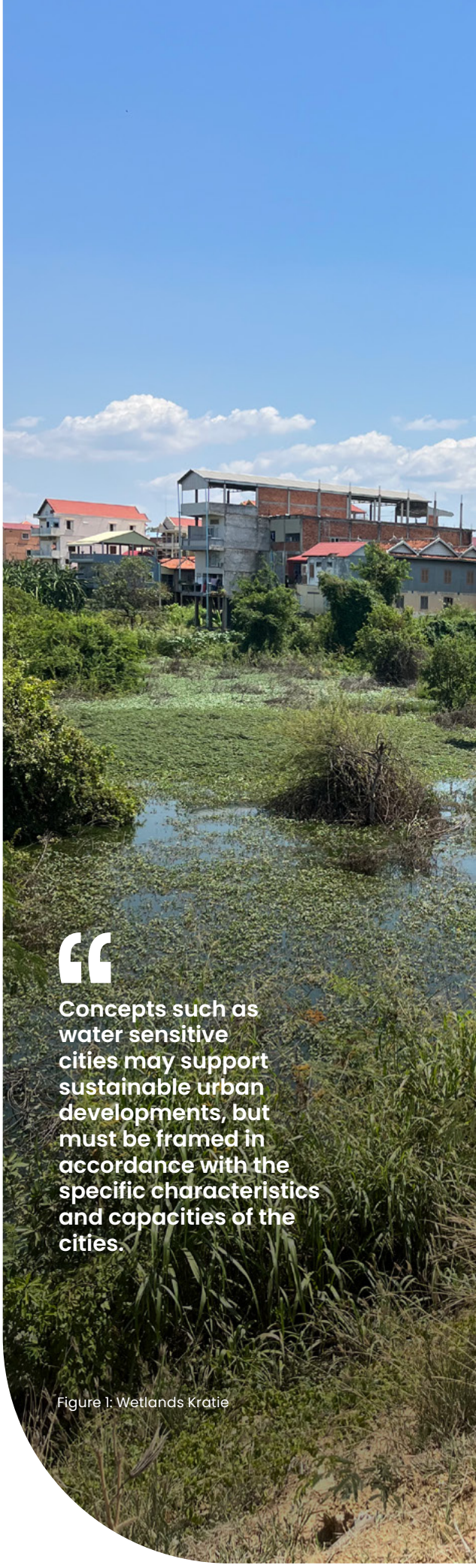
PolyUrbanWaters

Polycentric Management of Urban Waters: Responding to Water Challenges of Secondary and Tertiary Cities in South-East Asia – Preliminary Research Results and Outlook

Bernd Gutterer & Adrian Hodgson

Many secondary and tertiary cities in Southeast Asia are growing vigorously without comprehensively following urban planning guidelines. By primarily responding to dynamics in the private real estate sector, cities tend to adopt a reactive approach to such growth rather than a proactive one. This is often attributed to their limited institutional and financial capabilities, imprecise mandates, and informal decision-making frameworks. At the same time, there is a growing awareness that "water in the city" is much more than water supply and sanitation. In cooperation with three partner cities in Cambodia, Indonesia, and Laos, the PolyUrbanWaters project has identified and analysed the water-specific development characteristics of each city and elaborated approaches to effectively address these urban challenges by applying strategic, customised elements of water sensitive urban development.



> **Concepts such as water sensitive cities may support sustainable urban developments, but must be framed in accordance with the specific characteristics and capacities of the cities.**

Figure 1: Wetlands Kratie

South-East-Asia

Banyak kota-kota sekunder dan tersier di Asia Tenggara tumbuh secara dinamis tanpa mengikuti pedoman perencanaan kota secara komprehensif. Kota-kota tersebut cenderung mengikuti dinamika sektor real estat swasta secara reaktif daripada proaktif karena kapasitas kelembagaan dan keuangan yang tidak memadai, mandat yang tidak tepat, dan struktur pengambilan keputusan yang informal. Pada saat yang sama, ada kesadaran yang berkembang bahwa "air di kota" lebih dari sekadar pasokan air dan sanitasi. Bekerjasama dengan tiga kota mitra di Kamboja, Indonesia, dan Laos, timPolyUrbanWaters telah mengidentifikasi dan menganalisis karakteristik pembangunan yang berkaitan dengan air di setiap kota dan menguraikan pendekatan untuk mengatasi tantangan perkotaan secara efektif dengan menerapkan elemen-elemen pembangunan perkotaan yang ramah air yang strategis dan disesuaikan.

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 start of the 2020s, have made significant achievements for a number of indicators in the Agenda 2030 Sustainable Development Goal (SDGs) framework. Yet with dynamic growth in many of these cities and the increasingly obvious impacts of climate change, there are significant urban water management challenges. Agreement is growing among urban development decision makers, scholars, and practitioners that classical models of urban planning and water-related infrastructure development cannot meet the development challenges of these cities alone. As such models no longer reflect the cities' realities, needs and capacities, a rethinking of current planning approaches and implementation schemes for these cities is required. 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 levels, which involve city administrations, communities, citizens, the private sector, civil society institutions and academia, should allow for a polycentric management of water resources. This comprehensive urban transformation may be guided by concepts such as "water-sensitive cities" or "water-wise cities".

The PolyUrbanWaters Project

The polyurbanwaters.org project aims to ensure that polycentric approaches to urban water resource management can contribute to the water-sensitive transformation of secondary and tertiary cities in Southeast Asia toward resilient, inclusive, and livable urban areas. In doing so, the project will support these cities in their effort to localise the 2030 Agenda in the field of the management of urban waters more effectively.

The project is a collaborative effort of a network of academic institutions, civil society organisations and public entities from Cambodia, Germany, Laos, Indonesia, Thailand and Vietnam.

The concept of Polycentric Management of Urban Waters (PUW) responds to the challenges for urban areas and settlements and intends to include "water" as a cross-cutting issue requiring cross-sectoral solutions. PUW brings together security of supply of water-related services (water supply, wastewater and waste management, flood management, etc.), resilience to the impacts of climate change, and the creation of livable and inclusive urban spaces in an integrated approach to sustainable water resource management (IWRM) and participatory urban development planning. The solutions are developed and implemented according to the specific natural and socio-economic characteristics of the respective urban areas, the regulatory frameworks, and the financial and institutional capacities of the cities and local stakeholders.

The PolyUrbanWaters project works on 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 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 the multitude of realities faced by secondary and tertiary cities in SEA. Furthermore, the project undertakes comprehensive studies of the water management and urban planning framework and experiences in Indonesia, Cambodia, Laos, Thailand and Vietnam in order to create a robust and comprehensive understanding of challenges that secondary and tertiary cities in the region are facing, as well as possible options and solutions available to such cities in the face of such challenges.

Key Research Findings

The project elaborated comprehensive baseline studies between 2021 and 2023 that allow partner cities to understand existing and emerging water challenges in the wake of urban development and

Figure 2: Sariharjo

factors such as climate change. The results of the studies will allow local decision makers to make strategic decisions for sustainable, water-sensitive urban development. Some key-findings are listed here:

- All countries have made extensive efforts to decentralise public administration in recent decades, whereby the mandates and decision-making processes between national and local levels have been redefined by law. National development plans are essential for local processes to receive adequate finances, and national objectives pertaining to Agenda 2030 (Sustainable Development Goals - framework) are firmly incorporated within such plans. However, analyses of the respective governance structures have revealed that governance practices are characterized by overlapping mandates with fragmentation of different departments at the national and local levels, insufficient consistency of the regulatory framework, and insufficient implementation capacity.
- In recent decades, Southeast Asian cities have generally made substantial progress in infrastructure development (road network, electricity supply, etc.) (Figure 2). In the water sector, such progress is primarily limited to water supply; thus, cities are only partially prepared to tackle the diverse challenges of urbanization and climate change. Consequently, such cities have a limited ability to achieve comprehensive water-related resilience. Despite this, it is worth highlighting that awareness for sustainable urban development, which is also vital for achieving water-sensitive development, is growing in many cities in Southeast Asia and partner cities. New middle-class areas (Figure 3) increasingly demand green urban development in which comprehensive water security plays an important role.
- The development of efficient structures for urban water management is highly dependent on the characteristics of each city. It is difficult to speak of "the" secondary or "the" tertiary city in Southeast Asia. Specific socio-cultural characteristics of the cities play a major role, which can transcend the political and governance systems of the countries, as well as the respective socio-economic and

Figure 3: Urban Sariharjo

demographic development dynamics, institutional and financial resources. Thus, decision-making processes, (also at the community level) in Javanese Sleman, Indonesia, differ substantially from those in Sam Neua, Laos, and Kratié, Cambodia. This underscores the fact that primarily technical approaches to development have a limited recognition as success factors.

• Today, many secondary and tertiary cities themselves still have insufficient technical capacity, institutional capacity, funding, and mandates to plan, implement and sustainably monitor more complex urban and infrastructure development processes. Participatory processes in urban planning are largely unknown. For example, a lack of "law enforcement" leads to regulatory requirements for wastewater treatment not being implemented, polluters not adequately treating their wastewater, and service providers having only a very limited resilient business model for septic sludge treatment. Infrastructural projects such as those financed by the Asian Development Bank, for example, in the expansion of water infrastructure, often find insufficient anchorage at the local level to sustainably finance their operation.
Cities in Southeast Asia have made significant progress in infrastructure development in recent decades, but water-induced vulnerabilities are rapidly intensifying in many places.

• In the administrative practice of the cities, the concept of "urban water management" - let alone "integrated water resource management" - is also little known or anchored in the city administrations. The organisational structure and the processes of financial resource allocation are also decisive for this. To date, in some countries, budgets are set at the national level and allocated to departments at the city level. In doing so, many cities have little revenue of their own. "The great challenge of resilience is that it is still a relatively abstract concept to many decision-makers in SEA. 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*" (UNESCAP, 2019). This makes it even more important to break down the concept of resilience to concrete levels of action that cities can practically and realistically address.

• Growth in the urban-rural transition area in most of the cities follows urban planning guidelines to a very limited extent. Growth is largely driven by the demand for housing and commercial space or by the exploitation logic of private-sector actors and the financial interests of political actors. In this context, development of water management infrastructure (e.g., urban drainage, sewage) normally follows the course of construction activity, as there is no systematic, strategic urban planning conducted when developing new settlement areas.

• Changing land use patterns and discharges of urban stormwater runoff have significant impacts

Figure 4: Time series 1st image 2013 and 2nd image 2019 Sam Neau central built up area

on water quality and ecosystem performance. In many places, this results in increased water-related vulnerability, which is exacerbated by the effects of climate change. Agricultural land, such as rice paddy fields (widespread in the region) has an important function in the runoff regime of surface waters. With the dynamic development of land prices, these areas, which are mostly cultivated by small farmers, are being transformed into building land with a high degree of sealed surfaces. For example, between 2000 and 2015, 35.73% of the rice field area in the study area of Ngaglik, Sleman sub-county was converted to building land. In Sam Neua Town, it is expected that by 2030 rice paddy fields, which were extensive until recently, will have largely disappeared (Figure 4). Additionally, there is significant settlement pressure on wetlands. Coupled with changing land use patterns in the respective watersheds (e.g. due to deforestation), mutually reinforcing factors which influence increased vulnerability to flooding and climate change impacts, include increased heavy rainfall events, and inadequate drainage and water retention systems.

Outlook

Derived from these research results, in 2023 and 2024 PolyUrbanWaters supports the partner cities in strategy development (vision-building) for water-sensitive urban development and informed decision making based on their specific characteristics, needs, and capacities.

- The **Town of Sam Neua** is supported in achieving its vision of a *"green, clean and beautiful town"* in the context of water-sensitive urban development. Located in the mountains of northeastern **Laos**, the town is expanding into valleys whereby the surfaces are progressively being sealed, and the slopes are gradually being deforested.
- The vision includes strategies and options for action to reduce the city's increasing risks and vulnerabilities to flooding events and water-induced landslides, which will be exacerbated in the context of climate change. It also identifies solution strategies for decreasing water pollution, which poses a growing threat to safe drinking water supplies.
- The local government and communities are being

Figure 5 (top): City view from Ongtue temple
Figure 6 (middle): Flooding cetral Kratie
Figure 7 (bottom): Concrete sealing

assisted in adapting their vision to the emerging urban areas of Sam Neua Village and Naliew Village. A land-use plan for new a urban expansion area, currently in progress, emphasises - among other elements - effective stormwater management. This entails a comprehensive approach to developing both grey and blue-green infrastructures.
· Beyond creating efficient grey drainage systems and runoff retention facilities, there is a need for green solutions that promote substantial infiltration. The sustainable stewardship of existing green areas like meadows, riparian zones, etc., is planned to progress in tandem with the introduction of new nature-based solutions. Schemes for sustainable management of grey-green infrastructure by local government and communities are addressed from the beginning of the planning process.

Visions can give guidance for water sensitive urban development, but they must reflect the reality of people's lives and be underpinned by very concrete, achievable measures.

• **Sariharjo Village** with 22,000 inhabitants, is located in the in Special Region of Yogyakarta in **Indonesia**, which has a population of more than 1 million inhabitants. Like many villages in the Special Region, Sariharjo village shows how traditional agrarian social structures and water use patterns will become more urban which poses significant challenges for sustainable water management. It can be predicted that by 2035 Sariharjo will be characterised as settlement and business area primarily of middle classes, upgraded traditional village centres with settlement areas of lower-income population groups in the peripheral zones.

Based on the results of the base-line assessments, the following parameters - among others - have been discussed with the local government:
· By 2030, in Sariharjo at least 30% of its area are green open spaces.
· By 2025 40 % and by 2030 80 % of households should have access to piped water.
· By 2025 50 and by 2030 90 % of households should be equipped with improved septic tanks and the generated sludge safely managed by annual emptying.
· By 2025, 100% of all newly built parking spaces are equipped with water infiltration structure.
· By 2030, 90 % of parking spaces public and private buildings are equipped with water infiltration devices.

Together with the local government and communities, PolyUrbanWaters has initiated a participatory process of vision building in two sub-villages of Sariharjo. The goal is to devise land-use plans tailored for water-sensitive development in these sub-villages. It's anticipated that essential interventions will be integrated into public village development plans, potentially financed under official budgetary frameworks.

• The town of **Kratié** in **Cambodia**, with nearly 30.000 inhabitants, is located on the banks of Mekong River. The urban area is frequently hit by severe flooding.
· The wetlands behind the city have an important function for the livelihood of the communities, serve as water reception basins during the flooding regimes and have an important function for a pleasant urban climate.
· As is the case in many other cities in Cambodia, urbanisation leads to the increasingly filling in of wetlands, significantly increasing the vulnerability of the urban area. PolyUrbanWaters supports a process of awareness - building among the provincial and city government and communities regarding the importance of wetlands for the sustainable development of the city.
· An Area Development Plan will address the options of a multifunctional use of the wetlands close to the city for income generation, resilience to flooding events and climate change impacts, tourism development and in general for increasing the livability of the city.

Between 2025 and 2027, the elaborated instruments are set to facilitate specific implementation activities.