Mentoring Knowledge Series

Towards Resilient Urban Planning Systems

Using the Systems Thinking Approach

CITIES FORUM · 2026

COVER PHOTOGRAPH: FLOATING HOMES, NASSAUHAVEN, ROTTERDAM · TONIA VASILE (2026)

CITIES FORUM

Institute for Urban Excellence

MENTORING KNOWLEDGE SERIES

Towards Resilient Urban Planning Systems

Using the Systems Thinking Approach

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Cities Forum · iUE (Institute for Urban Excellence)

2026

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Cities Forum was born from the vision of a group of multidisciplinary experts who met at Oxford University, deciding to create an organization where they harness their skills, experience and common background in making cities more efficient, resilient and sustainable.

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REFERENCE

List of Abbreviations

Acronyms and initialisms used throughout this publication

ABBREVIATION	FULL FORM
UN-Habitat	United Nations Human Settlements Programme
OECD	Organisation for Economic Co-operation and Development
UNDP	United Nations Development Programme
NUA	The New Urban Agenda
NUPs	National Urban Policies
NUPP	National Urban Policy Programme
GSNUP	Global State of National Urban Policy
IG-UTP	International Guidelines on Urban and Territorial Planning
WUF	World Urban Forum
WCR	World Cities Report
SDGs	Sustainable Development Goals
APA	American Planning Association
MLIT	Ministry of Land, Infrastructure, Transport and Tourism (Japan)
GIS	Geographic Information System

OVERVIEW

Executive Summary

Urban planning systems are crucial for **implementing resilience and the integrated development of urban territories**, particularly with regard to adapting to the climate crisis and achieving carbon neutrality. They are not only important for urban planners.

However, current planning systems are based on **outdated regulations from previous centuries** and have not been convincingly adapted to the challenges that cities and territories are facing worldwide, such as the climate crisis. Such inconsistencies can lead to unintegrated and contradictory developments and controversial decisions, rendering urban areas less adaptable and resilient.

This publication discusses the current state of urban planning and the urgent need to transform planning systems and urban policies into coherent, resilient legal frameworks, including urban governance, using a **systems thinking approach**. It explores the current state of urban planning systems around the world and examines current urban planning and legislative trends. Based on a description of the systems thinking methodology, the publication analyses and comments on the international planning framework, providing examples of how to implement resilience in urban planning systems and elaborating further on how to improve urban planning systems' resilience.

Urban planning systems are crucial for implementing resilience and the integrated development of urban territories — they are not only important for urban planners.

Sandkaj, Copenhagen: planning water, land and urban growth as one connected system. Photograph: Tonia Vasile (2026).

MENTORING KNOWLEDGE SERIES

Table of Contents

FRONT MATTER

About the Organisations 3

List of Abbreviations 4

Executive Summary 5

CHAPTERS

1 Introduction 7

2 State of the Art 11

3 Current Trends in Urban Development & Legislation 22

4 Systems Thinking Methodology 27

5 International Urban Policy & Planning References 36

6 Implementing Resilience in Urban Planning Systems 51

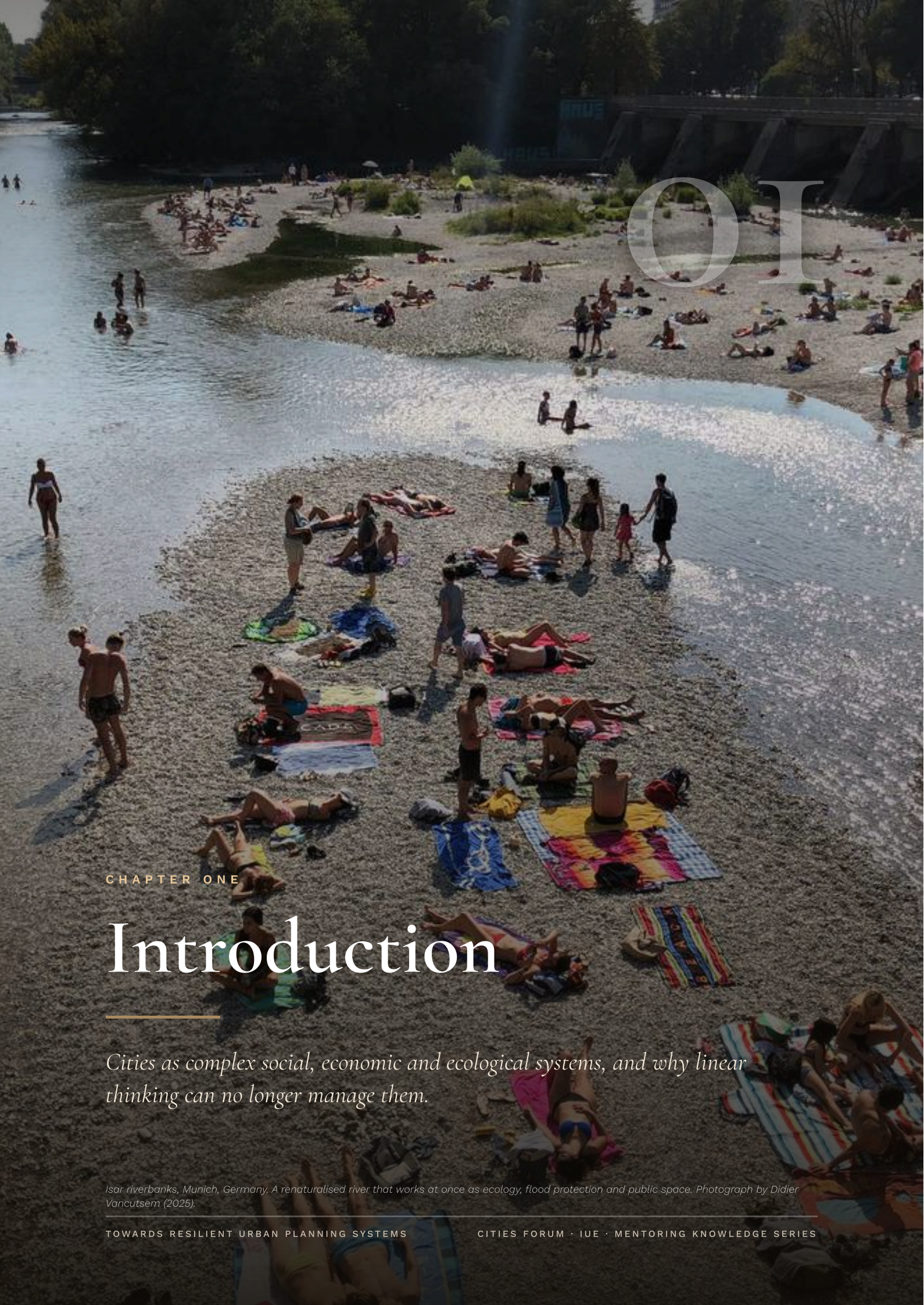
7 Towards Resilient Urban Planning Systems 63

8 Conclusion 69

BACK MATTER

References 72

About the Authors 79



01

CHAPTER ONE

Introduction

Cities as complex social, economic and ecological systems, and why linear thinking can no longer manage them.

Isar riverbanks, Munich, Germany. A renaturalised river that works at once as ecology, flood protection and public space. Photograph by Didier Vancutsem (2025).

1 · INTRODUCTION

Reading the City as a System

Why urban complexity resists simple, linear thinking

Cities are complex social-economic and ecological systems: it is not something you can understand with simple, linear thinking. So, **planners need systems thinking and system analysis** to handle urban growth and sustainable development (Pourmohammadi, 2022). The city consists of a system capable of counter intuitive responses which can be properly understood and controlled only if the interaction between the basic urban sub-systems is fully taken into account. In other words, the main question is not to better understand the individual sub-systems (population, transportation, recreation), but also to appreciate how they act together, and how they are harmonized into this entity so-called city. There are main characteristics in the urban system. First, urban regions can be understood as complex systems involving the connection of associated variables and objectives that play simultaneously, often in tension with one another. Urban issues such as housing, mobility, flooding or inequality rarely appear from a single cause; they arise from the interaction of factors like land values, income distribution, infrastructure quality, regulatory frameworks, social norms and climate-related risks, all being negotiated by actors who pursue different, sometimes conflicting, goals. Property developers may focus on maximising returns, residents demand affordable and secure housing, municipalities are under pressure to increase revenues while meeting environmental targets, and communities fight for cultural continuity and recognition in decision-making, all within the same urban fabric.

Second, in urban systems, social, political and economic processes cannot be treated as separate domains – they continuously shape and reshape one into another. A change in zoning regulations or land-use policy, for example, is never purely "technical", it alters where businesses can locate and invest (economic), who encounters whom in streets and public spaces (social), and which interests gain visibility and leverage in formal institutions (political), often feeding back into new claims and contestations. Everyday practices, political decision-making, informal arrangements and market logics therefore **co-produce urban space and governance**, and any attempt at more ethical or participatory urbanism has to engage with these intertwined logics rather than treating them separately.

Social, political and economic processes cannot be treated as separate domains – they continuously shape and reshape one into another.

Werksviertel Mitte, Munich: housing, culture, work and public space produced by many actors negotiating the same urban fabric. Photograph: Landeshauptstadt München / Nagy.

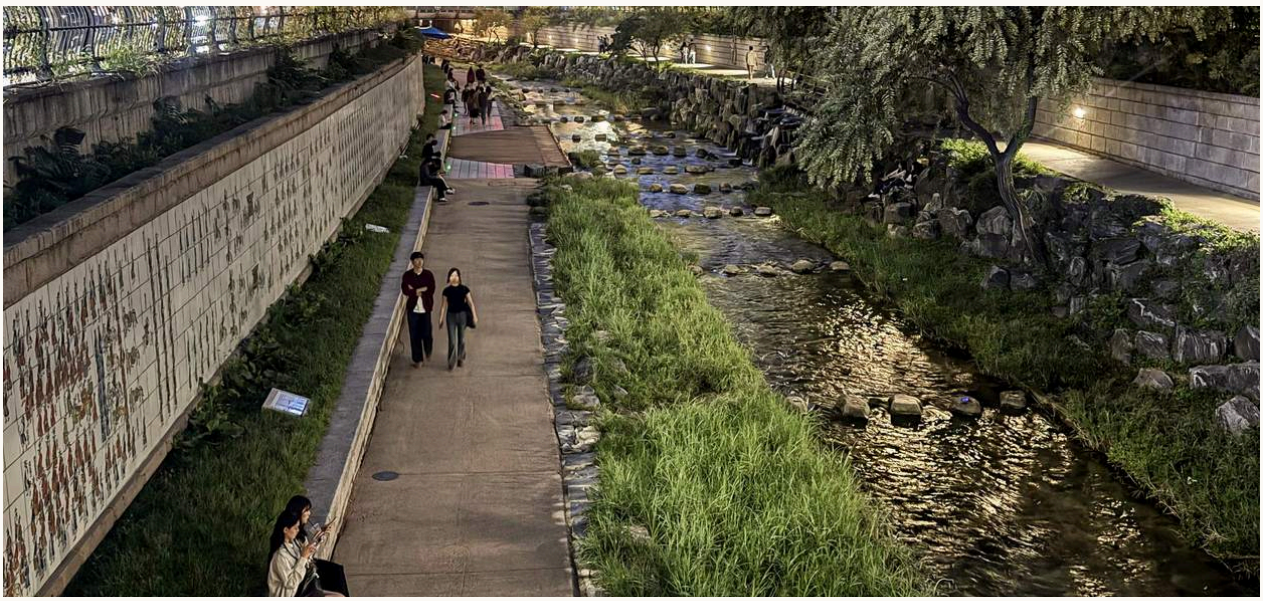
1 · FEEDBACK & PLANNING

Feedback Loops and Silo Thinking

From treating interventions as objects to reshaping the whole system

The last one, many elements of this urban system are structured through feedback relationships rather than simple one-way of cause and effect. Feedback loops (reinforcing or balancing) mean that outcomes often loop back to influence their own conditions. Rising congestion can trigger demands for new road infrastructure, which in turn encourages more car use and further congestion. Whereas well-designed public transport can attract more riders, justify reinvestment and strengthen the service over time. These kinds of loops, whether virtuous or vicious, show why **interventions in cities need to be read systemically**.

Planning can be understood as a systems-oriented practice, it seeks to weave together the different dimensions of a spatial, social, ecological, economic, and institutional into a holistic framework that guides collective action over time. Yet, current planning of the built environment still gravitates towards treating interventions as individual objects or sectors, relying on linear ways of thinking that address problems one by one, instead of reading the city as an interconnected socio-ecological and economic whole. In this reductionist mode, human-made structures are often considered separately from the landscapes and ecosystems they inhabit, and from the cultural, non-material practices that give meaning to place, which makes it easy to overlook how these layers constantly interact to produce vulnerability or resilience (silo thinking). Systems thinking offers a different point. It suggests that, in complex urban systems, the most transformative possibility lies not in upgrading isolated parts but in **re-organising the systems so that new patterns of behaviour and more sustainable outcomes can emerge across the whole** (Meadows, 2008). In other words, it is more about reshaping the underlying system that connects community, environment and built form.



Cheonggyecheon, Seoul: an urban stream restoration that reconnects ecology, public space and metropolitan life. Photograph: Tonia Vasile (2025).

1 · A SYSTEMS THINKING PERSPECTIVE

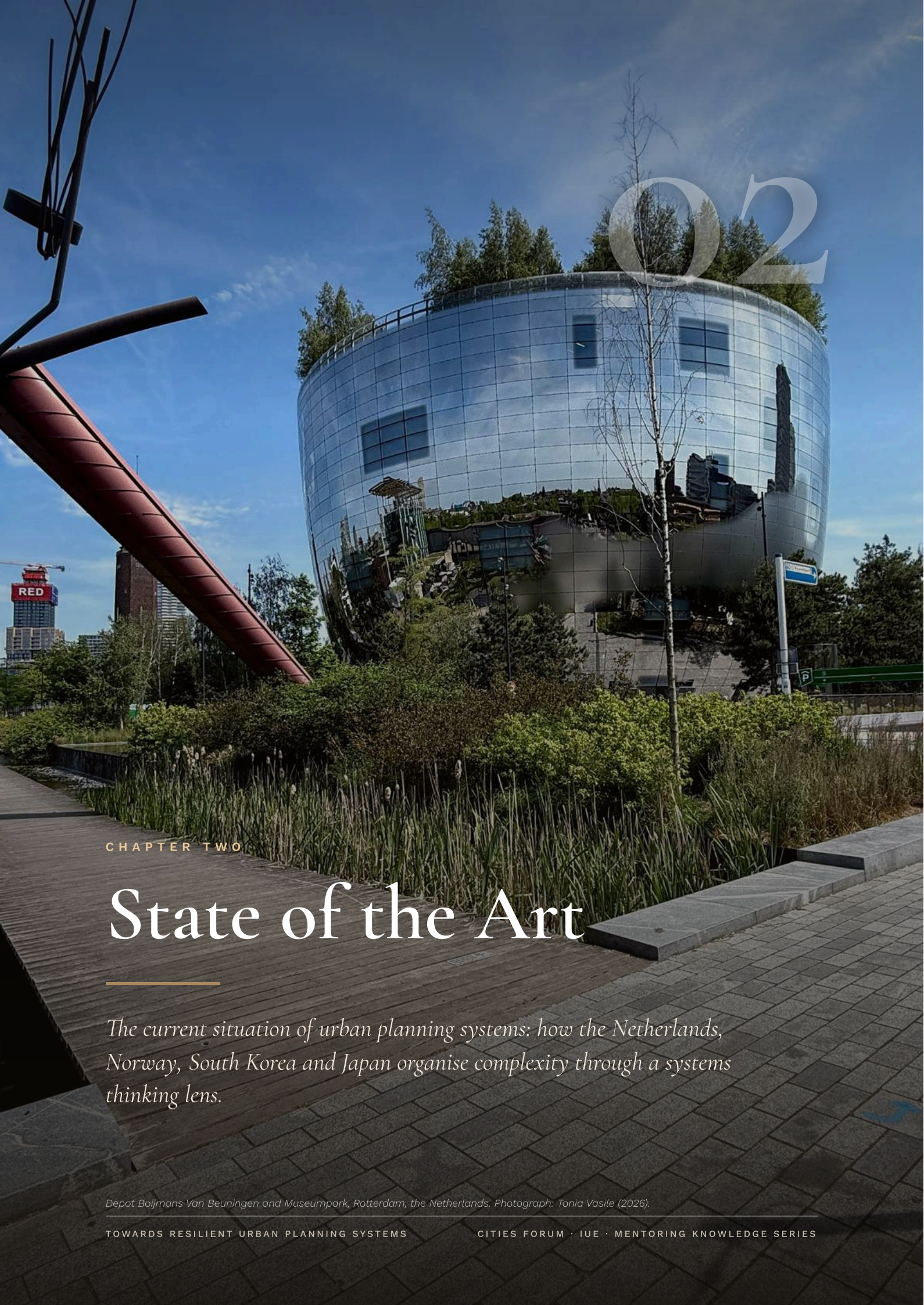
Relationships, Wholes and Feedback

Beyond linear cause and effect toward the whole system that underpins urban life

Conventional decision-making in planning still relies on a linear cause–effect logic, in which problems are framed as if they appear from a single dominant cause, which produces a single, predictable effect, while the many other influences are treated as background conditions that can be ignored. To move towards resilient urban planning systems, this needs to be set aside in favour of a systems thinking perspective that views complexity through **relationships and wholes, rather than isolating each component on its own**. Such a shift offers planners a richer way to understand the interconnectedness of the built environment and urban systems more broadly. In this sense, pursuing ambitious sustainability and wellbeing goals for cities is not simply about expanding more projects or targets, but about widening the scope of how we define problems and imagine solutions, so that they engage with the full system that underpins urban life instead of just its most visible symptoms.

In a systems thinking perspective, the starting point is the awareness that any element of a system will behave differently once it is taken out of its wider context and separated from the other elements. Rather than treating these components as self-contained units, systems thinking invites us to read the city, an organisation, or a policy field as a single, intertwined whole, and to search for understanding in the relations and patterns of interaction that hold this whole together. Human activity systems are assumed to constantly absorb influences from their surroundings and, in turn, shape the environments in which they operate, whether this concerns climatic conditions, social norms, economic signals, or institutional rules. From this view, **even a seemingly local intervention in one corner of the system can trigger consequences elsewhere** so systems thinking emphasises the need for communication and learning across organisational boundaries to prevent decisions from being made in isolated silos. Analytical attention therefore shifts away from simple, one-to-one "input–output" logics toward the whole of the multiple inputs that feed it, the processes through which they are transformed, the outputs that emerge, and, crucially, the feedback and control mechanisms that loop back to modify future behaviour.

Pourmohammadi (2022) illustrates that system thinkers consider a system as a complex whole and dynamic, which means to **read the city as a single rather than a set of disconnected projects**. Transport, housing, the local economy, ecology and culture are all subsystems that continuously shape one another, so their behaviour only makes full sense when we see how they work together as one integrated urban whole. Also, system thinkers emphasise that elements of a system are communicating with one another. A change made in one place therefore sends signals that can reshape what happens and influence behaviour in the system. Systems are made up of actors that generally aim to keep things stable, like maintaining services, protecting budgets, preserving routines. But, their collective behaviour is not linear or smooth because decisions interact through feedback loops, the system as a whole can swing through chaotic patterns, for instance in the form of accelerated urban sprawl or sudden decline.



02

CHAPTER TWO

State of the Art

The current situation of urban planning systems: how the Netherlands, Norway, South Korea and Japan organise complexity through a systems thinking lens.

Depot Boijmans Van Beuningen and Museumpark, Rotterdam, the Netherlands. Photograph: Tonia Vasile (2026).

CONTEXTUAL EXPRESSIONS OF SYSTEMS THINKING

Reading Planning Systems as Living Wholes

This section explores selected urban planning contexts through a systems thinking lens: not to label them, but to understand how each organises complexity, coordinates governance and responds to long-term urban challenges.

Rather than providing a comprehensive overview of global planning systems, this section focuses on a limited number of cases to understand how different planning systems **organise complexity**, coordinate governance levels and respond to long-term urban challenges.

The objective is not to claim that these cases explicitly adopt systems thinking as a formal planning methodology. Instead, the section uses systems thinking as an analytical framework to examine how different governance structures, planning cultures and urban challenges shape planning responses.

By comparing these cases, the section identifies key similarities, differences and recurring themes in the ways planning systems connect policy sectors, spatial scales and decision-making processes. Each case illustrates **different expressions of integrated and coordinated planning**. Together, they provide insights into how urban planning systems address complexity, balance competing priorities and support long-term urban development.

Feldmochinger Anger, Munich: an open-space corridor read together with the districts around it, an example of how a planning system organises land, landscape and urban growth as one whole. Photograph: Landeshauptstadt München.

2.1 · THE NETHERLANDS

Territorial Integration in Spatial Planning

Planning water, land and urban growth together

The planning culture of the Netherlands is built around the need to coordinate land, water, infrastructure, climate adaptation and urban growth, which helps us understand its systems thinking process. In a country with high density, limited land and strong exposure to water-related risks, **spatial planning cannot be treated only as a question of land-use regulation**. It becomes a way to manage the relationships between environmental vulnerability, economic development, housing demand and quality of life (Government of the Netherlands, 2013a; Ministry of Infrastructure and the Environment, 2013; OECD, 2017).

The Dutch planning system is organised across three levels of government: the national government, the provinces and the municipalities. The national level defines the general legal and strategic framework, especially for issues of national importance such as infrastructure, mobility, water safety, ecological networks and economic development. Provinces coordinate regional interests, including landscape management, urbanisation, green areas and water-related planning. Municipalities are the main actors in local land-use planning and are responsible for translating wider strategies into zoning schemes, land-use plans, project plans and urban development programmes (Government of the Netherlands, 2013a; OECD, 2017).

A key principle of the Dutch system is **subsidiarity: decisions should be taken at the lowest possible level**, while higher levels intervene when an issue has wider regional or national importance. This makes the system both decentralised and coordinated. Local authorities have a strong role, but they operate within a broader framework of national and regional priorities.

Floating Homes, Nassauhaven, Rotterdam: housing on tidal water shows how residential development, climate adaptation and the reuse of former harbour areas can be approached as interconnected urban systems. Photograph: Tonia Vasile (2026).

The main limitation of the Dutch model is its complexity. Because many levels of government, actors and planning instruments are involved, decision-making can become slow and difficult to navigate. In cities such as Amsterdam, this complexity is intensified by housing pressure, limited available land and the need to balance growth with environmental protection (OECD, 2017; City of Amsterdam, 2025a). Yet this same complexity is what allows the Dutch system to **treat water, land, infrastructure and urban growth as one connected spatial problem** rather than a series of separate technical decisions.

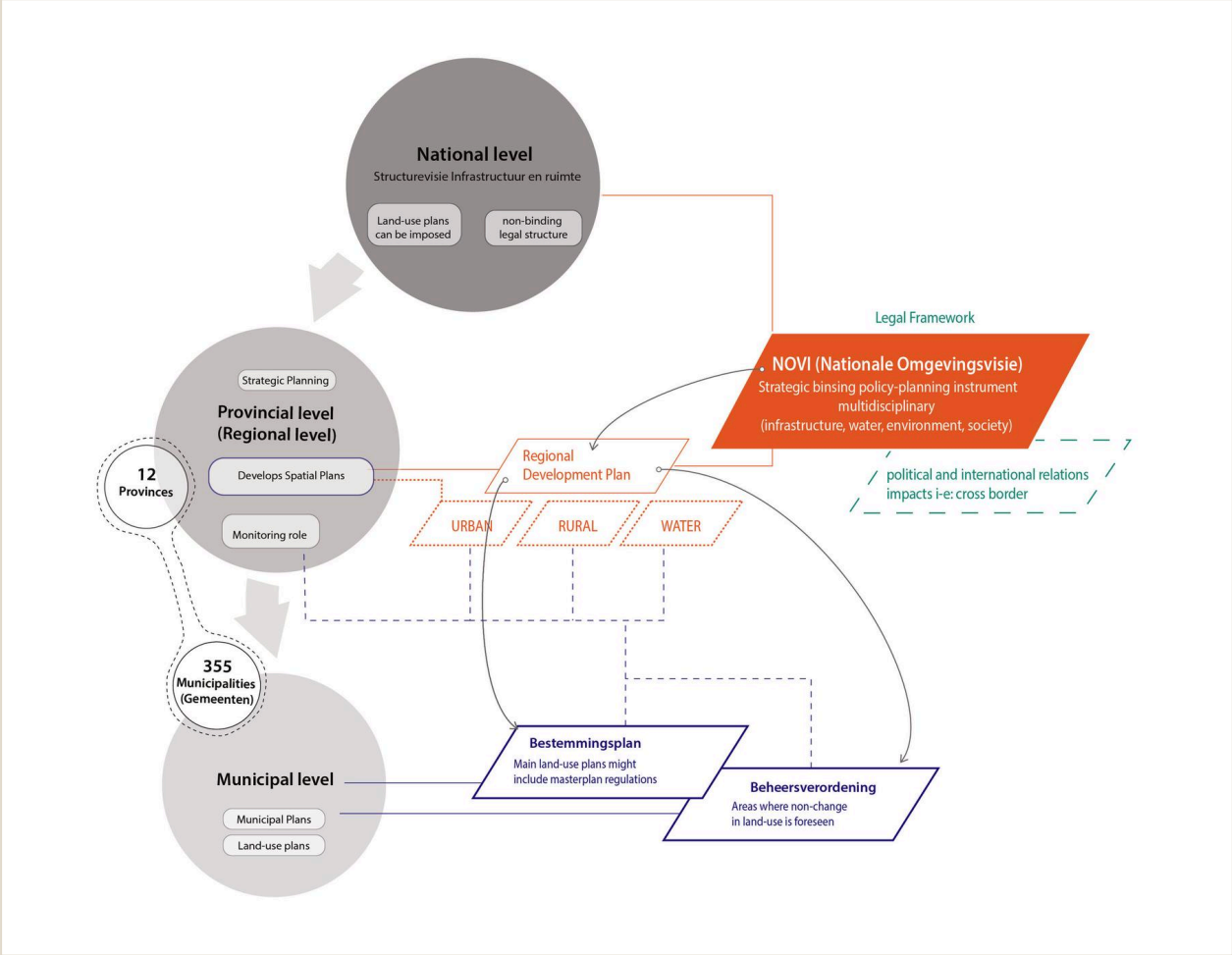


Figure 2.1. General scheme for spatial development units, plans and competences in the Netherlands. Source: Institute for Urban Excellence (iUE), 2024.

KEY LESSON: THE NETHERLANDS

Urban systems thinking is not about simplifying the city, but about organising complexity: the Dutch system shows how water, land, infrastructure, climate and urban growth can be treated as one interconnected spatial system.

2.2 · NORWAY

Public–Private Coordination in Municipal Planning

Coordinating national goals and local planning

Norway is a useful case for understanding urban systems thinking because its planning system **connects national objectives, regional coordination and local land-use decisions**. Although most spatial planning happens at the municipal level, municipalities do not operate in isolation. They work within a wider framework shaped by national laws, regional strategies, environmental priorities and coordination mechanisms (OECD, 2017; Ministry of Local Government and Regional Development, 2021a).

Norway is a unitary state with three levels of government: the national government, counties and municipalities. The national level defines the legal and strategic framework for planning, mainly through the Planning and Building Act, national planning guidelines and, in rare cases, legally binding central government planning provisions. Counties play a coordinating role between the national and municipal levels: they coordinate municipal planning, prepare regional planning strategies and provide forums where local land-use plans can be discussed with regional and national authorities. Municipalities are the main actors in everyday land-use planning, preparing municipal planning strategies, master plans and zoning plans.

A key feature of the Norwegian system is the **balance between local autonomy and vertical coordination**. The national government does not usually intervene directly in local planning, but it can object to municipal or county plans when they conflict with national goals.

Regional planning strategies help align municipalities within the same county, especially when urban development issues go beyond municipal boundaries. Although strategic plans often provide guidance rather than strict regulation, land-use and zoning plans are legally binding.

From an urban systems thinking perspective, Norway shows how different levels of governance can be connected without relying only on top-down control. National priorities — climate adaptation, biodiversity, farmland preservation, infrastructure and balanced regional development — can be translated into regional strategies and then into municipal plans, while local planning strategies are reviewed regularly so municipalities can adapt priorities to changing needs.

The case of Bergen illustrates this logic clearly. Its Municipal Master Plan 2030 combines social goals with land-use planning, promoting a city that is walkable, green, compact, diverse, safe and future-oriented, and shifting from a car-based model toward a compact walking city supported by strategies for housing, cycling, seafront development and climate-friendly energy.

The redevelopment of Dokken, a former port area in Bergen, shows how broad municipal goals become concrete spatial principles: the plan transforms the waterfront into a new district with public access to the shoreline, high-quality public spaces, urban nature, mixed functions and sustainable mobility.

National priorities become regional strategies and then municipal plans — coordination achieved without relying only on top-down control.

The main limitation of the Norwegian model is its complexity. The system includes many plans, strategies, forums and objection mechanisms; this can improve coordination but also slow implementation. A further tension is the strong role of private actors in detailed zoning plans, where long-term public goals may be influenced by project-based development interests.

A further current tension concerns the growing conflict between climate goals, energy transition, nature protection and land-use development. Norway's recent priorities place stronger emphasis on biodiversity, climate adaptation and farmland protection, but these objectives can compete with the need for housing, infrastructure and renewable energy projects. Even so, the Norwegian model shows how a coordinated, multi-level system can hold these competing demands within one planning conversation.

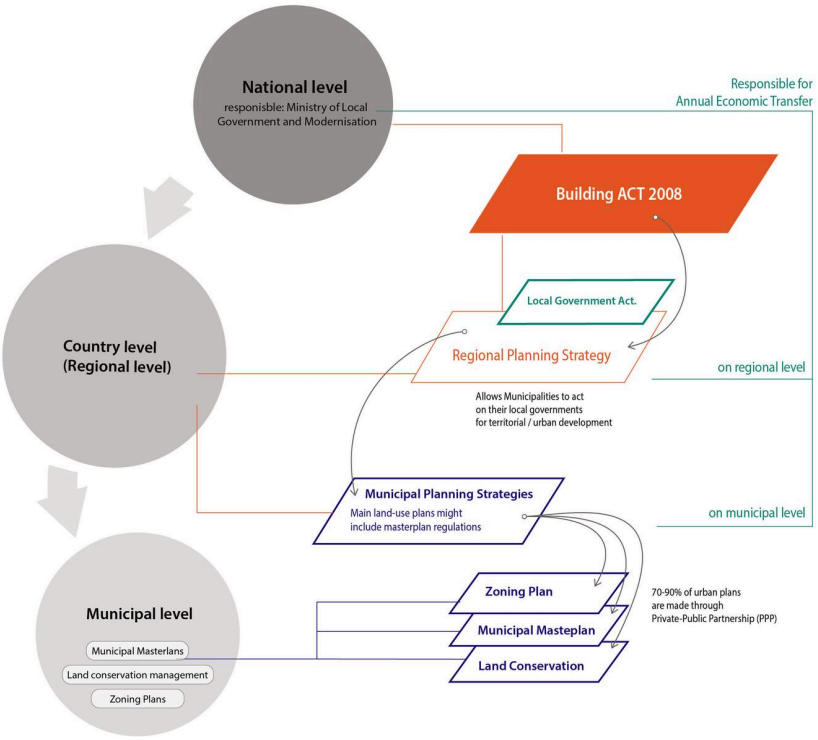


Figure 2.2. General scheme for spatial development units, plans and competences in Norway. Source: Institute for Urban Excellence (iUE), 2024.

KEY LESSON: NORWAY

Systems thinking can work through coordinated local planning, connecting national, regional and municipal levels to address climate, land use, mobility and quality of life, the challenge being to keep coordination effective without becoming too slow or dependent on private development logic.

2.3 · SOUTH KOREA

Strategic Implementation and State-led Development

Connecting national strategy, infrastructure and urban systems

South Korea is a helpful example for understanding urban systems thinking because its planning system connects national territorial strategy, infrastructure, technology, environmental policy and urban development within one coordinated framework. With **more than 80% of the population living in cities**, planning is used not only to organise space, but also to guide growth, manage density, improve living conditions and support innovation (World Bank, n.d.; Cha, 2022).

The system is organised across three main levels: central government, regional or provincial governments and local authorities. The central government defines the legal framework and prepares the Comprehensive National Territorial Plan, which sets long-term priorities for land development, infrastructure, environmental protection and regional growth. Regional governments translate this framework into broader territorial strategies, while local authorities prepare land-use plans, zoning regulations and urban management tools.

From a systems thinking perspective, the Korean case shows how planning can connect systems that are often treated separately. Land use, transport, environment, industry, welfare, safety, culture and digital infrastructure are coordinated through a hierarchy of plans and implementation tools. In this sense, planning works not only as a regulatory mechanism, but as a way of **aligning multiple urban systems across different scales**.

80% of the population of South Korea lives in cities. Planning is used not only to organise space, but to guide growth, manage density and improve living conditions.

Namsangol Hanok Village, Seoul: traditional architecture, landscape and contemporary high-rise development stand side by side, revealing heritage and rapid urbanisation as interconnected layers of the same urban system. Photograph: Tonia Vasile (2025).

Technology plays an important role in this model. South Korea has invested in GIS-based planning tools, national spatial information systems and urban data platforms, and the idea of the **"ubiquitous city"** shows how digital infrastructure can be embedded in everyday urban life — from transport and environmental monitoring to public services — reinforcing the systemic logic of planning by linking physical space, infrastructure and real-time data. Seoul's 2040 Comprehensive Plan expresses this through a 30-minute locality structure, water-based urban infrastructure, more mixed and flexible uses, a context-based approach to density and a polycentric structure linked to future mobility.

The case also reveals an important limitation. Because the system is strongly hierarchical and guided by national strategies, local governments may have limited room for independent decision-making. The model is effective in connecting infrastructure, technology and urban growth, but it can become **too top-down and too efficiency-driven** if local social needs and place-specific conditions are not sufficiently considered.

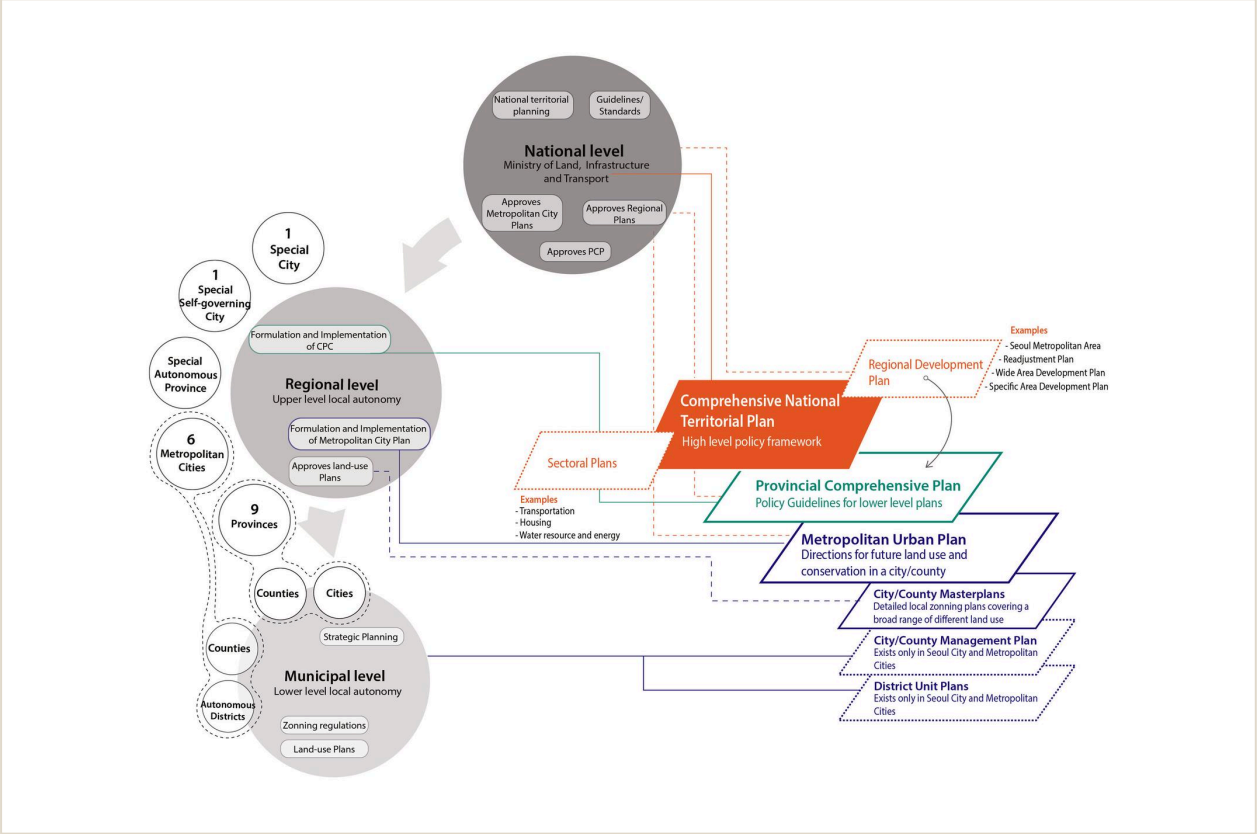


Figure 2.3. General scheme for spatial development units, plans and competences in South Korea. Source: Institute for Urban Excellence (iUE), 2024.

KEY LESSON: SOUTH KOREA

Systems thinking becomes operational when planning connects strategy, infrastructure, digital tools and local development across scales, its strength being coordination and implementation capacity; its challenge, balancing efficiency with local autonomy, inclusion and context.

2.4 · JAPAN

Resilience and Adaptation in Urban Planning

Linking density, infrastructure and disaster resilience

Japan is a useful case for understanding urban systems thinking because its planning system does more than regulate land use: it connects density, infrastructure, disaster risk, regional development and territorial management within one coordinated framework. In a highly urbanised country exposed to earthquakes, tsunamis, increasingly severe rainfall and long-term demographic decline, planning is used not only to organise urban growth, but also to manage risk, support territorial balance and maintain the functioning of complex urban systems over time.

The Japanese planning system is organised across three main levels: the national government, prefectures and municipalities. The national level, mainly through the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), defines the broad territorial framework and sets long-term priorities for national land development, infrastructure and resilience. Prefectures deal with planning issues that extend beyond municipal boundaries, while municipalities prepare master plans and detailed city plans.

From a systems thinking perspective, Japan shows how planning can connect pressures that are often treated separately. Density, transport infrastructure, land use, disaster risk, population decline and regional disparities are brought together through a territorial logic that links national strategy, local planning and implementation tools. The Third National Land Spatial Strategy and the Sixth National Land Use Plan, both approved in 2023, emphasise regional living areas "where digital and real fuse together" and land management under conditions of demographic decline.

Tokyo provides a clear example. In the redevelopment of the Shibuya Station area, transformation has not been limited to rebuilding the station: it has involved the coordinated reorganisation of railway facilities, roads, plazas, pedestrian networks and surrounding projects — linking mobility, public space and redevelopment to disaster prevention, flood control and support for people unable to return home after a major event.

Density, disaster risk, population decline and regional disparities are brought together through one territorial logic.

Technology and ecological planning are becoming more important in Japan's model. Project PLATEAU introduces **digital-twin and 3D city-model infrastructure** into urban planning, while the Green Infrastructure Promotion Strategy 2023 strengthens ecological and cross-sectoral approaches. Together, these developments show that resilience and adaptation in Japan are increasingly addressed not only through conventional grey infrastructure, but also through data, modelling, environmental systems and long-term land management.

The Japanese case also reveals an important limitation. The system is strong in coordination, infrastructure and disaster-risk management, but operates under growing demographic pressure: **the population declined to 123.8 million in 2024** — the fourteenth consecutive year of loss — with 29.3% aged 65 and over. Planning must therefore respond not only to disaster risk and metropolitan concentration, but also to shrinking regions, ageing communities and the increasing difficulty of maintaining services and infrastructure over time.

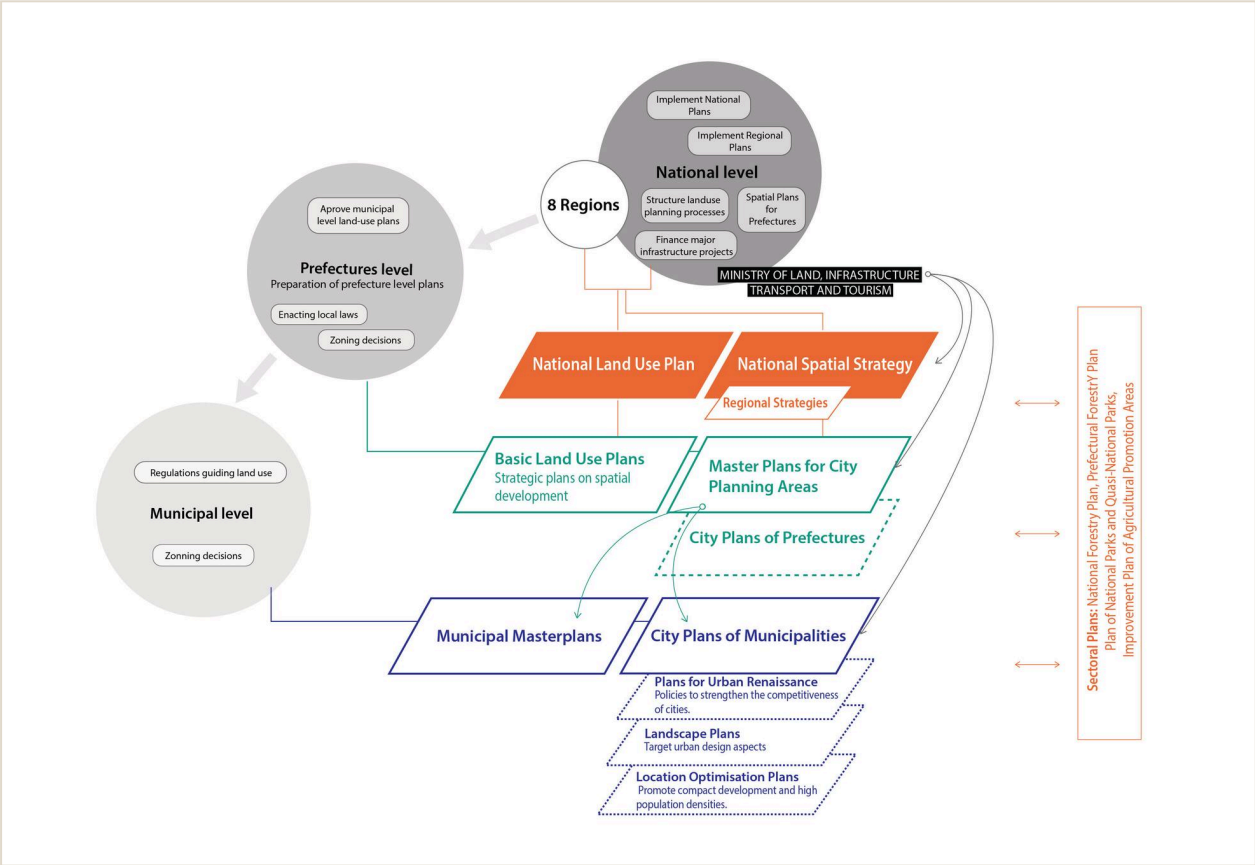


Figure 2.4. General scheme for spatial development units, plans and competences in Japan. Source: Institute for Urban Excellence (iUE), 2024.

KEY LESSON: JAPAN

Systems thinking becomes operational when planning connects density, infrastructure, disaster resilience, digital tools and territorial management, the challenge being to balance metropolitan concentration with demographic decline and long-term territorial care.

2 · COMPARATIVE SYNTHESIS

Systems Thinking Across Planning Cultures

Four governance models, one systemic lens

The comparison demonstrates that systems thinking can be expressed in different ways depending on governance structures, planning traditions and urban challenges. While Japan and South Korea illustrate strong national coordination and strategic implementation, the Netherlands and Norway highlight integration, collaboration and local adaptability.

COUNTRY	GOVERNANCE MODEL	MAIN CHALLENGE	PLANNING RESPONSE	SYSTEMS THEME
Netherlands	Multi-level planning with strong integration across national, provincial and municipal levels.	Water risk, climate adaptation, housing growth and limited land.	Integrated spatial planning linking water, land, infrastructure and urban growth.	INTEGRATION
Norway	Municipal-led planning within a coordinated national and regional framework.	Balancing local autonomy, coordination, private influence and environmental goals.	Coordinated local planning through regional alignment, objection mechanisms and strategic municipal plans.	COORDINATION
South Korea	Strong state-led planning with hierarchical implementation across scales.	Rapid urban change, infrastructure demand, territorial imbalance and digital transition.	Strategic planning with strong implementation capacity, integrating infrastructure, technology and development.	IMPLEMENTATION
Japan	Multi-level planning with strong national coordination and local implementation tools.	Disaster risk, demographic decline, ageing and territorial imbalance.	Resilience-oriented territorial management linking land use, infrastructure, adaptation and maintenance.	RESILIENCE

Table 2.1 — Systems thinking comparative table. Analysis: Institute for Urban Excellence (iUE) & Cities Forum, 2026.

SYNTHESIS

Planning systems express systems thinking through integration, coordination, implementation or resilience, rarely through one alone.

03

CHAPTER THREE

Current Trends in Urban Development & Legislation

Multiple crises, resilience, and beyond the SDGs after 2030, accelerating urbanisation meeting weakening governance capacity.

Nordhavn waterfront, Copenhagen, Denmark: offshore wind turbines on the city's horizon. Photograph: Tonia Vasile (2026).

3 · GLOBAL CONTEXT

Accelerating Urbanisation, Weakening Governance

A housing crisis at scale and a fragmenting coordination architecture

Global urbanisation is accelerating, while governance capacity is weakening. According to the United Nations Human Settlements Programme (UN-Habitat) 2026-2029 Strategic Plan, **2.8 billion people are currently facing a housing crisis**. Furthermore, climate migration is putting additional pressure on planning systems. It is estimated that 2.8 billion people worldwide are affected by different forms of housing inadequacy, a figure which is expected to increase due to population growth, urbanisation, forced displacement and economic pressures.

The US withdrawal from multilateral urban platforms signals the fragmentation of the global coordination architecture at a time when it is most needed (APA Trend Report 2026; UN-Habitat 2026–2029 Strategic Plan).

The issues surrounding informal settlements have now reached a critical tipping point. **Incremental upgrading is no longer sufficient.** UN-Habitat's Housing First strategy recognises that slum transformation requires integrated interventions in areas such as tenure, services, finance and spatial planning, rather than isolated fixes. (UN-Habitat 2026–2029 Strategic Plan).

2.8 billion people are currently facing a housing crisis, a figure expected to increase due to population growth, urbanisation, forced displacement and economic pressures (UN-Habitat 2026–2029 Strategic Plan).

Copacabana, Rio de Janeiro: everyday density and street life reveal the human scale behind global statistics on urbanisation, housing and migration. Photograph: Evelin Raico (2025).

3 · HOUSING, MODELS & MUNICIPAL FINANCE

Housing Is More Than Homes

Two competing urban models and the missing link of municipal finance

During the last World Urban Forum (WUF) in Baku in May 2026, the central message of the Baku Call to Action was that **housing involves more than just the construction of homes**. It also emphasised the importance of closely connecting housing systems with land, infrastructure, transport, public services, and economic opportunities. (WUF13, Baku Call to Action, May 2026).

Regarding the challenges of silo thinking and non-integration as the topic of this publication, several key messages were addressed in the last months: a structural tension is emerging between the compact, mixed-use, locally led, low-carbon model (promoted by several governments and UN-Habitat) and the car-centric, digitally embedded, market-driven model that is accelerating in the Global North. Meanwhile, cities in the Global South are being pulled between the two models without the adequate legal and fiscal tools to deliberately choose the most contextually appropriate one (APA Trend Report 2026; UN-Habitat WCR). Although UN-Habitat explicitly prioritises financial innovation for sustainable infrastructure, most local governments globally lack the autonomy, creditworthiness or institutional capacity to access the capital markets that would fund the transitions they require. Thus, **municipal finance remains the missing link**.

The key aspects of sustainable urban development today are still the integrated urban and territorial planning, participatory multilevel governance, knowledge and data development, capacity building, partnerships and advocacy, and effective resource mobilisation. Access to financing is identified as a central challenge, particularly for smaller and secondary cities. Governments require the capacity to plan and execute effectively. (UNDP at WUF13)

Municipal finance remains the missing link — most local governments lack the autonomy, creditworthiness or institutional capacity to fund the transitions they require.

Freiham energy centre, Munich: district-scale climate-neutral infrastructure illustrates the compact, locally led, low-carbon model, set against the market-driven model accelerating elsewhere. Photograph: Landeshauptstadt München / Nagy.

3 · DIGITAL TRANSFORMATION

Two Faces of the Digital City

How "digital tech" is entering planning from two directions

Regarding the digital transformation of cities, "digital tech" is entering urban planning from two perspectives:

01

AI Driven permitting, management and participatory tools, deploying faster than governance regulations.

02

Digitalization as a service and data access.

The gap between both perspectives is **deepening a planning divide rather than closing it** and it can be seen between the Global North and Global South.

Mobility hub, Thomas-Wimmer-Ring, Munich: shared vehicles, charging points and cycle infrastructure show how digital technology, market forces and public policy meet in everyday urban space. Photograph: Landeshauptstadt München / Dobner, Angermann.

3 · RESILIENCE & BEYOND THE SDGS

From Framework to Accountability

Climate resilience becomes political, and the decade of action begins

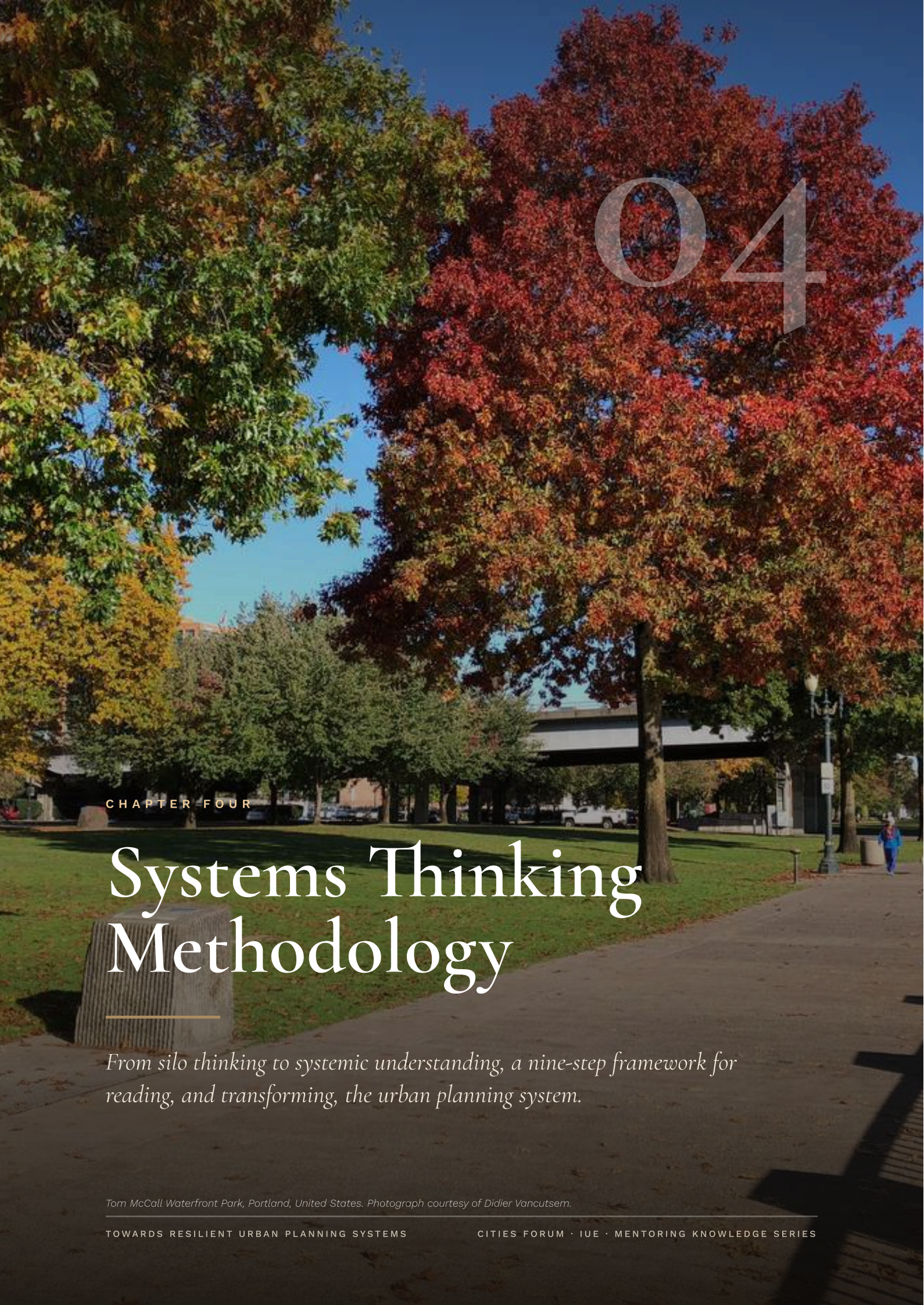
In terms of resilience, climate resilience in particular is **shifting from a technical planning issue to a political and economic one** (APA Trend Report 2026). Locally led adaptation is now the dominant framework of UN-Habitat, but local governments in regions exposed to crises are simultaneously losing international funding streams. The USA's withdrawal from global climate discourse and governance, coupled with more frequent events exceeding any city's capacity to respond to flooding, inflation, displacement and informality, is exacerbating the situation. (APA Trend Report 2026; UN-Habitat 2026–2029 Strategic Plan).

The last World Urban Forum (WUF13), Baku May 2026, concluded with a statement from the UN Deputy Secretary-General, Amina Mohammed: 'Our shared future is, for the most part, a story about territorial planning. At its heart, it is a story about housing.' The world has now reached the midpoint of the New Urban Agenda and is approaching the 2030 SDG deadline, but the implementation gap remains wide open. (WUF13 closing ceremony, May 2026). The Baku Call to Action explicitly designates the next decade (2026–2036) as a period of action to accelerate the implementation of the New Urban Agenda (NUA) and achieve tangible progress on the Sustainable Development Goals (SDGs). It calls for the WUF outcomes to include trackable commitments. This represents a shift in approach, **from framework to accountability**. (Baku Call to Action, WUF13)

Climate park, Bispeparken, Copenhagen: public space designed to store stormwater turns climate adaptation into an everyday urban amenity. Photograph: Tonia Vasile (2025).

KEY LESSON: CURRENT TRENDS

The next decade (2026–2036) marks a shift from framework to accountability: housing, land, infrastructure and climate resilience can no longer be planned in silos, and territorial planning becomes the shared story of our urban future.



04

CHAPTER FOUR

Systems Thinking Methodology

From silo thinking to systemic understanding, a nine-step framework for reading, and transforming, the urban planning system.

Tom McCall Waterfront Park, Portland, United States. Photograph courtesy of Didier Vancutsem.

4 · INTRODUCTION

We Live in Systems

From silo thinking to understanding systems as wholes

4.1 Introduction

We live in systems, and systems are everywhere. The world is shaped by complex, interconnected ecological, social, economic, technological and institutional systems. Yet most of these remain invisible to us, not because they are hidden, but because we have been conditioned not to see them. Contemporary education, professional training and administrative organisation remain overwhelmingly structured around linear, sequential logic, what we refer to as **"silo thinking"**. Problems are assigned to departments, departments develop solutions, and these solutions are often implemented without considering their wider consequences across the system.

The consequences are familiar to anyone who works in or around cities. Transport policy that undermines housing affordability. Zoning regulations that contradict climate commitments. Green infrastructure strategies that conflict with land value capture mechanisms. As illustrated in the previous chapters, these examples are not isolated planning failures but symptoms of a broader mismatch between increasingly interconnected urban challenges and the fragmented organisation of many planning systems. This chapter builds on those observations by introducing systems thinking as the methodological foundation for analysing urban planning systems. It first defines systems thinking and its core principles before proposing a structured framework for applying this perspective to urban planning systems. The framework builds upon the comparative analysis of planning systems and the broader planning frameworks presented in the previous chapters.

Systems thinking is becoming increasingly relevant in the context of contemporary urban challenges. As discussed in the previous chapters, housing shortages, climate adaptation, infrastructure provision, social inclusion, economic competitiveness and governance capacity are deeply interconnected. Yet planning systems continue to address many of these challenges through sectoral policies and fragmented institutional arrangements. This mismatch between the interconnected nature of urban challenges and the fragmented nature of decision-making is one of the main reasons why many planning interventions fail to achieve their intended outcomes. Systems thinking provides a framework for understanding and managing these interdependencies by focusing on the relationships, interactions and feedback processes that shape urban planning systems as a whole.

4.2 Systems Thinking

Systems thinking is understood in different ways across disciplines. Some scholars define it as a specific methodology, while others consider it a collection of concepts and approaches used to study systems and complexity. It is also described as both a scientific orientation and a broader way of thinking concerned with understanding systems as whole (Cabrera & Cabrera, 2023). Despite these different perspectives, most definitions share a common emphasis on understanding systems through the relationships and interactions between their components rather than through isolated elements.

According to Aguilar Jaber et al. (2025), systems thinking is **a holistic approach that embraces complexity** by focusing on the structures, relationships and interactions within a system rather than identifying a single isolated cause. It emphasizes interconnections, feedback loops and dynamic processes between system components.

4 · PRINCIPLES & ORIGINS

The Roots of Systems Thinking

Holism, complexity and the move beyond single causes

4.3 Systems Thinking Principles

The roots of systems thinking in urban planning can be traced back to the work of Patrick Geddes. In "Cities in Evolution" (1915), Geddes described urban development as an evolutionary process shaped by survival, cooperation and adaptation. He argued that **cities should be understood as interconnected systems** in which social, economic and environmental elements continuously influence one another. This early recognition of complexity, interdependence and systemic relationships laid the foundations for contemporary systems thinking in urban planning.

Systems thinking is a holistic approach to analysis that focuses on the structures, relationships and interactions within a system rather than identifying a single isolated cause (Aguilar Jaber et al., 2025). It moves beyond surface-level fixes to understand the broader patterns that shape system behaviour, enabling more durable solutions by addressing root causes rather than symptoms. As Meadows (2008) argues, in complex systems **the greatest potential for change comes from reorganising the system** to enable new patterns and outcomes, yet most decisions in the built environment continue to focus on isolated issues rather than on the system as a whole. These characteristics can be translated into a number of core principles that provide the analytical foundation for applying systems thinking to urban planning systems.

Systems thinking can be understood through a number of core principles. In the context of urban planning, these principles provide the analytical foundation for understanding how complex planning systems function and can be transformed.

The definitions presented above highlight several recurring characteristics of systems thinking: structures, relationships, interactions, feedback loops and dynamic processes. Together, these elements help explain why urban systems often behave in unexpected ways and why linear planning approaches frequently fail to address complex challenges. Understanding these characteristics is therefore essential before applying systems thinking as a methodology for analysing and transforming urban planning systems.

Systems thinking does not seek to reduce complexity, but rather to embrace and understand it. Rather than searching for a single cause, it aims to reveal how multiple factors interact simultaneously to shape system behaviour. This perspective is particularly relevant for urban planning, where social, economic, environmental and institutional systems continuously interact and influence one another. The focus therefore shifts from analysing individual components to understanding the relationships between them.

4 · INTERCONNECTEDNESS & FEEDBACK

Loops That Shape the City

Reinforcing and balancing feedback under stress

The first principle of systems thinking is interconnectedness. The components of a planning system, regulations, infrastructure, institutions and people, do not operate in sequence. Rather, they operate simultaneously, each shaping and being shaped. Housing unaffordability, traffic congestion and climate exposure are not separate challenges, they are **expressions of the same underlying system operating under stress** (Aguilar Jaber et al., 2025). The departmental logic that separates these challenges into individual policy portfolios does not reflect the structure of the system itself. That structure matters because of feedback. Actions within a system do not simply produce outcomes. Outcomes come back and alter the conditions that produced them. Two types of feedback loop drive much of what can be observed in cities reinforcing loops and balancing loops. The first, amplifies change, like rising land values attract investment, investment increases desirability and desirability drives land values further upward. A well-known dynamic that zoning instruments were not designed to interrupt. The second, on the other hand, counteract change: higher housing costs push lower-income residents out, reducing demand pressure in the core and ultimately moderating price growth until supply constraints or new investment balance and the cycle starts all over. Planning systems generate both types of feedback, mostly without the intention.

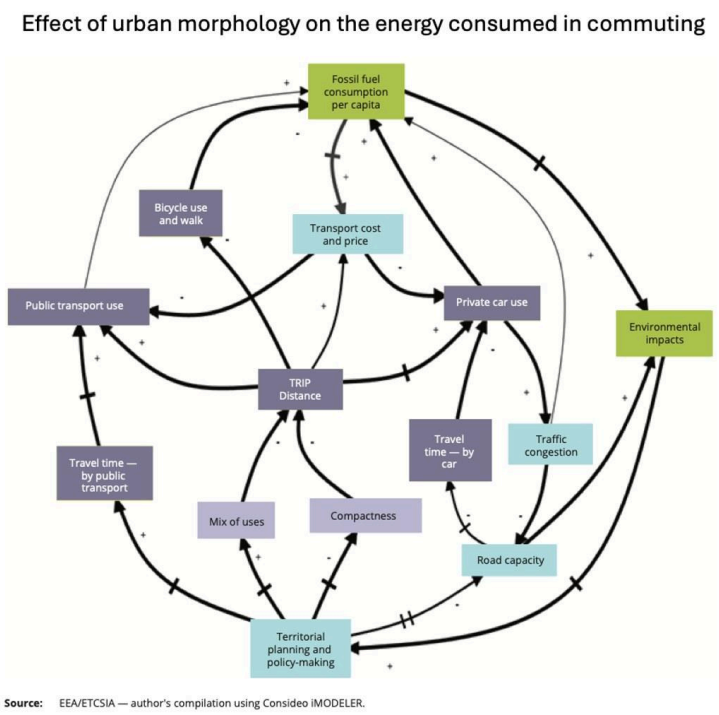


Figure 4.2. Causal loop diagram. Source: EEA Technical report No 23/2015, Urban sustainability issues: What is a resource-efficient city?
Example of Causal Loop (EEA ETC/SIA, 2024).

4 · EMERGENCE & CORE PRINCIPLES

The Whole Behaves Unlike Its Parts

Emergence, stocks and flows, boundaries, and the core principles

The behaviour these loops produce is not predictable from the parts alone. This is what systems thinkers call emergence: the system's outcomes **arise from the interaction of its components, not from the components themselves** (Cabrera & Cabrera, 2023). Urban informality, sprawl, and car-dependency do not result from any single decision. They emerge from the accumulated interaction of land markets, regulatory frameworks, infrastructure investments, and governance structures operating together across decades. Changing one element without modifying the relationships that produce the outcome often results in the system absorbing the intervention rather than transforming it.

Part of why this happens is the distinction between stocks and flows. Stocks are the accumulated quantities in a system that change slowly, for example, the pattern of land ownership or the legal framework. Flows are the rates of change that modify the stock, like construction rates or budget allocations. Systems thinking makes that mismatch visible before the programme is designed rather than after it has failed.

This is compounded by the non-linearity of causal relationships. **Small interventions can produce unmeasurable results, while large investments can produce negligible change.** The effects of planning decisions made today may not become apparent for a decade or more, by which time the political context will have changed, making attribution impossible and meaning that no one will be held accountable for the outcome. Zoning decisions made in the 1960s and 1970s still shape cities today. This temporal gap represents a significant blind spot in planning practice.

Lifespan of people, assets and infrastructure — Source: UNESCAP

Every system analysis requires a decision about where to draw the boundary. Urban planning systems are particularly vulnerable to this kind of boundary mismatch: the scale at which planning authority is exercised rarely corresponds to the scale at which urban dynamics actually operate (OECD, 2017). Choosing the wrong boundary does not just limit the analysis, but it actively misdirects the solution.

Taken together, these concepts provide the foundation of systems thinking. Therefore, and having understood this, we could say that the core principles of systems thinking are:

Interconnectedness: Recognizing that components of a system (e.g., people, processes, technology) are interdependent and influence one another.

Feedback Loops: Understanding that actions can create ripple effects, where output in one area becomes input for another, causing change over time.

Synthesis: Combining parts to understand the whole, rather than just analyzing individual components (analysis).

Emergence: Recognizing that a system's behavior arises from the interaction of its parts, not just from the parts themselves.

Iceberg Model: Looking beyond visible events to understand the underlying patterns, structures and mental models that shape system behaviour.

4 · THE ICEBERG MODEL

Beneath Visible Events

Patterns, structures, mental models and leverage points

The Iceberg Model provides a useful framework for understanding urban challenges. Visible events such as housing shortages, congestion, flooding or social exclusion are often symptoms of deeper systemic structures. Beneath these events lie recurring patterns and trends, which are themselves produced by underlying structures such as institutions, regulations, governance arrangements and market mechanisms. At the deepest level are mental models: the beliefs, assumptions and values that shape how societies understand development, growth and urban change. **Sustainable transformation often requires interventions at these deeper levels** rather than focusing exclusively on visible symptoms.

One of the objectives of systems thinking is the identification of leverage points, places within a system where interventions can influence overall system behaviour. The identification of these leverage points helps planners move from understanding complexity towards designing effective interventions.

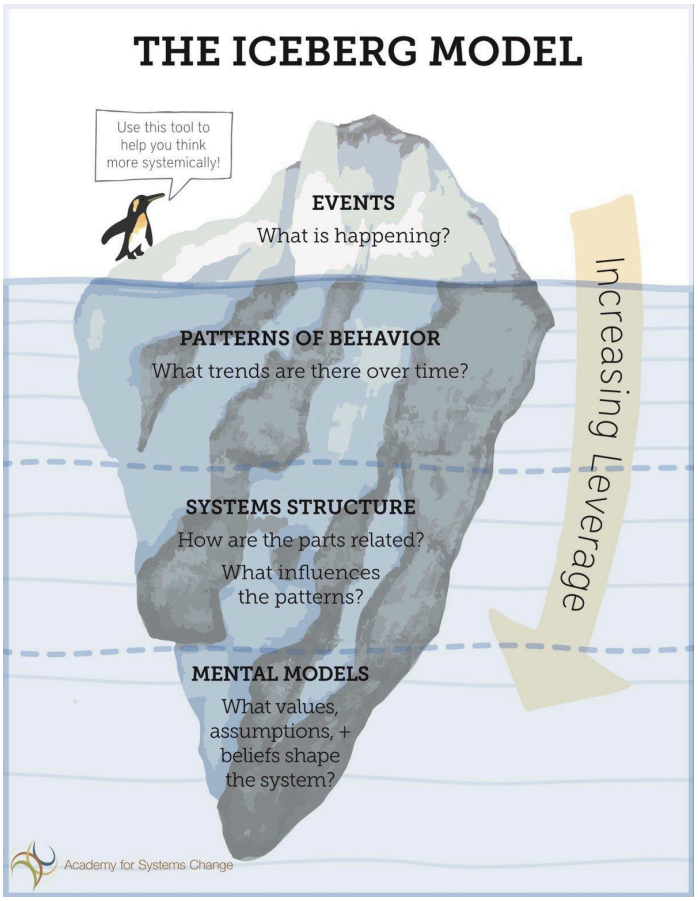


Figure 4.1. The iceberg model: events, patterns, structures and mental models.
Source: The Iceberg Model, Academy for Systems Change, after D. Meadows (2008).

4 · METHODOLOGICAL FRAMEWORK

The Planning System Is Itself a System

A structured, iterative and adaptive process

4.4 Methodological framework for urban planning systems

The urban planning system is itself a system, not only a tool for managing other systems. It comprises legislative frameworks, regulatory instruments, planning institutions at multiple governance levels, professional bodies, land and property markets, infrastructure providers, civil society, and the political processes that connect them. As demonstrated above, the relationship between these components differ substantially across national and regional contexts. What they share however, is the systemic character of their dysfunction. Failures and mistakes are rarely isolated but cascade across levels and sectors.

Applying systems thinking to this context requires a structured and iterative process. The following nine-step framework provides that structure. The proposed framework should not be understood as a rigid sequence of analytical steps. Rather, it provides a structured way of thinking about complex urban systems. In practice, planners frequently move back and forth between different stages as new information emerges and new relationships become visible. Systems analysis is therefore both iterative and adaptive, reflecting the dynamic nature of urban systems themselves. It is not a linear sequence but it provides a consistent analytical discipline approaching a planning system that is not producing the outcomes it was designed to deliver, thus it is essential to be consistent and coherent between the past, present and future system. Hereafter 9 key guidelines to be applied in considering the systems thinking approach for urban planning systems.

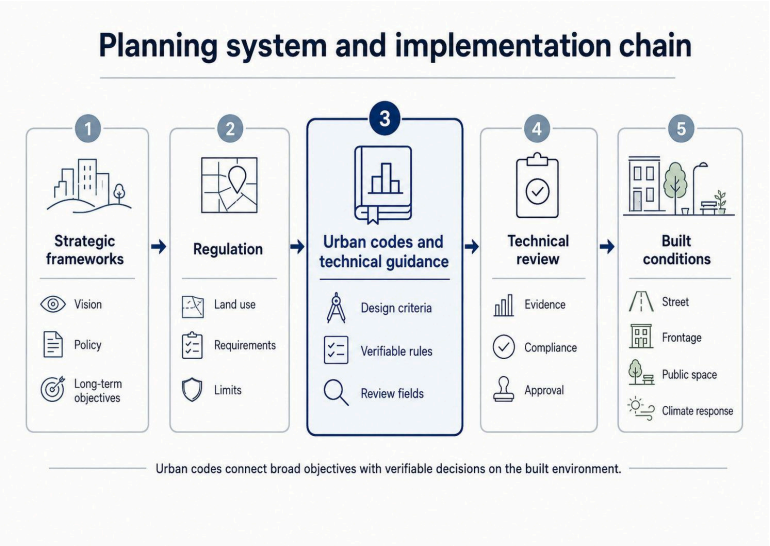


Figure 4.3. Methodological framework for urban planning systems. Source: iUE, 2024.

4 · A NINE-STEP FRAMEWORK

Reading the System, Step by Step

Nine guidelines for a systems thinking approach to urban planning

(1) Recognizing the parts of the system and their interconnections

Mapping the tangible and intangible components such as actors, institutions, data processes, physical inventory and instruments that constitute the planning system, and the relationships between them. All parts are mapped, identified and evaluated, and their interconnections or cross-relationships are elaborated.

(2) Identifying and understanding feedback (causal loops) within the general urban system by taking natural, social, cultural and economic systems and their impact on land use and land form into account.

Identify causal loops operating within the system, distinguishing reinforcing from balancing dynamics. Amplification vs. balance under pressure. Rules, flows, and relationships that bind these elements together are understood.

(3) Understanding system structure and system boundaries

Define the boundaries explicitly and question them. Boundary choices determine what causes are visible and which remain hidden.

(4) Differentiating types of flows and variables. These are partially also the resources in the urban system

What can change quickly? What changes slowly? Interventions that target fast-moving flows without acknowledging slow-moving stocks tend to generate short-term results.

(5) Identifying and understanding non-linear relationships. For example: small changes in one variable may result in large changes in another variable.

(6) Understanding dynamic system behaviour, integrate properties of complex systems

Integrate temporal dimension. Planning does not operate in static cities... it accumulates and enters different qualitative realities.

(7) Use conceptual models, reducing complexity by modeling systems conceptually, intuitive simplification is allowed, as long as you know that you are simplifying.

Reducing complexity by modelling the system conceptually... A conceptual model that is wrong but provokes the right questions is more useful than a comprehensive description that shadow leverage points

(8) Always try to understand systems at different scales

Systems must be understood at multiple scales. A proposal at the neighborhood level has an impact on the city. Similarly, decisions at the national or regional level define the possibilities for implementing projects at smaller scales.

(9) Integrate actors and governance, power structures.

Planning systems reflect and reproduce power structures... governance structures, power asymmetries, and institutional incentives must be part of the whole picture...

Planning systems do not operate independently from political and institutional realities. They reflect existing governance structures, decision-making arrangements, stakeholder interests and power relations. Understanding who participates in planning processes, who controls resources, who benefits from interventions and who bears their costs is therefore an essential component of systems analysis. Governance structures influence the effectiveness of planning systems as much as technical planning instruments themselves. Consequently, institutional incentives, power asymmetries, stakeholder relationships and coordination mechanisms across governance levels should be explicitly incorporated into the analysis.

4 · FROM METHODOLOGY TO RESILIENCE

Where Systems Thinking Ends

Leverage points, transformation and the turn to resilience

4.5 From methodology to resilience

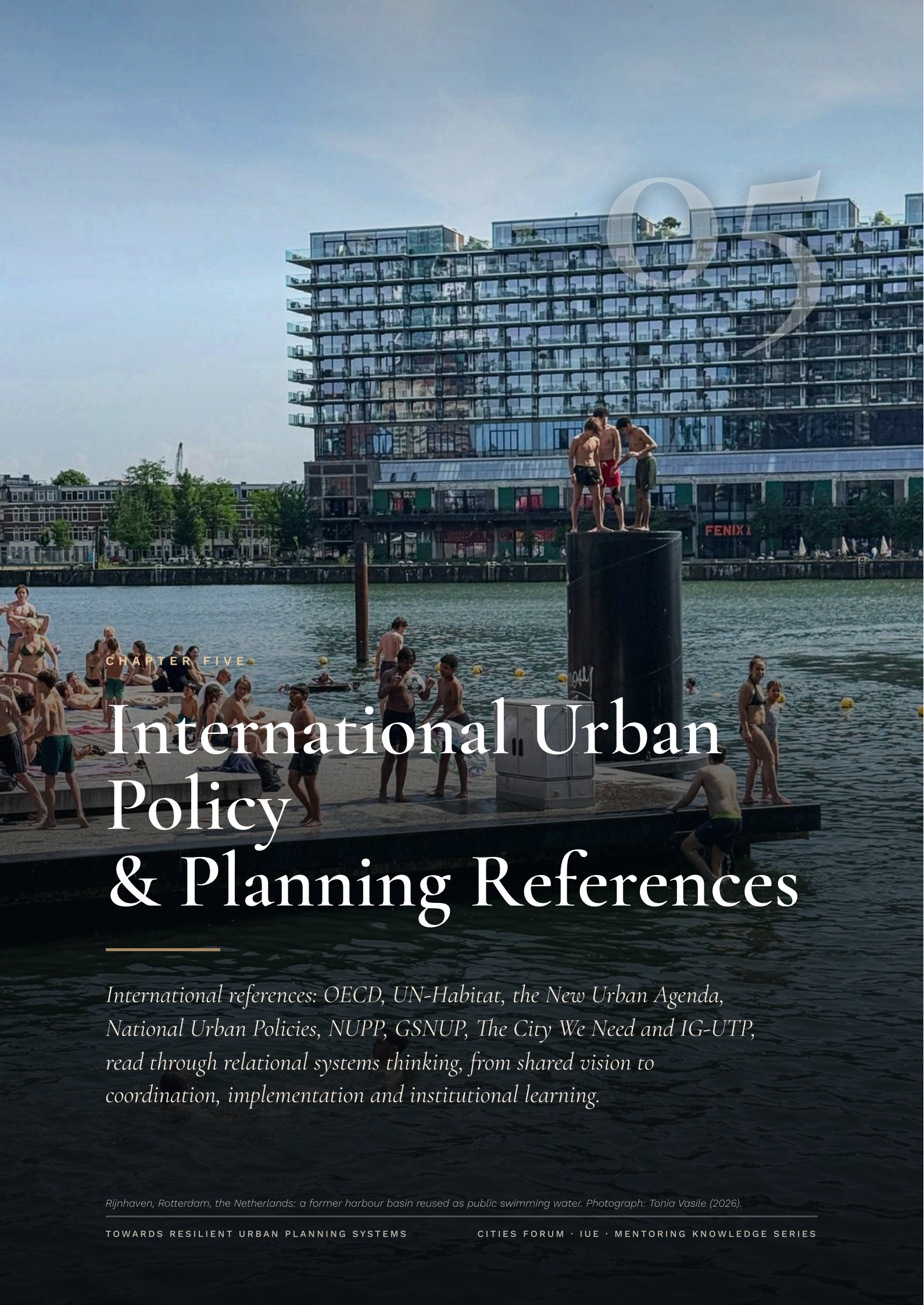
The framework above is diagnostic. Its purpose is not to produce a systems map as an end in itself, but to locate what Meadows (1999) calls leverage points, places where a small shift in structure produces large change in system behaviour. In the urban planning systems examined before, **those leverage points are more structural than technical**. For example, the governance arrangements that determine which actors hold authority at which scale or the professional cultures that shape whether planners understand their role as static or dynamic within a living system.

Identifying leverage points should be understood as the beginning of transformation rather than the end of analysis. Understanding a system does not automatically change it. System transformation requires experimentation, stakeholder engagement, learning processes and coordinated interventions across multiple parts of the system. Complex urban challenges rarely respond to a single project or policy instrument. Instead, meaningful change often emerges through portfolios of complementary interventions that simultaneously address governance structures, regulations, financial mechanisms, institutional behaviour and spatial development patterns.

Identifying these points is **where systems thinking ends and resilience begins**. Resilience, understood here as the capacity to absorb disturbance, adapt structure, and continue to function under changed conditions (Folke et al., 2010), is the design criterion that transforms the analysis into a direction. The following chapter tests whether systems thinking can serve as the lens and resilience as the goal.

KEY LESSON: SYSTEMS THINKING

Systems thinking and resilience should therefore be understood as complementary concepts. Systems thinking provides the analytical lens for understanding complexity, while resilience provides the strategic direction for how urban planning systems should respond to uncertainty, disturbance and long-term transformation.



05

CHAPTER FIVE

International Urban Policy & Planning References

International references: OECD, UN-Habitat, the New Urban Agenda, National Urban Policies, NUPP, GSNUP, The City We Need and IG-UTP, read through relational systems thinking, from shared vision to coordination, implementation and institutional learning.

Rijnhaven, Rotterdam, the Netherlands: a former harbour basin reused as public swimming water. Photograph: Tonia Vasile (2026).

5 · INTERNATIONAL URBAN POLICY & PLANNING REFERENCES

Relational Systems Thinking as the Central Criterion

The evaluated corpus and how each reference is read

International urban policy and planning references form the evaluated corpus, including OECD, UN-Habitat, the New Urban Agenda, National Urban Policies, NUPP, GSNUP, The City We Need / The City We Need Now and IG-UTP. The Sustainable Development Goals (SDGs) provide a broad, voluntary and non-binding global framework for sustainable development, remaining outside the evaluated corpus. **Relational systems thinking provides the central criterion**, supported by implementation capacity, monitoring and policy learning.

5.1 Introduction

In his book "Cities in Evolution", Patrick Geddes (1915) discussed the evolution of complexity through three aspects: survival, cooperation, and evolution. He emphasized that all elements are interconnected and affected by one another.

Relational systems thinking evaluates the capacity of international urban frameworks to **read the city as an integrated system of interdependent components, sectors, scales, actors and effects**. The analysis examines the connections each framework establishes between housing, mobility, land use, public services, climate, economy, health, governance and territory within a shared urban logic.

Implementation mechanisms, monitoring and evaluation operate as derived dimensions of the analysis. They indicate whether an integrated urban vision becomes institutional coordination, policy instruments, data systems, follow-up procedures and collective learning. The analysis distinguishes the strength of integrated vision, its translation into implementation and the presence of feedback mechanisms for adaptation and improvement.

The selected references are grouped by function within the international planning framework. OECD and UN-Habitat provide the institutional base for policy guidance, evidence and global urban cooperation.

Istanbul, Türkiye: reading the city as an integrated system means connecting climate, water, housing and everyday urban life within one shared logic. Photograph: Evelin Raico (2023).

5 · GROUPING THE CORPUS

From Shared Vision to Institutional Learning

The New Urban Agenda and IG-UTP set global orientation for urban and territorial planning. The City We Need / The City We Need Now frame a shared urban vision and mobilisation platform. **National Urban Policies form the national coordination instrument**. NUPP provides institutional support for their development, implementation and monitoring. GSNUP offers comparative monitoring of their progress.

The analysis separates institutional sources, global frameworks, policy instruments, support programmes and monitoring reports. Each reference can then be read through its specific contribution to **relational systems thinking**, from shared vision to coordination, implementation support and institutional learning.

Institutional sources

Organisation for Economic Co-operation and Development OECD

An international organization established in 1961 and currently composed of 38 Member countries. OECD turns comparison between countries into policy evidence, guidance and indicators for urban governance, territorial development and national policy performance

UN-Habitat

UN-Habitat as a global United Nations organisation promotes transformative change in cities and human settlements through knowledge, policy advice, technical assistance and collaborative action to leave no one and no place behind. UN-Habitat turns global urban agendas into policy guidance, planning instruments, technical assistance and implementation support for cities and human settlements.

Callao, Peru: institutional sources such as the OECD and UN-Habitat connect global agendas, evidence and territorial development across very different national contexts. Photograph: Evelin Raico (2018).

5 · THE EVALUATED CORPUS

Specific References

1. NUPs

A national policy instrument for implementing the New Urban Agenda at the national level. National Urban Policies translate a global urban agenda into a national coordination process between policy direction, institutional responsibility and local implementation capacity.

2. GSNUP

A comparative monitoring framework for National Urban Policies. GSNUP turns NUP progress into a comparable field of analysis across countries, relating policy development, implementation conditions and policy learning.

3. National Urban Policy Programme NUPP

A support programme created by UN-Habitat, OECD and Cities Alliance after Habitat III to support NUP development, implementation and monitoring through knowledge, capacity building, country support, monitoring and policy dialogue.

4. New Urban Agenda

A global policy framework adopted in 2016 during Habitat III to promote sustainable urban development worldwide. The New Urban Agenda sets a common urban frame for planning, governance and territorial development as conditions of inclusive, resilient and sustainable urban outcomes.

5. The City We Need & The City We Need Now

A global urban vision framework launched in 2014 by the World Urban Campaign under the leadership of UN-Habitat, renewed through The City We Need Now in 2022–2023 including the urgent aspects of urban development. The City We Need sets shared urban principles for reading urban development through interdependence between physical form, public action and everyday urban life. The City We Need Now moves those principles into action areas, mobilisation and policy dialogue as one shared urban agenda.

6. International Guidelines for Urban and Territorial Planning IG-UTP

A global planning guideline publication approved by the UN-Habitat Governing Council in 2015. IG-UTP sets broad planning principles for urban and territorial planning, with general guidance for compact, socially inclusive, resilient and connected cities and territories.

Ayacucho, Peru: international references translate global urban principles into national coordination and, ultimately, into the lived reality of the city. Photograph: Evelin Raico (2019).

5 · SELECTED BENCHMARKS

A Two-Level Comparison

The evaluation follows a hierarchical structure based on type, function and benchmark weight. Two levels organise the comparison: institutional sources and specific references.

Institutional sources receive ratings according to their capacity to structure the international urban planning field through evidence, policy guidance, technical support, monitoring support and institutional learning. This applies to OECD and UN-Habitat.

Specific references receive ratings according to the function performed by each agenda, policy instrument, support programme, monitoring report, mobilisation framework or planning guideline. This applies to The New Urban Agenda, National Urban Policies, NUPP, GSNUP, The City We Need / The City We Need Now and IG-UTP.

The three benchmarks

I. Integration and Holistic Vision

Integration and Holistic Vision is the central benchmark. It measures relational systems thinking as the capacity to read the city through relations, interdependencies and cross-effects between sectors, scales, actors and urban conditions. It evaluates the extent to which each reference treats urban development as an integrated territorial, social, economic, environmental and institutional system.

II. Implementation Mechanisms

Implementation Mechanisms is a derived benchmark. It measures the translation of integrated urban vision into implementation, including governance arrangements, institutional coordination, policy instruments, stakeholder roles, technical guidance and implementation capacity across levels of government.

III. Monitoring and Evaluation

Monitoring and Evaluation is a derived benchmark. It measures feedback, follow-up and institutional learning, including indicators, comparative evidence, reporting procedures and review mechanisms for adaptation and improvement over time.

5 · RATING SCALE

Strong · Moderate · Low

Strong / Moderate / Low ratings apply to the three benchmarks defined above. Intermediate ratings indicate performance between two adjacent categories. With this criterion, **Integration and Holistic Vision becomes the central benchmark.** Implementation Mechanisms and Monitoring and Evaluation operate as secondary tests for the passage from systemic vision to practice and institutional learning.

STRONG

Clear relations between sectors, scales, actors and urban effects. Explicit interdependencies between themes. **The city is addressed as a territorial, social, economic, environmental and institutional system.**

MODERATE

Several urban themes brought together with partial relational development. Coordination is present, although relations between themes remain closer to aggregation than to causal or relational analysis.

LOW

Themes organised as separate categories. Limited connection between sectors, scales and accumulated effects.

Ayacucho, Peru: terraced public space where landscape, water management and everyday urban life meet, the kind of interdependence that a strong relational reading of the city seeks to capture. Photograph: Evelin Raico (2019).

5.3 · ANALYSIS & EVALUATION

Institutional Sources

The analysis applies the benchmark hierarchy defined above. Integration and Holistic Vision **carries the main methodological weight because it measures relational systems thinking**. Implementation Mechanisms and Monitoring and Evaluation operate as derived criteria, measuring translation into practice and capacity for follow-up, evidence and institutional learning. OECD and UN-Habitat are evaluated as institutional sources. The remaining references are evaluated according to their specific function within the international planning framework.

Organisation for Economic Co-operation and Development OECD

OECD functions as an institutional source of comparative urban policy evidence. Its relevance lies in policy indicators, country reviews, benchmarking, territorial development, multi-level governance, policy learning and the OECD Principles on Urban Policy.

INTEGRATION AND HOLISTIC VISION — MODERATE

OECD relates urban policy to governance capacity, territorial development, economic performance and institutional learning through comparative evidence. Its contribution is methodologically useful for reading policy systems across countries, including the European NUP framing developed through the EUKN-OECD / New Leipzig Charter material. The integration remains Moderate because the relational work is mainly analytical and evidence-based, with emphasis on policy performance rather than a full urban systems vision.

IMPLEMENTATION MECHANISMS — MODERATE TO STRONG

OECD supports implementation through policy frameworks, recommendations, toolkits, indicators, country reviews and the OECD Principles on Urban Policy. Its role is indirect but operationally relevant, since it gives governments evidence and guidance for aligning national and local policy action. The valuation reaches Moderate to Strong where these tools help translate comparative evidence into policy decisions.

MONITORING AND EVALUATION — STRONG

OECD has a strong monitoring function through comparative indicators, benchmarking, policy reviews, cross-country evidence and the Global State of National Urban Policy. These instruments create feedback between performance measurement, institutional learning and policy adjustment. The valuation is Strong because **monitoring and policy learning are central to its institutional role**.

Istanbul, Türkiye: where comparative policy evidence, indicators and benchmarking ultimately meet the built city. Photograph: Evelin Raico (2023).

5.3 · INSTITUTIONAL SOURCES

UN-Habitat

UN-Habitat functions as an institutional platform for the international urban agenda. Its relevance lies in global urban agendas, planning guidance, National Urban Policies, monitoring reports, technical assistance, country support and mobilisation frameworks.

INTEGRATION AND HOLISTIC VISION — MODERATE TO STRONG

UN-Habitat structures a broad urban policy field across knowledge, policy advice, planning guidance, technical support and collaborative action. Its institutional capacity helps organise relations between global principles, national policy work and local urban development support. The valuation is Moderate to Strong because the organisation sustains an integrated field, while the strongest relational content appears through specific instruments such as the New Urban Agenda, NUPs and The City We Need.

IMPLEMENTATION MECHANISMS — MODERATE TO STRONG

UN-Habitat supports implementation through policy advice, technical assistance, planning guidance, country support and collaborative programmes. Its implementation role is institutional and supportive, with delivery carried through governments, cities and partners. The valuation is Moderate to Strong because it provides channels for application, while direct implementation depends on adopted instruments and local institutional capacity.

MONITORING AND EVALUATION — MODERATE

UN-Habitat contributes to monitoring through reports, programme follow-up and evaluation-oriented instruments. Its monitoring role varies across the corpus, since some references are designed for follow-up and others for agenda-setting, guidance or mobilisation. The valuation is Moderate at institutional level, with the strongest comparative monitoring placed specifically in GSNUP.

Turin, Italy: institutional platforms such as UN-Habitat translate global urban agendas into planning guidance and country support on the ground. Photograph: Evelin Raico (2024).

5.3 · ANALYSIS AND EVALUATION

Specific References

New Urban Agenda

The New Urban Agenda functions as a global urban agenda. Its relevance lies in providing a shared international framework for sustainable urban development after Habitat III.

INTEGRATION AND HOLISTIC VISION — STRONG

The New Urban Agenda frames urbanisation through interdependent social, spatial, environmental, economic and institutional conditions. Planning, governance, inclusion, resilience, housing, services, economy and territorial development form part of one shared urban agenda. The valuation is Strong because the agenda builds an integrated vision of urban development rather than a simple thematic catalogue.

IMPLEMENTATION MECHANISMS — MODERATE

The New Urban Agenda establishes commitments and policy orientation. Its operational force depends on national, regional and local instruments able to translate the agenda into planning systems, governance structures, regulations, investment priorities and institutional action. The valuation is Moderate because the agenda guides implementation but requires later instruments for delivery.

MONITORING AND EVALUATION — MODERATE

The New Urban Agenda includes follow-up and reporting through global processes and alignment with broader international agendas. Evaluation capacity depends on reporting systems, data availability and institutional continuity. The valuation is Moderate because follow-up exists, while practical monitoring relies on external reporting capacity.

National Urban Policies NUPs

National Urban Policies function as a national policy instrument for implementing the New Urban Agenda. Their relevance lies in translating global urban principles into national coordination, policy direction and implementation structures.

INTEGRATION AND HOLISTIC VISION — STRONG

NUPs align urban development, sectoral policy, territorial priorities, institutional responsibilities and local implementation within one national urban policy process. Their relational strength lies in organising sectors and levels of government around a shared national urban vision. The valuation is Strong because integration is part of the instrument's core policy function.

IMPLEMENTATION MECHANISMS — STRONG

Implementation is central to NUPs. They organise coordination between ministries, levels of government, urban actors and policy instruments. Their function is to move global urban principles into national policy architecture and implementation arrangements. The valuation is Strong because the instrument is designed around coordination and delivery.

MONITORING AND EVALUATION — MODERATE

Monitoring forms part of the NUP cycle. Its strength varies across countries according to indicators, reporting procedures, institutional follow-up, data capacity and continuity. The valuation is Moderate because the monitoring component exists but depends on national capacity.

5.3 · ANALYSIS AND EVALUATION

Specific References (continued)

National Urban Policy Programme NUPP

NUPP functions as a support programme for National Urban Policies. Its relevance lies in the institutional architecture created by UN-Habitat, OECD and Cities Alliance to support NUP development, implementation and monitoring.

INTEGRATION AND HOLISTIC VISION — MODERATE

NUPP supports the NUP field through knowledge, capacity building, country support, monitoring and policy dialogue. Its integrated dimension comes from sustaining the full NUP cycle, from development to implementation and follow-up. The valuation is Moderate because the programme strengthens an integrated policy instrument rather than formulating a separate urban systems vision.

IMPLEMENTATION MECHANISMS — MODERATE TO STRONG

NUPP supports implementation through capacity building, country support and policy dialogue. Its role strengthens institutional capacity across the NUP cycle and helps countries move from policy formulation to application. The valuation is Moderate to Strong because its operational content sits directly in support to NUP implementation.

MONITORING AND EVALUATION — MODERATE

Monitoring forms one of the NUPP pillars, with support for evidence, learning and follow-up. The strongest comparative monitoring function remains with GSNUP. The valuation is Moderate because NUPP supports monitoring, while its main role is programme support across the policy cycle.

Global State of National Urban Policy GSNUP

GSNUP functions as a comparative monitoring report for National Urban Policies. Its relevance lies in tracking the state, progress, gaps and challenges of NUPs across countries.

INTEGRATION AND HOLISTIC VISION — MODERATE

GSNUP reads National Urban Policies as a comparable field. It brings policy development, thematic coverage, coordination, implementation conditions and institutional capacity into one monitoring structure. The valuation is Moderate because the relational work is evaluative and comparative, focused on the NUP field rather than on a full urban vision.

IMPLEMENTATION MECHANISMS — MODERATE

GSNUP informs implementation through evidence. It identifies stages of development, progress, gaps and institutional conditions across national contexts. The valuation is Moderate because its implementation value comes through policy learning and comparison rather than direct operational instruments.

MONITORING AND EVALUATION — STRONG

GSNUP has monitoring as its core function. Country coverage, common methodology and comparative analysis give National Urban Policies a clear evaluation base. The valuation is Strong because comparative follow-up is the main purpose of the reference.

5.3 · ANALYSIS AND EVALUATION

Specific References (continued)

The City We Need / The City We Need Now

The City We Need / The City We Need Now functions as an urban vision and mobilisation framework. Its relevance lies in shared principles, drivers of change, action areas, recommendations, solutions, mobilisation and policy dialogue.

INTEGRATION AND HOLISTIC VISION — STRONG

The City We Need 2.0 formulates principles and drivers of change for a shared urban paradigm. The City We Need Now updates that vision through action areas and current urban priorities. The relational strength lies in treating urban priorities as mutually dependent parts of one shared agenda. The valuation is Strong because the framework works primarily through an integrated urban vision.

IMPLEMENTATION MECHANISMS — MODERATE

The City We Need Now moves the vision toward action through mobilisation, recommendations, policy dialogue and solutions. Implementation depends on uptake by institutions, governments, cities, networks and partners. The valuation is Moderate because the framework creates action orientation, while delivery depends on external adoption.

MONITORING AND EVALUATION — LOW TO MODERATE

The reference works mainly through vision, mobilisation, recommendations and shared action. Follow-up capacity is weaker than its agenda-setting role and lacks the consolidated monitoring structure found in OECD indicators or GSNUP. The valuation is Low to Moderate because monitoring remains secondary.

International Guidelines for Urban and Territorial Planning IG-UTP

IG-UTP functions as an urban and territorial planning guidelines publication. Its relevance lies in highly general planning principles for governments and planning systems, and is outdated.

INTEGRATION AND HOLISTIC VISION — LOW TO MODERATE

IG-UTP gathers several planning themes within a broad guideline, including urban and territorial planning, governance, sustainable urban development, planning components, implementation and monitoring. This thematic coverage gives the document some integrated orientation. The valuation is Low to Moderate because the document mainly aggregates planning principles and recommendations, with limited development of causal relations, interdependencies, cross-effects or a relational method for reading the city as an urban system.

IMPLEMENTATION MECHANISMS — LOW

IG-UTP provides principles and recommendations for governments and planning systems. Its implementation rests on voluntary adoption and has limited operational force. The valuation is Low because guidance exists, while binding capacity and delivery mechanisms remain weak.

MONITORING AND EVALUATION — LOW

IG-UTP refers to implementation and monitoring, but its follow-up structure remains weak. Reporting, enforcement and standardised evaluation capacity are limited. The valuation is Low because monitoring appears as a general reference rather than as a consolidated evaluation system.

5.4 · SUMMARY TABLE

The Evaluated Corpus — Profile

The table below gives the overview of the assessment of the International Urban Policy and Planning References to date.

REFERENCE	TYPE	DATE OF CREATION	LEAD ORGANISATION	ROLE
OECD	International organisation, 38 Member countries	1961	OECD	Comparative policy evidence, indicators, policy reviews, benchmarking, OECD Principles on Urban Policy, implementation toolkits and policy learning
UN-Habitat	United Nations programme	1978	UN-Habitat / United Nations	Institutional platform for global urban agendas, planning guidance, technical assistance and programme support
NUA	Global policy document	2016	United Nations / Habitat III	Global framework for sustainable urban development
NUPs	Policy instrument	Early 2010s	National governments, with UN-Habitat support	National-level coordination and implementation of the New Urban Agenda

Table 5.1 (i) — Profile of the evaluated references: OECD, UN-Habitat, the New Urban Agenda and National Urban Policies. Analysis: iUE & Cities Forum, 2026.

Baku, Azerbaijan: the waterfront city that hosted the World Urban Forum, where global urban agendas, national urban policies and institutional sources meet the built city. Photograph: Evelin Raico (2026).

5.4 · SUMMARY TABLE

The Evaluated Corpus — Profile (continued)

REFERENCE	TYPE	DATE OF CREATION	LEAD ORGANISATION	ROLE
NUPP	Support programme	2016 / Habitat III	UN-Habitat, OECD and Cities Alliance	Support for NUP development, implementation and monitoring
GSNUP	Comparative monitoring report	2018, with later editions	UN-Habitat and OECD, with NUPP partners	Monitoring and reporting progress of National Urban Policies
The City We Need / Now	Vision framework	2014 / 2022–2023	World Urban Campaign / UN-Habitat	Shared urban vision, mobilisation and action agenda
IG-UTP	Guidelines	2015	UN-Habitat Governing Council	General guidance for urban and territorial planning

Table 5.1 (ii) — Profile of the evaluated references: NUPP, GSNUP, The City We Need / Now and IG-UTP. Analysis: iUE & Cities Forum, 2026.

Baku, Azerbaijan: support programmes, comparative monitoring, shared urban visions and planning guidelines are ultimately measured against the everyday landscape of the city. Photograph: Evelin Raico (2026).

5.4 · SUMMARY TABLE

Benchmark Evaluation — Institutional Sources & Global Frameworks

REFERENCE	INTEGRATION & HOLISTIC VISION	IMPLEMENTATION MECHANISMS	MONITORING & EVALUATION
OECD	**Moderate** — reads urban policy systems through evidence, territorial development, governance capacity, policy performance and European NUP framing through EUKN-OECD / New Leipzig Charter.	**Moderate to Strong** — supports governments through recommendations, toolkits, indicators, country reviews, policy reviews and OECD Principles on Urban Policy.	**Strong** — indicators, benchmarking, policy reviews and Global State of National Urban Policy evidence provide a clear evidence and learning mechanism.
UN-Habitat	**Moderate to Strong** — structures the international urban field across agendas, guidance, technical support and institutional cooperation.	**Moderate to Strong** — provides policy advice, technical assistance, country support and programme-based implementation support.	**Moderate** — supports reports and follow-up, with stronger monitoring carried by specific instruments.
NUA	**Strong** — frames urbanisation as an integrated social, spatial, environmental, economic and institutional agenda.	**Moderate** — sets commitments and policy orientation, with delivery through national, regional and local instruments.	**Moderate** — includes global follow-up, with effectiveness shaped by reporting capacity, data and institutional continuity.
NUPs	**Strong** — aligns sectors, levels of government, territorial priorities and local implementation within one national urban policy process.	**Strong** — provides the main national implementation bridge between global principles and policy architecture.	**Moderate** — includes monitoring within the policy cycle, with strength shaped by national systems.

Table 5.2 (i) — Benchmark evaluation: OECD, UN-Habitat, the New Urban Agenda and National Urban Policies. Analysis: iUE & Cities Forum, 2026.

5.4 · SUMMARY TABLE

Benchmark Evaluation — Programmes, Monitoring, Vision & Guidelines

REFERENCE	INTEGRATION & HOLISTIC VISION	IMPLEMENTATION MECHANISMS	MONITORING & EVALUATION
NUPP	**Moderate** — supports the integrated NUP field through institutional capacity, knowledge and programme coordination.	**Moderate to Strong** — strengthens implementation capacity through knowledge, capacity building, country support and policy dialogue.	**Moderate** — supports monitoring and learning within the NUP cycle, while comparative evaluation sits mainly with GSNUP.
GSNUP	**Moderate** — reads NUPs as a comparable field through policy development, coordination, coverage and institutional capacity.	**Moderate** — informs implementation through evidence on progress, gaps and institutional conditions.	**Strong** — provides the main comparative monitoring mechanism for National Urban Policies.
The City We Need / Now	**Strong** — formulates shared urban principles, drivers of change and action areas as mutually dependent urban priorities.	**Moderate** — moves vision toward mobilisation, recommendations, policy dialogue and solutions.	**Low to Moderate** — follow-up remains secondary to vision, mobilisation and agenda-setting.
IG-UTP	**Low to Moderate** — offers broad planning orientation, with relational methods expressed mainly through thematic coverage.	**Low** — operates through voluntary adoption and general planning guidance.	**Low** — follow-up, reporting and evaluation remain general in scope.

Table 5.2 (ii) — Benchmark evaluation: NUPP, GSNUP, The City We Need / Now and IG-UTP. Analysis: iUE & Cities Forum, 2026.

READING THE TABLE

Integration and Holistic Vision is the central benchmark; Implementation Mechanisms and Monitoring and Evaluation are the secondary tests that trace the passage from systemic vision to practice and institutional learning.

06

CHAPTER SIX

Implementing Resilience

Urban codes as applied instruments, how Saudi Arabia and the oasis territory of Al-Ahsa turn resilience into cumulative, everyday decisions in the built environment.

AL-AHSA OASIS · EASTERN PROVINCE · KINGDOM OF SAUDI ARABIA

Al-Ahsa oasis, Eastern Region, Saudi Arabia: the historic water channels that structure the public realm. Image: Gabriela Fontanals Litter.

6 · IMPLEMENTING RESILIENCE IN URBAN PLANNING SYSTEMS

Resilience as a Measurable Urban Capacity

Withstanding shocks, recovering and adapting over time

Resilience in urban planning systems is the measurable ability of a city to withstand, recover from, and adapt to acute shocks (like floods or pandemics) and chronic stresses (like economic disparity or climate change).

Referring to the accumulated crises and fragmented context in our current urban development, resilience is becoming crucial - however, as demonstrated above, the resilience dimension is not fully integrated in our urban planning systems.

While it is essential to understand the city as an interconnected system (people, infrastructure, and institutions) rather than a collection of separate parts, the inclusion of resilience in Urban Planning Systems leads to considerable review, transforming our planning approaches and rethinking the current systems we are using since centuries.

The resilience dimension is not fully integrated in our urban planning systems.

AL-AHSA · EASTERN REGION — PUBLIC SPACE

Al-Ahsa, Eastern Region of Saudi Arabia: public space where Vision 2030 meets an arid oasis territory, and urban codes translate national direction into everyday decisions. Image: Gabriela Fontanals Litter.

6.1 · IMPLEMENTING RESILIENCE — EXAMPLES & CASE STUDIES

Urban Codes as Implementation Tools for Resilient Urban Systems

Opening

In planning systems, urban resilience is shaped by sustained coordination between planning decisions and the built environment. **Strategic objectives become part of urban planning through conversion into applicable criteria for design, approval and implementation.** Through repeated application, each intervention reshapes material conditions supporting urban function, adaptation and maintainability over time.

Urban codes connect systemic principles with built form through the relation between street edge and public space. At this scale, the plot becomes part of the city through a built frontage where access and climate response are resolved within the same material relation. Urban codes turn resilience from a general planning objective into a sequence of decisions that move from drawing to approval and from construction to maintenance.

Urban codes turn resilience from a general planning objective into a sequence of decisions — from drawing to approval, from construction to maintenance.

Applied rules shape the built environment by connecting technical criteria with material outcomes. An urban code becomes an implementation tool as strategic direction guides everyday development and later maintenance. The position of urban codes places separate interventions within a shared urban condition.

In Saudi Arabia, **Vision 2030 and the Quality of Life Program set the national frame for urban quality** and transformation of the built environment. In the Eastern Region and Al-Ahsa, this frame reaches an arid territory requiring applied instruments on the ground for public space, built form and climate response. Urban codes connect national direction with territorial reading and decisions made through each intervention.

AL-AHSA · EASTERN REGION — THE STREET EDGE

Al-Ahsa, Eastern Region: at the scale of the street section and public edge, shade, drainage and pedestrian continuity are resolved as one applied relation between plot and city. Image: Gabriela Fontanals Litter.

6.1 · THE OPERATIONAL LAYER

Structure Produces Urban Behaviour

1. Implementation as the Operational Layer of Urban Resilience

A systemic reading of the city becomes relevant to planning through its effect on decisions on the built environment. Interdependencies and shocks connect territorial structure with urban form, while feedback loops explain the cumulative effect of repeated intervention over time. At the scale of implementation, resilience requires rules and technical criteria that establish continuity between separate interventions. In urban contexts exposed to extreme heat and institutional change, **the operational layer defines the capacity of planning to produce consistent material results across the city.**

The structure of the system produces urban behaviour.

Urban planning shapes the built environment through repeated decisions across successive intervention cycles. Rules and technical criteria convert public objectives into a common basis for intervention, while coordination between actors links approval with construction and later maintenance. Each intervention changes the material relation around it, because street edges, plot access and public space conditions gradually define the urban pattern inherited by later decisions. Urban resilience is linked to **the capacity of the planning system to keep that pattern aligned with continuity, climate response and later adjustment**.

Urban codes connect urban objectives with decisions made at the scale of intervention. Their role is to organise the relation between street, plot, built frontage and public space through rules applied in design and approval procedures. Shade and drainage set criteria for the public edge and the ground plane, while pedestrian continuity links access with the public space system. Consistent application across separate interventions aligns each case with a shared urban condition across development cycles.

Urban codes with implementation capacity connect a measurable standard with a decision field and with its expected effect on the city. A shade rule relates street section to orientation and outdoor comfort, while a drainage rule connects the ground plane with planting and maintenance. A frontage rule coordinates the built edge with access and everyday safety along the plot-city relation. Urban codes reach urban scale once separate technical checks become one applied relation between the intervention and the city.

Urban decisions continue to produce effects during construction, use and maintenance. Resilience-oriented urban codes incorporate update cycles as technical criteria require adjustment under changing urban or climate conditions. During use and maintenance, the code is revised to preserve continuity between interventions and respond to changing conditions in the built city. Resilience becomes part of the planning system when urban codes turn continuity, climate response and later adjustment into applied requirements for ordinary interventions across design, construction and use.

6.1 · PLANNING INSTRUMENTS

From Strategy to Street Section

2. Planning Systems and Instruments with Implementation Capacity

A planning system is formed by instruments positioned at different levels of decision. Strategic frameworks set the priorities for urban transformation, while regulation converts those priorities into a frame for land development and permitted uses. Plans organise that frame across territorial structure, infrastructure and urban growth. **Technical guidelines and urban codes operate closer to design and delivery**, converting the planning frame into criteria applied to urban interventions and bringing the system to the level of built form.

Strategic priorities acquire design relevance as the instruments pass from regulation to plans and from plans to urban codes. Strategy and regulation define the conditions for permitted urban transformation, while plans organise the terms across urban areas, infrastructure corridors and growth areas. Urban codes operate at the scale where the sequence reaches street section, built frontage, access and the plot-city relation, converting the planning frame into criteria that affect the proposed form of each intervention before construction.

Within this sequence, urban codes establish the technical requirements that apply to each intervention before construction. Each rule states the condition for the design and the permitted range for resolving it. A frontage or access rule defines the relation between the built edge and the street, while a shade or drainage rule relates the intervention to climate performance. Planning direction becomes an applied technical condition once the code assigns it to a specific design decision within the intervention.

Implementation depends on continuity between instruments, technical review and urban intervention.

International references define continuity between planning instruments and urban intervention through different systems of application. France connects public planning with territorial regulation, so each intervention is assessed through its insertion into an ordered urban form structured by alignment, scale and frontage continuity in relation to the surrounding fabric. The Netherlands coordinates urban development with water management and infrastructure, making urban form respond to drainage, open space and territorial support within the same spatial operation. Zoning, design guidance and form-based codes in the United States concentrate applicable criteria at the scale of building form and street edge, with frontage conditions organising the visible relation between development and public space. Across the three references, **application capacity depends on the planning structure that converts urban criteria into conditions for each intervention.**

Across the three models, urban codes derive practical force from the instruments supporting their application. Public planning directs criteria toward the insertion of each intervention within an ordered urban form. Land and infrastructure coordination relates built form to drainage structure, open space and mobility. Zoning and design guidance concentrate code criteria on the visible relation between plot, building and street edge. The models distinguish urban codes by the planning instrument anchoring their application and by the urban decisions brought under code criteria in each system.

6.1 · INSTITUTIONAL POSITION

Where Urban Codes Sit in the System

Institutional position defines the role of urban codes within the system from strategic planning to implementation. At the strategic level, planning figures set urban direction and transformation priorities, while planning regulation establishes the formal frame for development control. Across the level of development, urban codes facilitate the passage from the strategic and regulatory frame to applicable urban design content for each intervention. Guidelines define design criteria for technical teams and public authorities, while **urban codes convert those criteria into rule-based decisions** on form, section, built edge, access and the relation with public space. Submitted plans and sections document intervention-scale spatial resolution, with technical reports and compliance matrices recording the urban design response. Urban codes establish their institutional role by linking strategic direction, planning regulation and implementation through submitted plans, sections, technical reports and compliance matrices.

Within the planning system, urban codes operate between public policy, planning regulation, urban design and technical review. Their role is to translate planning system priorities into cumulative decisions on the built environment through applied rules and verifiable criteria. Urban resilience objectives are integrated into the city by connecting strategic frameworks, applied rules, verifiable criteria and mechanisms for later adjustment. Urban codes establish a verifiable relation between strategic framework, urban intervention and material conditions across the main components of the built environment.

3. Saudi Arabia as an Applied Field of Urban Implementation

Saudi Arabia provides **an applied field for understanding urban implementation as an active part of a planning system**. Transformation associated with Vision 2030 and the Quality of Life Program has expanded the scope of urban action by connecting urban development, the quality of the built environment and everyday experience. Public investment, heritage regeneration and residential expansion coexist with demanding climate conditions and a diverse territorial structure. Within the Saudi framework, the planning system articulates applied instruments that translate broad objectives into verifiable criteria and material decisions adjusted to specific territorial conditions.

Vision 2030 and the Quality of Life Program establish a national direction linked to urban quality, liveability and public life. Urban design instruments introduce criteria structuring its application in practice, while the National Urban Design Guidelines and the Public Realm Design Manual provide a technical basis for streets, public space and urban form. Saudi Architecture sets out a territorial framework for architectural identity, built form, materiality and climate response for national application. Urban codes and technical guidance translate territorial differentiation into instruments applicable within urban practice.

6.1 · TERRITORY, RULE & GOVERNANCE

National Direction, Territorial Identity, Local Application

Saudi Arabia demonstrates that territorial identity requires instruments of application.

The cases selected within Saudi Architecture provide references for understanding variation in application within a common national framework. Nearby regions depend on differentiated instruments because **climate, settlement and built form directly condition the urban rule**. Saudi architectural identity becomes part of the process by connecting territorial references with criteria for urban form, climate response and the relationship with public space.

The Eastern Region provides a broader regional frame in which metropolitan expansion, an urban economy shaped by energy and industry, coastal frontages and arid climate define coordination requirements related to scale, climate exposure and built form. Within this regional frame, Al-Ahsa introduces a specific territorial condition linked to the oasis, the historic fabric and everyday architecture.

In Al-Ahsa, urban codes apply to the built environment within specific territorial conditions, connecting technical rule and material decision and converting place-specific conditions into verifiable criteria for urban form. Identity, performance and governance structure the relationship between territory, applied rule and planning system. Identity establishes the connection with territory and the urban language that remains recognisable in built form. Performance and governance translate the territorial framework into verifiable criteria and procedures of application.

The Saudi case consolidates the relationship between national direction, territorial identity and local application. Urban codes operate as instruments that translate general objectives into applicable criteria for specific territories. Rules, evidence and review procedures convert applicable criteria into territorial decisions and **establish verifiable alignment between national direction and local intervention**.

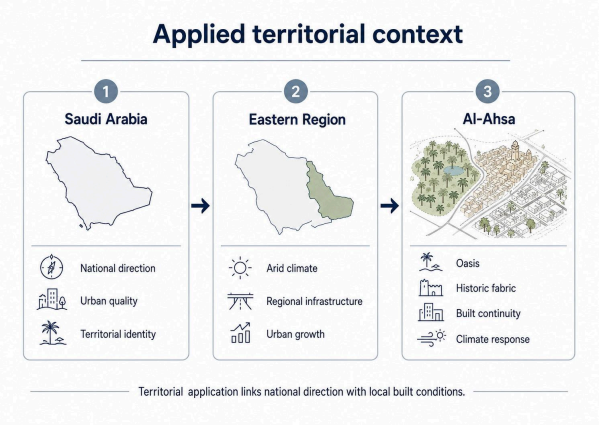


Figure 6.1. Applied territorial context: national direction, regional conditions and local application in Al-Ahsa. Source: Gabriela Fontanals Litter, 2026.

6.1 · CUMULATIVE IMPLEMENTATION

Repeated Rules, Shared Built Condition

4. Urban Codes and Cumulative Implementation

Urban codes acquire implementation capacity by converting urban direction into repeatable decisions across interventions, teams and development phases. Successive interventions reshape the built environment across different scales and development cycles, while urban codes provide a common structure for keeping decisions aligned across interventions. A decision applied to a street, plot, frontage or section contributes to cumulative implementation once **it reinforces a shared built condition beyond the limits of a single intervention**.

Repeated application converts separate decisions into a shared built condition through consistency in urban code criteria across interventions.

Urban code criteria connect measurable requirements with material effects on the built environment. Width, height and distance define specific dimensions once each measure is linked to a field of application. A sidewalk width contributes to cumulative implementation through pedestrian continuity, shade and planting within the same street section. A setback has urban function through climate transition, legible access and the relation between building and public space. Applied criteria convert technical precision into a repeatable relation between intervention and shared built condition.

Cumulative implementation organises ordinary decisions at the interface between street, plot and urban infrastructure. Plot-by-plot decisions on edge, access, shade and drainage require a common structure to form continuity across separate interventions. Urban codes coordinate urban edge, access and technical street infrastructure through the relation between section, climate and built form. Through cumulative application, street, plot, infrastructure and climate response stay aligned with one urban direction across interventions.

The street section provides the main support for urban repetition because it connects the pedestrian route with the technical conditions of the street. Pedestrian continuity organises the main line of movement, while shade and drainage integrate outdoor use with the same section. Each intervention adjusts dimensions and materials to its context through criteria compatible with street infrastructure. Across separate interventions, section criteria align the pedestrian route, built frontage and technical support within a continuous street structure.

The public edge defines the direct relation between ground floor, access and street. At ground level, frontage depth and entrance location organise visibility, everyday activity and pedestrian continuity between different plots. Public edge criteria coordinate separate frontages through legible access and a clear transition between interior use and public space. As the same street order is applied across plots, access, exterior transition and ground-floor use form a continuous public edge along the pedestrian route.

6.1 · THE APPLIED RELATIONS

Edge, Climate, Water and Service

Climatic comfort operates across the street section and the public edge because spatial decisions define real conditions for outdoor use. Shade and façade depth create protected outdoor areas along the building-street relation. Vegetation extends protection along routes and waiting areas. In hot-arid territories, shade criteria and exposure control produce usable exterior segments along streets, entrances and waiting areas. **Urban form incorporates climate response when shade, depth and exposure control become material conditions of the public edge** in each intervention.

Soil and water extend applied urban rules into topography, drainage and infiltration. Each intervention defines the ground plane through slopes and permeable surfaces, with planting strips supporting runoff control and infiltration. Across separate interventions, **ground-plane decisions create a distributed structure for water management within the built environment.** Ground treatment and green infrastructure reinforce continuity in the street by linking water management, planted shade and outdoor space quality within the same urban operation.

Service integration completes the relation between technical operation and urban form. Ground level organises technical access and operational areas within the building-street interface, while parking and lighting remain coordinated with the pedestrian route and frontage legibility. Urban codes establish coordinated locations for technical elements within the section, urban frontage and plot-city interface. Technical coordination reinforces the public edge by placing service access, equipment and lighting in positions compatible with maintenance and pedestrian continuity.

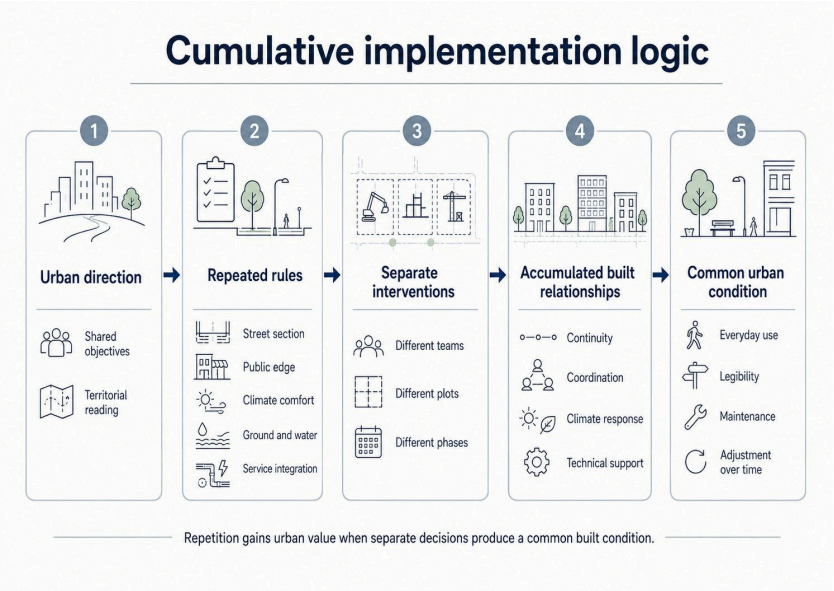


Figure 6.2. Cumulative implementation logic: repetition gains urban value when separate decisions produce a common built condition. Source: Gabriela Fontanals Litter, 2026.

6.1 · CUMULATIVE IMPLEMENTATION MATRIX

Repeated Rule to Cumulative Urban Effect

REPEATED RULE	BUILT URBAN RELATION	APPLICATION ACROSS INTERVENTIONS	CUMULATIVE URBAN EFFECT
Street section rule	Pedestrian route, shade, drainage and technical street infrastructure are coordinated within one street section.	Section criteria align dimensions and materials with street infrastructure across separate interventions.	A continuous street structure links pedestrian movement, built frontage and technical support across successive interventions.
Public edge rule	Ground floor, access and street form a direct public edge through frontage depth and entrance location.	Public edge criteria coordinate separate frontages through legible access and transition between interior use and public space.	A continuous public edge orders visibility, everyday activity and ground-floor use along the pedestrian route.
Climatic comfort rule	Shade, façade depth and vegetation define usable outdoor conditions along the building-street relation.	Shade criteria and exposure control are applied to routes, entrances and waiting areas.	Usable exterior segments reduce climate exposure and strengthen outdoor use across successive interventions.
Soil and water rule	Topography, drainage and infiltration are organised through the ground plane.	Ground-plane criteria coordinate slopes, permeable surfaces and planting strips across separate interventions.	Distributed water management links ground treatment, planted shade and outdoor space quality within the street structure.
Service integration rule	Technical operation and urban form are coordinated through the building-street interface.	Technical elements are located within the section, urban frontage and plot-city interface.	Service access, equipment and lighting are coordinated with maintenance needs and pedestrian continuity along the public edge.

Table 6.1 — Urban code criteria: repeated rule, built urban relation, application across interventions and cumulative urban effect, Al-Ahsa. Source: Gabriela Fontanals Litter, 2026.

Technical documentation defines the application of urban code criteria for each intervention through coordinated drawings and compliance matrices. Graphic definition relates plot insertion and urban frontage to street structure as part of the same applied criteria. At section scale, pedestrian route and built edge are coordinated with drainage, shade and technical support. At component level, dimensions and material treatment are specified with compliance evidence for the implementation cycle. **Urban code criteria establish technical continuity across separate interventions** through graphic definition, material resolution and the approval-to-maintenance cycle.

Cumulative implementation converts the repeated application of urban code criteria into material continuity across separate interventions. Each intervention reinforces the relation between built edge and street structure, carrying urban order from technical definition into operation. As interventions accumulate, **material continuity extends through use, maintenance and transformation of the built environment**. At the scale of resilient urban systems, the built environment maintains urban operation and supports progressive adjustment through accumulated continuity.

6.1 · RESILIENT URBAN SYSTEMS

Cumulative Urban Condition

5. Cumulative Urban Condition and Resilient Urban Systems

Urban resilience is grounded in **a cumulative urban condition able to sustain urban functioning during use, maintenance and transformation**. Separate interventions create material relations with effects continuing after initial implementation. Street structure, public edge, technical support and maintenance connect everyday use with progressive adjustment. Climate response and progressive adjustment operate within the same material relations during use, maintenance and transformation.

In resilient urban systems, the built environment sustains urban functioning through interdependent material components. Streets, plots, infrastructure and public space operate as connected parts of the same urban system, linking use, technical operation and progressive adjustment. Feedback loops relate use and maintenance with technical information. Observed conditions inform adjustment of the built environment. **Diversity, redundancy and connectivity** expand functional alternatives under climate exposure or urban change and ground resilience in the material organisation of the built environment.

The structure of the system produces urban behaviour.

In urban planning, system structure is formed by the relation between rules, technical criteria, available information and adjustment capacity. Rules, technical criteria, available information and adjustment capacity guide decisions on street sections, public edges and infrastructure interfaces. Implementation and operation after delivery are connected through assigned responsibilities, while adjustment during use and maintenance follows the relation between available information and technical criteria. Shared rules and technical criteria maintain consistency between separate decisions, climate response and transformation of the urban environment.

Material and technical relationships incorporated through ordinary decisions form a cumulative urban condition. Across separate interventions, coordinated access and shade support functional continuity along the street structure and public edge. Drainage and maintenance extend that relation into technical support during use and operation. Under climate or operational stress, intervention capacity is based on the continuity already established between street structure, public edge and technical support.

Saudi urban areas are changing through growth, renewal and infrastructure works. In the Eastern Region, Al-Ahsa exposes the cumulative urban condition through oasis settlement, historic fabric and contemporary urban growth. Heat exposure acts directly on streets and built edges, while regional infrastructure increases the demand for coordinated access, shade and service continuity. Maintenance and progressive adjustment become material operations within this setting, as streets, edges and technical systems require repeated repair, calibration and adaptation during urban change. Through repeated repair, calibration and adaptation, territorial identity and urban quality stay connected to the usable condition of the built environment.

6.1 · RESILIENT URBAN SYSTEMS

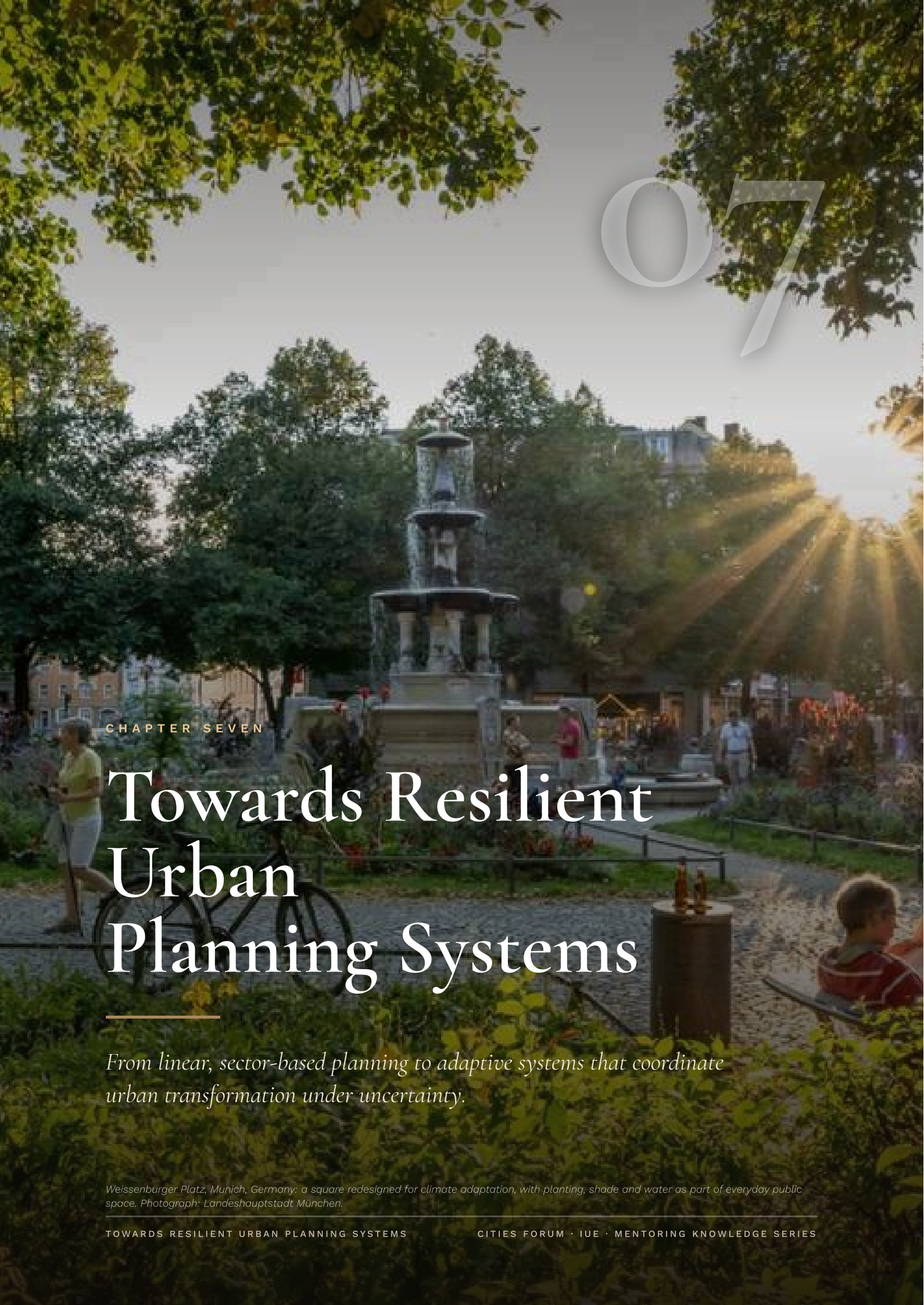
From Repeated Decisions to Resilient System Behaviour

Successive interventions consolidate cumulative urban conditions through the repeated application of urban codes. Decisions established in one intervention cycle continue through maintenance, adjustment and transformation, while each subsequent intervention is resolved within an existing built condition. Across the cumulative process, the relation between built edge and street structure reinforces material continuity in the city and keeps climate response connected to maintenance and progressive adjustment. At system scale, maintenance, adjustment and transformation sustain the material relations established across previous intervention cycles and **turn the cumulative urban condition into resilient urban system behaviour**.

Figure 6.3. Cumulative urban condition in Al-Ahsa: from a single intervention to repeated interventions and, finally, to an accumulated condition where shade, greenery, active edges and drainage work as one street. Source: Gabriela Fontanals Litter, 2026.

KEY LESSON: IMPLEMENTATION

Resilience becomes system behaviour when urban codes turn continuity, climate response and later adjustment into applied requirements for ordinary interventions, sustaining the material relations established across previous intervention cycles.



07

CHAPTER SEVEN

Towards Resilient Urban Planning Systems

From linear, sector-based planning to adaptive systems that coordinate urban transformation under uncertainty.

Weissenburger Platz, Munich, Germany: a square redesigned for climate adaptation, with planting, shade and water as part of everyday public space. Photograph: Landeshauptstadt München.

7 · SYSTEMS THINKING

Towards Resilient Urban Planning Systems

Reading the city as a complex, interconnected and adaptive whole

7.1 From linear systems to homogeneous complex urban systems

Urban planning has evolved from traditional linear, sector-based approaches towards the recognition of cities as complex and interconnected systems. Historically, planning focused on individual sectors such as land use, transportation, housing, and infrastructure, often addressing them independently. However, increasing urban complexity, climate uncertainty, and socio-economic challenges have demonstrated the need for **integrated and adaptive planning approaches based on systems thinking**. The experiences are presented in this study, from different contexts including the Netherlands and Norway from Europe, Japan and South Korea from East Asia. Last but not least Saudi Arabia from the Middle East illustrates different pathways toward resilient urban planning. While each country operates within distinct governance structures, environmental conditions, and development priorities, they all demonstrate the growing importance of integrating multiple urban systems to strengthen resilience and support sustainable urban development.

Promenade des Anglais, Nice: a seafront where land, water, mobility and public space are planned as one interconnected urban system. Photograph courtesy of Didier Vancutsem.

7 · THE RESILIENCE CHALLENGE

Interconnected Crises, Fragmented Responses

Why urban resilience demands systems thinking as a guiding framework

7.2 Current situation and big challenges of our cities towards urban resilience

Cities today face unprecedented and interconnected challenges, including climate change, rapid urbanization, housing shortages, infrastructure deficits, biodiversity loss, economic uncertainty, and increasing social inequality. At the international level, frameworks such as the NUA, the SDGs, and the work of UN-Habitat provide comprehensive guidance for sustainable urban development. Nevertheless, these agendas are often implemented through fragmented governance structures, sectoral policies, and disconnected institutional frameworks, limiting their collective impact. This lack of interconnectivity hinders cities' ability to build resilience, as urban challenges rarely occur in isolation but emerge from complex interactions between environmental, social, economic, and institutional systems. Consequently, there is an urgent need to adopt systems thinking as a guiding framework that connects policies, governance, planning instruments, and stakeholders across scales, enabling cities to move from isolated interventions toward integrated, adaptive, and resilient urban planning systems.

There is an urgent need to adopt systems thinking as a guiding framework that connects policies, governance, planning instruments and stakeholders across scales.

River Isar, Munich: the renaturalised river answers interconnected pressures of climate, water, ecology and public life that can no longer be addressed sector by sector. Photograph: Landeshauptstadt München.

7.3 · RECOMMENDATIONS

Our Recommendations Based on Systems Thinking

A paradigm shift from static regulation to adaptive coordination

7.3 Our recommendations based on the system thinking

Urban planning systems are entering a major paradigm shift. They are moving from static regulatory frameworks focused on land-use control and project approval toward **adaptive systems able to coordinate urban transformation under uncertainty**.

This shift is driven by necessity. Housing, climate risk, infrastructure pressure, migration, informality, public finance, digitalisation and governance now operate as **interconnected crises within the same urban system**.

01

Resilience should become a structural criterion of planning systems. It should link **spatial decisions, governance arrangements, finance, infrastructure and maintenance** so that cities can keep functioning, absorb shocks and adapt their instruments over time.

02

Systems thinking provides the method for reading interdependencies, feedback loops, system boundaries, leverage points and cumulative effects before interventions are implemented. It helps planning move beyond sectoral responses to problems that are systemic by nature.

03

Resilient planning systems should incorporate continuous learning through monitoring, evaluation and feedback loops. Rather than treating planning as a one-off exercise, planning systems should continuously adapt policies and instruments based on changing conditions and observed outcomes.

04

Over the next two to three years, the urban agenda is likely to shift further from general declarations toward measurable implementation. Housing delivery, climate adaptation, financing capacity, institutional coordination, monitoring and review mechanisms will become central.

Cheonggyecheon, Seoul: the human scale behind the paradigm shift, where housing, mobility, public finance and governance meet in the everyday life of the street. Photograph: Tonia Vasile (2025).

7.3 · RECOMMENDATIONS

From Leverage Points to Territorial Calibration

Where transformation happens, and how it must adapt to place

05

The greatest opportunities for transformation often lie in institutional and governance leverage points. Small changes in regulations, governance arrangements or decision-making processes can produce disproportionate improvements across the wider planning system.

06

Strengthening local and inter-institutional capacities is a crucial part of efficient planning. It involves recognizing that all stakeholders are part of the same system and being able to coordinate and develop proposals as part of that system. In this same vein, valuing multi-level governance, where each level has distinct responsibilities while remaining interconnected with the others, **along with non-linear proposals and implementation mechanisms, reduces fragmentation and siloed thinking.**

07

It is also essential to understand that planning is a continuously evolving process, and like all systems, cities constantly face new challenges and, consequently, new needs to address. Planning should consider an operational ecosystem beyond the validity period of a plan and anticipate the life cycle of a project as part of the system.

08

Systems thinking also requires space for innovation, pilot projects, or living laboratories where proposals can be tested. Furthermore, scenario-based planning should be a complementary approach to explore future paths that allow cities to achieve their objectives more efficiently.

09

Continuous documentation, monitoring and institutional learning are essential components of adaptive planning systems. In that sense, monitoring proposals should be an essential point, not only to see how the results are progressing, but also to understand how they function within the system, understand the consequences, and how they interact with the other elements of the system.

10

Planning solutions must be territorially calibrated. Shared global principles can guide action, but the instruments need to respond to climate, urban form, culture, governance, resources, financial capacity and the specific risks of each place.

7.3 · RECOMMENDATIONS

Regenerative Logic and Learning Systems

From urban agendas to implementation systems that learn from the built city

11

Green and blue infrastructure should be treated as core urban infrastructure. It connects land, drainage, shade, biodiversity, health, public space, investment, maintenance and climate adaptation within the same planning system.

12

Urban regeneration refers to intervention in existing areas, while a regenerative logic goes further. It means that each intervention should **strengthen the long-term environmental, social and urban capacity of the territory.**

13

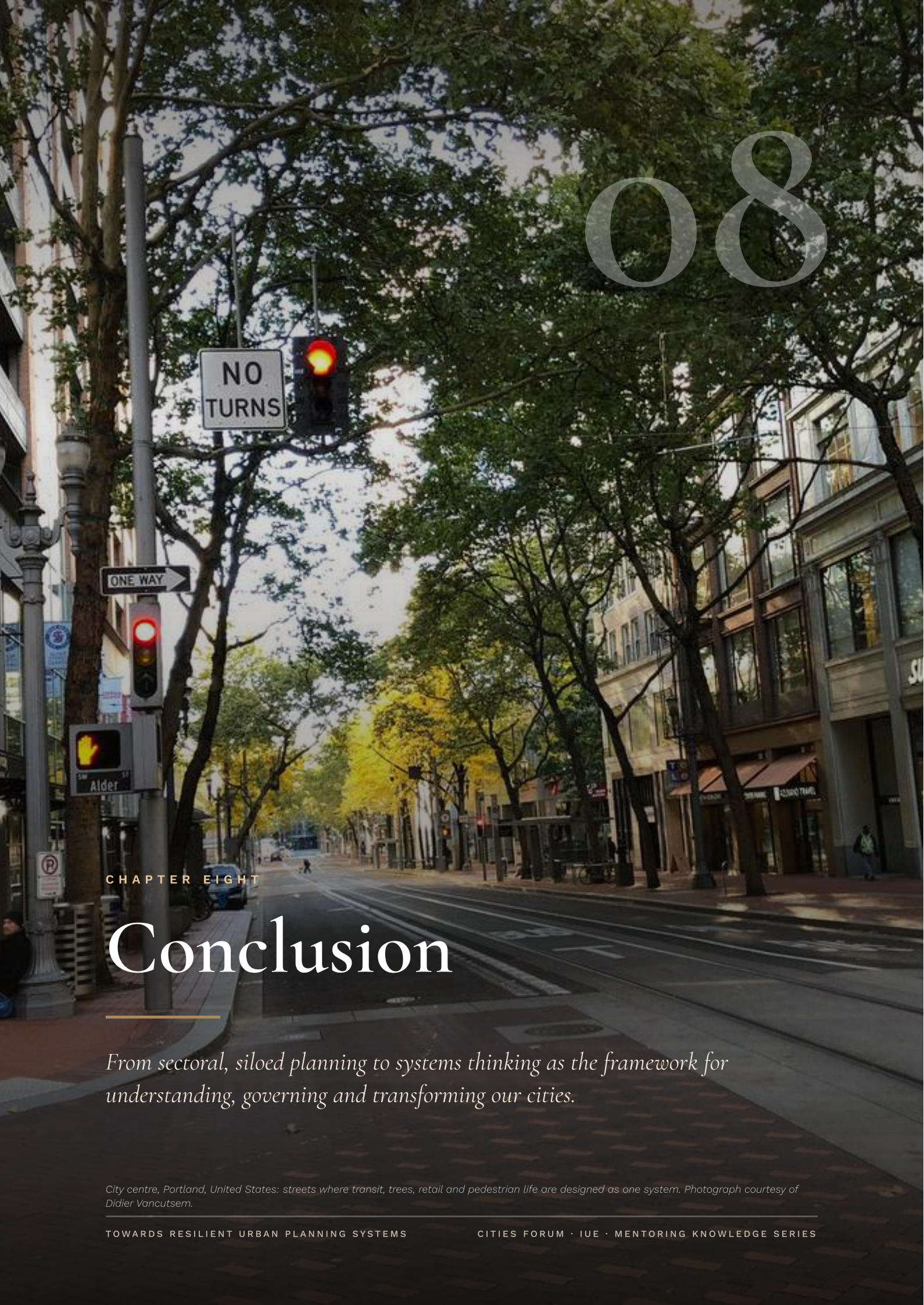
The next stage should move from urban agendas to implementation systems that learn from the built city. Data and AI can support this shift when they strengthen public accountability, improve decision-making, adjust planning instruments and help produce measurable, adaptable and place-based resilience over time.

14

Strengthen professional capacity through continuous training, adaptation, monitoring, and evaluation to address the increasing complexity of urban risks while closing critical knowledge, skills, and capacity gaps needed for effective implementation, preparedness, and resilience.

KEY LESSON: TOWARDS RESILIENT SYSTEMS

Resilience should become a structural criterion of planning systems. It should link spatial decisions, governance arrangements, finance, infrastructure and maintenance so that cities can keep functioning, absorb shocks and adapt their instruments over time.



08

CHAPTER EIGHT

Conclusion

From sectoral, siloed planning to systems thinking as the framework for understanding, governing and transforming our cities.

City centre, Portland, United States: streets where transit, trees, retail and pedestrian life are designed as one system. Photograph courtesy of Didier Vancutsem.

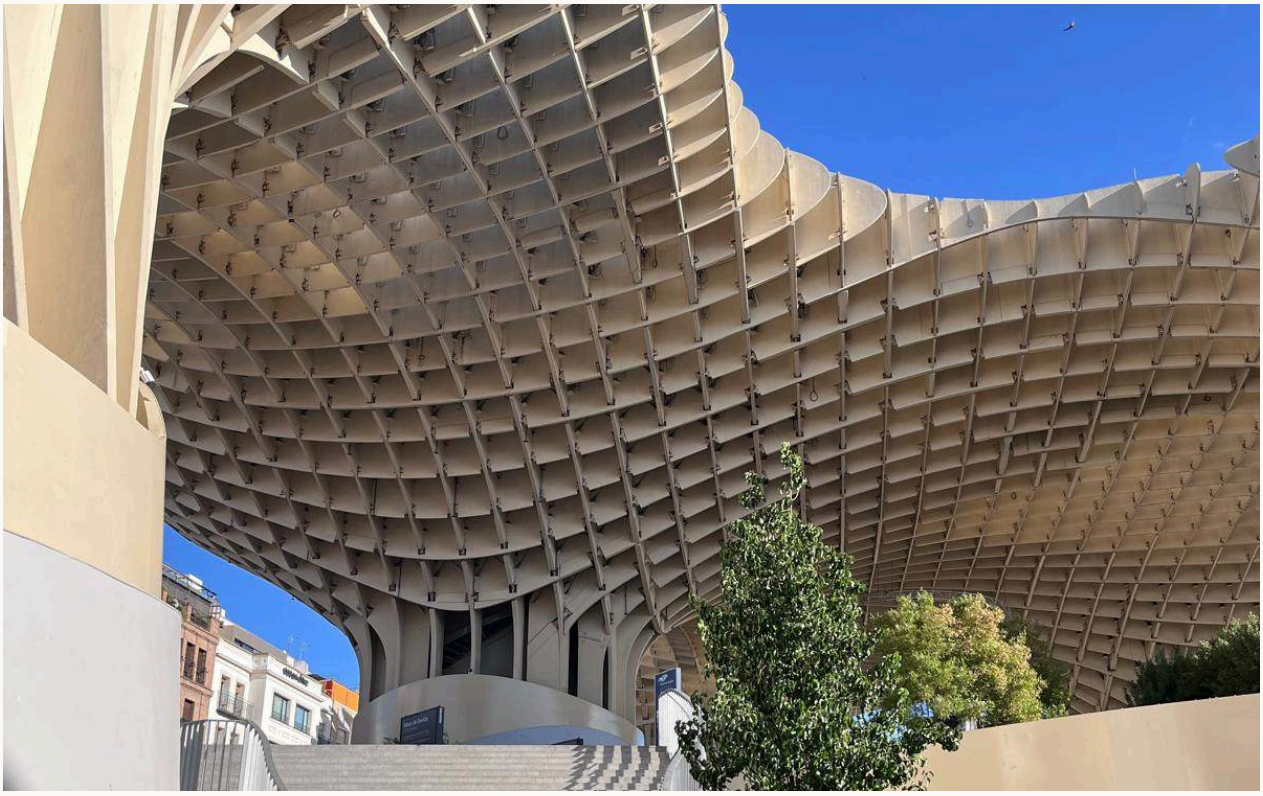
8 · CONCLUSION

Breaking the Silos

Why complex urban systems can no longer be planned sector by sector

This publication aims to show that our urban planning systems, and consequently our cities, have been affected by siloed, isolated approaches until now. Complex urban issues such as transport, housing and utilities are still **treated as individual, sector-specific problems rather than interconnected networks**. Several historical barriers can be attributed to reductionist planning paradigms, technological limitations, prioritisation of short-term profit, urban modelling from the 1960s and 1970s (which is still in use today) and siloed bureaucracy. This silo-thinking approach appears to be related not only to urban planning itself, but also to urban professions. It is only in the face of recent climate and resource crises that there has been a call for more systems-based frameworks that avoid the pitfalls of fragmented urban development and lack of resilience. Furthermore, the benchmark analysis of the international urban policies and planning references currently available (see Chapter 5) reveals a dearth of documents oriented towards systems thinking.

Across the countries reviewed, systems thinking does not emerge as a fixed model or a transferable formula. Its expression depends on the specific context, planning culture, governance structures and challenges of each place, showing that a systems approach must begin with **understanding the system before attempting to transform it**.



Las Setas, Seville: a single intervention holding market, public space, archaeology and city life together, an image of what becomes possible once sectoral silos are removed. Photograph: Evelin Raico (2026).

8 · CONCLUSION

A Necessary Paradigm Shift

Towards integrated, adaptive and resilient urban systems for the 21st century

It is an urgent time to shift from sectoral thinking to a more resilient systems approach. Firstly, we need to move towards **urban resilience as a systemic performance of an urban fabric** shaped by planning rules that ensure each intervention reinforces the physical, environmental and operational continuity of existing urban conditions.

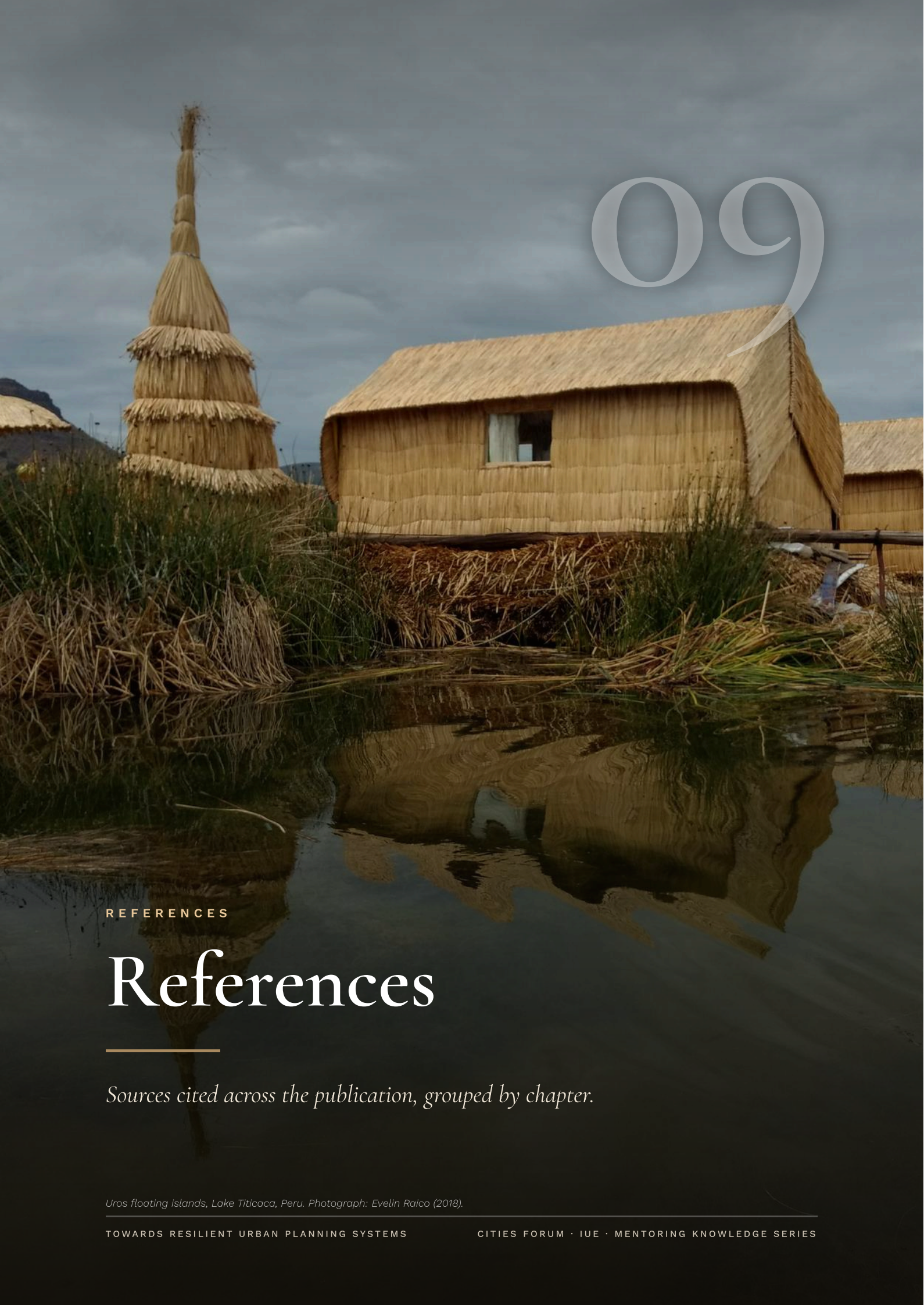
Secondly, urban planning systems require a shift from sectoral, static planning to integrated, adaptive systems. A systems thinking approach can support this transition by helping planning systems to **understand interdependencies, respond to feedback, and adapt over time**.

Based on our knowledge and research, we recommend acknowledging the **systems thinking approach as a method of paradigm shift** to transform urban planning systems in response to future challenges in the 21st Century. System thinking should become the framework through which urban planning principles, governance and implementation should be understood. This could be achieved through a white paper or manifesto that sets out a new, innovative approach to urban development and the transformation of current planning systems.

Al-Ahsa, Eastern Region of Saudi Arabia: resilience as the systemic performance of an urban fabric where each intervention reinforces the continuity of existing conditions. Image: Gabriela Fontanals Litter.

IN CLOSING

In the 21st century, thinking in systems is a necessary skill. Cities are dynamic, interconnected and highly intricate systems that require integrated solutions to eliminate silos. System thinking is a way of understanding, governing and transforming cities in all their complexity to create more resilient and adaptive spaces. Indeed, it is essential that future urban systems are balanced, given the high risk of urban systems collapsing.



09

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Uros floating islands, Lake Titicaca, Peru. Photograph: Evelin Raico (2018).

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Endnote / acknowledgement for background material

- This section also benefited from background comparative material developed by iUE – Institute for Urban Excellence, with contributions from the OECD for data gathering and raw data sharing. As this document was not officially published, it is not included in the formal reference list and is acknowledged here only as background material.

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7 & 8. Towards Resilient Urban Planning Systems and Conclusion

- Chapters 7 and 8 draw on the sources listed above for chapters 1 to 6, in particular Meadows (2008), Folke et al. (2010), the OECD and UN-Habitat programmes on National Urban Policy, the New Urban Agenda (United Nations, 2017) and the International Guidelines on Urban and Territorial Planning (UN-Habitat, 2015).

THE TEAM

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This publication was developed as part of the Mentoring Knowledge Series within the International Mentoring Program for Urban Planners, bringing together a multidisciplinary team of international urban professionals who contributed their diverse and valuable expertise, perspectives and practical experience.

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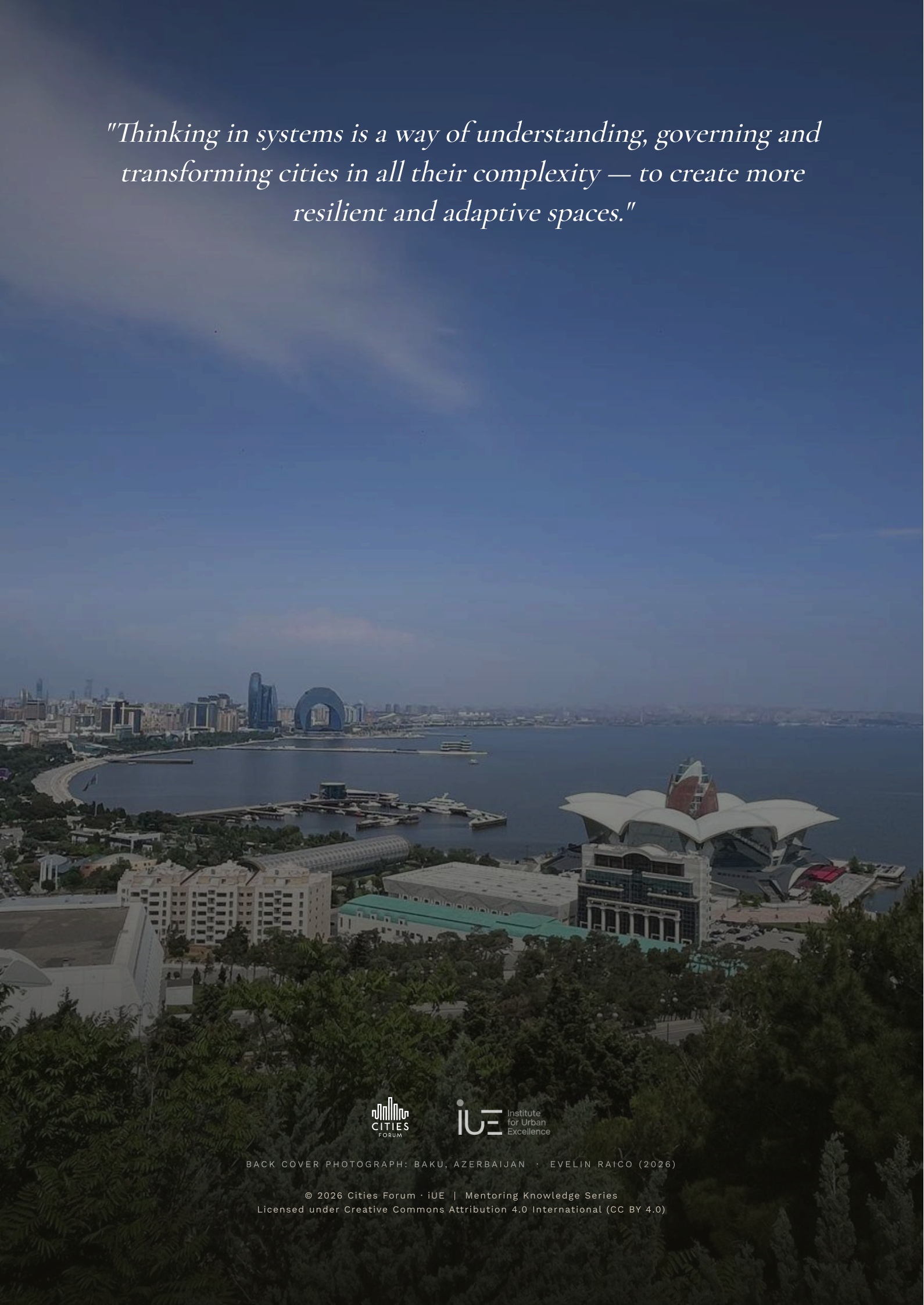

"Thinking in systems is a way of understanding, governing and transforming cities in all their complexity — to create more resilient and adaptive spaces."

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