

Urban Planning for Resilience

*EUKN Policy Lab for Slovenia, 24 October 2023
Input Paper*



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Cover Image: Aerial picture of Celje, Slovenia. Source: Eugene Kuznetsov, Unsplash

Date of Publication: August 2023



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Input Paper

The Policy Lab 'Planning for Urban Resilience', organised by the EUKN and the Ministry of Natural Resources of the Republic of Slovenia, will take place on 24 October 2023 in Celje, Slovenia. The flooding happened in Slovenia in August 2023, described as the worst natural disaster that ever hit the country, emphasised the urgency to act. Acknowledging this urgency, recent developments and gaps in the field of 'planning for urban resilience', this Policy Lab aims at activating the urban practitioner's community. The event will provide an overview of existing planning tools to inspire future interventions and will offer a platform for urban practitioners to share struggles in the implementation of resilience measures, identifying what is needed to overcome them.

This input paper serves to prepare the ground for the Policy Lab, introducing key discussion questions that will be addressed during the event and the context in which they are situated.

[Register for the Policy Lab](#)

1. The concept of resilience

The rising effects of climate change, and the need for cities to adapt, have sparked many debates around the concept of resilience. As emphasised by the latest IPCC report (2021)¹, preventive actions must be implemented as global climate change has substantially increased the probability of extreme weather and climate events such as heat waves, droughts, wildfires and flooding. With their high concentration of population, economic activities and infrastructures, urban areas face greater risks related to climate change. Local policymakers are aware of this situation. Indeed, according to a 2023 survey done by Eurocities, Climate Action has been identified as the top priority for 55% of mayors². One of the responses for cities across the globe is to develop resilience plans.

The concept of resilience has also been widely discussed during the COVID-19 pandemic, when cities implemented quickly responsive measures, demonstrating their resilience capacity. The pandemic highlighted the links between urban planning and

health, as well as the importance of good (urban) emergency governance. Lockdowns and social distancing measures increased the – already – high demand for qualitative public spaces, decent housing, and accessible green spaces.

Nowadays, resilience has become a buzzword, widely used in policy discourses and documents, often interchangeably with other concepts such as sustainability or adaptation. But this broad utilisation of the term brings ambiguity about its meaning³. So, how can resilience be defined?

The concept of resilience has been first introduced in the field of ecology by Holling (1973)⁴ and refers to the capacity of ecological systems to maintain their structure and functions during and after disturbance. Rapidly, it has gained popularity in social sciences where it was used to examine the link between societal and ecological systems. Still today, the meaning of resilience is not clearly bounded, and many definitions exist.



Image 1 : Circles drawn in Saint Peter's square in Ghent to promote social distancing during COVID-19. Photo credits: Bart Biesemans, Reuters

Overall, three main aspects of resilience prevail in the literature⁵:

- Resilience as the capacity of a system to absorb perturbations while maintaining its fundamental functions. The idea to decrease the impacts of shocks is at the core of the definition of resilience. Vulnerability can be defined as the degree to which a system is likely to experience harm due to exposure and sensitivity to a specified hazard or stress⁶.
- Resilience as the capacity of a system to return to a state of equilibrium after disturbance. As the system 'bounces back' to its previous state, it does not induce change. Eventually, the system returns to a state of vulnerability that caused the disturbance in the first place. This conception of resilience can also be associated with the strengthening of existing structures and institutions⁷.
- Resilience as the capacity of a system to learn, adapt, and transform itself after a shock. Here, the idea is that the system 'bounces forward'. The risk is not only perceived as a threat, but also as an opportunity that may be capitalised upon, to change the system and increase its ability to withstand future shocks.

Influenced by these different conceptions, the notion of 'urban resilience' has received much attention as well.

In the context of this Policy Lab, urban resilience will be considered as the ability of cities to not only withstand shocks but to adapt and transform. Urban planning is a powerful tool to strengthen this ability to withstand, adapt and transform. But to be used as such, urban practitioners need to be equipped with knowledge and capacity to act and react to change.

Definitions from institutions such as the Rockefeller Foundation or UN-Habitat further elaborated the idea of 'bouncing forward' and adaptation. The Rockefeller Foundation, founder and sponsor of the 100 Resilient Cities network, defines urban resilience as the 'capacity of a city to survive, adapt and thrive no matter what kinds of chronic stresses or acute shocks they experience'⁸.

For UN-Habitat, it is 'the ability of any urban system, with its inhabitants, to maintain continuity through all shocks and stresses, while positively adapting and transforming toward sustainability'⁹.

2. Urban planning to enhance resilience

The United Nations Office for Disaster Risk Reduction (UNDRR)¹⁰ recognises ‘poorly planned urban development’ as one of the six drivers of disaster risk. This is due to the direct relation between urban development and natural hazards, strongly interconnected for two reasons:

- The capacity of urban development to change natural ecosystems and hinder natural processes, such as the rainwater absorption by soils that have been sealed and impermeabilised.
- The capacity of urban development to increase the gravity of natural hazards when infrastructures are poorly managed, inadequate building regulations or industrial practices are in place

A well-planned urban development, thus urban planning, can indeed play a crucial role in reducing inhabitants’ exposure and vulnerability to external events, as it directly impacts the development of public spaces, buildings, and infrastructures. Thus, acknowledging urban planning has a key role in achieving resilience, the question is: are urban planners well equipped to design resilient cities?

Back in 2013, a group of urban planners and researchers issued a special volume of the GeoJournal Library, with the title ‘Resilience Thinking in Urban Planning’¹¹. Their discourse is based on two statements. On the one hand, they argue that neoliberalism has led to the development of market-oriented planning practices, which has reinforced cities’ vulnerability. On the other hand, they recognise that there is a lack of planning tools and policies to address this new reality.

The authors underline two objectives of their research:

- To verify the (in)adequacy of existing planning systems and practices to support sustainable urban development, preparing urban areas for both foreseen and unforeseen changes.

- To explore alternative principles for shaping a new, and more future-proof, planning approach.

What emerges is a strong sense of frustration and profound scepticism about urban planning approaches centred on ‘solving daily problems’ (p. 229) rather than preparing cities for the future. As an alternative, it is suggested to shape planning practices according to resilience thinking.

This means acknowledging that changes and disturbances will appear in the process, while preparing urban systems to positively absorb them. This approach, based on resilience thinking, could better support cities to prepare for the future.

Resilience has become a buzzword in policy discourses, but did the concept change urban planning in practice? Are current tools and approaches more adequate for shaping resilient cities, or is there still a sense of frustration among urban practitioners and researchers?

Natural hazards & urban planning – The case of Ischia

The flooding in Ischia (IT), happened in November 2022, is one out of the many recent examples of how vulnerability to risks and poor urban planning relate. The event not only caused the death of 11 people but also exposed the problem of illegal housing. According to experts, this tragedy was mainly due to the intensive illegal constructions in this high-risk area, which strongly increased the vulnerability of the place¹². It was known that these areas should have been left free for runoffs. The ground, mostly composed of ashes and rocks, was not well attached to the surface and easily triggered a snowball effect after heavy rainfall.



Image 2 : Picture of Ischia after the landslide Photo credits: Salvatore Laporta

3. Latest trends & tools for resilient urban planning

Desk research has been the main source to draft this input paper. It allowed to identify different tools for urban planners working on resilience, and to group them in the three categories presented in the following sections. However, considering the sources available, the list of identified tools is not expected to be exhaustive.

Acknowledging this, the objective of this paragraph is to provide an overview of some of the latest trend and tools for resilient urban planning, creating a base for the Policy Lab's discussion. The event will be used as a forum to deepen this research, questioning the identified tools to discover new ones, and discussing implementation gaps and barriers.

3.1. Research-based calls to action

In the past decade, the crucial role of urban planning for resilience has gained in importance, both in research and public discourses. In its 2023 report, the IPCC states that with global warming exceeding 1.5°C, urgent and transformational adaptation actions are needed to reduce climate-related risks. It also underlines that climate adaptation is context-dependent, 'making it predominantly a local government and community level of action', and planning is introduced as a key instrument¹³.

In 2022, the World Health Organization (WHO) published the report 'Urban planning for resilience and health'¹⁴. It summarises the results of the project

‘Protecting environment and health by building urban resilience’, demonstrating how urban planning can support the capacity of local actors in shaping urban resilience. More precisely, the project looked at three elements: academic evidence on the urban environmental impacts of disasters, cities’ practical experiences with environmental emergencies, and international indicators, data sets and monitoring frameworks related to urban resilience.

The summary report contains a set of key messages targeting policymakers and urban practitioners, to support them making use of urban planning and design while strengthening resilience and promoting health and well-being.

Urban planners and practitioners are especially called to:

- Establish and implement land-use, building and infrastructure planning and regulations with preventive approach to protect health.
- Promote compactness, land-use mix and connectivity throughout the city to help create healthier and more equitable proximity lifestyles and reduced car dependencies.
- Use green and blue spaces and Nature-Based Solutions strategically and synergistically in urban environments to build resilience and protect health.

The link between urban planning and resilience is being more widely recognised, and research-based calls to actions are being put forward to mobilise change.

3.2. Closing the gap between science and practice

Due to siloed government structures, differences in professional backgrounds, and the fact that adaptation is a relatively new policy area, adaptation scientists and urban professionals seldom interact¹⁵. Therefore, alongside calls to action and research projects, attempts have been made to close the gap between scientific knowledge and urban practice, fostering collaborative planning for urban resilience.

In 2020, C40, a global network of leading cities working on urban sustainability, issued the report ‘Integrating Climate adaptation – A toolkit for urban planners and practitioners’¹⁶. Urban adaptation strategies aim at modifying city characteristics to decrease vulnerabilities and, as such, they target strengthened resilience. However, according to the authors, the rare and difficult interactions between adaptation professionals and urban planners hinder a successful implementation of climate adaptation strategies. The authors advocate for closing the gap between adaptation and urban professionals in an integrated way.

The C40 report first demonstrates the need for climate adaptation and the efficiency gains of embedding climate adaptation principles into urban planning policies. Second, it presents ad-hoc tools, ideas, and resources designed to facilitate and develop effective workshops, where city officials from the adaptation and planning sectors gather to discuss.

Their suggestions refer to both the design and the implementation of such workshops, lay out how to set the appropriate goals, choose attendees, and define priorities and the right material during the preparation stage. The authors also provide guidance on how to determine the right format, ensuring smooth discussions among participants, and how to harness the momentum after the workshop.

Another tool comes from Deltares, a Dutch organisation working on the adaptation of delta areas.

Deltares recognised that most of the tools and guidelines were meant to raise awareness and assess cities' vulnerability, but that there were no supporting elements available for urban practitioners to implement adaptation solutions.

To fill this gap, they developed the Adaptation Planning Support Toolbox (APST)¹⁷, with the goal to support the co-creation of conceptual adaptation plans via workshops. Two actual tools were developed.

First, the Climate Adaptation App, giving an overview of 120 potential measures, each of them explained and ranked according to their applicability. Second,

the Application Support Tool (AST), allowing to apply adaptation measures to the project area and create conceptual plans that can be used as a future input for urban planners.

According to Deltares, the application of this toolbox had been very successful in terms of outcomes. The current updated version of the APST is called the Climate Resilient City (CRC) tool¹⁸, with the same aim: supporting collaborative planning via workshops and informing urban designers on the implementation of adaptation measures.

Such collaborative workshops, with the ad-hoc tools designed to support them, are valuable to bridge the gap between scientists and urban professionals. But, as underlined by C40, bringing these stakeholders around the same table can be challenging. The political context can prevent cities from embracing a collaborative approach, for instance when adaptation measures are not considered urgent to implement.



Image 3 : This picture displayed a screenshot of the CRC tool. This picture displayed a screenshot of the CRC tool. The window on the left shows the adaptation measures that have been chosen. A map of the project area is in the middle. The left window summarised the results of the measures describing its effects (e.g. on groundwater recharge, water quality, heat reduction) and providing an estimate of the costs for construction and maintenance. Source: Deltares

3.2. Urban Digital Twins for resilience

The ongoing digital revolution is promising as it can support urban practitioners with new tools providing useful data to strengthen resilience. Urban Digital Twins (UDTs) are a case in point. They are virtual representations of a city's physical, cyber, and social infrastructures. The objective of UDTs is to provide comprehensive data to enable urban professionals to make informed, data-driven decisions. Indeed, UDTs allow policymakers and urban practitioners to benefit from a platform to test solutions digitally, before taking and implementing decisions.

The potential benefits of UDTs are numerous: they can facilitate crisis management, enhance cities' resilience, and achieve cost savings. Above all, they are extremely useful to establish long-term scenarios or strategies to tackle the future impacts of climate change. For example, UDTs can simulate future climatic hazards like rising sea levels and increased storm severity, allowing decision-makers to assess the potential damage and identify the most vulnerable areas in the event of a flood. This is why they are gaining momentum and are expected to grow exponentially, from a handful in 2019 to more than 500 in 2025¹⁹.

The European Union is significantly supporting UDT development by funding several projects. DUET is one of them, funded by the Horizon 2020 research and innovation programme with the objective of harnessing the capabilities of UDT²⁰. Flanders, Pilsen, and Athens are the pilots of this project. The aim is to help cities develop data-based policies. As the tool consists of an accessible and interactive surface, it enables policymakers to better understand complex urban challenges.

The UDT developed in the context of the DUET project are not only relevant for emergency scenarios in case of disaster, but also useful to develop other policies, related to air quality, traffic, or carbon emissions.



Image 4 : Simulation of traffic-induced air pollution in Pilsen (Belgium) thanks to the DUET. Source: DUET

Several cities have already been using UDTs to harness their benefits and better respond to extreme climate events. For example, in Lisbon²⁰, the city government decided to create a Digital Twin for urban flood simulation. Thanks to the scenarios, the city was able to mitigate flood risk through intervention in the existing infrastructure, enhancing the drainage capacity of the existing stormwater system. Two new tunnels have been constructed to deviate the excess stormwater from critical areas. Furthermore, model scenarios for different intensities of storm have been developed to help the city prevent floods in the future.

4. Conclusion

The concept of resilience has become a buzzword in public discourse and urban documents. It is used extensively, often interchangeably with the concept of adaptation. In this broad sense, resilience can either refer to the ability of a system to ‘bounce back’ to its original state or to ‘bounce forward’. The definitions of urban resilience often refer to the need to ‘bounce forward’ and adapt cities to reduce their vulnerability.

Here, urban planners play an important role. While some professionals have expressed frustration related to the lack of appropriate tools one decade ago, in the meantime the situation has evolved. First, the role of urban planning to strengthen resilience is now widely recognised. However, a gap persists between scientists and urban professionals, as communication between them remains scarce. Fostering collaboration between the two professions in the planning process seems to be key for enhancing urban resilience. The digital revolution also provides new tools, such as Urban Digital Twins. This can give professionals a better understanding of the risks but also of the impacts different measures could have, thanks to the scenario

they provide. Already used by several cities across the world, they are currently gaining momentum and are likely to grow exponentially in the next few years.

Acknowledging the recent developments in the field of urban planning for resilience, the question remains of what is needed to fully leverage its potential. Are urban practitioners equipped with the adequate tools and resources to design more resilient cities? And if not, what are the gaps and how can they be filled moving forward?

The Policy Lab will serve as a platform to discuss these questions as well as the others previously introduced in the document.

¹IPCC, 2022: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press. Cambridge University Press, Cambridge, UK and New York, NY, USA, 3056 pp

²<https://monitor.eurocities.eu/eurocities-pulse-mayors-survey/>

³O’Hare, P., & White, I. (2013). Deconstructing resilience: Lessons from planning practice: Special edition of planning practice and research. *Planning Practice & Research*, 28(3), 275–279.

⁴Holling, C. S. (1973). Resilience and stability of ecological systems. *Annual review of ecology and systematics*, 4(1), 1–23.

⁵Eraydin, A. (2012). “Resilience thinking” for planning. In *Resilience thinking in urban planning* (pp. 17–37). Dordrecht: Springer Netherlands.

⁶Chapin, F. S., Kofinas, G. P., Folke, C., Carpenter, S. R., Olsson, P., Abel, N., ... & Young, O. R. (2009). Resilience-based stewardship: strategies for navigating sustainable pathways in a changing world. *Principles of ecosystem stewardship: Resilience-based natural resource management in a changing world*, 319–337.

⁷Manyena, B., O’Brien, G., O’Keefe, P., & Rose, J. (2011). Disaster resilience: a bounce back or bounce forward ability?. *Local Environment: The International Journal of Justice and Sustainability*, 16(5), 417–424.

⁸Link: [What is Urban Resilience? – Resilient Cities Network](#)

⁹<https://unhabitat.org/topic/resilience-and-risk-reduction>

¹⁰Link: [Poorly planned urban development as a risk driver of disaster](#)

¹¹Eraydin, A. (2012). “Resilience thinking” for planning. In *Resilience thinking in urban planning* (pp. 17–37). Dordrecht: Springer Netherlands.

¹²Link: [Euronews: experts-blame-intensive-construction-for-ischia-landslide-tragedy](#)

¹³Mimura, N., et al., 2014: Adaptation planning and implementation. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, pp. 869–898.

¹⁴Urban planning for resilience and health: key messages – summary report on protecting environments and health by building urban resilience. Copenhagen: WHO Regional Office for Europe; 2022

¹⁵Van de Ven, F. H., t al., (2016). Adaptation Planning Support Toolbox: Measurable performance information based tools for co-creation of resilient, ecosystem-based urban plans with urban designers, decision-makers and stakeholders. *Environmental Science & Policy*, 66, 427–436.

¹⁶C40 Cities (2020). Integrating Climate Adaptation: A toolkit for urban planners and adaptation practitioners. Available from: https://www.c40knowledgehub.org/s/article/Integrating-Climate-Adaptation-A-toolkit-for-urban-planners-and-adaptation-practitioners?language=en_US

¹⁷Ibid.

¹⁸Link: [Climate Resilient City Tool \(CRCTool\) | Deltares](#)

¹⁹Link: [Digital twin cities and the future of urban planning - ITU Hub](#)

²⁰Link: [DUET Project](#)

²¹Link: [City-scale Digital Twins for Flood Resilience | GIM International \(gim-international.com\)](#)