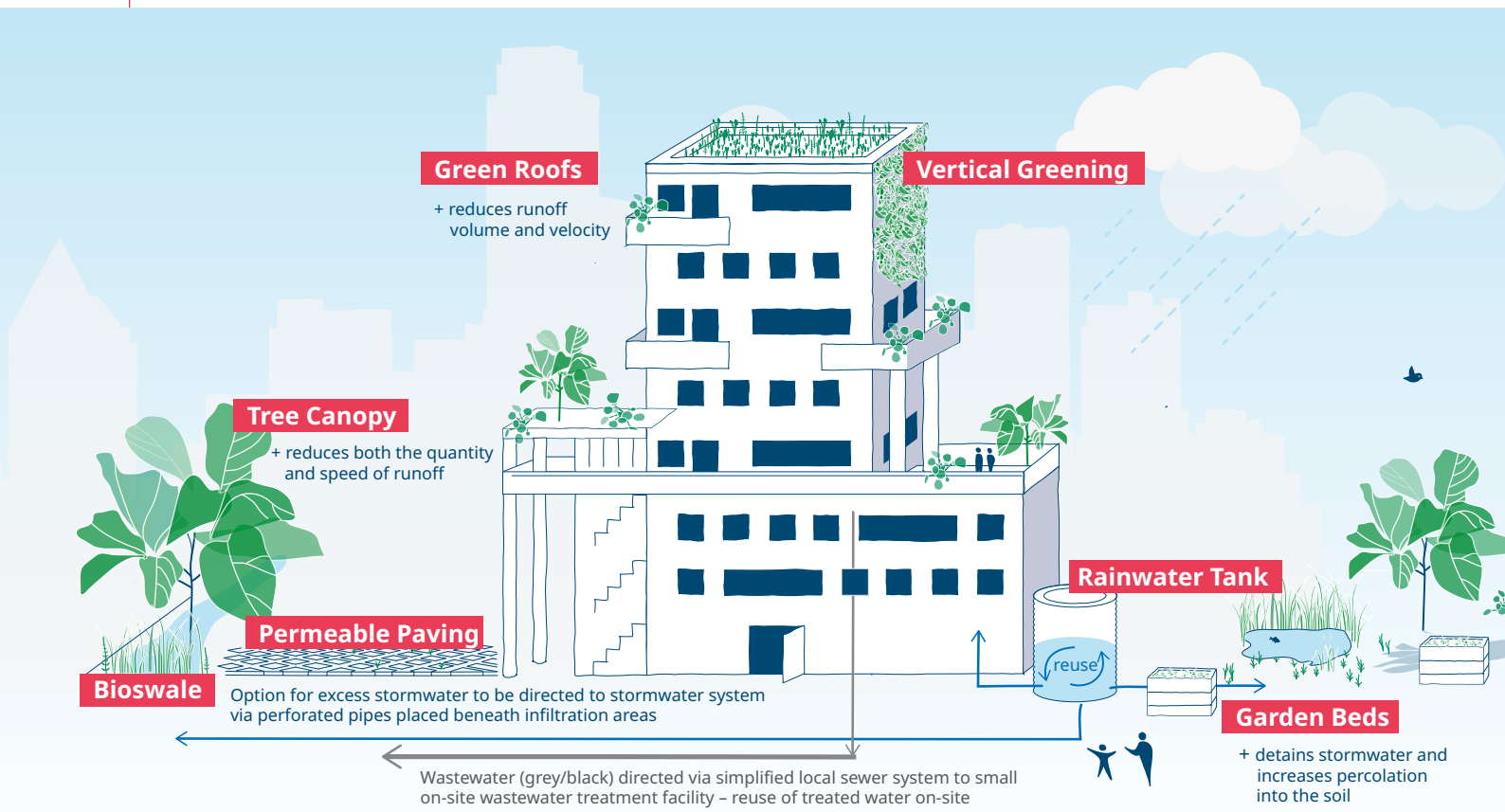
Numerous secondary and tertiary cities in SEA are trying to increase their attractiveness as tourist destinations. The systematic implementation of polycentric approaches to the management of urban water resources can make a significant contribution to improving a city's quality of life, making it more livable and therefore more attractive.

Increasingly, city administrations are working with investors from the tourism industry to develop citywide concepts that integrate attractive places of interest and nearby natural areas into the development of high-quality, ecologically oriented tourist infrastructures. This includes hotel infrastructure, ranging from simple accommodation to high-end hotels.

"Green" accommodations aim to minimize impacts on the natural environment and may be certified in accordance with international standards. They can be an important element in developing high-quality tourism in a city and can have a considerable influence on its aesthetics. Implementing water sensitivity can not only make a significant contribution to the efficient use of water, but can also contribute significantly to the attractiveness of buildings in general through natural design of their interiors and exteriors.

The development of water-sensitive tourism infrastructure results from cooperation between urban planners, the tourism authority, architects, investors, local hoteliers, community representatives and other relevant stakeholders. An overall concept should be developed that identifies the strategic points for such a development and potentially necessary incentives for this development process.

Fig. 26: Example of water-sensitive design of a hotel



Strategic entry points for water-sensitive design and retrofitting of public infrastructure

The transformation of existing infrastructure to become water-sensitive can be a starting point for the enhancement of public life. A municipality may, for example, be very concerned about rainwater management and therefore be interested in enabling rainwater infiltration by unsealing surfaces. Not only could this reduce the total amount of rainwater runoff, but it could also save costs in the dimensioning of drainage systems. It could also prevent the inflow of rainwater into wastewater treatment systems, which can reduce treatment performance.

Here, strategic starting points for cross-sectoral cooperation have proven to be effective, such as when the municipal department of public works cooperates with those of urban planning, environment and water in the redesign of streets in need of renovation. Green spaces can be integrated into the sidewalks at the roadsides, allowing trees to grow and providing more spaces for rainwater infiltration. With these types of measures, funds already earmarked in the city budget for road construction can be used. In this way, a bottleneck that often occurs between the project design and the financing of these innovative measures can be overcome.

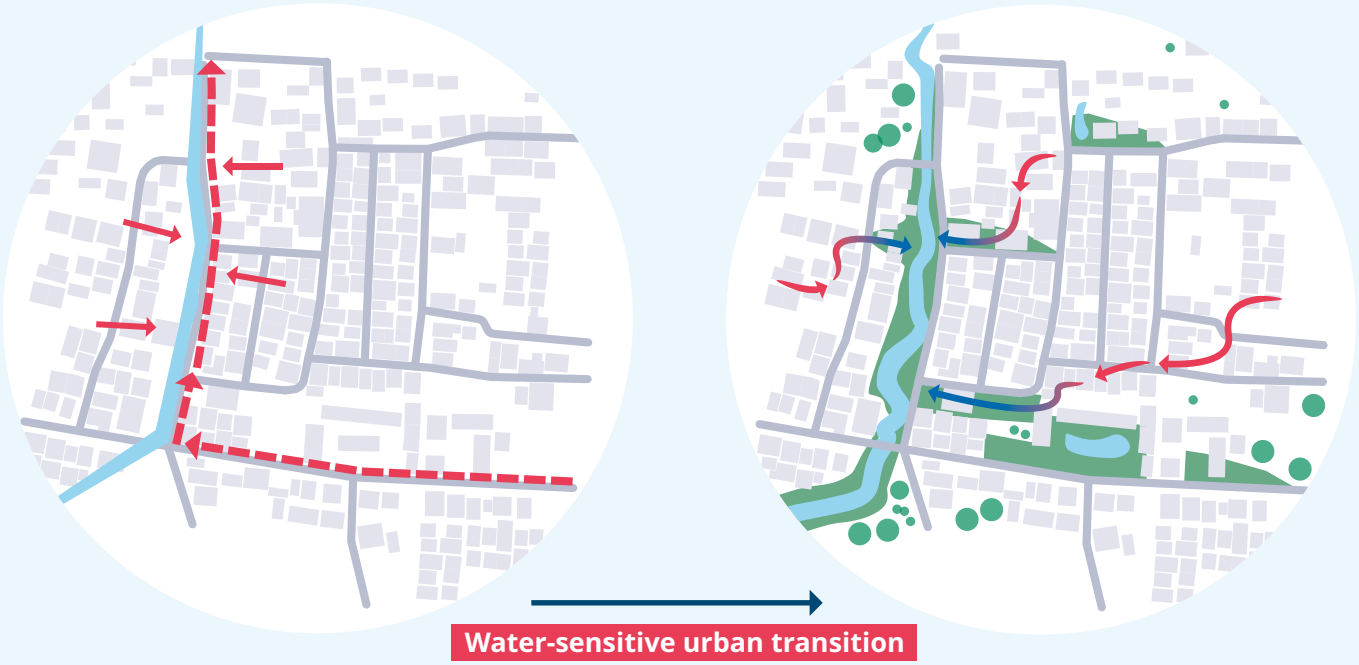
Fig. 27: Transition towards an urban ecology-based strategy for stormwater management

Conventional urban drainage system

A conventional urban stormwater system based on grey infrastructure and a high percentage of sealed surfaces increases the risk of urban flooding and the amount of pollutant discharge, while at the same reducing replenishment of groundwater.

Water-sensitive urban stormwater system

A water-sensitive urban system with nature based and hybrid infrastructure mimics natural processes by increasing permeable surfaces, which not only reduces runoff quantity and speed but also filters the water before it reaches local water bodies.



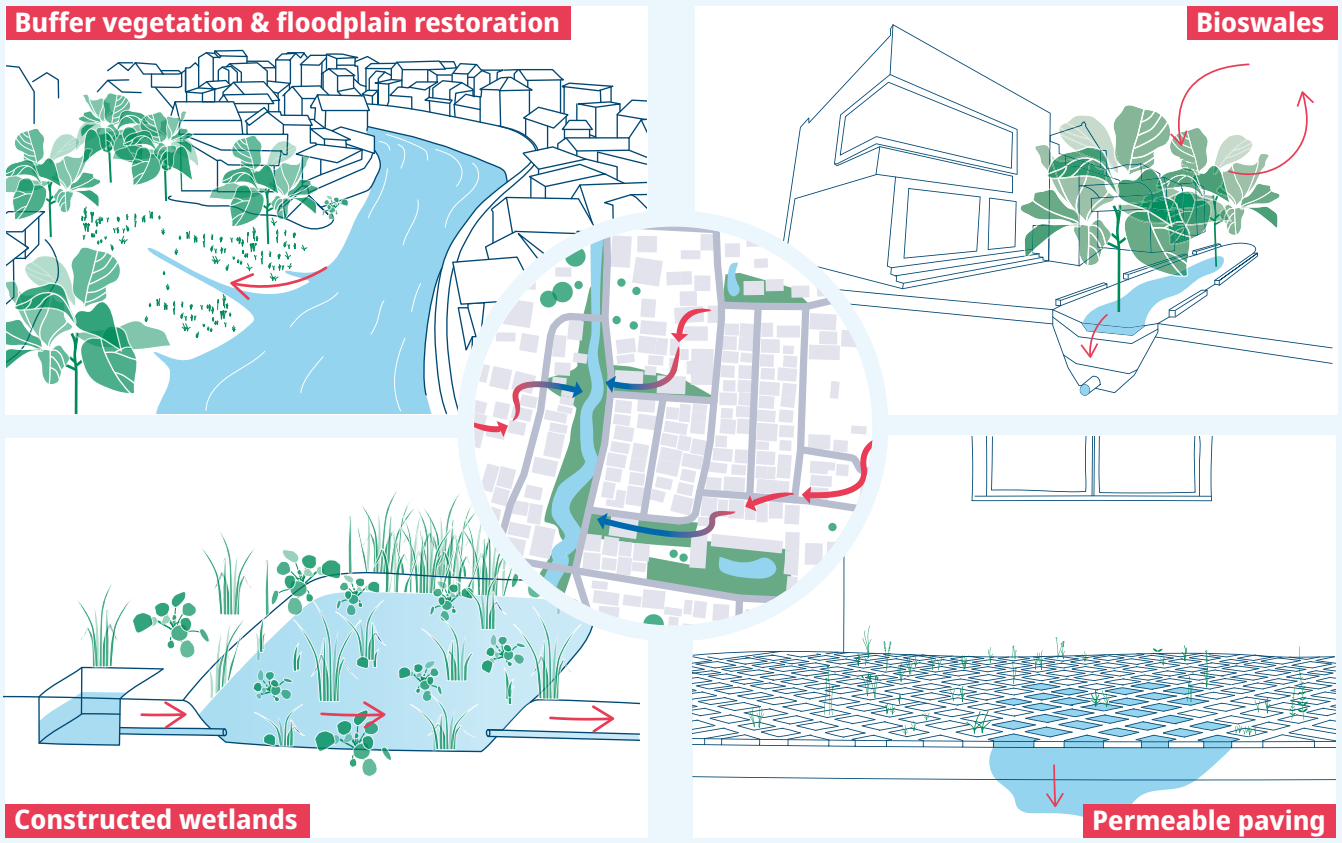
Water-sensitive design of new residential and commercial areas

In many cities around the world, new residential and commercial areas are designated in land use planning and then rapidly developed. Despite environmentally oriented urban development often being the declared will of the city administration, infrastructure is typically first developed, often followed by further development, before the call is made for how the municipal environmental agency can be involved in the design. Inevitably, the scope for environmentally oriented or even water-sensitive urban development is then limited.

Therefore, an aim for secondary and tertiary cities in SEA should be proactive planning of residential and commercial areas based on criteria of water-sensitive urban development. This can be achieved if entities such as planning and environmental management departments, public works, utilities, and service providers work together from the outset with the participation of business and communities. In such a process, sectors such as water, energy, transport, environment and communication can be combined with a high degree of effectiveness, and considerable potential for cost efficiency can be realized through integrated planning.

Fig. 28: Exemplary measures of polycentric, integrated wastewater/stormwater management for a residential area

Exemplary measures for a water-sensitive urban stormwater and wastewater treatment system, as shown in Fig. 27



Progressive polycentric wastewater infrastructure development in residential areas

In many cities, future development of residential wastewater management infrastructure will go hand in hand with the rest of the urban development. The use of often poorly constructed septic tanks will transition to the use of on-site treatment in improved septic tanks and to decentralized systems that can be connected to combined drains, followed by interceptor sewers and then by wastewater treatment facilities such as wastewater stabilization ponds or activated sludge treatment plants.

It can be assumed that mitigation efforts to reduce CO2 emissions will lead to the development of new system solutions that will reduce energy-intensive transport and treatment of wastewater. Innovative concepts, such as the Integrated Sanitation Approach, follow the UN principle of progressive implementation. They promote a systemic management system for urban water resources by combining technological solutions with effective septage management and solid waste management in accordance with the local situation and capacities.

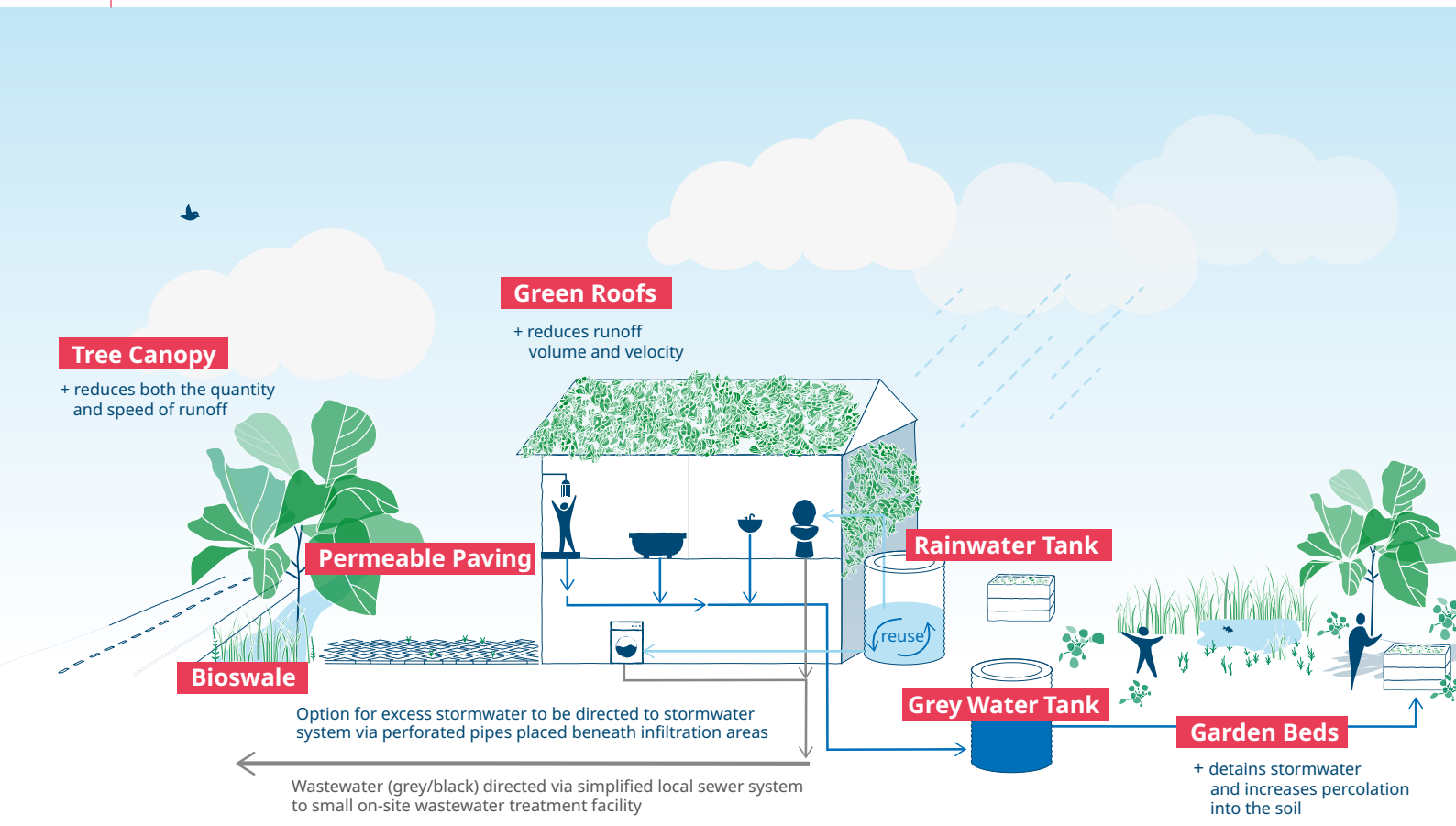
Fig. 29: Integration of green/ blue and grey infrastructure in accordance with local capacities

Water-sensitive transformation of already built-up residential areas

The transformation of already built-up urban districts into water-sensitive neighborhoods poses particular challenges: the infrastructure already exists, rows of houses are often built very close together, and streets and boundaries such as sidewalks are often narrow.

For comprehensive water management, in particular stormwater management, it is important to involve private homeowners in urban planning and to win them over for the redesign of residential areas. Private property owners are increasingly sealing off soil surfaces, thereby increasing the runoff of water into drainage systems during rainfall events, which significantly increases the risk of flooding due to overburdened systems. A water-sensitive redesign of the housing estate, possibly supported by the public authorities (e.g., establishment of model sites, matching financial contributions), can increase the infiltration rate of stormwater. Private homes designed in a water-sensitive way will not only decrease water-related risks, may not only contribute to a better urban climate and more attractive urban architecture but can also be economically and environmentally more sustainable than their traditional counterparts.

Fig. 30: Example of water-sensitive Design of a private household



2. The PolyUrbanWaters research project

PolyUrbanWaters is a research and project network funded by the German Federal Ministry of Education and Research (BMBF) that consists of academic institutions, municipalities, local and national government agencies, civil society and private-sector stakeholders from Indonesia, Cambodia, Laos, Thailand, Vietnam and Germany.

PolyUrbanWaters responds to the strong need to generate deeper, transferable and scalable know-how for the effective localization of polycentric approaches to urban water resources management in secondary and tertiary cities of the SEA region.

The project intends to demonstrate the importance of *polycentric approaches to the management of urban water resources, contributing to the water-sensitive transformation of secondary and tertiary cities in SEA towards resilient, inclusive and livable urban areas, thus contributing to the fulfillment of national and global sustainability agendas.*

In order to do this, the project will elaborate an empirically proven conceptual framework for these approaches with: a) development of relevant instruments for its implementation and scalability; and b) a sustainable contribution to the systematic emergence of a new interdisciplinary practice-oriented research and economic-academic cooperation context.

The PolyUrbanWaters international research collaboration focuses its research activities around three Living Labs located in Sleman (Indonesia), Sam Neua (Laos) and Kratié (Cambodia), which provide a representative cross-section of the challenges faced by fast-growing secondary and tertiary cities in the SEA region in diverse governance contexts.

Within this framing, PolyUrbanWaters pursues the following core questions:

1. How can a diverse set of stakeholders contribute to building an inter- and transdisciplinary local knowledge base on water and urban development-related challenges in the SEA region? How can this knowledge be systematized, scaled and regularly updated to serve as a basis for inclusive and future-oriented municipal planning approaches across the region?

2. How can effective and sustainable water-sensitive urban development be fostered through a combination of centralized and decentralized technical and social-ecological innovations – including nature-based solutions, participatory strategic planning and effective water management structures – as an integral part of a systemic polycentric nexus approach (water, waste, energy, housing, IT, food, community development, etc.) and innovative financing schemes for the management of urban waters?

3. How can “water” serve as a strategic entry point to integrated, inclusive and resilient urban development that is guided by the SDG framework? Which polycentric, intersectoral and participatory governance approaches are required to plan, develop, sustainably operate and finance integrated, water-sensitive development with the capacity to evolve further in line with dynamic urbanization processes?

4. How can local innovation processes inform new practice-oriented pedagogies, capacity building approaches and research agendas to strengthen a network of academic institutions in the region?

Answering these core questions, the project will:

- **Build a qualitative and quantitative understanding of "water" within urban development dynamics.** Instruments will be co-developed with local partners and communities within and through the three Living Labs to support secondary and tertiary cities in SEA and their stakeholders in analyzing current water use patterns, water-related vulnerabilities and the interrelations of urban development dynamics.

- **Develop tools and instruments for future-oriented strategic urban planning including urban visioning, scenario development and conceptualization of water-related resilience.** These tools and instruments, developed in three Living Labs, will help guide cities in modelling alternative urban development scenarios and take informed strategic decisions for near real-time urban transformation.

Fig. 31: Map of PolyUrbanWaters project partners

- **Test how planning processes can be translated into transformative action at selected sites.** Governance schemes for effective urban transformation and sustainable management of pilot measures and pilot projects will localize entry points to bring water-sensitive development into practice. Methodologically designed as learning and co-production processes, relevant stakeholders from local government, private investors, households and water operators will work on the polycentric technical, social, financial and governance configuration of the areas.

- **Support the emergence of new multi-stakeholder cooperation structures between local, national and SEA levels.** In this manner, the project will contribute to the emergence of a new political, academic, professional cross-sectoral narrative and of a regulative political environment that is crucial for water-sensitive urban development.

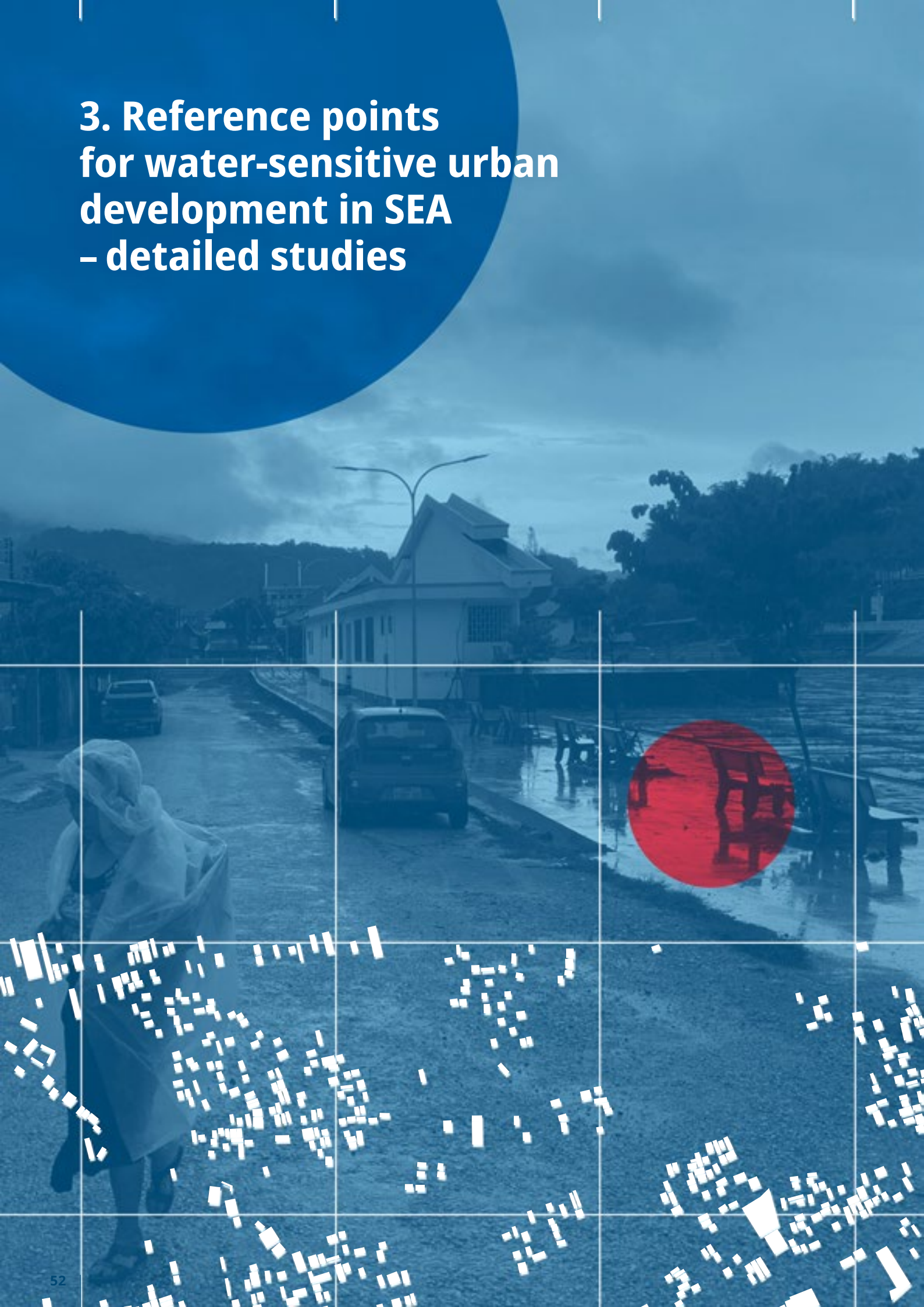
- Be processed into concrete products in the form of **guidelines and recommendations for action**, which serve as a guide for the development of standards and regulatory frameworks.

- **Develop a practice-oriented research network for polycentric management of urban water resources** that: (a) contributes substantially to the research field of water-sensitive urban development; and (b) organizes sustainable, practice-oriented capacity development.

Pilot Cities

1. Sleman, Indonesia
2. Kratié, Cambodia
3. Sam Neua, Laos

3. Reference points for water-sensitive urban development in SEA – detailed studies



The **Cambodian Institute for Urban Studies (CIUS)** is a research and development institution focusing on the increasing challenges associated with urbanization in Cambodia. It acts as an independent think tank that supports the development and the implementation of innovative, application-oriented approaches for urban planning and development processes in Cambodia and SEA.

3.1 Challenges for water-sensitive urban design in Cambodia (CIUS)

Linkages to Cambodian Sustainable Development Goals Framework 2016–2030

Based on the 17 SDGs, the Royal Government of Cambodia (RGC) assigned the Ministry of Planning (MoP) as the focal point for the development of the localized Cambodian Sustainable Development Goals (CSDGs) framework, with its formal process beginning in November 2016, resulting in a framework being adopted by the government in November 2018 and publicly released in March 2019. The framework forms part of the government's national development framework – set out in the Rectangular Strategy for Growth Employment, Equity & Efficiency, Phase Four (RS IV) – and implemented through the National Strategic Development Plan (NSDP) 2019–2023, which incorporates the CSDGs.

The CSDGs emphasize leaving no one behind, so that all Cambodians can share in the country's future development and prosperity. This is matched with a commitment to sustainability, to continue development while protecting the nation's abundant natural capital for current and future generations, and to contribute to combating climate change. Cambodia completed a Voluntary National Review (VNR) on the implementation of the 2030 Agenda for sustainable development in June 2019[5]. However, this review, which was conducted very soon after adoption of the CSDGs, does not discuss the numerous targets and indicators not covered by the CSDG framework, or how these goals and targets will be attained in the future.

The dissemination of the CSDG framework to subnational levels, including secondary cities ("Krong(s)") in Cambodia is just beginning. In Krong Kratié, institutional stakeholders were consulted about their knowledge and understanding of the SDGs/CSDGs and nexus-related issues, and the significance for their institutions' roles and work. Few had any real understanding of the CSDG framework, targets and indicators, as they had received little to no orientation, training or guidance on the CSDGs to date (February 2020) either from the government or their line ministries. Some stakeholders indicated that they had heard of the existence of the CSDGs but knew nothing beyond that extent, and few had any understanding of the implications of the CSDG framework, targets and indicators on or for their sector roles.

Towards a water-sensitive Kratié

The location of and geophysical conditions pertaining to Krong Kratié make the city vulnerable to the water system that surrounds it. Parts of the municipality are prone to frequent flooding (usually between July and October) for varying lengths of time. In some locations, flooding can persist for over a month. The small, built-up urbanized core of the municipality (located in one *sangkat*[6]) is also at risk from periodic flooding, both from rapid monsoon downpours (a frequent occurrence during the rainy season) and the rise of the Mekong River in the wet season, which inundates the numerous small water courses and channels to the north and south of the city, such that they flow backwards and flood the surrounding land areas.

5 Accessible from https://sustainabledevelopment.un.org/memberstates/cambodia

6 In Cambodia, municipalities are divided into "Sangkats" equivalent to communes, and Krong Kratié is made up of five sangkats. The subordinate unit to the sangkat is the village; there are 16 villages in Krong Kratié.

Vulnerability to flooding is further compounded by deficient and aged infrastructure in parts of the municipality where there is a combined sewerage-drainage system in the urban core (mainly in areas of one of the five *sangkats*). The majority of the municipality lacks an effective and comprehensive drainage system. What does exist in most areas is a constantly evolving fragmented drainage system of isolated lines and outflows constructed in some areas (villages and *sangkats*). In some instances, these become blocked and their capacity is consequently significantly reduced, resulting in drainage flows rapidly backing up and thus exacerbating municipal flooding.

An additional seasonal hazard is localized droughts, as numerous peri-urban villages in the municipality frequently suffer from droughts during the dry season (December to May), due to deficient water planning and management. As a result, they have insufficient water resources to sustain agricultural production, impacting the livelihoods of those dependent on agriculture.

Approximately 84% of the 7,145 families living in Krong Kratié are reported to have access to 'safely managed water supply' services, meaning that they are connected to one of two privately operated treated piped water supply systems within the municipal area. 10% of families (721) have access to 'basic levels of service', while 6% of families (425) use a range of unsafe water sources (unprotected wells or open sources). An additional concern for families relying on groundwater supplies is the risk of arsenic contamination, which is present along the Mekong River banks and floodplains.

Available data on access to safely managed sanitation across the city raises some concerns, as reported coverage varies considerably across the 16 villages in Kratié Municipality. Overall, 80% of the 7,145 families have access to some form of 'basic sanitation', but whether it can be considered to be safely managed is unknown.

Water management

Responsibility for the management of water issues is dispersed across multiple state agencies, with limited coordination between the involved actors. While the roles and responsibilities of the provincial, municipal and *sangkat* authorities are being strengthened in principle, multiple gaps and deficiencies remain. Local line agencies and offices often have limited understanding, capacities and resources to effectively address water-related issues, which is compounded by the lack of technical guidance and tools to facilitate inclusive water planning processes. Many of the provincial line departments are understaffed when it comes to people with technical knowledge, resulting in limited abilities to deliver on their mandates. As a result, they frequently have to rely on their national ministry for technical support, where skills and resources are overly concentrated.

Financial resource allocations available to subnational authorities remain limited and are in the region of USD 100,000 per annum (in 2020) to each *sangkat*, of which approximately 70% is to be applied to support activities across all 20+ government sectors. When and where (significant) investment resources are made available, they are frequently controlled by national institutions, with limited responsibilities assigned to local authorities. This is compounded by the lack of technical guidance and approved approaches for use by sub-national administrations (SNAs) to better plan, act upon and manage local issues for specific sectors, including effective consideration of water-sensitive matters.

Some challenges to water-sensitive design approaches

Future possible water interventions are limited and are held back by the lack of relevant information needed for water-sensitive design approaches. Hence, support may be required to address identified cross-sectoral technical deficiencies, such as the absence of:

- a comprehensive, updatable, geo-referenced municipal water and drainage plan (of the current situation and for 10-20 years into the future) and localized flood risk maps (linked to a municipal flood warning system) for localized disaster management;

  - This includes the lack of municipal digital elevation models (DEMs). Because of the relatively flat terrain of the municipality, high-resolution accurate DEMs are likely needed to facilitate localized planning, engineering, and routing to combat flood risk.

- a municipal solid waste management plan to better address the growing solid waste challenge for the municipality – inadequate solid waste management, specifically improper disposal, has been identified as a factor that exacerbates urban flooding;

- up-to-date drought monitoring and forecasting capability and maps (mainly for the agricultural and fisheries sector(s)) as part of a localized monitoring system to support drought preparedness and disaster management;

- updatable arsenic contamination maps of exploited groundwater sources and an effective monitoring system (of particular concern in Sangkat Koh Thanol, but also for isolated settlements dependent on groundwater);

- an adopted municipal land use master plan (the drafted plan remains unapproved) and the implications of this for other aspects of urban water resources planning;

- a costed and updatable urban infrastructure needs database;

- knowledge and information on alternative wastewater treatment options (including designs, operation, and investment issues); and

- a comprehensive municipal disaster management plan outlining alert stages and checklists for action, including temporary options for (possible relocation of) residential and commercial activities and services provision and other responses for floods and droughts.

Recommendations for a research program on water-sensitive urban design in secondary cities in Cambodia (Krong Kratié).
Initial engagement with responsible local actors and stakeholders, and the undertaking of a multi-channeled capacity, needs assessment to:

- identify perceived (demand side) capacity needs to strengthen knowledge and understanding on issues related to urban water resources management;

- rank and rate suggested contemporary knowledge and technical (supply side) inputs needed to strengthen knowledge and understanding of and capacities to address water-sensitive urban issues; and

- assess knowledge of the CSDG framework and its possible influence(s) on local development.

Based on this needs assessment, the following focused recommendations are made:

- Develop appropriate capacity development materials and inputs (in Khmer) for delivery to municipal authorities, their technical units, and *sangkat* representatives. This will enable these parties to acquire the knowledge, skills and

expertise required to better plan and consider water-sensitive issues.

~ Deliver training and establish an online e-learning repository option for replication and future access.

~ Develop local capacities to maintain and support inputs (use of smart technologies and data management, GIS drone / remote sensing inputs) to ensure sustainability and enable supported skills.

~ Devlop a local CSDG response framework (with a focus on water-responsive measures).

Other recommendations include:

~ Support the development of and capacities to establish and maintain a municipal geographical information system (GIS) for water-relevant issues and parameters. This should be expandable (i.e., open software architecture), and based on cost-effective (open source) systems such as QGIS and remote sensing data.
  - Data and tools should be stored at the municipality, but remain accessible to *sangkats* and line departments so they can generate hardcopy outputs and update data as required.

~ Facilitation of a phased cross-sectoral water planning process to:
  - engage with the different actors and stakeholders, in order to
  - identify and consider issues related to urban water resources, and
  - identify the gaps and missing inputs required for improved planning.

~ To provide support and inputs to address (some of) the identified deficient cross-sectoral technical inputs and provide a better understanding of how these will influence future planning and responses at local levels.
  - Through consultative / round table or focused phased planning sessions to reach consensus on specific, measurable, achievable, realistic, time-bound and costed (SMARTC) options and solutions to begin to progressively address water-relevant issues and ensure that these solutions are aligned with and contribute to the evolving development needs in municipal and *sangkat* plans.

~ Support the municipality and *sangkats* in their efforts to better understand and monitor progress on localized CSDGs targets.

UNIVERSITAS GADJAH MADA

Universitas Gadjah Mada (UGM) is an Indonesian state university founded in 1949. UGM is the oldest and largest institution of higher education in Indonesia. Beyond its mission in education, the **Department of Architecture and Planning** has the vision to be responsive to a variety of conditions, issues, and demands of globalization as well as to compete on a national and international level in the development of science, technology, and arts to support sustainable development.

3.2 Challenges and potential for water-sensitive urban planning in Sleman, Indonesia (UGM)

Urban transformation of Sleman

The key drivers and the risks of urban transformation in Sleman Regency are illustrated in Fig. 32. The first section identifies key drivers, the second section identifies aspects of urban transformation, and the third section identifies risks that arise from urban transformation.

Urban development along riverbanks

Urban development along riverbanks is an important aspect of urban transformation in Sleman Regency. Eleven of the seventeen rivers that flow through districts in Sleman Regency flow through portions of Yogyakarta Urbanized Areas (YUA), and urban settlements have been built on most of them. These settlements include *kampong* (organic housing developments), self-built housing, and sub-standard settlements. These urban settlements were initially formed due to the difficulty of finding affordable land in Sleman, and have developed incrementally and organically. This type of development creates controversies from a disaster risk standpoint (both natural and manmade disasters), and environmental conservation, especially river conservation. The riverbank settlements do not comply with river setback regulations, and some are located in disaster-prone areas.

The development of urban riverbank settlements significantly interrupts natural hydrological processes, and goes against the principles of water-sensitive planning. Because these settlements belong to low-income households, they typically do not meet minimum standards of water supply and sanitation. Most of these households tend to dispose of their waste (solid and liquid) with no treatment. The settlements tend to be very dense and have neither green nor public spaces for environmental and social functions. Some settlements can be categorized as slum areas. In recent years, however, there is a tendency for not only low-income households but also middle and even higher-income households to occupy land along the riverbank. Some developers even select the riverbank for investment projects. Close to the urban center, the riverbank areas also host shops, hotels, restaurants, campuses and offices.

The national government has initiated several programs and projects to address riverbank settlements. For example, the Kampong Improvement Program (KIP), initiated in the 1970s, has been implemented in many cities in Indonesia, including Sleman. In the 1980s–1990s, the KIP was further improved by integrating three aspects of improvement: social, economic, and environment. In the 1990s–2000s, urban poverty projects were implemented with the aim of reducing the poverty rate in urban areas. In the 2010s to present, more physical improvements through programs including 100-0-100 (100% clean water, 0% slum, and 100% sanitation), 3-M (Mundur "setback", Munggah "up", Madep Kali "facing the river") and KOTAKU have been implemented. However, some of these programs are criticized as "beautification" projects that simply focus on improving the appearance of the settlements. The main water-related problems remain unresolved.

In summary, there is a critical need to address riverbank settlements through a more comprehensive approach that balances housing rights and river conservation, and utilizes water-sensitive planning strategies and tools with community involvement. Co-production models should be developed that involve the riverbank settlements' many stakeholders.

The challenges for water-sensitive urban development in Sleman

Water-sensitive urban development presents a new opportunity for the government of Sleman. This is because even at the national level, such approaches are not yet introduced. The management of urban waters is a critical issue that should be tackled by many agencies, yet the way in which each agency currently responds to water-related issues remains somewhat segmented and partial. For example, the preparation of land use planning (delivered as a Regional Spatial Plan, RTRW in Bahasa Indonesia) does not utilize a water-sensitive urban development approach. As Sleman is an environmentally sensitive area, the implementation of water-sensitive urban development there is of crucial importance.

In this regard, the following challenges should be recognized and addressed:

- As growth management in the regency is not effective, there is an urgent need to strengthen the related planning instruments. This includes the implementation of new, innovative growth management instruments such as land consolidation, land value enhancement/capture, and other incentive and disincentive mechanisms in growth management.

- There are conflicts of interest between local governments in the region. The Kartamantul joint secretariat (for cooperation between Sleman, Yogyakarta City, Bantul and the Province on several issues including water and sanitation) has the potential to coordinate, mediate, and even resolve these conflicts of interests.[7]

- The concept and principles of water-sensitive urban development are still new for bureaucrats in Sleman Regency, therefore it is important to expand their knowledge and skills on this topic.

Opportunities for Sleman in terms of water-sensitive urban development are:

- Sleman has active communities and private-sector actors that can be mobilized through collaborative water-related programs.

- Sleman has sufficient professionals and expertise, especially at its universities, to better support water management.

- Sleman has water resources that can contribute to the fulfillment of water needs in the Special Region of Yogyakarta (DIY). Therefore, Sleman has a strong bargaining position in water-related issues compared to other regions in the province.

7 The Kartamantul joint secretariat was initiated and funded by GIZ in the late 1980s, and is considered to be the first successful regional cooperation model between Indonesian cities

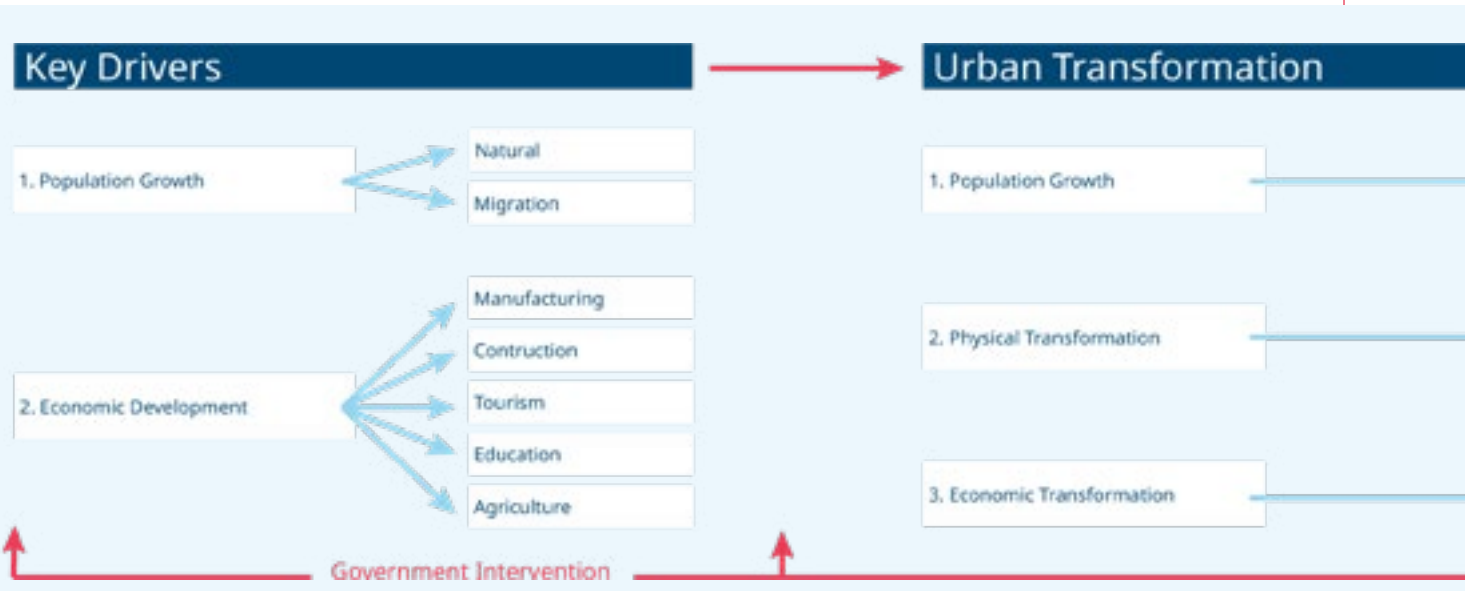


Fig. 32: Drivers and risks of urban transformation in Sleman

Governance structures – the challenges and limitations for public entities

Public entities have a number of limitations in ensuring water-sensitive urban development. These include limitations related to the knowledge and skills of local government bureaucrats concerning water-sensitive urban development, weaknesses in regional cooperation, and a lack of effective and sustainable collaborative management involving the private sector and communities.

The main recommendations for public entities in planning water-sensitive development are:

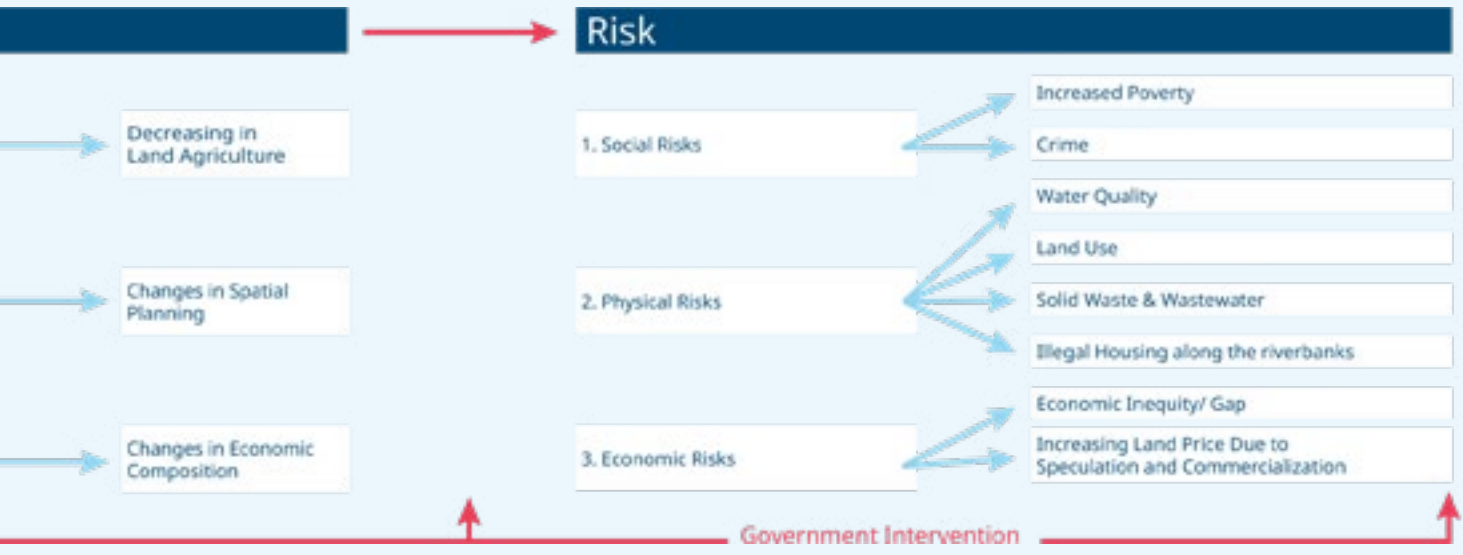
- Public entities should have regulatory power. With this power, they would be able to introduce water-sensitive urban development into several regulatory instruments, including regional long-term and medium-term development plans (RPJP/M), spatial and detailed plans (RTRW/RDTR), and even criteria on building permit systems. Public entities should also have budget negotiation power (the ability to negotiate and decide where the funds are allocated). With such power, they would be able to allocate local government budgets towards water-sensitive urban development.

- Public entities should take advantage of opportunities to work collaboratively with both the private sector and communities. Such collaborative networks are important because successful water-sensitive urban development requires the involvement of these stakeholders.

Given these recommendations, it is crucial to develop innovative models of co-production, where public bodies, the private sector and communities are engaged in effective collaboration for common benefits and to ensure sustainable services that support livable cities. The following actions are recommended:

- Improved coordination among government agencies, the private sector, and communities. Such coordination is crucial because water issues are currently tackled by several agencies with their own interests and agendas. Improved coordination can ensure that all agencies work towards common goals and objectives.

- Stakeholders should place a greater value on water. Water needs to be recognized as a common good; the communities and the greater public should also understand that water should be better valued and access to it is not completely free, but affordable. A more rational way of valuing water would be an important step towards the more efficient management of water.



- Technical improvement in managing water is also crucial, because many of the water problems in Sleman are related to water loss and low water quality, both of which are caused in part by technical deficiencies.

- Effective corporate governance is needed to be able to manage and provide water more professionally. This point is particularly relevant to PDAM (the local government-owned drinking water company).

- Maintaining and strengthening *pamdes* and *pamsimas* is also important as they are the organizations responsible for providing water to communities, particularly in the rural areas of Sleman.

- Because Sleman is an important source of water for the whole province, the local environment and water sources must be conserved. Forest conservation in Sleman is therefore essential.

As water management involves inter-sectoral cooperation between several agencies, the following recommendations should be considered to increase the effectiveness of future water management programs in the region/regency:

- Foster a common understanding of water-sensitive urban development among all stakeholders. Such an understanding must be elaborated at both levels of spatial planning (RTRW and RDTR).

- Strengthen the role of BAPPEDA (local planning agency) as the lead and coordinator agency in the whole planning process.

- More opportunities should be given to the communities to speak up and be involved in collaborative processes related to water.

- Economic rationality should be introduced in the management of urban water resources.

In a polycentric approach to urban water resources management, the involvement of private-sector stakeholders should not be neglected. These stakeholders (e.g., real estate owners, developers, private investors, service providers) could be involved in this process by:

- Providing training to community leaders, as community capacity building will be more effective when leaders take the initiative and put effort towards strengthening their own communities;

- Improving coordination between government and relevant stakeholders; and

- Providing fiscal incentives for the private sector to invest or collaborate with the government and communities.

KOTA KITA
A CITY FOR ALL

Yayasan Kota Kita is a non-governmental organization based in Indonesia with expertise in urban planning and citizen participation in the design and development of cities. Kota Kita's work focuses on governance, inclusivity and climate change resilience. They have worked with more than 25 local governments across Indonesia.

3.3 Challenges and potentials for water-sensitive communities and co-production processes in Sleman, Indonesia (Kota Kita)

Development and urban transformation challenges in Sleman

Environmental and socio-economic dimensions

As a fast-growing area, Sleman experiences two main development trends: rapid population growth and the massive transformation of rural land into urban areas. These two trends contribute to social, economic and environmental challenges in the region.

Since the 2000s, population growth has bolstered economic growth, in particular strengthening the non-agricultural sectors. The key non-agricultural sectors are tourism, trading and services, education, and construction and manufacturing.

At the same time, net migration to Sleman has impacted the demand for land, both for residential areas and for economic activities, transforming green open spaces such as farms and paddy fields into built-up urbanized areas. If this transformation pattern remains unchecked and uncontrolled, it will ultimately reduce Sleman's capacity as a vital catchment area that provides water security for the region. Increased population and economic activity have also dramatically increased groundwater demand in the Yogyakarta-Sleman region, thus posing a looming threat to water security. While the transformation from agriculture-based to a trade and services-based economy has produced wealth and access to modern amenities, it may also result in some future socio-economic drawbacks. Over the years, the Gini coefficient of Sleman has steadily increased[8]. The shift in economy has produced an income imbalance between the communities working in the agricultural and non-agricultural sectors, with those working in the non-agricultural sector (i.e., trade and services) earning higher incomes. The poverty rate in Sleman is 7.41%, which is disproportionally dominated by the agriculture-based population in the north and east of the region. To strengthen the agricultural sector, the government plans to provide fertilizer subsidies, eliminate the agriculture land tax, and secure land for sustainable agriculture in Sleman Regency. Despite this, there is an opportunity to look into applying a more equitable approach focused on sustainable agriculture and water management that takes advantage of Sleman's urbanization trends and growing popularity as a regional destination.

Sleman's diverse landscape requires localized approaches

Sleman has a vast land area with varied landscape typologies, community dynamics, specific development dynamics and transformation challenges. In addition to the environmental dimensions of the landscape, the dynamics of the communities divided into the *desa* (villages) and *padukuhan* (hamlets) are also important to consider. Issues around local governance effectiveness and strength of social capital in the community play a significant role in the environmental transformations of the areas. This is particularly true due to the relative autonomy of the *desa* or rural village units in Indonesia.

New investment and settlement areas are growing to the north

New investments, focused on the northern fringes of the current urban area, such as a new toll road, outer ring road, and new Yogyakarta airport will affect the development of Sleman in the near future. The toll road development will pass through 21 villages and approximately 212 hectares total area will be directly impacted. Furthermore, high land prices in urban areas force people to

8 The Gini ratio in Sleman increased from 2016 to 2018, starting from 0.39, 0.41, and 0.42 respectively. (http://www.slemankab.go.id/3176/indeks-pembangunan-manusia-ipm.slm)

seek other housing options in peri-urban or rural areas. Supported by existing accessibility, Sleman in the north remains a popular place for people to settle. As a result, a regulation to limit development in the northern fringes would be required to prevent massive urban expansion and uncontrolled development in this zone.

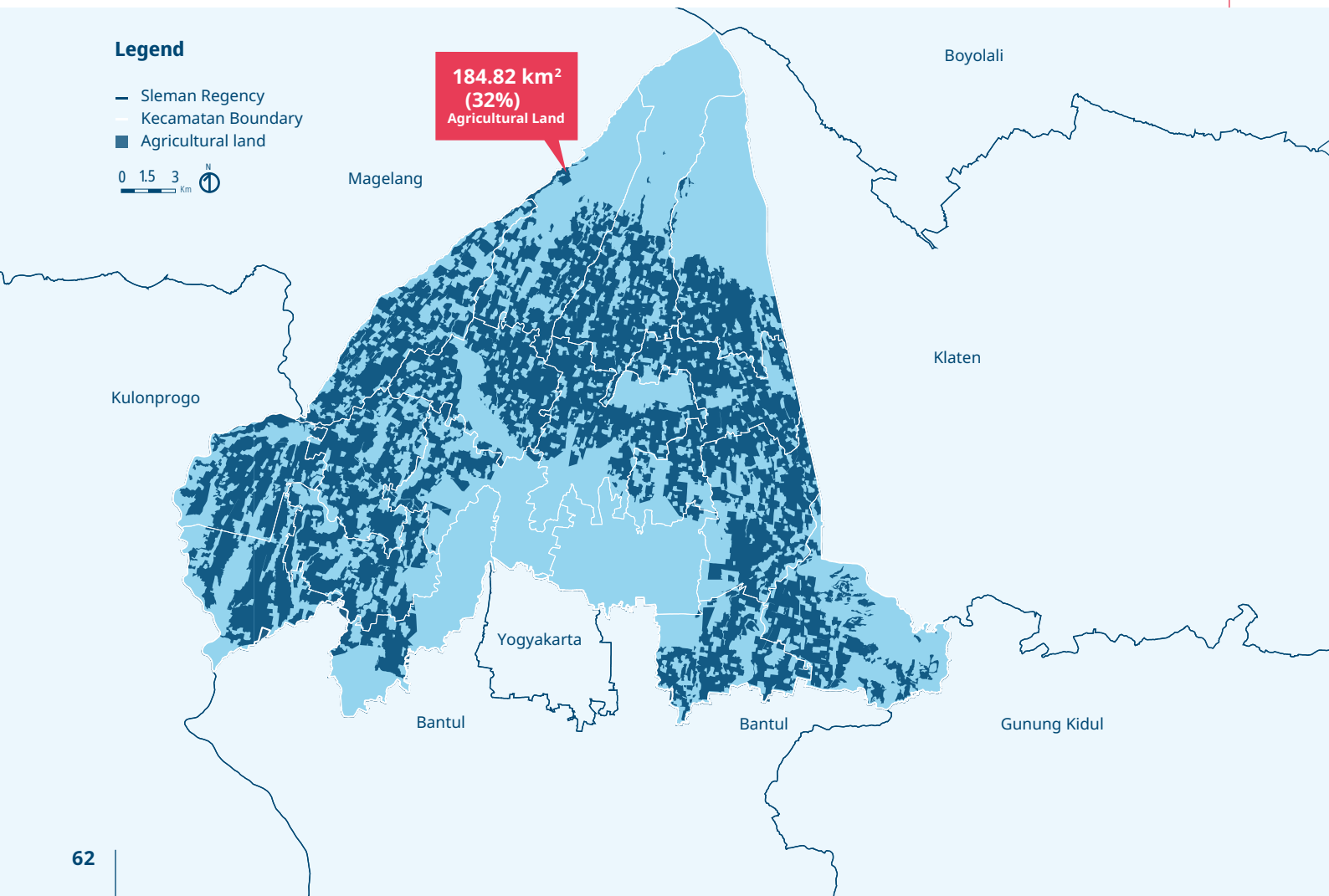
Preserving agricultural land and water conservation areas

The active volcano Merapi is situated at the northern boundary of Sleman, thus exposing Sleman to the risk of a volcanic eruption. However, this volcano also has a positive impact due to the highly fertile surrounding soils. Thus, the Sleman government is planning to introduce new regulations and declare approximately 18,000 hectares for protected rice fields or sustainable greenfields *(sawah lestari).* As a consequence, the owners of the rice fields are not permitted to sell the designated land to the people outside of their subdistrict (*kecamatan*) or to change the land use of the rice field. As a reward for following the government regulations, the government provides fertilizer tax-free for the land that is used for sustainable agriculture. If the agricultural land belongs to the government and the land use will be changed, the government has an obligation to find an equivalent substitute rice field to maintain the number of sustainable greenfields as stated in the regulation. In addition, areas designated for protected paddy fields *(Sawah Lestari)* in Sleman are restricted to only rice crop production and the national government has mandated that land-use changes are not allowed. Changes in land use can only be authorized at the national level.

Clean water, wastewater and solid waste issues in Sleman

In the RPJMN (National Medium-Term Development Plan) 2015–2019, the government targeted 100% access to clean water, 0% slums and 100% access to sanitation by 2020 (known as the 100-0-100 policy). These targets are consistent with SDGs 6 and 11. Despite progress on clean water, wastewater and sanitation as well as solid waste management, these targets were not fully achieved by the end of 2019.

Fig. 33: Agricultural land in Sleman



Clean water management issues

In Sleman and other large Indonesian cities, clean water and wastewater is separately managed by different sectors. While clean water is managed by Local Clean Water Utilities (PDAM), wastewater and sanitation fall under the responsibility of the Environmental Department (DLH). PDAM provides clean water services for communities in urban areas, whereas clean water provision in rural areas is managed by community-based clean water providers (PAMDES). In Sleman, the provision of clean water is not only from local PDAM and PERPAMDES[9] but also from the Yogyakarta City PDAM and Yogyakarta Province PDAM.

Based on government data, 98.9% of the population had clean water provision in 2018 (up from 98.6% in 2017). 71.0% are served through individual shallow wells, 19.4% receive water from PDAM networks, 8.2% through PAMDES and 0.03% from deep wells. These numbers are very encouraging for Sleman, but the fact that more than 70% of water resources come from individual shallow wells leaves many vulnerable to risks of groundwater contamination and overexploitation in the future. Therefore, managing water resources through establishing a regulation to protect and preserve its availability is needed.

Clean water resources

The geology and highly permeable soils surrounding Mount Merapi allow high levels of aquifer recharge for the supply of groundwater resources for Sleman. There are 4 spring systems in Sleman: Bebeng, Sleman-Cangkringan, Ngaglik and Yogyakarta, with 154 springwater resources in total. Moreover, the 17 rivers and their tributaries flowing through the region are also utilized as raw water

9 PERPAMDES (Perkumpulan PAMDES/Association of PAMDES) is the association of all PAMDES in Sleman. This association provides training and coaching to every PAMDES at the village level on drinking water management techniques, drinking water quality standards, institutional management including AD/ART and financial administrative management. PERPAMDES, in collaboration with the Department of Public Works, annually conducts a PAMDES competition in Sleman to improve service and management quality.

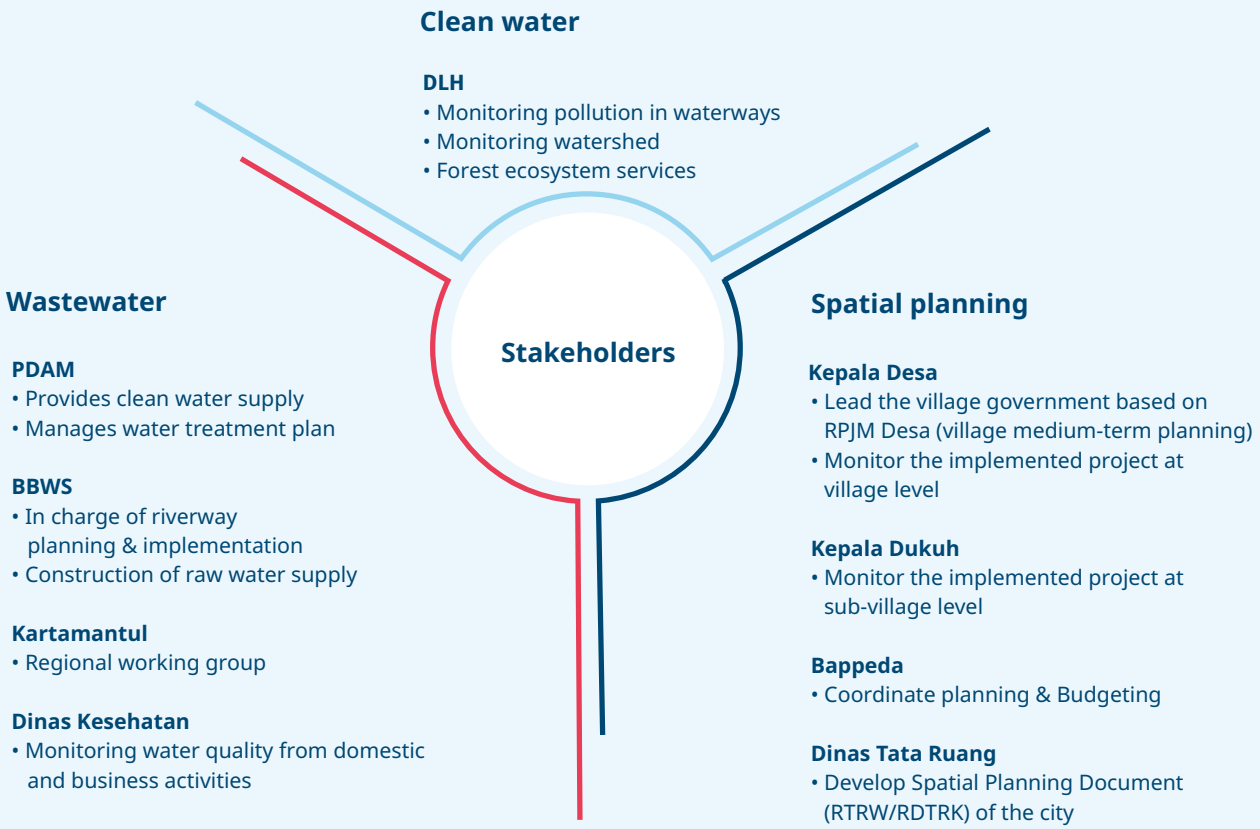


Fig. 34: Map of stakeholders related to management of urban waters in Sleman

for water utilities (PDAM) and irrigation networks. In addition to groundwater, spring water, and rivers as water resources in Sleman, some rainwater harvesting initiatives have also been started by communities.

Clean water problems

More than 98% of the Sleman population has access to clean water; however, the following problems regarding its provision and services are evident:

- The use of dug wells (both shallow and deep wells) as a clean water resource is quite high, which will potentially impact on the wells' sustainability due to overexploitation of aquifers. This not only threatens its sustainability but also makes it difficult to control water quality standards.

- Clean water and wastewater are currently managed by different institutions, which may impact water sustainability. For this reason, an integrated water resources management is needed.

- The current management of water utilities is not optimized, which is evidenced by high water losses due to technical and administrative factors. These problems are caused by several factors including lack of reservoir capacity, high levels of water loss caused by the sedimentation in reservoirs, and other problems related to infrastructure conditions. At the same time, water losses are exacerbated by cases of not recording water used and water theft.

- The standardization of the management of PAMDES/SPAMDES needs to be improved as well as the involvement of community participation in managing the community-based clean water provision. There are hundreds of community-based clean water providers in Sleman, with varying management capacity and often a lack of knowledge and organization.

Sanitation and wastewater management challenges in Sleman

1. There are often problems in the construction of individual septic tanks, which are not standardized and can endanger their surroundings as a result. To overcome this problem, the Environmental Department plans to distribute standardized septic tanks as well as improve their safety.

2. Lack of community awareness on how to maintain the wastewater plant and lack of community participation in the management of WWTPs[10]. There are 132 community-based wastewater management groups that voluntarily operate 132 communal IPALs in Sleman. Although the government has provided the training and standard operating procedures to manage the IPALs, their implementation at the community level varies. Community commitment to and participation in managing their own facilities vary widely; some groups are very engaged while some lack capacity and/or are not really committed to operating the communal IPAL.

3. Lack of management procedures in the government bodies to manage the IPAL as well as lack of budget allocation for improving sanitation. Some identified problems are:
   - There is no technical management division that specifically manages wastewater and sanitation in Sleman. The current management is handled by the Division of Open Space and Cleanliness under the Environmental Department. For the 132 communal IPALs in Sleman, a separate unit to manage and monitor their operation is required.

10 IPAL (Instalasi Pengolahan Air Limbah) also known as WWTP (wastewater treatment plant)

- Currently, the government only has two septic trucks to service the whole area of Sleman.
- There is a limited financial ability to develop new wastewater treatment plants.
- There is no wastewater treatment that is specifically operated for the market and school areas.

The NGO AKSANSI has started to organize the different CBOs and connect with the local government to set up co-production, linked to the recommended separate division for managing and monitoring IPAL operations.

Solid waste management issues in Sleman

Solid waste is also one of the main environmental issues in Sleman and in Yogyakarta Province. The current dumpsite, TPA Piyungan, has reached its capacity. The Regional Strategic Policy (Jakstrada) document for solid waste management in Yogyakarta Province states that every city/regency has to decrease its solid waste volume up to 30% by 2019. However, according to information from local governments, Yogyakarta only has the potential to decrease its solid waste volume by approximately 27%, while Sleman can only decrease it by approximately 15%.

Sleman produces 776 tons of solid waste per day, of which only 378 tons (49%) is managed. From this 49% managed waste, 29% is transported to the dumpsite and the remainder (20%) is managed through waste banks[11] or individually managed through sorting and 3R (reduce, reuse and recycle) procedures.

Furthermore, the following problems with solid waste management in Sleman are identified:

- Limited financial capacity of the local government in managing solid-waste problems. Sleman should have at least three landfills to serve the area (local government recommendation). A lack of financial capacity also limits available technology and innovative solutions to reduce and recycle waste.
- There is a high level of illegal garbage disposal due to a lack of garbage services and the reluctance of communities to pay the service fees. As a consequence, littering is common in many areas such as in the river and on empty land and side roads, thus polluting water resources.
- There is a lack of law enforcement and regulation in relation to solid waste management. There is neither regulation to reduce the use of plastic waste nor regulation to allow the management of garbage independently by the communities.

11 Waste banks are a system for collecting & segregating solid waste that works like banking, but what is saved is not money but waste. Savers, who are also called customers, have a savings book and can borrow money that will later be returned with solid waste worth the money borrowed. Waste deposited by the customer will be weighed and valued with a sum of money, then the waste will later be sold to factories or recycling agents or handed over to local upcycling agents for processing. Source: https://waste4change.com/waste-bank-to-support-indonesia-clean-from-waste-2025/

Spatial planning challenges in Sleman

According to Government Regulation No. 34/2017 concerning village land utilization, village land in Yogyakarta is owned by the Kingdom of Yogyakarta and managed by the village government. There are four types of village land: *Tanah Kas Desa* (TKD, land intended to be a revenue-generating asset for the village), *Pelungguh* (part of village land managed by village government officers for additional income), *Pengaremarem* (part of village land an an allowance for retired village government officers), and land for public purposes. The Sultan Ground is land located in every village that is owned and managed by the Kingdom of Yogyakarta as the provincial government. Citizens can rent Sultan Ground as long as they get permission from the provincial government and use the land for its prescribed function.

Currently, there is no comprehensive and accurate map detailing the extent of village land throughout Yogyakarta Province, because villages rely on manual documentation. In many cases, *Pelungguh/Bengkok* and *Pengarem-arem* have been converted to individual property for retired officers. Consequently, there is a problem of unclear ownership, especially for *Pelungguh* and *Pengarem-arem*. The allocation of TKD land remains steady due to village government control. Another issue is ownership conflicts between citizens and village government due to unclear land certificates or lack of land certificates. This unclear ownership of village land leads to an unclear determination of the exact extent of village land.

New policies should be provided by the government to aid in solving the problem. First, baseline data on the existing village land is needed. Subsequently, the government should share these data transparently with the public, allowing civil society and other stakeholders easy access to the data.

Enforcement and compliance in spatial planning – In terms of spatial planning, both government and civil society or developers as users have the responsibility to strictly adhere to the regulations and land use plans. Regulations specified in the spatial plans (RTRWs) are executed loosely and restrictions are considered adjustable by the local planning authority. Consequently, spatial planning is made to accommodate new development rather than to control undesirable development. Legal compliance by the developer and civil society is another issue. Developers usually modify their construction proposals to avoid higher tax payments and increased responsibilities for externalities.

Data limitations – Two challenges faced by Indonesia concerning data are the quality and accessibility of data. Most spatial data in Indonesia are not yet standardized across the different government sectors. Furthermore, data are not collected frequently.

Evidence-based planning – The lack of available data influences the quality of evidence-based planning in Sleman. As an iterative process, spatial planning needs to be frequently monitored and supported with updated data. Hence, when the data are not available and accessible, the quality of the spatial planning policy declines. If the government continues with spatial planning following a business-as-usual approach, planning will be based only on budget spending. In some cases, local government planning only accommodates the national program and their requests. Spatial planning in cities and regions remains reactive rather than proactive, meaning that their own development and spatial problems are not adequately addressed. That is why a paradigm shift from reactive planning towards a proactive approach is needed. This desired proactive approach will encourage the smart and comprehensive use of data as the main basis for spatial planning processes and analyses. As a result, the local government can intervene in urban planning and development to address its unique challenges and conditions. Currently, the ad-hoc nature of development and transformation and the inability of infrastructure to keep pace are evolving with or without government readiness.

Difficulties and potentials for water-sensitive communities in Sleman

To achieve more sustainable urban development, there is a need for ongoing initiatives at the local and national government levels and a comprehensive program that aims to empower village level planning to achieve and localize SDG implementation. Such a program, along with technical support for creating cleaner water systems in the city, has the potential to create multiple co-benefits encompassing good governance, community development, economic development and sustainable resource management.

Current challenges are:

1. Clean surface water is a critical resource for the future

In rapidly urbanizing urban areas, extra stresses are placed on water supplies, primarily due to extra demand, increased pollution loads and reduced space for water storage infrastructure as well as land-use changes that inhibit healthy, thriving aquatic ecosystems. In Sleman, where there is limited management of wastewater, solid waste and water extractions, the continued high pollution of the surface rivers and the contamination and depletion of groundwater pose serious risks to public health and livability.

2. River setbacks are not addressing the fundamental issues of waste and water

A blanket national regulation on river setbacks has sparked a nationwide frenzy of riverbank revitalization, embankment protection and resettlement of communities. However, riverbank revitalization efforts have largely been cosmetic and have not yet addressed the water quality issues critical for public health and the creation of good urban public space.

3. The 100-0-100 policy requires a comprehensive yet fine-grained approach

Despite the 100-0-100 policy, progress has largely been driven by political will, national level programs and special budgets[12] (e.g., the KOTAKU program), which may not present long-term sustainable solutions for local governments. Changes in the political climate and renewed priorities at the national level may put these efforts at risk. While national programs scale well across the country, they cannot necessarily address precise and fine-grained issues and coordination at the local level.

3. Undang-undang Desa (village regulations) is an opportunity for decentralized planning at the village level

The *desa* (village) status of Sleman presents multiple opportunities for community-based approaches to planning and participation due to the *desa*'s relative autonomy in planning.

- *Tanah Kas Desa / Tanah Bengkok* (village communal land) – land that is meant to be a revenue-generating asset for the village in order to finance its administration with a high degree of autonomy. This village asset can become potential leverage for planning and urban infrastructure investments that contribute to the localization of SDGs.

- *Dana Desa* (village budget) – a direct budget from the national government across all villages. It is managed directly by the village for general development ranging from social services to developing village business units and physical infrastructure. The capacity to conceptualize vision and planning is largely limited, leaving the rapidly urbanizing villages to respond to aggressive market forces without addressing basic infrastructure needs such as wastewater management, solid waste management and construction and maintenance of public spaces.

12 Source: https://pu.go.id/berita/view/10919/program-kotaku--kolaborasi-pemerintah-dan-warga-menjadikan-karangwaru-bebas-kumuh

Community engagement

To realize a water-sensitive community, the role of the community is crucial. Despite the importance of government readiness, the community will be a determinant actor that can ensure the sustainability of a water-sensitive program. Commonly in Indonesia, a top-down program from the government will not be sustainable in the long-term unless it arises from community initiatives and awareness. That is why the first critical step to be taken in order to develop a water-sensitive community is raising awareness within the community.

Learning from the experience of a communal wastewater treatment plant (WWTP) program in Sleman, we see that a co-production approach is more effective than other approaches. In this case, when the village government was first trying to introduce a communal WWTP to the community, it was unsuccessful. The community believed that the communal WWTP would not make any difference compared to individual septic tanks. This perception changed when the village government invited public health officers to provide education on the importance of communal WWTP in diminishing E. coli bacteria from water sources in people's houses. The government itself needed a five-step training to convince the community to participate. It also became clear that from an organizational standpoint, an incentive mechanism would be needed to keep the programs running. For instance, the government might provide stimulus funding at the beginning of a program, but afterwards, the community has to generate its own funding as the main source for the program budget. This budget could then be used to pay the wages of the WWTP operator. Another way to guarantee funding is to align village programs with national and provincial level programs.

3.4 Water-wise urban development through new multi-disciplinary local governance structures in Sleman, Indonesia (Hamburg Wasser)

Hamburg Wasser (Hamburg Water) is Hamburg's drinking water supply and wastewater management company. Hamburg Wasser is in charge of the provision of basic public services and is active in the transfer of operator know-how internationally. It is the second largest municipal water supply and wastewater management company in Germany after the Berliner Wasserbetriebe.

SDG-oriented urban planning

SDG-oriented urban planning may help us understand the strategic elements of urban development as multi-disciplinary facets of cities like Sleman. An analysis of urban planning may provide decision makers with a better understanding of the impacts of water-related infrastructure development in its multidimensionality (health, eco-systems, livability in cities, etc.). It may change the perspective of city managers from a purely output driven decision making, towards a more impact driven decision making that invites affected or concerned departments to participate in the process. Neither an exclusive water-oriented approach nor any other exclusive sector-driven approach is helpful in overcoming the overall challenges associated with urban development. Rather, urban development is a common challenge asking for common solutions for all affected sectors and parts of a municipality and society.

All SDG-oriented decision making and tool development should take into account possibilities and basic conditions for pricing and budgeting in the municipalities. There should be an assessment of the extent to which intersectoral collaboration in the city/district creates incentives for relevant stakeholders involved in decision making processes. Instruments for the financing of polycentric water-related infrastructure should be identified.

The city administration has started to assign fields of action to SDG-relevant indicators and initial reflections on strategy development with regard to SDGs have been undertaken. However, the formulation of activities remains predominantly within sectoral boundaries (e.g., urban planning, road planning, water supply, sewage disposal, waste disposal).

A promising way to achieve a situation described by the IWA Principles of Water Wise Cities [26] within a 5-year research program is to build up pilot sites (i.e., Living Labs), which – at least internally – do not orient themselves towards existing governance rules or structures and processes of local administrations.

Conceptual recommendations

The conceptual framework of water-wise cities in its planning, technical, financial and governance-relevant dimensions needs to be concretized in the relevant specific social, socio-economic and cultural contexts. This would be a strong starting point for comprehensive water-sensitive urban development.

A high level of organizational capacity is required to ensure that the regulations and decisions of the local government permanently serve the relevant interfaces. The establishment of a multi-layered communication system that permanently integrates the relevant stakeholders into the relevant processes is therefore indispensable. A high level of participation and strong leadership of community organizations, combined with a pronounced technical and methodological competence in ongoing long-term project management, are essential success factors.

Water infrastructure (water pipes, drainage systems, storage tanks, etc.) and waste disposal concepts should be integrated into district development concepts, including into the design and creation of public spaces. This requires cross-sectoral cooperation with the various specialist departments of the city administration.

Polycentric water-sensitive community development also requires, in parallel, incremental development and professionalization of governance, supply and disposal structures. Effective co-production between municipalities, civil society organizations and communities can make a certain infrastructural development standard possible in the near future. Nevertheless, in the medium and long term, efficient and more professionalized operator structures and utilities are indispensable for ensuring and satisfying the population's growing needs and expectations for affordable municipal basic services.

Technological, organizational and financial solutions chosen by local community-based organizations may not incorporate high standards (e.g., for water supply and wastewater disposal). Nevertheless, these decentralized approaches are an important starting point for the comprehensive development of water-relevant infrastructure at the local scale. To support these activities, the respective local regulatory framework should consider the technological competences of these community-based structures.

Recommendations for Sleman

Based on the principles of the SDGs (6, 11, 17) and the NUA, practice-oriented research should focus on a holistic, long-term and multidisciplinary approach. The hearts and minds of politicians and administrations have to be opened to such an approach. The SDGs and NUA, along with the IWA principles, are suitable mechanisms to help convince local politicians and administrative bodies to think in a more strategic way. This thinking is fundamental to paving the way for local level administrations and decision-makers to increase collaboration between authorities and departments, both horizontally and vertically, as well as between experts (e.g., urban planners, water engineers, investors) and the local population.

It is important to demonstrate to local decision makers (i.e., governments, authorities) that living labs can provide the space and the scope to go beyond the usual, very often inflexible responsibilities and competencies within a city administration. A shift towards working together in cities typically means a more or less complete change in administrative structures, both local and regional. Decision makers should understand that such a process does not endanger their power or influence in the city. Instead, one can be part of a future-oriented, water-sensitive development of their own city or municipality, resulting in a win-win situation for all parties.

These approaches also provide a suitable and promising means to develop suggestions for where the decentralized activities of local communities can be combined with the possibilities and necessities of central institutions. The role of regional institutions and administrations could be to manage technical standardization, run well-equipped central water laboratories, establish and oversee training institutes to educate and train craftsmen, and harness the engineering capacity at local universities to support local communities.

In summary, both decentralized action and central support are needed, thus enabling capacity development and supervision. The challenge is to meaningfully combine the bottom-up approach with the top-down approach.

Free Hanseatic City of Bremen

Free Hanseatic City of Bremen. The Ministry for Climate Protection, Environment, Mobility, Urban and Housing Development (Die Senatorin für Klimaschutz, Umwelt, Mobilität, Stadtentwicklung und Wohnungsbau) is responsible for a wide range of administrative activities at federal state level (Bundesland) and municipality level. It is mainly responsible for climate protection, mobility, climate resilience, flood protection, stormwater management, and nature conservation, and is the supreme building authority for the City of Bremen.

3.5 Recommendations for climate change adaptation in secondary and tertiary cities of SEA (City of Bremen)

The effects of climate change can already be observed and will increase during the next decades. Adapting to the consequences of climate change is a long-term challenge for society as a whole. Cities and regions have to preserve favorable living and working conditions and ensure that they remain prosperous even in the face of climate-related changes that will have a wide range of effects. When designing a climate-resilient city, heavy rainfalls, heat stress, sea level rise, droughts, more intense storm events and deterioration in wind comfort are the main issues to consider.

Many studies and policy papers assume that cities and their administrations play a crucial role in building resilience in growing urban environments. However, there are general obstacles that must be overcome. The lack of resources is a known and often major issue. For example, urban planning has to integrate an increasing number of aspects: economic, social and infrastructural issues have to be considered and are often the driving forces in development and planning processes. Climate change adaptation makes these processes increasingly complex and sometimes also more expensive. It is no wonder that the integration of climate change adaptation is sometimes considered to be a nice addition rather than a required element of sustainable planning. This is the case in many Southeast Asian cities, as Daniere and Garschagen (2019) report on findings from several scientific studies in cities in the region: *"Here, as in many of our urban settings, the local capacity of resources and knowledge for effective climate change adaptation and mitigation is critical but absent. Residents affected by increased flooding, landslides, and rampant development investments see little improvement in the livelihood situation while decisions about their city and neighbourhoods take place without consultation."*[10]

The scientifically formulated requirements of holistic, cross-sectoral, participatory and sustainable approaches for climate resilience in cities very often deal with cities that struggle to provide basic services for their residents, due to a lack of resources. The expectation that the development of climate resilience policies would solve the problems inherent in the system and societal inequalities is unrealistic. Thus, it is not surprising that Puliat (2019), for the case study of Lao Cai, Vietnam, comes to the conclusion that "there is an implementation gap that results in a chasm between a pro-climate adaptation discourse and actual planning that seems to follow a 'business as usual' pattern." [43]. Even if a very sustainable, holistic and participatory process for the development of climate resilience policies can be formulated, the implementation still faces the same obstacles inherent in the system. To build a climate-resilient city, several challenges have to be met, of which the following three can be considered to be crucial from a practical perspective:

1. Adaptation to climate change as a strategic challenge

Cities face many urgent short-term problems that have to be tackled by local governments and administrations. In contrast, climate adaptation is considered a long-term task that deals with long-term effects and may cost resources today while the benefit will only be seen in the future. This makes investing in climate change adaptation unattractive for politicians, and thus it is often difficult to keep climate change adaptation on the local political agenda.

A climate adaptation strategy can help define a framework for both current and future actions; it helps prepare the ground for adaptation measures and can broaden the scope of measures towards future-oriented and more sustainable decisions. A strategic concept – either simple or comprehensive – is therefore an important step towards a more climate-resilient city.

2. Adaptation to climate change as an integration and mainstreaming challenge

Planning procedures and sector policies are essential for a city to shape and define its future appearance, attractiveness and viability. Thus, it is crucial for a city to integrate climate change considerations into relevant sector policies and planning decisions. This is a time-consuming process, conflict of aims can arise, and processes will become more complex, but it is also a chance to create more sustainable solutions. Synergies can be achieved when departments in charge of areas such as urban development, public works, traffic planning, water management, disaster control, green infrastructure and healthcare work together and integrate climate change adaptation into their plans and processes. In addition, integration also refers to the integration and participation of different stakeholders, including both powerful and less powerful groups and residents.

3. Adaptation to climate change as a learning and development challenge

"Exploring suitable adaptation pathways to address existing vulnerabilities and increase resilience will require a process of learning by people and organisations." [44]

Climate change adaptation remains a relatively young topic. Although much theoretical work has been conducted in the last decades, the implementation is relatively slow, due to many operational, organizational, financial and political reasons. A large step remains in moving from a scientific and political discourse to implementation on the ground. This gap can be observed in many cities across SEA and elsewhere. In order to strengthen implementation, climate adaptation should be made tangible, such as through pilot projects. Pilot projects can fail but can also create learning loops and provide the opportunity to initiate processes that would not be possible within the existing framework of day-to-day administration. Because there is no perfect solution, step-by-step infrastructure development combined with a culture of institutional learning and development can help to illuminate the best pathway to a resilient city.

Beyond theory – practical recommendations from lessons learned

The resources of a city are limited. Cities have to deliver many services yet often lack personnel and financial resources, even for basic services. Additionally, they often have limited experience in dealing with cross-sectoral and strategic issues. Despite these limitations, cities have a lot of experience in getting things done on the ground and they know which measures are feasible.

Several key practical recommendations, drawn from experience with the development of municipal climate adaptation policies, shall support similar initiatives in SEA:

- **Hook in to existing processes and working groups.** There may be existing and functioning cross-sectoral processes and working groups in a city that are suited or amenable to a climate change adaptation process.

- **Let all concerned departments and stakeholders participate.** A cross-sectoral problem needs a cross-sectoral approach. Some departments, stakeholders and sectors are more concerned than others. However, a shared process with equal partners helps to formulate the integrated measures required, which are difficult to develop with a sector-specific approach.

- **Analyze impact chains and consider indirect impacts.** A flooded road, for example, can impede traffic not only during the flood event but also afterwards, as receding water leaves behind debris. This could lead to logistics problems that could affect the supply chain, resulting in negative impacts on the economy and on food and medical supplies. Thus, the indirect impacts of a heavy rainfall can be more severe than the direct impact

of a flooded street itself. An impact chain analysis can help to generate a more comprehensive picture of possible direct and indirect impacts and to assess the different interlinkages of the systems within a city. Even a rough analysis can be a good tool to communicate impacts, create a shared understanding, and illustrate cross-sectoral consequences and challenges.

- **Create co-benefits**. One of the most critical challenges in cities is limited resources. To increase the probability of implementation, it is helpful to identify synergies and co-benefits. For instance, well-planned green infrastructure can help to manage stormwater, improve the livability and attractiveness of the city, and produce positive health effects. It is clear that integrated and cross-sectoral measures can create short-term or long-term co-benefits. The identification of those co-benefits greatly assists in the later implementation process.

- **Seize the window of opportunity.** When there is the possibility to integrate climate change adaptation into planning or other decision processes, the chance should be taken to create a quick success story. The implementation of each measure, large or small, will create momentum and acceptance.

- **Identify no-regret and low-regret options.** Since the magnitude of climate change impacts can only be estimated to a limited degree of certainty, it can be helpful to define no-regret or low-regret measures. As described by Suzanne Martin:

One of the benefits of identifying no-regret, low-regret and win-win actions is that it enables organisations and others to implement short-term adaptation actions and in doing so begin the adaptation process, rather than adopt a 'wait and see approach'. No-regret actions are cost-effective now and under a range of future climate scenarios and do not involve hard trade-offs with other policy objectives. Low-regret actions are relatively low cost and provide relatively large benefits under predicted future climates. Win-win actions contribute to adaptation whilst also having other social, economic and environmental policy benefits, including in relation to mitigation. [45]

- **Consider both directions (i.e., from measures to strategy and from strategy to measures).** In many cases, adaptation measures have already been developed or even implemented (even though they may not be called adaptation measures). These can be used as a skeleton for an adaptation strategy or an action plan. The reverse flow of strategic development and practical experience is an excellent precondition for developing an implementable strategy.

- **Plan enough time for communication.** New approaches and cross-sectoral processes need a significant amount of time for communication to create a common understanding and "translation" of specific sectoral knowledge.

- **Find a balance between long-term strategic measures and "low-hanging fruit"**. The priority is to formulate objectives and measures in order to strengthen the resilience of the city's systems. Climate resilience can only be improved when measures are implemented. Thus, in order to maintain a certain momentum, it is helpful to define easy-to-implement measures that create quick success stories, without forgetting long-term strategic measures.

- **Plan and ensure a mainstreaming process.** Mainstreaming is essential for a sustainable adaptation and implementation process. The integration of climate change adaptation into sectoral policy is needed in the long run. Mainstreaming ensures that climate resilience is considered whenever possible, especially in infrastructure-related decision making.

3.6 Experiences with co-production between public entities and communities for decentralized wastewater treatment in Indonesia (AKSANSI)

Community-based sanitation (CBS) in Indonesia is a program from the national government that aims to provide access to proper sanitation for Indonesian citizens. CBS is one of the three main approaches to achieving the SDGs across the 14,000 islands of Indonesia. Since its launch in 2003, the CBS program has established more than 8,000 sanitation facilities (community sewerage, community sanitation centers, mixed sewerage and sanitation centers) throughout Indonesia under several programs including SANIMAS, SANIMAS DAK, SANIMAS USRI and SANIMAS IDB.

By prioritizing sustainable principles, the approach stresses the importance of active community involvement at each stage, starting from preparation and construction to the post-construction stage, where CBS operation and maintenance take place. Community involvement empowers the community to independently operate and maintain their own sanitation facilities.

Co-production was initiated to accommodate community responsibility for user fees and operation and maintenance (O&M) of the CBS system. For expenses where the CBO faces difficulties in collecting sufficient funds, the local government allocates funding. This applies for larger cost positions in order to achieve sustainable operation of the CBS systems.

Founded in 2006, the Association of Community-Based Organizations on Sanitation in Indonesia (AKSANSI) is an umbrella association that accommodates the needs of the CBOs, in particular for the O&M phase.

The CBS program applies locally adapted decentralized wastewater treatment systems (DEWATS) with low O&M costs. With collaborative management or co-management schemes, stakeholder responsibilities are shared between the user groups and the local government. AKSANSI facilitates the establishment and coaching of co-management schemes. These schemes accommodate the interests of all sanitation stakeholders at city/regency level for CBS sustainability and environmental protection. Based on goodwill, equality, respect and shared benefits, co-management accommodates the rights and obligations of all CBS system stakeholders.

Currently, there are 4,167 CBS systems recorded in the AKSANSI database:

- Number of community-based sewerage systems: 2,069
- Number of community-based sanitation centers: 1,349
- Number of community-based mixed sewerage and sanitation centers: 436
- Number of non-identified systems: 313

In Sleman District from 2017 to 2019, there were 35 CBS systems monitored, all fully funded by the local government. The figure below shows effluent samples from these systems and whether they comply (blue) or do not comply (orange) with regulations.

AKSANSI is a communication forum and umbrella organization for community-based organizations in the sanitation sector throughout Indonesia. The association specializes in the co-management (neighborhood groups, community facilities, private sector) of decentralized wastewater infrastructure and related monitoring processes.

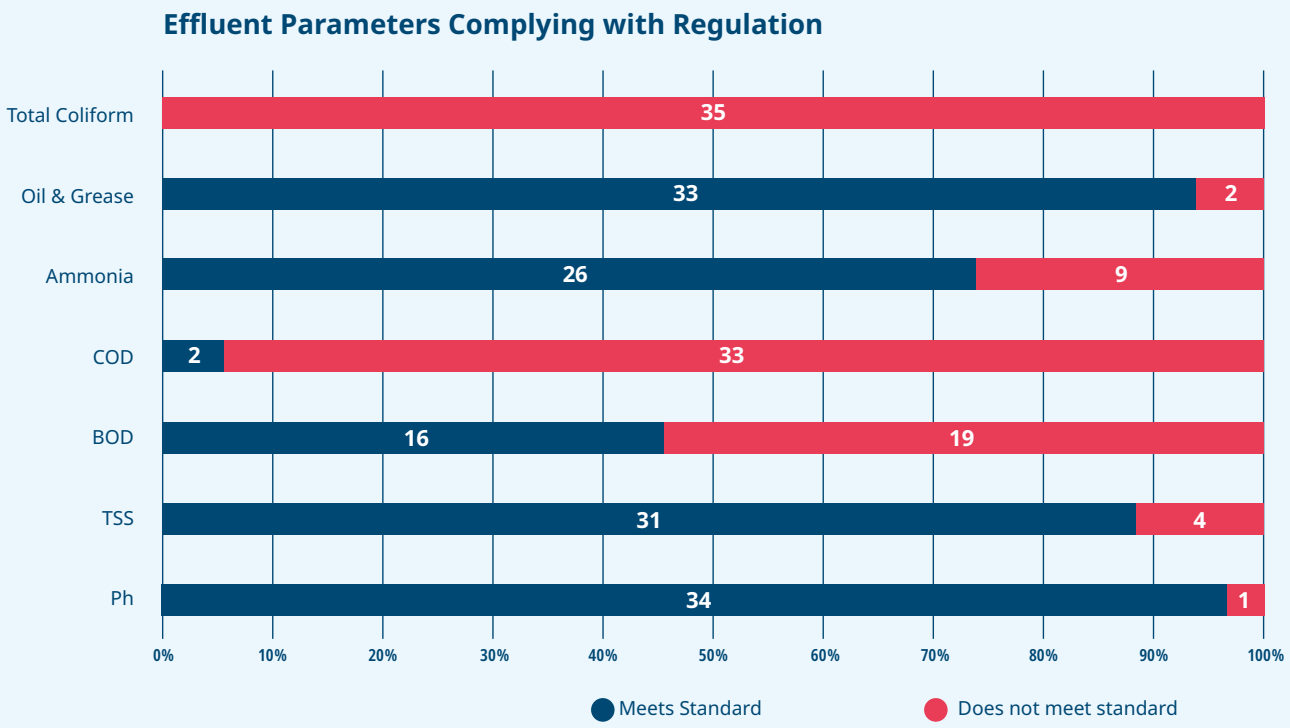


Fig. 35: CBS systems in Sleman – effluent parameters complying with regulations [46]

The most recent discharge standard from the Ministry of Environment (No. 168/2016) introduced very strict parameters. Based on this standard and sampling data, none of the 35 CBOs comply with E-coli discharge standards. Only 2 CBOs comply with the COD standard, while 16 CBOs comply with the BOD standard. In order to achieve the newly introduced high standards, the CBS systems require add-on components which require additional investment and additional O&M capabilities (financial and managerial), which needs to be developed by the stakeholders at district/city level.

Selected challenges which call for the facilitation and setup of co-management schemes

The most common problems in the pre-construction phase and reasons for potential failure are:

- The selection of CBS and its location is determined by where land is available rather than by where the CBS is needed the most. If village-owned land is used, construction will be a lot easier if the surface elevation meets the technical requirement for gravity flow and discharge points.
- With the roll-out of a large number of systems, the CBS contractor tendering process creates complexity and problems. Processes are often accelerated, resulting in a focus on quick implementation with no involvement from the community (either during or after the construction process). If the community would be involved, most of the labor cost would fall out and the household connections could be funded from the project funds.
- The majority of funds are typically allocated for construction, with a very small sum of money left over for post-construction.
- In many cases, it is not clear who owns the CBS assets because asset transfer documentation was not provided to the local government or village government during handover.

In the construction phase, the most common problems are:

- The community-based process usually involves two CBOs: one CBO is responsible for contributing during the construction process, and the other CBO for the O&M process. In some cases, the CBO for construction was legalized but not the one for O&M.
- Household connections are not part of the project funds, so in some cases, the CBO faces difficulties in encouraging households to connect.
- In some cases, the setting and collection of user fees is done directly by the CBO and users, meaning that the village government is not involved in formalizing the user fees.

Many CBOs don't function in an ideal manner:

- Few are democratically elected.
- Half of all CBOs are headed by RT (official local community council) leaders.
- Most are poorly prepared for their role.
- There is no training for new members post-construction.
- There is nowhere to get assistance.

Conclusions to be drawn to establish similar programs for the development of water-sensitive cities

Regulatory framework

- The *Rencana Pembangunan dan Pelaksanaan* (RPP, Development and Implementation Plan) SPAM should cover provisions regarding sanitation and/or put both drinking water (SPAM) and wastewater (SPAL) on equal footing. Alternatively, national legislation focused on sanitation could be developed to clarify roles and responsibilities for national and local government for the development and operation phases, as well as a realistic minimum service standard.
- In order to cope with increased effluent standard requirements, possibilities to develop a local legal framework which allows for progressive implementation towards achieving those standards need to be elaborated and applied. Otherwise, well-proven solutions will no longer be legal and appropriate alternatives are currently not available.
- Draft *Perda* (local ordinances) on wastewater should only refer to legal entities.
- *Perda* should incorporate NSPK (norms, standards, procedures and criteria) and a minimum service standard defined by national laws.
- There is a need to consolidate and codify all water services-related legislation into a single *Perda*. This is to avoid the fragmentation of regulatory roles and responsibility and to ensure the coherence of water and sanitation policy.

Financing

- A guideline on expenditure should be issued with sufficient coordination between *Bappenas*,[13] the Ministry of Public Works, the Ministry of Home Affairs (MOHA) and the State Audit Agencies. This guideline is important in order to remove ambiguities and provide assurance to local governments in utilizing budgets to support operation, management, optimization and rehabilitation of local-scale community sanitation.

- The institutional set-up under local government for supporting wastewater services can range (in terms of budgetary and structural independence) from *Dinas* (government departments) to the Regional Technical Implementation Unit (UPTD) to the Regional Public Service Agency (BLUD).
  The government can decide differential tariffs (for IPLT/waste collection) by the UPTD or BLUD.

- The *Perda* or *Walikota* (Regent) decree regulating SKPD/UPTD (local government entities) must contain detailed descriptions on the duties of the relevant SKPD in supporting local-scale wastewater-related interventions.

Asset ownership

If the community management model remains the predominant model in any given local government area, then:

- CBOs must be incorporated as legal entities and the registered name on the land certificate must either be individual or legal entities.
  (In other management models, the local government may own the system.)

- The land transfer must be conducted between the original owner of the land and the CBO.

- CBOs must obtain a building permit, specifying both buildings and other installations and infrastructure owned by them.

Appropriate legal forms

If the community management model remains the predominant model in any given local government area, then:

- One of the options for the legal form is to create a multiple-tier structure of entities. In this case, one non-profit entity owns a for-profit subsidiary. This is most feasible with a foundation. In addition, the foundation is able to access different sources of funding. In the event that the foundation is liquidated, the assets have to be transferred to other organizations that have similar aims or to the government. This will protect the interest in long-term operation.

- A cooperative may be another option, although the regulatory framework governing cooperatives is not as clear as for a foundation. The current cooperative law (25/1992) does not specify whether cooperatives can create a limited liability company. However, there has been a circular letter from the Ministry of Cooperatives which encourages cooperatives to establish a limited liability company ahead of the relevant ASEAN Economic Forum, especially for cooperatives that have assets greater than five billion IDR[14].

13 Ministry of National Development Planning of the Republic of Indonesia

14 Equivalent to 356,000 USD at the time of writing this publication.

- It may be conceivable for multiple CBOs (in villages or *kelurahan*) to be amalgamated into one single legal entity at the *kecamatan* (or even city) level, in order to simplify the paperwork and procedures for maintaining the legal entity. The barrier to this is hardly a legal one, but rather lies in the governing process of coordinating between CBOs and the management of the entity as asset owners.

Recommendations for increasing local government support:

- Encourage local government entities to allocate skills and functions for sanitation planning, implementation, and monitoring and evaluation to particular responsibility areas or *Bidang*.

- Increase the space for local government to experiment with post-construction funding for local-scale systems, e.g., by providing specific guidance to counter fear of sanctions for misuse of public funds.

- Recognize the politics inherent in performance monitoring, i.e., that local governments may be hesitant to expose the full extent of failure through robust outcome monitoring, evaluation and reporting, because it will increase the pressure on them to act. Where this is the case, create positive incentives for monitoring, e.g., by creating an award (or financial reward) system for regencies and cities that achieve high standards of local scale system effluent.

- There are challenges with legally entrusting ownership to either CBOs or local government. Despite this, local governments should explore options to reduce the risk of rent-seeking (i.e., using local-scale systems to obtain economic gain from others without reciprocation) that arises due to unclear ownership arrangements of land or technology.

- Take a respectful approach to local government assumptions around community empowerment. It should be recognized that while the local government appears to be taking a normative position on community empowerment (which results in side-stepping responsibility for failing local-scale services), it may not be a conscious decision for many actors involved. In the face of deep-rooted norms, it could be helpful to have an open, joint discussion about the appropriate balance of responsibility between CBOs, local government, and other actors involved in local-scale service sustainability.

Recommended government and donor program designs:

- Program financing that ensures all (or the majority of) households have a connection to the sanitation system, so design capacity of local scale systems is utilized

- Mechanisms to formalize tariff setting at levels that enable sustainable operations

- Mechanisms to formalize fee collection, to improve user payment rates

- Procedures to maximize the capacity of each CBO to deliver, such as improving the CBO's standing in the community by including powerful local champions, succession planning and hand-over processes for knowledge transfer

- Institutional arrangements for responsible management partnerships with local governments to ensure all operational responsibilities are successfully undertaken

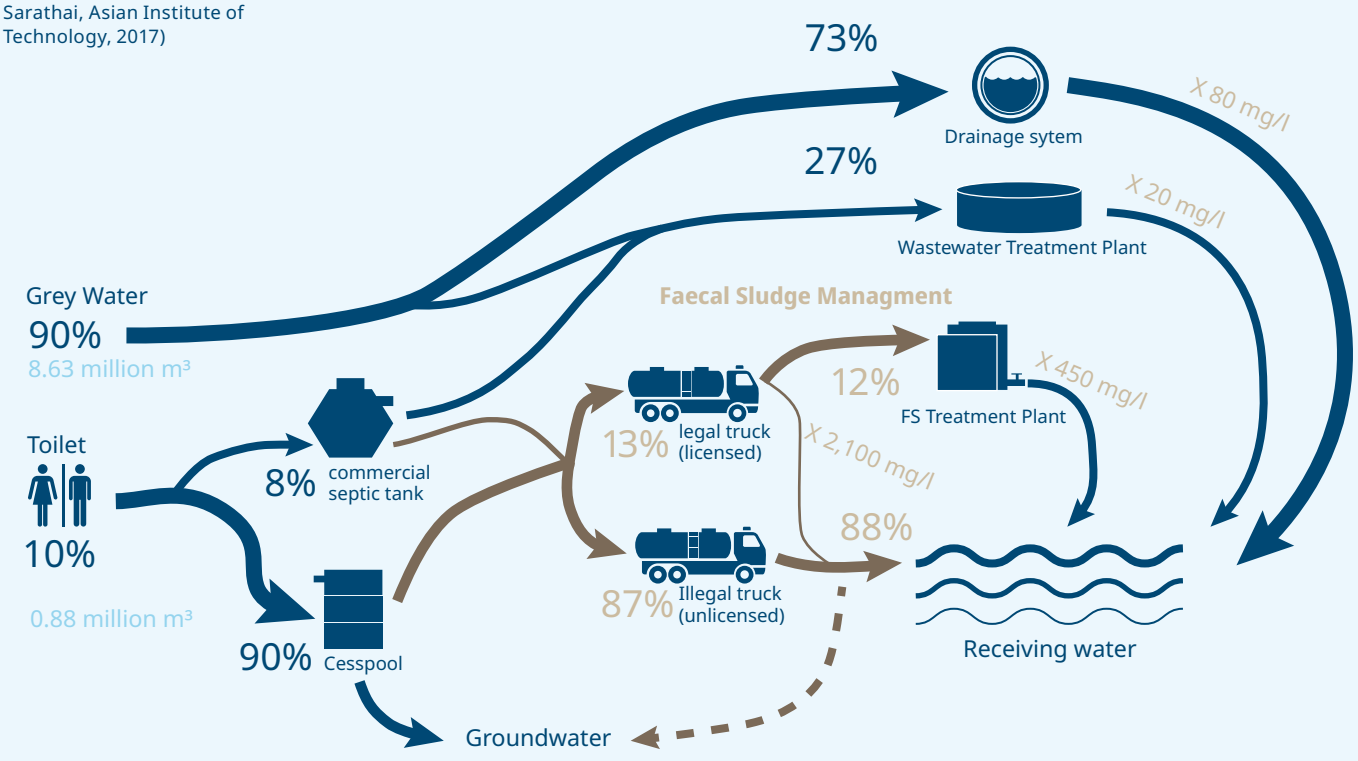
The **Asian Institute of Technology (AIT)** promotes technological change and sustainable development in the Asian-Pacific region through higher education, research and outreach. Established in Bangkok in 1959, AIT has become a leading regional postgraduate institution and is actively working with public and private sector partners throughout the region and with some of the top universities in the world.

3.7 Governance schemes, regulatory framework and market development for decentralized wastewater treatment in Thailand (AIT)

In recent years, Thailand has achieved remarkable improvement in access to improved sanitation by limiting direct human contact with excreta at the point of origin. Over a period of four decades, sanitation coverage grew from 0.17% in 1960 to over 98% in 1999 with strong impulse from the government backed up by policies and awareness campaigns. The provision of water and sanitation services today reaches 99.8% of the population, with open defecation effectively eliminated.

However, improved sanitation is limited to user interface and containment systems while Thailand struggles to keep pace with increasing water pollution resulting from the second-generation waste (i.e., waste that's been flushed) stemming from population growth and urbanization. The urban population grew from 20% in 1960 to 52% in 2017. With a population of 64 million, 9.7 million cubic meters of domestic wastewater is produced daily in Thailand. The black water from toilets undergoes preliminary treatment in on-site sanitation systems (OSS) at individual households, which form the basis of sanitation in Thailand. The grey water and effluent from OSS are then channelled to sewer networks or drains, of which 27% is treated by 105 centralized wastewater treatment plants and safely disposed into receiving water bodies, while the remaining 73% is disposed untreated into the open environment.

Fig. 36: Domestic wastewater management in Thailand (developed by Dr. Yuttachai Sarathai, Asian Institute of Technology, 2017)



Despite every household relying on OSS, only 13% of faecal sludge (FS) is treated and the rest ends up in the open environment. The type of OSS depends on the state of the community and socio-economic status. For example, in newly developed housing estates, commercial watertight septic tanks are the norm while in the urban slums, which are usually located along canal corridors, cesspools and pit latrines along with natural vegetative drainage are the most prominent systems. In older households, cesspools are the dominant OSS used. At present, about 88% of households in urban areas of Thailand use leaching nature cesspools. Likewise, industrial facilities, households or any buildings greater than 1000–2000 m², condominiums, commercial buildings and retail stores larger than 300 m² need to have their own treatment systems.

The focus of wastewater treatment until now has been on developing centralized treatment facilities, which have not proven to be successful in the country, and in the last decade there has been no major investment in the wastewater management sector. Urbanization trends and population growth place increasing pressure on the system. Furthermore, the situation is exacerbated by overlapping institutional roles and unwillingness of politicians to collect tariffs for wastewater treatment. This has resulted in poor performance of the wastewater treatment systems.

Steps towards SDG implementation

During the National Consultation Workshop held in AIT (14–15 January 2020), Mr. Suchai Janepojant from the Wastewater Management Authority (WMA) stated that Thailand has invested 60 million THB (approx. 2 million USD) to implement SDG 6; however, the total investment required for this sector by 2030 is USD 6.9 billion with a potential private-sector investment of 0.7 billion USD [47]. The country's progress towards the implementation of SDG 6 is indicated by the incorporation of SDGs in the national framework (i.e., the 20-year National Strategy 2017–2036), whose seventh strategy "Advance Infrastructure and Logistics" is mapped to the SDGs (United Nations, 2017). In line with the national strategy and SDG6, Thailand implemented its 20-year Master Plan on Water Resource Management (2018–2037) with the aims of:

- Expansion of safe drinking water for all – the government aims for all villages and urban communities to have access to safe and clean water.
- Expansion of access to sanitation and hygiene for all.
- Improvement of water quality by reducing pollution, with the aim to reduce wastewater at the source while increasing the efficiency of the wastewater treatment systems.
- Integrated water resource management at all levels – to achieve this, Thailand has established a national water resource management mechanism comprising the National Water Resources Committee at the national level, the River Basin Committee at the river basin level and user / civil society associations at the water user association level. Furthermore, the government has established the Office of National Water Resources to supervise the operations of agencies in water resource management for integrated, systematic and sustainable operations.

The Thai government has targeted the local and regional level as the first level of implementation while engaging local communities' participation in improving water quality and sanitation.

In a recent survey carried out by the Sustainable Development Solutions Network (SDSN) and Bertelsmann Foundation on development progress related to the SDGs, Thailand ranked first in ASEAN and 41st in the world with a score of 74.5% [48], [49].

Wastewater treatment

Centralized wastewater treatment plants (WWTPs) have proven to be an inadequate solution to wastewater management problems in Thailand. In spite of universal sanitation coverage and billions of THB invested in 105 centralized wastewater treatment plants and over 1500 FS treatment plants, the safe treatment of wastewater and FS accounts for only 27% and 13% of total generated volume, respectively. Furthermore, almost all of the centralized WWTPs in Thailand are operating at less than half of their capacity, because they are often oversized considering their design for long-term need. The capital intensity of the centralized WWTPs and the unwillingness of political leaders to charge tariffs to users has made it difficult to fund these treatment systems. Likewise, planning and development of the centralized WWTP is a long-term process whereas decentralized wastewater treatment systems (DEWATS) are a readily available solution. Similarly, private investors are more interested in investing in DEWATS, considering the immediate returns compared to centralized wastewater treatment plants.

Based on the Bellagio Principles, decentralized wastewater management:

- does not require large and capital-intensive trunk sewers;
- increases the scope of the various technological options;
- increases wastewater reuse and reduces water requirements for waste transportation;
- reduces the risk of system failure; and
- allows incremental development and investment.

DEWATS can be appropriate for peri-urban areas where communities are isolated and population density is low. DEWATS manage wastewater at or near the source while mobilizing local resources, thus making the financial requirement more affordable and feasible. Furthermore, it encourages local participation in decision-making processes and often instills a sense of ownership, as these systems are usually operated by the communities they serve.

The choice of technology should not only be guided by an assessment of the benefits of decentralized or centralized treatment options, but also by citywide sanitation planning directives for the zoning of the centralized, decentralized and combined systems. There will be room for both approaches considering population density, isolation of communities, accessibility, and other factors. Hence, the approach should be designed using the incremental sanitation ladder[15] along with the technical and financial feasibility of the proposed system(s). Moreover, technology selection shall be based on cost-benefit analyses that serve as a useful guide to decision makers and those responsible for implementation.

Challenges for establishing intersectoral cooperation

No single institution is responsible for sanitation in Thailand. Instead, responsibility is spread across multiple national level ministries and local level departments. There are 38 ministries involved in the management of the water sector as it relates to wastewater. While the Ministry of Public Health (MoPH) and associated departments at local level are responsible for faecal sludge management

15 The incremental sanitation ladder focuses on achieving priorities on a level basis rather than directly jumping to centralized facilities from on-site sanitation systems. For example, the lower rung of the sanitation ladder focuses on health functions such as safe access to and availability of latrines with excreta containment, grey water management and pathogen reduction in treatment while higher rungs stress environmental functions with resource recovery like nutrient reuse, reduced eutrophication risk and integrated resource management.

(FSM), the Ministry of Interior (MoI) and the Ministry of Natural Resources and Environment (MoNRE) and associated local bodies are responsible for wastewater management. This has resulted in gaps and overlaps in roles and responsibilities. A lack of interdepartmental coordination is identified as another major obstacle to adopting an integrated approach. Local bodies are responsible for the management of wastewater and FS at their respective localities; however, they lack the capacity to construct and operate the treatment plants and rely heavily on central funds. They cannot afford to operate and maintain centrally funded wastewater treatment plants as they cannot cover the O&M costs with their local budgets. They have local ordinances to collect service fees from the users for wastewater treatment; however, politicians tend to avoid collection of service fees from the community in the fear of losing votes and the general population's political trust. The local bodies lack sufficient manpower to regulate informal service providers. Private firms do not take the initiative to invest in wastewater treatment facilities.

Selected policy recommendations are as follows:

- Government should form a separate entity that bridges the multiple ministries and local departments involved in sanitation and provides complete sanitation service at the local level, including operation and maintenance of the wastewater and FS treatment systems, and assistance in upgrading community-owned DEWATS.
- Enforcement and monitoring have been the major issue as the Local Government Authorities lack capacity; therefore, they need to work together with NGOs and/or civil society organizations and/or academic institutions.
- Encourage local government to develop local ordinances along with guidelines for implementation and enforce these ordinances in line with ministerial regulations.
- There is a need to implement advocacy campaigns, develop citywide sanitation planning, prioritize areas for DEWATs, centralized and mixed systems along with a GIS-based sanitation map, and train local government agencies for better sectoral performance.
- Local authorities should design the treatment systems and effluent standards, considering water quality, water usage and ecosystem as well as the influent water quality.
- Policies should be developed that target utility reform in the sanitation sector; the sector would benefit most if the government unit/utility or private organization provides integrated services including water supply, wastewater, FSM and solid waste management.
- Government should implement and frequently revise the wastewater tariff through regular advocacy and willingness to pay surveys.
- Implementation of public-private partnerships (PPP) while creating the enabling environment for private sector involvement.
- Encourage private-sector involvement via mechanisms developed by service providers and government to formalize the informal service providers.
- Mandate implementation of the Thailand Industrial Standard Institute's standards on DEWATs performance to ensure healthy market competition as well as product quality. To implement the standards, the government shall collaborate with academic and research institutions for testing and certification of the product.

3.8 SDG localization in Vietnam (VAWR)

The **Vietnam Academy for Water Resources (VAWR)** is one of the leading water resources management and technology institutions in Vietnam. Established in 1959, the academy has built on over 50 years of experience in the water sector to develop into the modern scientific facility that it is today.

An integral part of Vietnam's transition to lower middle-income status has been its transition from a largely rural to an urban economy. The country's economic progress has coincided with rapid urbanization. This growth has contributed to significant challenges in service delivery and infrastructure in cities, in general, and specifically, for water and management (wastewater, drainage, solid waste and water supply). The Vietnam 2035 Report noted that integrated approaches are needed to address Vietnam's burgeoning urbanization challenges, including transport, water supply and sanitation, environmental protection, and flood risks [50]. The environmental quality of water is important not only for ecosystem health and quality of life in general but also for income growth. In urban areas, environmental pollution from urban wastewater has resulted in toxic waterways and polluted beaches/coastal waters, with impacts on economic activities.

Vietnam has undergone rapid urbanization but due to difficult economic conditions and limited investment in urban infrastructure systems (e.g., urban water supply, wastewater collection and treatment), the result has been a limited capacity of the water sector to meet growing needs, particularly in urban areas. The lack of technical infrastructure for wastewater treatment as well as the use of many inappropriate wastewater treatment technologies have led to a situation where untreated urban wastewater is discharged directly into the environment, thus creating a great challenge for urban areas. This is a consequence of a long history of neglect of sewerage and wastewater treatment by municipalities. As with urban water supply, there is no sector investment plan. Urban sanitation services have suffered from a lack of financial resources, with providers largely dependent on operational grants from the Provincial People's Committee (PPC). Most investments in the last decade have been donor-funded and provided via projects in selected locations, but management of sewerage remains a largely undeveloped sector for the country as a whole.

Findings from the voluntary national review of SDG implementation

According to the latest voluntary national review of the implementation of SDGs, the seventeen global SDGs have been nationalized into 115 Vietnam SDG (VSDG) targets based on Vietnam's development context and priorities. These targets also consider other international commitments, which are elaborated in the National Action Plan for Implementation of Agenda 2030 for Sustainable Development. The VSDG Action Plan and the nation's voluntary review have mandated that the SDGs must be integrated within the formulation of social-economic development plans at all levels (country, ministries, sectors, localities, agencies) starting from 2020 to prepare for the period from 2021-2025. According to Vietnam's review of its implementation of VSDGs, some of its targets are ambitious, and some targets still lack technical and institutional guidelines for implementation (meaning both technical know-how and management mechanisms for the translation of some targets to the national context). The process therefore will call not only for financial resources but also for a process or practice that involves better mechanisms to make use of innovative solutions for water management issues in urban areas, so that even with limited resources, the localization of SDGs in Vietnam will be achieved.

Regarding SDG 6 and SDG 11, the target ratio for wastewater collected and treated properly has been set to >50% by 2030 for Category II and above cities (the current level is 12.5%), which is an ambitious target that will require greater resources and many improved initiatives in order to be met. Concerning SDG 13, climate change adaptation measures are often proposed separately for individual sectors and regions rather than integrated in a way that can improve the

resilience of the affected areas, as is promoted in SDG 13. The integration of climate change and natural disaster considerations into development strategies, plans and planning has been formalized through various legal documents and directives; however, the integration process remains inconsistent and lacks many proper guidelines.

In the past decades Vietnam, with the support of international donors, has achieved some reform of and made investments in the water sector in order to meet MDG and SDG commitments. As Vietnam has acquired middle-income country status, the nature of donor investment is changing. Official development assistance will become less available and will be structured differently, with reduced levels of grant financing and concessional loans. The country is therefore seeking increased investment from the private sector in both urban and rural water supply and sanitation, which is why the introduction of the decree on public-private partnerships is required. Until now, few public utilities have been able to access commercial finance. A critical obstacle here is the difficulties that utilities face in obtaining government guarantees.

Current management situation for water and sanitation services

Each province and city in Vietnam has its own institutional management model for urban services. Service providers may be state-owned enterprises (SOEs), single owner companies (public), joint stock companies (mainly public), or private companies. They may have service provision delegated to them along with service contracts, or they may operate without contracts. Service contracts are typically very basic, with limited service obligations and a one-year lifespan; very few of them are performance based. Most urban sanitation enterprises operate their systems under the mechanism of a work order from the city authority and are paid directly from the city budget. The current practice of providing these enterprises with a fixed annual budget for operations does not allow them to invest in research and development or in the optimization of their wastewater management systems.

Standards, monitoring and regulation: Currently, there is a lack of standards for measuring and benchmarking the performance of sanitation enterprises and improving coverage in small towns and cities. The absence of reliable monitoring data, weak regulation and a lack of progress in implementing policy directives on service provider autonomy and commercialization are critical challenges.

Wastewater tariffs: The collection of wastewater tariffs following the current decree is not high enough to pay for the O&M of sewer and wastewater treatment plants (collected tariffs only meet about 20–30% of the wastewater treatment costs). For example, Ha Noi city collected roughly 9 million USD/year from wastewater tariffs, but the O&M cost is about 44 million USD/year. The tariff for domestic wastewater is 10% of the selling price of 1 m^3 of clean water, excluding value-added tax. If necessary, People's Councils of Provinces cities could exercise their authority[16] and decide on specific tariffs suitable for local situations (this is yet to be applied in any city).

The wastewater tariff is built on the principle of "polluter pays" in order to motivate enterprises and households to reduce pollution and, at the same time, create a revenue source to pay for wastewater collection and treatment. The cities Ha Noi and Ho Chi Minh City currently apply only the wastewater tariff, which is too low to offset drainage management and/or wastewater treatment costs, while over 20 other smaller cities have applied in parallel the wastewater

16 People's Councils have the authority by law to adjust the tariff according to local conditions (either increase or decrease). Despite this, they rarely use their authority to adjust the tariff to fully reflect the real costs, often keeping tariffs at current rates and using other government subsidy systems to supplement the full costs of wastewater treatment.

tariff on household discharges directly to the environment (i.e., those without a collection system) as well as the drainage fee for households connected to drainage system (see decree 80/2014/ND-CP on urban drainage and wastewater treatment) [51]. The drainage fee is often higher than the wastewater tariff. Decree No. 154/2016 / ND-CP (recently replaced by decree 53/2020/ND-CP) stipulates that the collection of wastewater tariffs is delegated to localities, while the Department of Natural Resources and Environment (DONRE) collects environmental protection fees for industrial wastewater, and the clean water providers or the People's Committees in communes and townships collect environmental protection charges for domestic wastewater. The People's Committees in townships and cities are permitted to deduct 10% of the total domestic wastewater tariff and 25% of the industrial wastewater to cover the expenses of tariff collection (labor and administrative fees). The remainder is paid to the local budget for environmental protection activities.

Sanitation technology: In the Ministry of Construction's (MoC) action plan, there are actions targeted to energy savings and resources recovery in the wastewater sector. Now is the appropriate time to consider advanced technology in the sanitation sector that helps with cost recovery and reduces O&M costs, with the aim of making the sector attractive and sustainable in the long run.

Financial incentives: Considering the disparity in Vietnam between private capital funding of water supply companies and that of sanitation and wastewater services companies, it is evident that providing water supply is more attractive than providing sanitation. This is because the willingness to pay for clean water is much higher than it is for wastewater and sanitation service. In addition, the regulatory framework allows for higher pricing on water supply (within a government subsidy framework) compared to the wastewater tariff (fixed to 10% of the water supply pricing), while the cost to treat 1 cubic meter of wastewater to meet discharge standards is comparable to that of clean water treatment, if not higher. Thus, consideration should be given to innovative financial incentive mechanisms for sharing the burden between clean water supply and wastewater collection and treatment. Such schemes could involve:

- rewarding investors with water supply development contracts (which enjoy higher rates of return) in exchange for a commitment to develop sanitation systems (which have lower rates of return); and/or
- a lower land-use tax for developers applying green infrastructure that supports the treatment of stormwater and wastewater.

Assessment of water-related SDG localization in three cities in Vietnam

VAWR conducted assessments of water-related SDG localization in the cities of Vinh Yen (Vinh Phuc province), Vinh (Nghe An province) and Quy Nhon (Binh Dinh province).

The findings from Vinh Yen are representative of many secondary cities in Vietnam. The city lacks inter-sectoral management of water-related infrastructure, which would encompass wastewater, clean water, stormwater, sustainable development, citywide water resource management and development of green infrastructure connected with water management, while also accounting for the impacts of increasing urbanization and climate change. With the current administrative structure, it is difficult for the city to coherently develop this kind of integrated urban water management. The reasons for this are:

- Different planning phases for different sectors result in different implementation plans, which ends up causing disruptions in fulfilling the potential of infrastructure projects.

- Different investment criteria for different areas and different donors (with several sources of funding including ODA, central government funds, provincial funds and PPP) resulting in mismatches in the setting of priorities. Therefore, the planning law framework at the national level was put in place to ensure that development projects are coordinated to generate the desired impacts.

- Approaches to developing shared technical infrastructure (e.g., water, electricity, telecommunications) lack the necessary mechanisms to enforce the sharing of investment and O&M costs between different sectors.

Holistic and integrated planning has been expressed in Vietnam's action plans (VSDG, Green Growth, and Climate Change Action Plans). Therefore, a strong coordination effort is needed, especially in uniting different action plans and planning processes with consideration given to available financial resources and the cities' visions for making the plans work in localized contexts. In Vinh Yen, a promising effort to improve urban water management is the Vac lagoon development [52], which is happening through several phases of different projects that are coordinated with each other. This program is a prime example of how multiple measures can effectively be integrated.

Fig. 37: Secondary and tertiary cities are regional centers of trade and development

4. Shaping water-sensitive urban design in three pilot cities

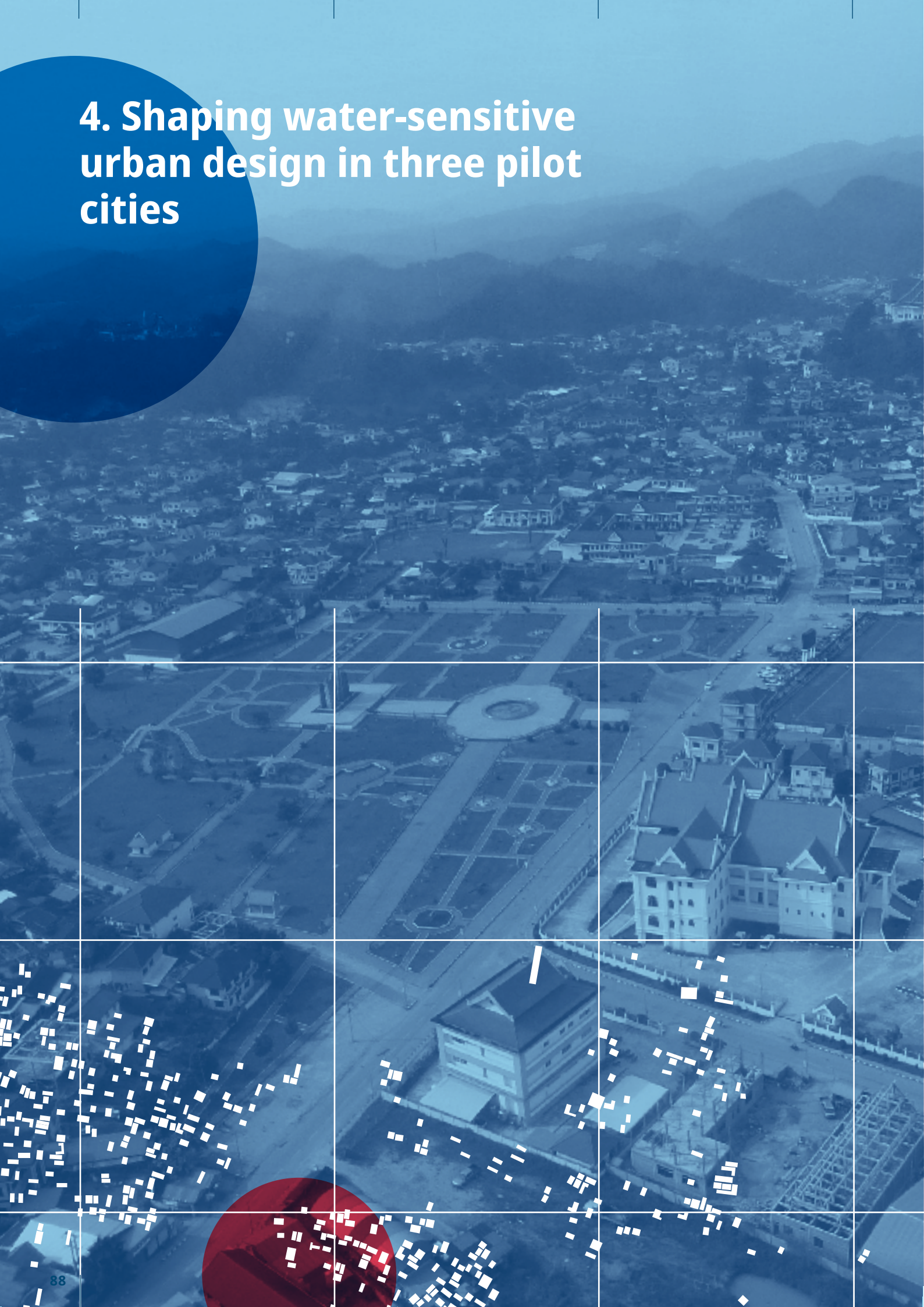


Fig. 38: Map of PolyUrbanWaters Pilot Cities

The PolyUrbanWaters project works with polycentric approaches to water-sensitive urban management in **three pilot cities: Kratié (Cambodia), Sam Neua (Laos) and Sleman (Indonesia).** The three pilot cities represent a broad cross-section of different contexts in terms of size, urban water resources challenges, urban scales, governance schemes, cultures, transformation models and financing capabilities at government as well as community level. In working with these cities, the project aims to reflect a large number of realities faced by secondary and tertiary cities in SEA. The project team has already begun to initiate a local-level, multi-faceted cooperative management approach that demonstrates the project's value proposition to decision makers, fosters trust within the scientific network, and establishes a basis for solid working relationships. During the Definition Phase, the project team specified the conceptual and methodological design of the approach to urban water resources management within the pilot cities, in turn facilitating the relevant decision-making processes between the multiple stakeholders.

The methodological approach of the project enables working with local stakeholders to gain comprehensive knowledge about water resources in the cities and develop strategic management approaches for a transition towards water-sensitive cities. The benefit of such a methodological approach is its scalability and transferability for other secondary and tertiary cities in the region.

Together with the three pilot cities, PolyUrbanWaters intends to co-create water-sensitive urban development scenarios to foster urban resilience and support the localization the localization of the SDGs. Combining urban design and integrated water management, the project seeks to develop tools and instruments for cross-sectoral cooperation that bridge existing silo approaches by bringing together different sectors and relevant stakeholders, such as public entities, private sector, communities, civil society and academia.

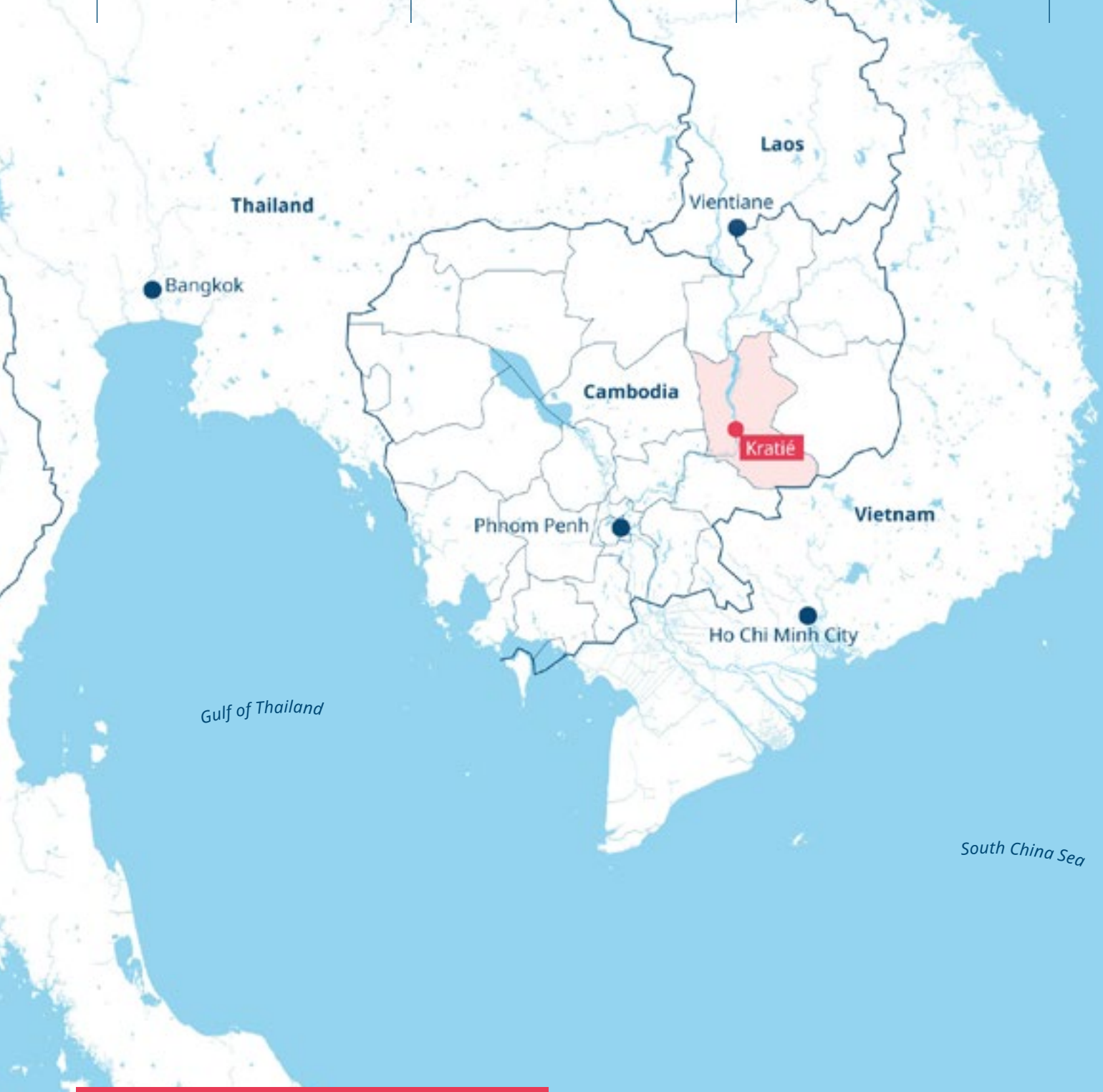
How PolyUrbanWaters will support the development of water-sensitive cities

The focus of the PolyUrbanWaters team lies on the development of tools and instruments for future-oriented strategic urban planning. In the pilot cities, these tools and instruments will enable the assessment of water-related risks and opportunities as well as support the development of a water-sensitive and resilient urban concept based on the localization of the SDGs in the relevant contexts. The development of tools and instruments will be embedded in participative processes and supported by capacity building activities to aid the pilot cities in understanding and developing resilient and transferable strategies towards the localization of the SDGs. As a result, the cities will be guided in modelling alternative urban development scenarios and co-developing strategies for near real-time urban transformation.

With the elaboration and regular refinement of development scenarios, including business-as-usual and water-sensitive scenarios for 2030 and 2045, water-relevant approaches to urban development can advance beyond single-sector decision-making practices. The scenarios consider a multitude of possible trends in urban development together with patterns of water availability and water consumption. Scenario-based planning can be seen as a vision building process that fosters a comprehensive understanding of development opportunities at various urban decision-making levels. The output of the proposed approach is a multi-scale plan for the future, developed for and by the people of the pilot cities, which includes and protects local resources in an environment that is undergoing both social-economic and climatic changes.

The desired outcome of this entire process will be the incremental implementation of the SDGs (especially SDG 6 and SDG 11) on a local level in the pilot cities. This process will build on ongoing initiatives at the local and national government levels and encourage the formulation of transition pathways to coordinate these complex multi-stakeholder processes. Therefore, local capacities will be strengthened and local municipalities empowered through co-production processes to carry out SDG implementation.

Fig. 39: Localization of the SDGs in the urban context



Kratié, Cambodia

Location:
Central Cambodia

Municipal Area:
approx. 88.6 km²
(land area 72 km²)

Population:
32,012

Population growth rate:
0.75% per year

Density:
622 people/km²

Communes:
5 *Sangkats* (Krakor, Krachech, Roka Kandal, Ou Ruessei, Kaoh Trong)

Villages:
16

Fig. 40: Location of Kratié

Kratié, Cambodia

Kratié is a regional city and important node for regional trade, located approximately 220 km northeast of the Cambodian capital Phnom Penh.

Kratié is located on the riverbank and floodplain of the Mekong River, meaning that large seasonal floodplains surround the city. The water acts as both a great opportunity and threat for a city that must cope with regular riverine and flash flood events. These flood events, which are likely to increase in frequency and intensity due to the effects of climate change, cause many development challenges such as reduced economic capacity (the city essentially shuts down) as well as increased pressure on existing systems related to mobility and transport, public health, waste management and socio-economic development. Planning for flooding exceeds the city's technical capacities; when floods occur the city mainly provides support in the provision of food and medicine, especially to poorer communities.

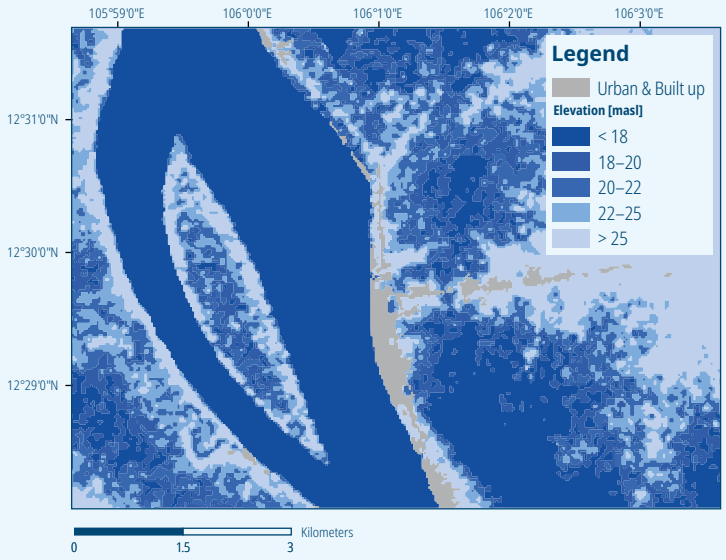
Figures 40 and 41 present the topography of Kratié and its mean monthly precipitation and temperature. The figures illustrate the flood-prone character of the city, highlighting low-lying areas.

The demand for quality provision of water from public services in Kratié is constantly increasing due to changing expectations as well as population growth. Wastewater, solid waste and sanitation management services in the city are struggling to keep up with the increased demand. In parts of the city, these services are completely lacking; in fact, there is no comprehensive waste collection and management system in place. There is a need for strategic planning to further develop the city's wastewater strategy and strengthen its flood resilience in order to improve livelihoods and provide business and investment opportunities – all while operating within a strategic framework that manages wastewater and flood events in a holistic way.

Cambodia lies at an important geographical junction that links the Southern Economic Corridor (SEC) and Central Corridor of the Greater Mekong Subregion (GMS) Economic Cooperation Program, which was adopted by the GMS countries in 1998 to accelerate the pace of sub-regional economic cooperation. Looking to the future, Kratié, as a Regional Economic Corridor City (REC), has geographical advantages and potential to become an engine of economic growth in the region, due to its market accessibility, transport connectivity, economic density, level of urbanization, and human capital.

Fig. 41: Topography of Kratié [53],[54]

Fig. 42: Mean monthly precipitation and temperature [55]



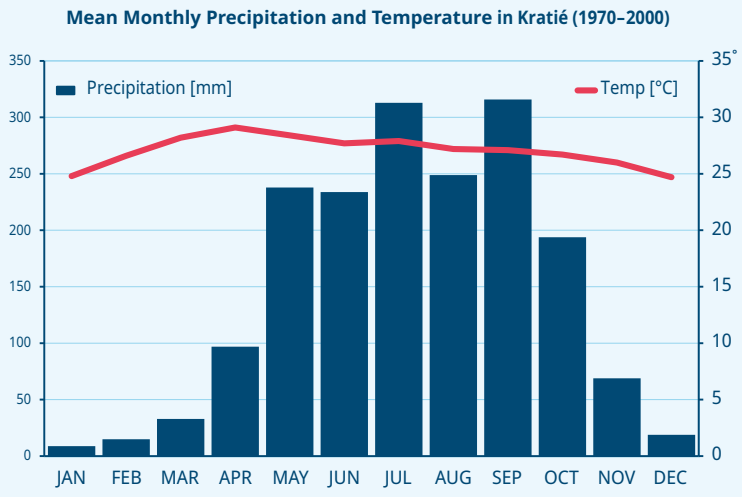


Fig. 43–46: Living with water in Kratié: The city's close relationship with its water resources and flood prone character are represented in the local architecture and riverbank erosion is a constant threat to infrastructure

Fig. 47: Urbanization process in Kratié 1984–2018 [56]

Fig. 48–51: Ongoing infrastructure development in Kratié (urban expansion area and construction of new roads)

Fig. 52–53: The growing social-economic activity in Kratié that has led to greater resource management challenges associated with the interconnections between urban planning, solid waste management and integrated water resources management

The role of Kratié as a REC enables it to grow (continue to urbanize) and prosper in terms of provincial and regional economic importance, and the GMS cooperation program can support the city in unlocking positive developmental forces that benefit the local population, country and region.

The city is identified as having high economic potential [57] and is striving to develop its capacities for tourism and new investments. Various international investors are currently driving the transformation processes within the city through major investments such as road construction and upgrades, an urban extension project which involves roads that also serve as dikes and the backfilling of a lake, and the proposed ADB wastewater treatment project [58]. These anticipated developments, in addition to the numerous multi-level residential buildings under construction, are expected to bring positive economic changes to Kratié, but may add additional pressure on already challenged existing systems, so that they may be even more vulnerable to future flooding events (e.g., through the reduction of natural floodplains).

The ability of local governance to effectively guide these large urban transitions is limited due to the following aspects (see the summary from CIUS for more information, Chapter 3.1):

- lack of financing;
- concentration of decision-making powers at the national level;
- lack of technical capacity; and
- weak regulatory and enforcement environment.

How can we work towards a water-sensitive Kratié?

The tools and strategies co-developed through the PolyUrbanWaters project will give the city the opportunity to develop in a way that reduces its vulnerability to the dynamics of the larger water bodies around it (see Fig. 45). As a result, Kratié will be able to further develop its capacity to effectively handle and manage its various water processes, thus generating desirable benefits across sectors and ultimately enhancing the city's functionality and livability. This can be reached primarily through interventions to improve integrated urban planning capacities involving the thematic priorities (as stated by partners and stakeholders) of flooding, wastewater handling, stormwater drainage and the growing relevance and importance of working with priority SDGs.

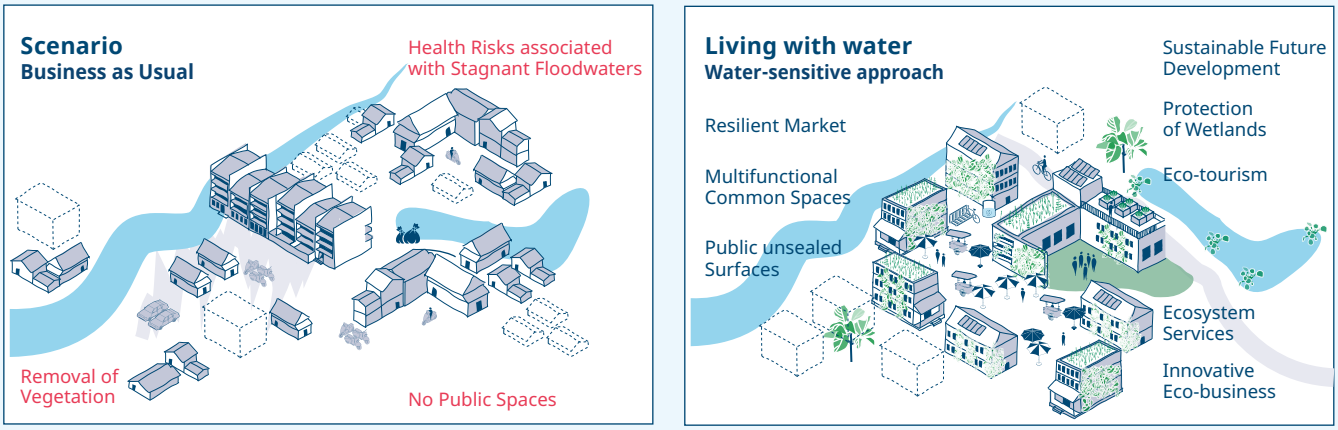


Fig. 54: Urban planning for Kratié: Vision model comparing a "business as usual" scenario to a water-sensitive approach

Sam Neua, Laos

Location:
Northeast Laos, Houphan Province

Population growth rate:
0.8% per year

Population (2019):
city 17,000; urban area 30,000

Villages:
12

Fig. 55: Location of Sam Neua

Sam Neua, Laos

Sam Neua is the provincial capital of Houphan Province, located in a mountainous region in the northeast of the Democratic Republic of Laos. The city has a rich cultural heritage and is an important regional node, due to its location on National Highway No. 6, which connects to the nearby border with Vietnam.

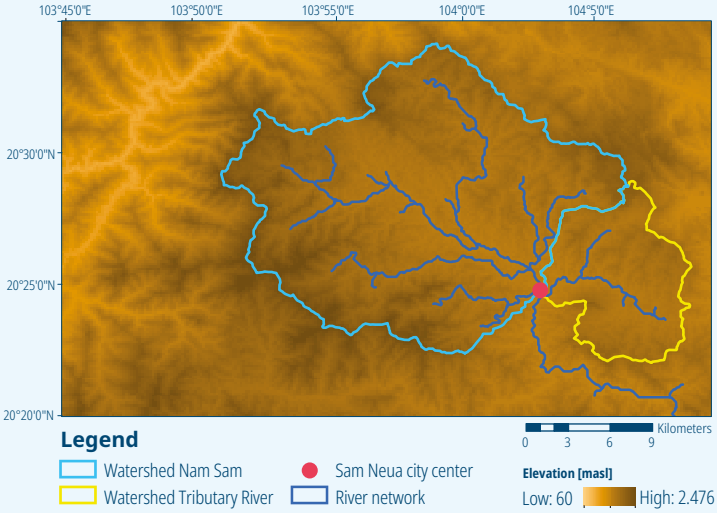
The region is expected to undergo major socio-economic changes, accelerated by the construction of an international airport 30 km from the city. Sam Neua is located on the planned Northeastern Corridor of the Greater Mekong Subregion (GMS) Economic Cooperation Program. According to the SDC (2018), "*if the northeastern section of the China-Indochina Peninsula Economic Corridor through Sayaboury and Sam Neua materializes, the importance of these towns would certainly increase, which could have significant implications for population growth and urban development*". These expected changes include an expanding population and the opening of Sam Neua for international tourism. Multiple national and international investors are already driving transformation processes within the city through the construction of larger hotels and real estate developments. While changes can bring positive economic development to the city, they are also expected to challenge existing systems, in particular those related to urban water resources.

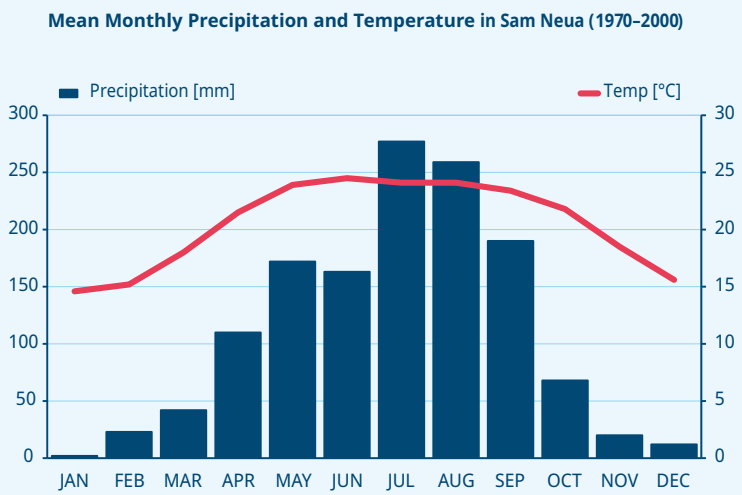
Sam Neua lies on the banks of the Nam Xam River, which has a water catchment area of 338 km² upstream from the town (its tributary has a watershed area of 81 km²). The river's water quality decreases noticeably after passing through urban areas, which is mainly due to an open canal drainage system in Sam Neua that discharges directly into the river. Although a basic assessment in the urban area indicates that 95% of the inhabitants have access to water and sanitation services, the treatment of wastewater remains a key challenge. Furthermore, although the majority of households have septic tanks, there is no centralized wastewater management system. During heavy rain events in the rainy season, localized flooding occurs on a regular basis.

Figures 55–57 show the region's land cover, topography and Sam Neua's mean monthly precipitation and temperature. The figures illustrate a mountainous region with a humid subtropical climate.

Fig. 56: Topography of Sam Neua [53]

Fig. 57: Mean monthly precipitation and temperature





While sufficient treatment of wastewater remains a challenge for Sam Neua, an additional challenge awaits the city if it continues along its projected development path. Since 1998, Sam Neua's water supply has been sourced from two stream intakes (Houay Dam and Houay Hin Men), which were considered to have an combined estimated long-term yield of 2,500 m³/day (allowing for an environmental base flow all year round). Since 2015, water demand during dry seasons has exceeded the water supply, leading the city to implement a rationing plan where water is allocated by zone and time of day. Sam Neua's current water demand is around 5,000 m³/day and is expected to increase continuously in the future, reaching an estimated demand of 11,300 m³/day in 2041. To satisfy this growing water demand, the ADB is funding an additional extraction project on the Nam Xam river in Sam Neua that will increase the city's water supply capacity by 8,800 m³/day [58]. However, drought-related issues have forced the ADB to adjust the extraction method. The question remains: For how long can the increasing demand of a growing Sam Neua be met?

The main functions of urban planning in Laos are to guide development and urban expansion as well as to protect the community, including environmental and cultural resources. Urban planning is predominantly a centralized, technical activity, with some relegation of powers and tasks to sub-national levels and various participatory mechanisms. Resource allocation decisions are also made centrally. Accordingly, for the purposes of understanding the overall urban planning situation of Sam Neua, national policies and strategies are central guiding instruments as they provide a background narrative for urban planning and development processes for all sub-national and local administrative units.

For the purposes of urban planning and administration, Sam Neua's urban area[17] comprises 12 of the 103 villages in Sam Neua District. A top-down approach remains predominant, with the Office for Planning and Investment (OPI) leading planning processes and activities. The principal planning instruments are the Master Plan and the 5-Year Socio-Economic Development Plan, which correspond to the five-year National Socio-Economic Development Plan. The stated vision of the current plan is: Sustainable development of Sam Neua District into a center of trade, services, culture and tourism-related goods production while simultaneously protecting the environment.

Despite the existence of a Master Plan and 5-Year Socio-Economic Development Plan, it appears that planning is not effectively being put into practice. Essentially, new urban development is uncontrolled, and is strongly influenced by private-sector property development. Furthermore, plans that have been prepared and budgeted for are not always implemented.

In effect, planning in Sam Neua appears to be largely practiced reactively rather than proactively, meaning that spatial designs and regulatory frameworks have to be redressed as urban development speeds forward without any managed approach[18]. Compounding this complication is a lack of coordination among the departments involved in development planning.

17 There is no solid definition of what constitutes a town or urban space in Laos PDR. This is a key issue because in order to define where and how to work in urban areas, there is a need to have a common definition and understanding of what "urban" means [59].

18 As evidenced, for example, by the situation of Sam Neua´s new residential expansion area, where building is taking place despite the lack of a formal planning process and plan (according to city planning staff).

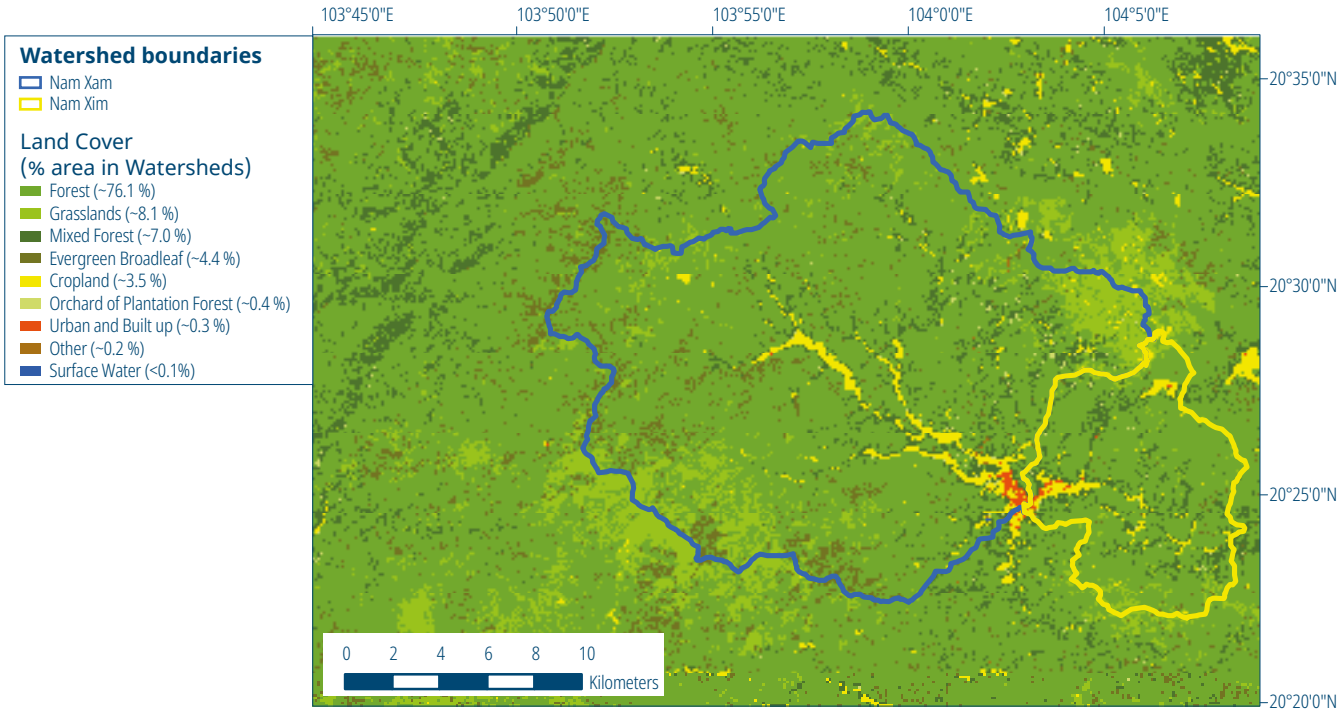


Fig. 58: Land cover of Sam Neua [54]

Fig. 59: One of the main roads in Sam Neua and central services located along the street

Fig. 60: A major new urban expansion area in Sam Neua

Water-sensitive Sam Neua: a development opportunity for the city

Several investments in Sam Neua could have a huge impact on the city: the new airport, new provincial hospital, new construction sites funded by international investors and an effectively unplanned city extension, where construction activities have already commenced.

The forces driving these investments can help unlock a powerful transformation of Sam Neua, which, if controlled and balanced, can have multiple significant benefits for both the public and private domains. A functional relationship between integrated urban planning processes at the District and Village administrative levels and privately led investment has tremendous potential for balanced, equitable and sustainable development in Sam Neua. This could offer opportunities for social, economic and cultural benefits as well as improved resource and energy efficiency. However, to unlock this full potential the city

Fig. 61: Sam Neua urbanization process 1988–2018 [56]

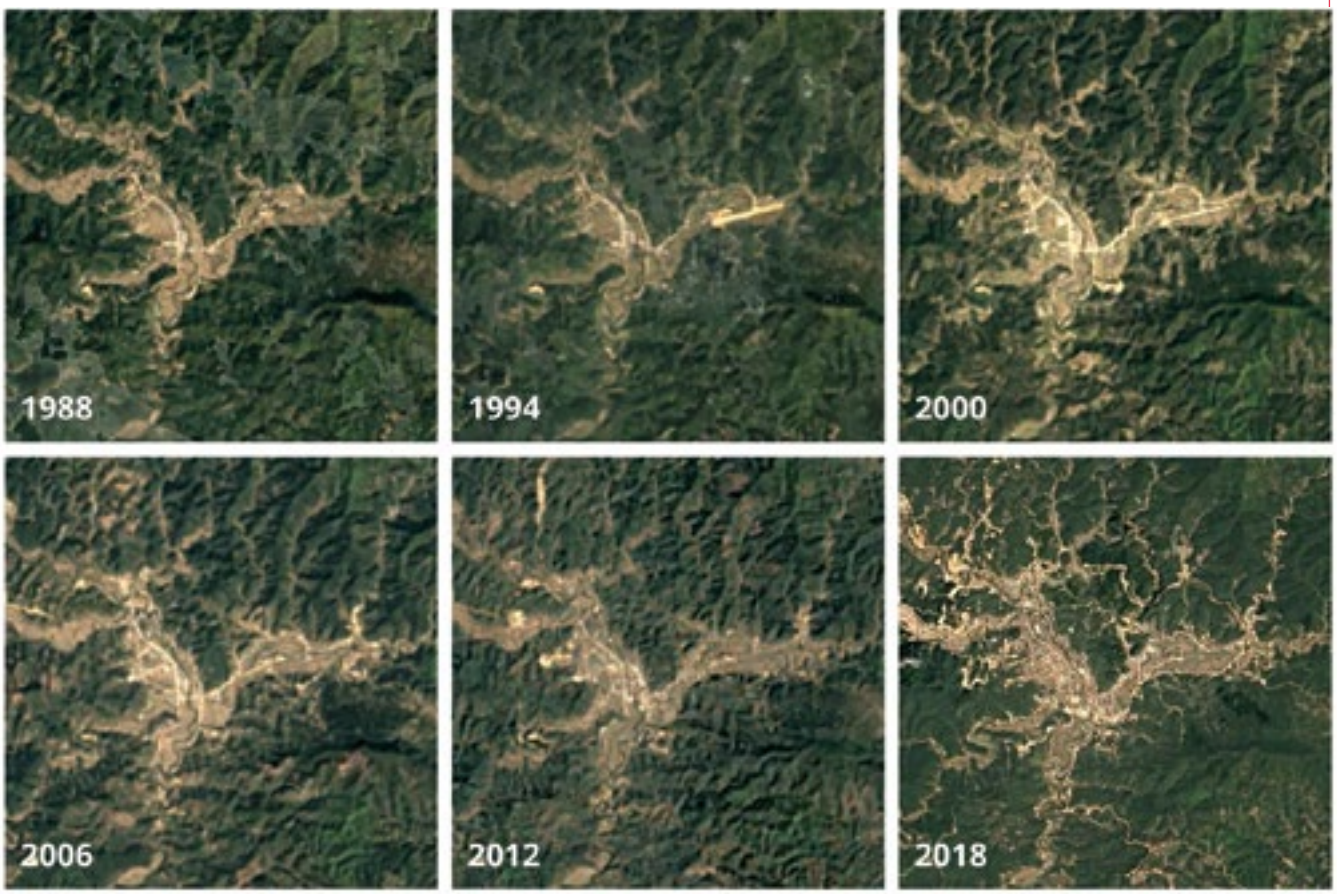


Fig. 62: A newly constructed airport with international travel connections is expected to have a major influence on the socio-economic development of the region, which is currently only accessible by irregularly scheduled domestic flights or by car over mountainous routes

needs to provide attractive settings for development with a functioning wastewater strategy and, most importantly, sufficient freshwater supply. Additionally, a proactive planning and shaping of the city's future development and its water resources is necessary to reduce inequality, achieve sustainable development and create business opportunities for local people. Furthermore, a water-sensitive urban planning approach integrates very well with the city's self-stated "green, clean, peaceful and beautiful" vision and the achievement of the SDGs at the local level. The approach presented by PolyUrbanWaters focuses on the integration of urban water resources management (wastewater and freshwater) and creates instruments for intersectoral urban planning. The aim is to enable Sam Neua to act on the opportunity to become a model city for the region, demonstrating how to plan and prepare for sustainable, water-sensitive transformation.

Fig. 62 shows a general vision of water-sensitive development for Sam Neua, contrasted with a "business as usual" planning approach. This comparison is drawn from a baseline assessment of existing water resources (availability, demand, quality), benefits from nature, urban planning approaches, planning instruments and methods, and challenges, vulnerabilities and opportunities for the city. In order to achieve the water-sensitive best-case scenario, strong stakeholder involvement will be crucial at all stages.

Fig. 63: Example of vision building in Sam Neua: "Water for the Future" using a water-sensitive approach

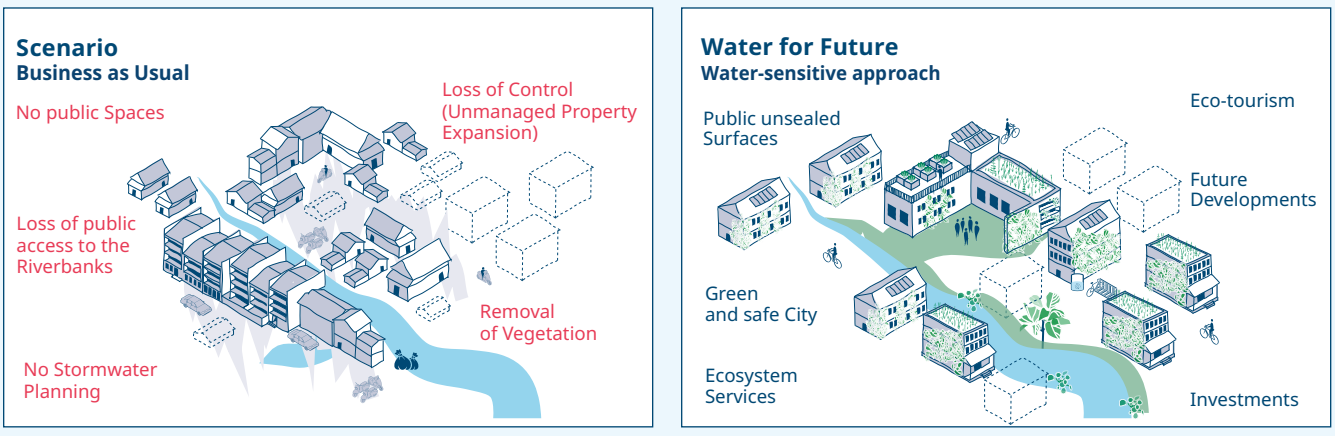


Fig. 64–65: The main market in Sam Neua is one of the most important nodes in the city, attracting regional and international merchants

Fig. 66–67: View of Sam Neua showing its urban development in the forested hills of northern Laos

Sleman Regency, Indonesia

Location:
Southern Java Island, Special Region of Yogyakarta Province

Area:
approx. 575 km²

Population (2019):
Population: 1,206,714[19]

Population growth rate:
1.29 % per year

Density:
2099 people/km²

Villages:
86

Fig. 68: Location of Sleman

Sleman Regency, Indonesia

Sleman Regency is a fast developing area located in the northern part of the Special Region of Yogyakarta Province, which is ruled by the Yogyakarta Sultanate and is the only officially recognized monarchy within the government of Indonesia. As a regency (*Kabupaten*), Sleman has urban and rural areas that administratively consist of 17 sub-districts (*kecamatan*), which are further divided into 86 villages (*desa*) and 1,212 sub-villages (*dukuh/dusun*). Agricultural and rural areas, including a national park, dominate the northern, eastern and western areas of the regency, while urban areas dominate in the southern part of the regency.

Situated just south of Mount Merapi, the most active volcano in Indonesia, Sleman is the main water catchment area for the region, which includes the Yogyakarta urban area. It is the most populated region in the province, has high migration rates and is attractive for new investments, which in turn drives transformative changes in the city. Increasing tourism and commercial development in the core city of Yogyakarta has driven urbanization upstream to Sleman. As a thriving education hub, Sleman is also experiencing high growth in rental dormitories (*kost-kostan*) along with other student-oriented amenities and related economies. Within Sleman, there are new investments planned such as an outer ring toll road, a new international airport, shopping malls, hotels and other accommodation for tourists, all of which will bring many changes to the city, and in turn, will place additional stress on the management of urban water resources. The recent drive for infrastructure development at the national level will also have a major impact on Sleman's future. A plan for a toll road connecting cities in the region (Solo, Yogyakarta and Magelang) will encourage trade and local tourism and drive urban development.

Population growth and development, combined with land use changes, can threaten the health of the hydrological systems that the region depends on. Figure 69 below presents the river network in Sleman Regency. A key issue in Sleman is poor water quality that results mostly from household wastewater entering the system and runoff from agriculture. This issue is especially significant since Sleman is a main water provider for downstream population centers such as the Yogyakarta metropolitan area. The areas highly permeable volcanic soils allow for fast replenishment of groundwater resources, which on one hand increases the supply capacity but on the other hand increases the potential that

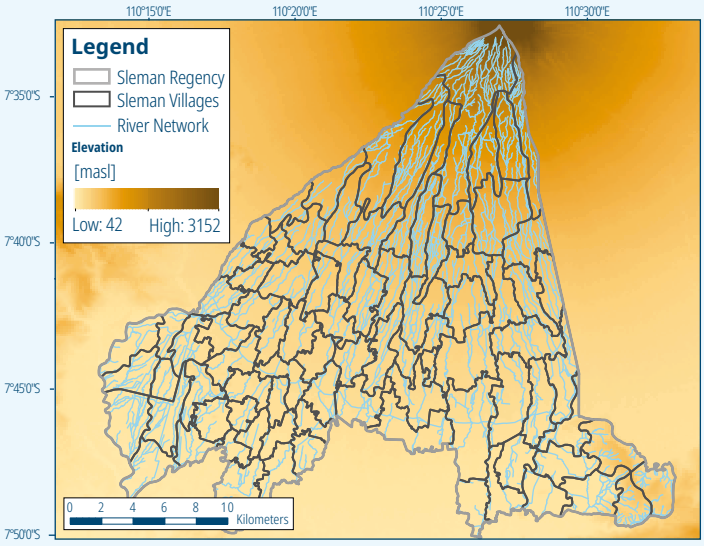


Fig. 69: Topography and river network in Sleman [53], [60]

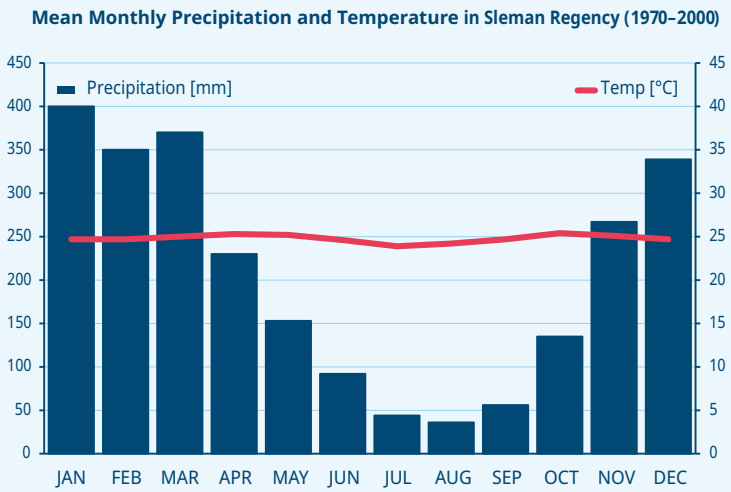
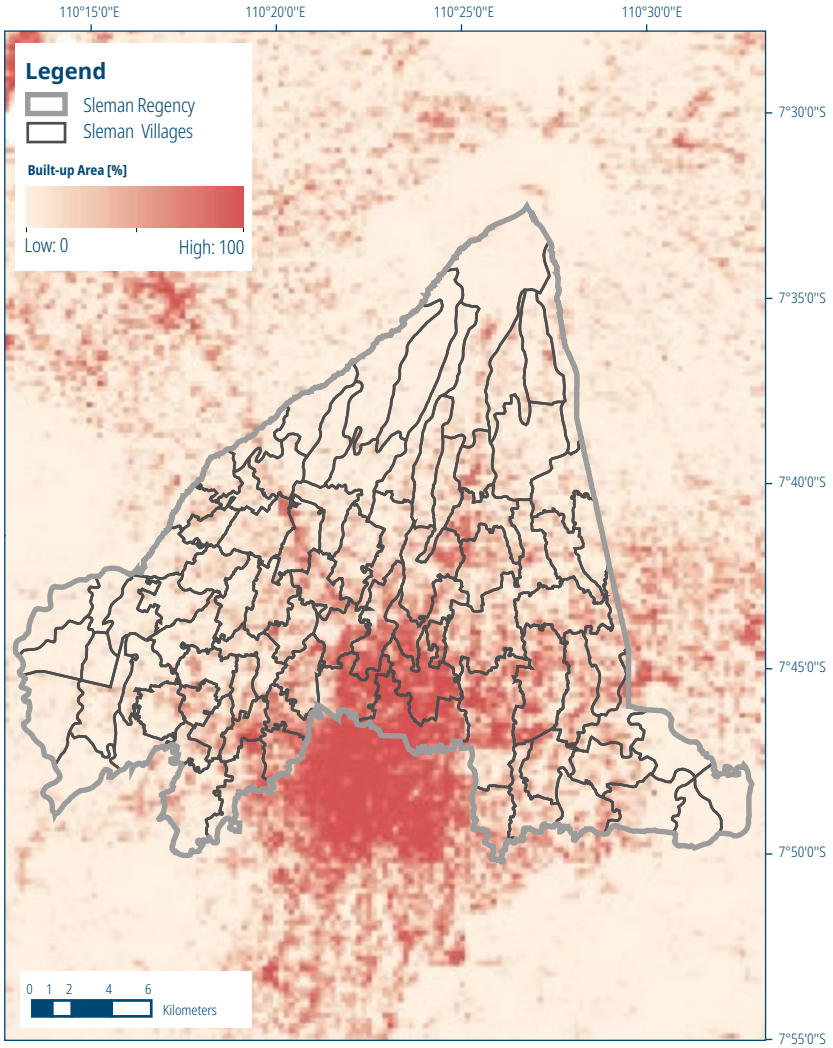


Fig. 70: Mean monthly precipitation and temperature [55]

pollutants reach groundwater reservoirs. Nevertheless, Yogyakarta's and Sleman's rapid growth in population and service-related industries and other sectors has foregrounded the strain on groundwater resources. To substitute for freshwater taken from groundwater, spring water and rivers, some communities in Sleman have begun rainwater harvesting initiatives.

Sleman has been subject to unexpected flash floods and droughts (outside of the usual wet and dry seasons) and unpredictable weather conditions, which strongly influence the revenue generated in many districts, mostly from agriculture. Despite this, no climate change adaptation strategy has been established for the city. Therefore, Sleman finds itself at a crossroads where the regency is aiming to embrace its dynamism and growth while ensuring water security for its population and for downstream users.

Figures 69–73 illustrate Sleman's topography and river network, land cover, urbanization and population density as well as mean monthly precipitation and temperature.



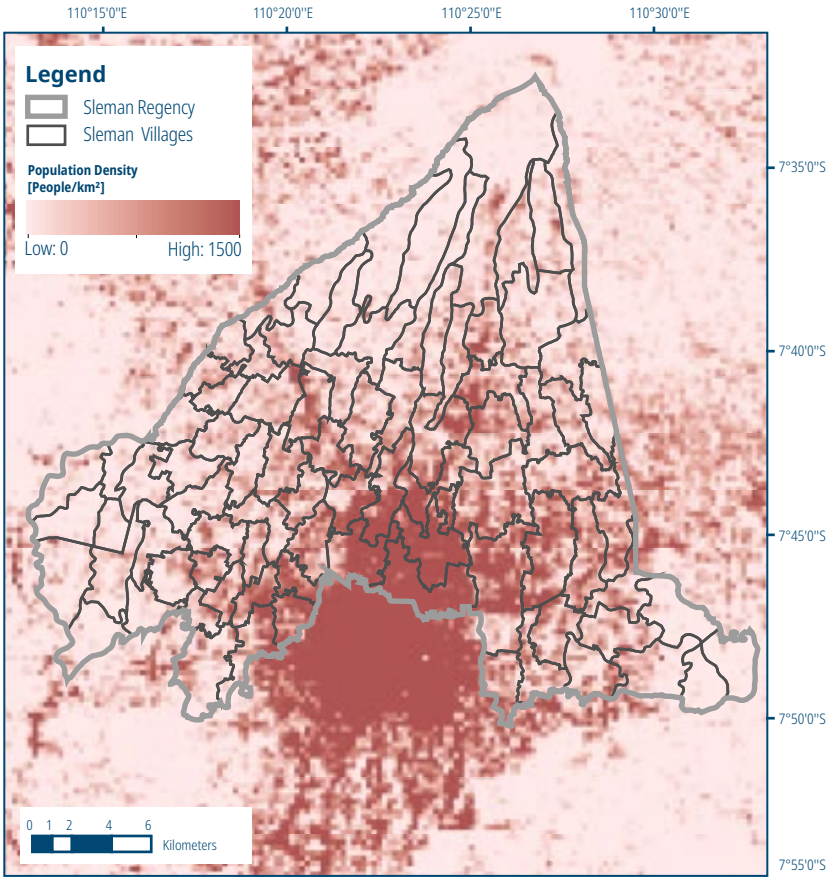


Fig. 71: Built-up areas in Sleman [61]
Fig. 72: Population density [61]

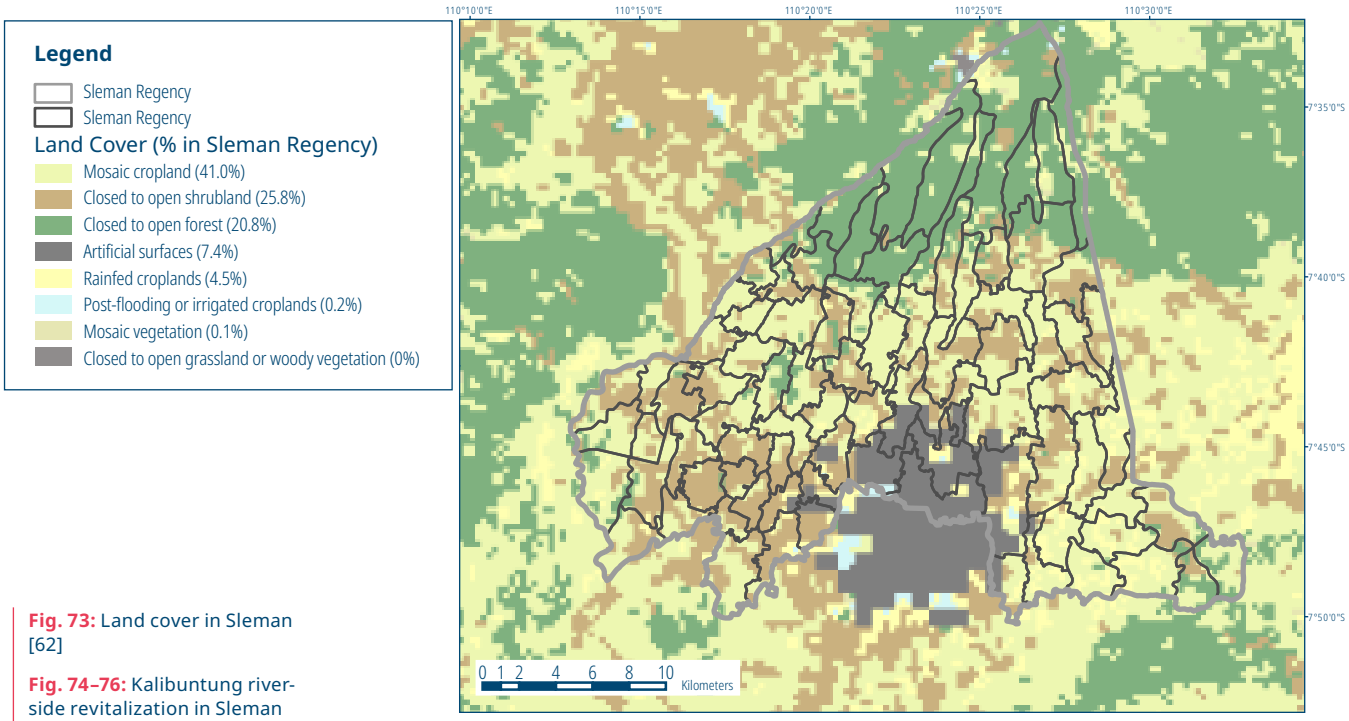


Fig. 73: Land cover in Sleman [62]

Fig. 74–76: Kalibuntung river-side revitalization in Sleman

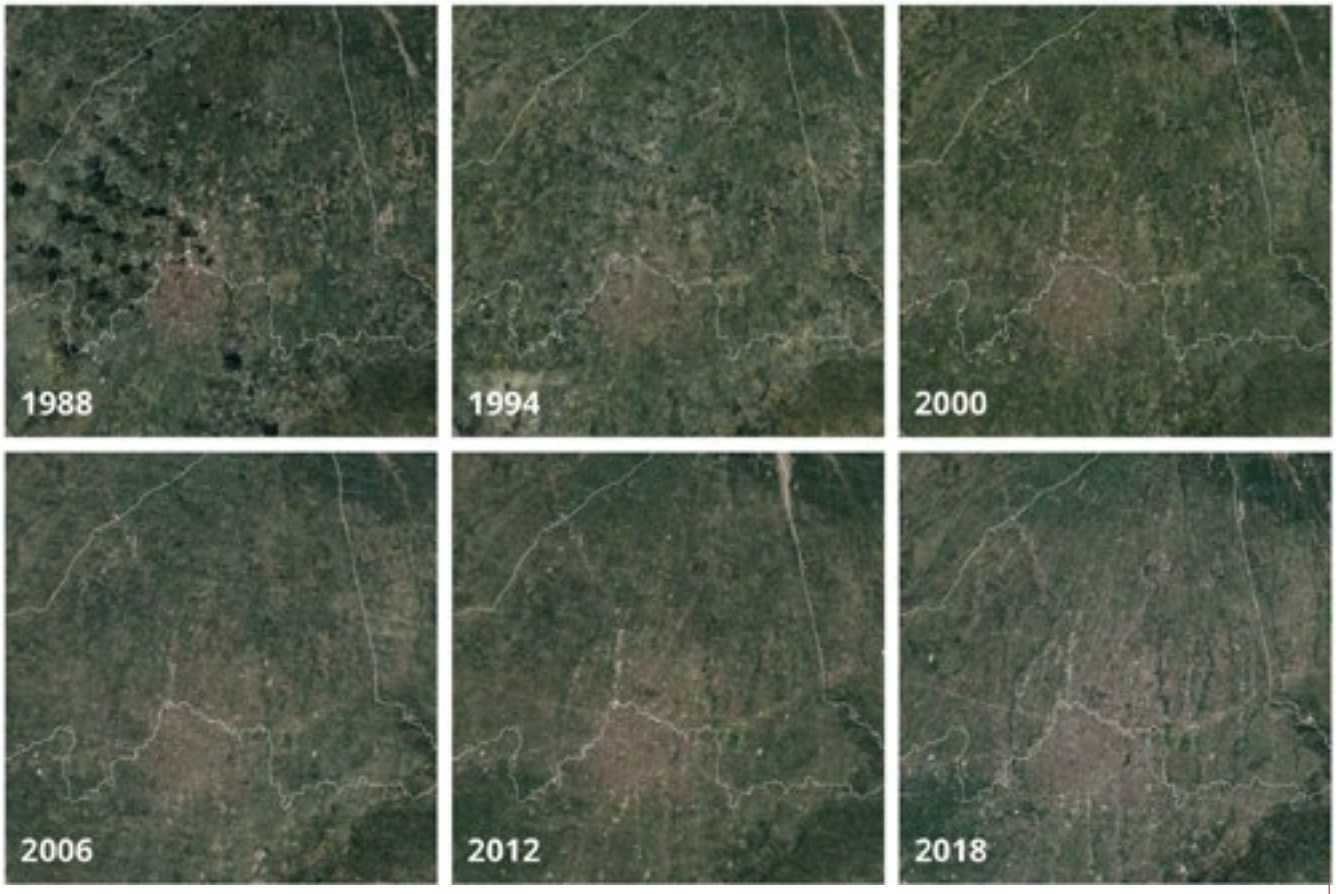


Fig. 77: Urban changes in Yogyakarta Region 1988–2018 [56]

In Sleman Regency, physical urban transformation is determined by the expansion of the City of Yogyakarta. Historically, urban expansion has typically taken place along important infrastructural axes such as arterial roads, or along the sacral north-south axis. The government currently plans to construct a toll road through Sleman Regency, which could severely impact the surrounding areas.

Fig. 77 illustrates the changes in Yogyakarta's urban form from 1998 to 2020. Urban growth from the city center has expanded predominantly to the north (Sleman Regency) and to the south (Bantul Regency).

The social and economic transformation away from an economy based on agriculture is evident from the decrease in agricultural land. According to data obtained from the provincial statistical bureau office, Sleman Regency currently has 21,840 hectares of agricultural land (38% of the region). During the period 2010-2016, the land conversion rate in Sleman was the highest in the Greater Yogyakarta Region, mainly due to newly built housing and commercial developments. In a shift consistent with land conversion in the regency, the hotel and restaurant industries now outpace agriculture as the largest contributor to local economic development.

Sleman's Spatial Planning Agency has divided the regency's territory into four areas: Urban Area, Agricultural Area, Cultural Tourism Area and Disaster-Prone/ Natural Conservation Area (Fig. 78). Even though current social and economic transformations indicate a development away from the agricultural sector, Sleman aims to conserve its traditional agricultural lands that give the regency its special character. Beyond the traditional value of the fields within the regency's boundaries, the unsealed surfaces play a major role in the management of the local water cycle and are therefore crucial for the regency as a major water provider for the whole region. In this context, Sleman aims to combine regional water provision with major socio-economic development.

North Sleman

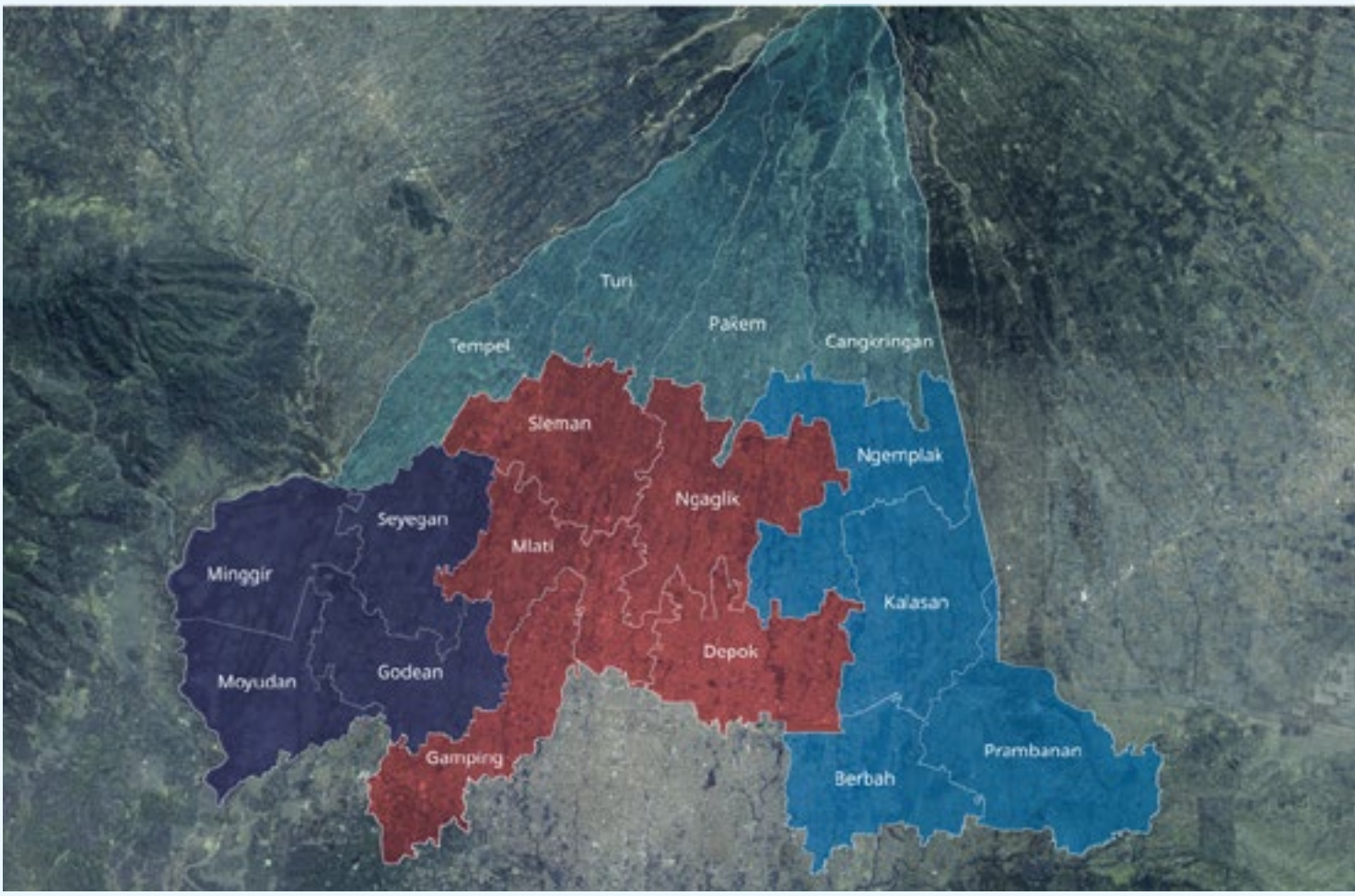
Disaster-prone and nature conservation area

North Sleman terminates at the peak of Mount Merapi, an active volcano, national park and highly-visited tourist destination in Indonesia. With steep slopes and valleys, the area is prone to disasters such as landslides, volcanic eruptions and lava flows. It plays a role as a critical water catchment area that needs to be conserved. However, growing tourism activities are putting the conservation area at risk - new hospitality developments and Merapi four-wheel drive tours encourage cut and fill developments along the slopes, which may impact water quality in the long run.

East Sleman

Cultural tourism area

East Sleman is designated as a cultural heritage conservation and tourism area due to the density of historical sites such as the Prambanan temple, Ratu Boko Temple, Ijo Temple, Plaosan Temple, Kalsan Temple and Breccia Cliffs. Its topography of rocky outcrops limits the area's viability for urban expansion. The area is also prone to water scarcity. East Sleman has one of the highest concentrations of poverty in the regency.



West Sleman

Agricultural area

Its vast flat and fertile landscape is cradled by Mount Merapi and the mountain ranges in Kulon Progo. The key driver of the economy is agriculture and the area has also been designated as a bread basket.

Fig. 78: Characteristics of the four settlement areas defined by Sleman's Spatial Planning Agency

South Sleman

Urban area

The urban area consists of sub-districts that are in close proximity to Yogyakarta – the metropolitan urban core. These areas have the highest revenue in the region, more than Yogyakarta City itself. The concentration of activities and relative proximity to Yogyakarta city makes these areas viable for new residential developments. In fact, these sub-districts boast some of the most expensive residential real estate in the province.

How can we work towards a water-sensitive Sleman?

The PolyUrbanWaters project proposes working towards a water-sensitive Sleman, as a way to embrace future-oriented socio-economic development while simultaneously respecting the regency's role as an important regional water provider. The proposed approach aims to create a development opportunity for the city, starting at the local level. A comprehensive program and technical support for creating cleaner surface water systems will generate multiple co-benefits encompassing good governance, community development, economic development and sustainable resource management. An entry point on the village level would enable the creation of transferable tools and instruments for sustainable urban development and can address the impacts of rapid and partly unplanned urbanization processes on water-relevant services in sub-districts (*Kecamatan/Desas*), especially those located along rivers.

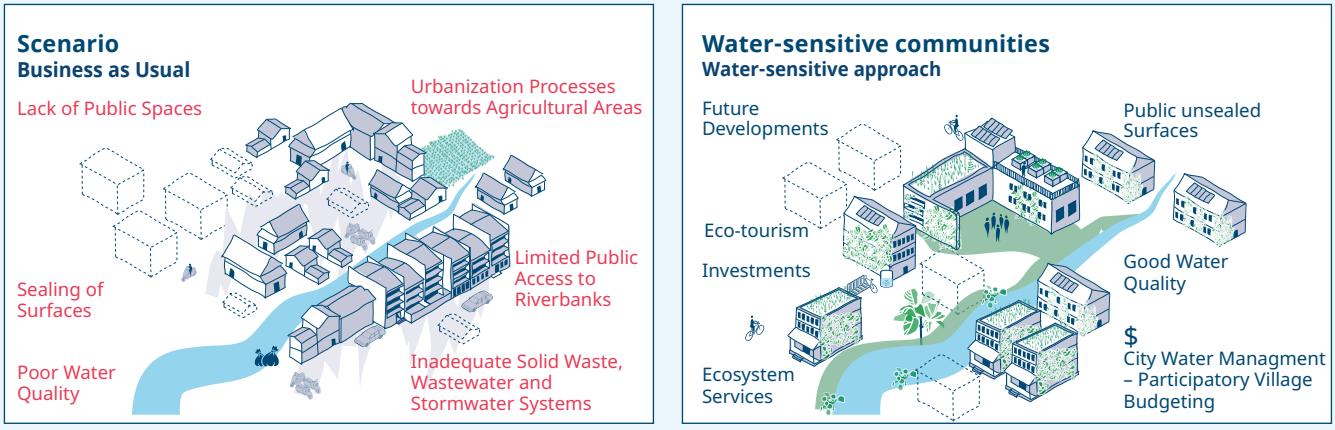


Fig. 79: Urban planning for Sleman: A vision model comparing "business as usual" to a "water-sensitive communities" approach

Fig. 80–82: Impressions of Sleman Regency Urban Area

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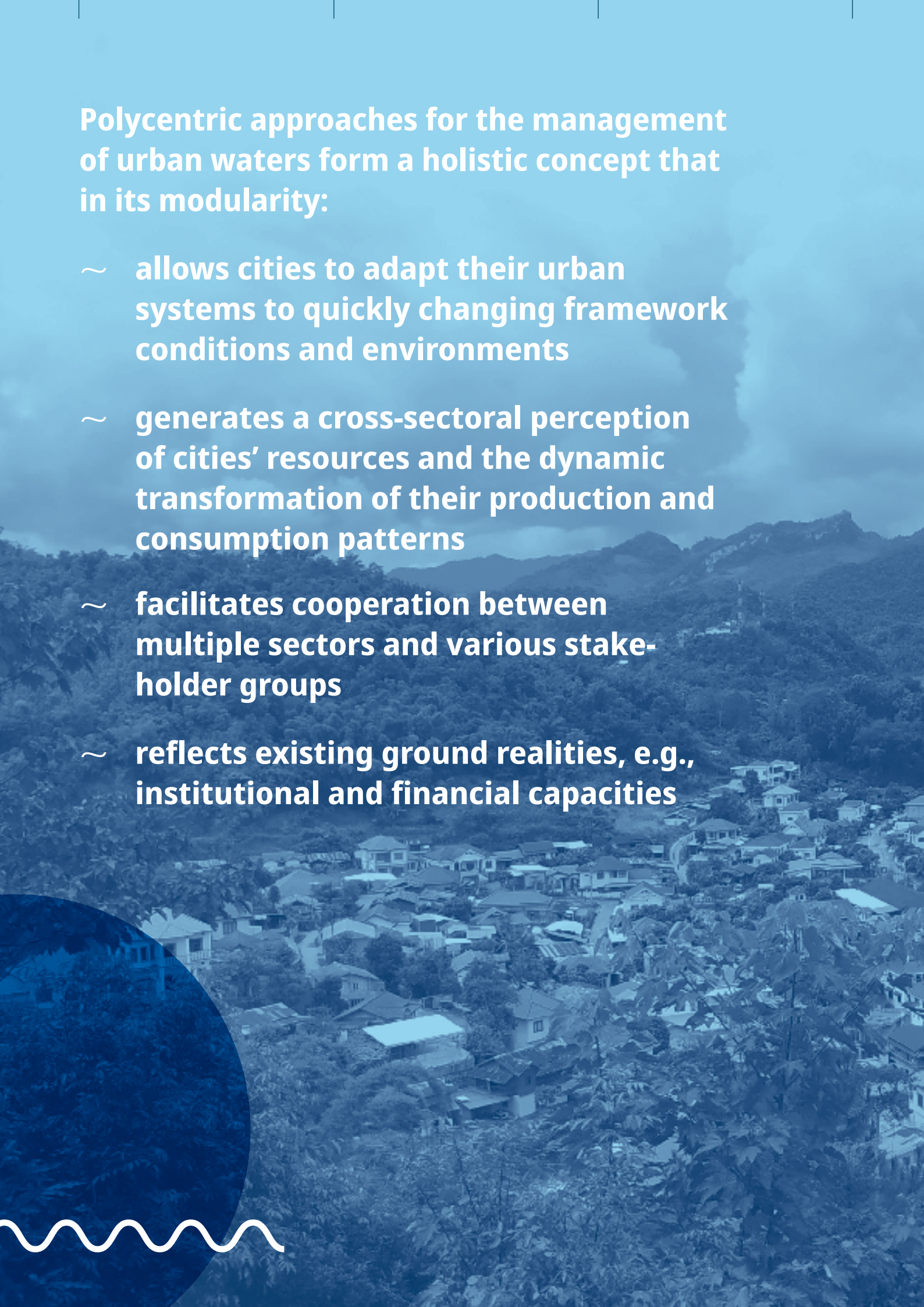
Polycentric approaches for the management of urban waters form a holistic concept that in its modularity:

- ~ **allows cities to adapt their urban systems to quickly changing framework conditions and environments**
- ~ **generates a cross-sectoral perception of cities' resources and the dynamic transformation of their production and consumption patterns**
- ~ **facilitates cooperation between multiple sectors and various stake-holder groups**
- ~ **reflects existing ground realities, e.g., institutional and financial capacities**



The PolyUrbanWaters project is developing practice-relevant tools that enable municipalities to implement polycentric approaches for urban development and integrated, cross-sectoral water management. The aim of the project is to develop new models for water-sensitive, sustainable and inclusive planning that meet the local needs and realities of urban areas.

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ISBN 978-3-00-068447-0