

Article

# City Models and Preventive Planning Strategies for Resilient Cities in Germany

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## Abstract

In the face of the Covid-19 crisis, the city model of the new Leipzig Charter of the EU was re-evaluated. The existing urban development model of a mixed and compact city is to be mainly maintained because the urban density or building typology does not influence the spread of Covid-19. But the pandemic has made it clear how important green space and recreation areas are for inner city residential areas. This green space also becomes more important regarding climate adaptation measures to provide cooler air and ventilation. In the framework of the Leipzig Charter of the EU, the German ministry for building adopted the memorandum on Urban Resilience in May 2021. Resilience in this context means that we should not only repair the damage of disasters but also adapt to future crises and make our cities more resilient and sustainable. For this, we need to strengthen preventive strategies in urban development planning connected with urban renewal approaches and ask for extended city models. Planning shapes the future, including counteracting undesirable scenarios with preventive planning. In this sense, future planning and disaster control have common objectives—they take an interdisciplinary approach to prepare for future change, they want to anticipate and prevent danger, protect and expand the infrastructure, and serve the common good. In this article, I will point out how integrated urban development concepts should be extended with aspects of urban resilience, and which city models are important for the future.

## Keywords

climate change; pandemic; planning models; urban planning; urban resilience

## Issue

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## 1. Introduction

Cities are increasingly confronted with severe challenges simultaneously: extreme weather, migration, cyberattacks, disease pandemics, and attacks on critical infrastructure. Cities need to face acute short-term catastrophes, such as the Covid-19 pandemic, but also long-term chronic crises, such as climate change or demographic change. Climate change will have a major impact on cities with increasing temperature and water shortages; demographic development will change the social situation in the cities with aging and a shortage of skilled workers. Cities should not react to such different crises with single measures but with integrated urban development strategies and combined measures.

The unjustified war of Russia against the independent state of Ukraine since February 2022 shows how important it is to protect critical infrastructure, care for supply lines and maintain military services, and protect the idea of freedom and pluralism in the European city. To respond to all these challenges, we need an understanding of further risks and new planning instruments and governance models. Urban resilience means the capacity of a city to rebound, adapt, and transform itself into an improved rebuild structure. Urban planning has to respond to these challenges with preventive strategies to increase resilience and further develop mission statements and planning tools (Resilient Cities Network, 2022; UN Habitat, 2022).

Resilience is already a common strategy in many countries in Asia, Africa, and America, which are often hit

by natural disasters such as flooding, heavy rain, drought, or hurricanes. So far, Germany has been considered less vulnerable in the last decades because of its comfortable climate and lack of natural disasters. But the Covid-19 pandemic, as an unexpected natural disaster in 2020, has made it clear how German society can also be vulnerable, despite all its wealth and technical and medical progress. The urban planning system in Germany was not prepared to deal with such a disaster, and it should focus on preventive strategies.

## 2. Urban Planning Models and Challenges

### 2.1. Historical Development of Urban Planning Models

The often-criticized Charter of Athens from 1933 about modern urban development with green spaces and single-story buildings is to be understood in the context of its time. It contains statements on city hygiene and healthy cities—as a response to the Spanish flu, cholera, and other pandemics and diseases in the densely populated cities of the late 19th century. The change of the city model to a less dense and greener city is also to be understood against this background: health and urban space should be considered together, with larger building distances, improved infrastructure, and more open spaces. “Hygiene” is still an urban development deficit in the German planning regulation act (“Baugesetzbuch”), even if it is no longer used as a reason for urban renewal measures—it could now experience a renaissance (Baugesetzbuch, 2022).

Since the 1980s, the concept of a compact, socially, and functionally mixed city has been continuously pursued, with severe implementation deficits. The Leipzig Charter of 2007 of the EU emphasizes the concept of sustainable and integrated urban development and the support of deprived neighborhoods. Since 2020, the New Leipzig Charter has been supplemented by the model of the transformative power of cities as the common-good-oriented, green, productive, and just city. An important question is whether our current urban planning model is still up to the challenges of the future, facing climate change and natural disasters (Bundesministerium des Innern, für Bau und Heimat [BMI], 2020).

### 2.2. Challenges for Urban Development

The pandemic has revealed “new” challenges, e.g., in the prevention of danger, in health care, and in digitization. In many areas, however, it acts more like a magnifying glass, e.g., stationary retail, mobility change, or social inequality. Urban development policy must respond to this. Digitization, in particular, creates many opportunities and risks. Due to digitization and the pandemic, the increase in homeworking will change our urban structures significantly; there will be less demand for office buildings but more demand for working spaces in residential neighborhoods. At the same time, however, care

must be taken not to neglect other fundamental challenges in view of the pandemic, e.g., in climate change, but also in mobility change, demographic change, and orientation toward the common good (Kunzmann, 2021; Kurth, 2020).

## 3. Urban Resilience As Part of the National Urban Development Policy

### 3.1. Memorandum Urban Resilience

In Germany, the objectives of the Leipzig Charter are implemented with the National Urban Development Policy (“Nationale Stadtentwicklungspolitik”). This policy includes expert groups, pilot studies and implementation with urban renewal projects, and also round tables about new developments.

As early as Spring 2020, the first expert workshops were held in this context to discuss the consequences of the pandemic on urban development from the ministry for housing. An independent expert advisory board was founded in the autumn of 2020, the recommendations of which were published in the memorandum urban resilience (“Memorandum Urbane Resilienz”) in May 2021 (BMI, 2021). The author was the chairman of the advisory board. The memorandum is only based on this expert group; there was no attendant research about these topics.

### 3.2. Meaning of Urban Resilience

In the narrower sense of the word, “resilience” means springing back to the original state. For a long time, the concept of resilience was rarely associated with urban planning; it was considered too closely linked to passive reactions or to rebounding to the original condition. Resilience has also been linked to climate change, in the sense of climate adaptation: how to deal with extreme weather conditions and analyze vulnerability (Fekkek et al., 2016).

With the memorandum, the concept of “urban resilience” was newly introduced into the urban development policy of Germany. The term “resilient city” was deliberately not used to avoid a one-sided urban mission statement. The resilience strategy should be integrated into the overall objective of sustainable urban development. For this reason, the narrower concept of resilience as a rebound was expanded with two more dimensions: preventive adaptation to prevent or reduce the risk of future crises, and transforming urban spaces to build better after the crises. This understanding of urban resilience follows the UN Habitat (2022) definition.

In the face of natural disasters, politicians first switch to crisis mode to avert danger. Pragmatic solutions and accelerated planning processes are often called for to force reconstruction. But commonly, it is a lack of prevention and planning that leads to greater damage during disasters and makes reconstruction more difficult.

The response to crises such as pandemics or climate events should therefore be to include resilience aspects in planning instruments and to use them strategically across the board.

#### 4. Elements of Urban Resilience

There are three main elements of urban resilience: the importance of preventive approaches, the meaning of neighborhoods, and building reserves at municipalities.

##### 4.1. Increase in Importance of Preventive Approaches

The memorandum on urban resilience calls for an integrated, forward-looking urban development policy, consolidated at all spatial levels of nation, region, and municipality. This includes comprehensive analyses of the urban structure, especially regarding critical infrastructure, risk factors, and vulnerabilities, but also continuous socio-spatial monitoring of the social and climatic situation. By overlapping spatial risk assessments with social and demographic risks, focal points of action can be defined.

Preventive measures are required which mitigate or even avoid the consequences of the hazardous event, with a robust and crisis-proof design. For example, a retirement home located at a hot spot with a risk of overheating must be protected or relocated. This method of overlaying risk maps is already well-developed in climate adaptation concepts, with risk prevention measures for the green, blue, gray, and white cities.

##### 4.2. Strengthening of Neighborhoods and Public Spaces

Since future damage events are usually not precisely predictable in space and time, redundant, robust, and flexible settlement structures and infrastructure are becoming increasingly important. Open spaces close to homes are becoming more important, as places of relaxation and health in the event of a crisis, as well as for improving the microclimate. With increasing levels of homeworking, improving the local supply and infrastructure in the residential areas is also necessary. The neighborhood level could become a “winner” of the pandemic, following the objectives of the compact city and short distances.

All in all, public space, in particular, is gaining in importance for multiple usage claims—it has no longer to be dominantly claimed by car traffic. In any case, major changes are expected in the mobility sector: electric mobility makes cars quieter and emission-free, and autonomous driving could lead to environmentally-friendly urban mobility. The citizens could reclaim the public space as a free space, a place for movement, meetings, gastronomy, and political demonstration.

##### 4.3. Resilience Reserves in the Municipalities

To implement urban resilience strategies, the municipalities must first carry out their basic financial and person-

nel tasks, provide multiple usable infrastructures, and reserve space for crisis events. If several municipalities in Germany have been under budget plight for decades and cannot even have the sidewalk repaired, they will hardly be able to undertake comprehensive crisis prevention. However, sufficient municipal equipment is a prerequisite for being able to react to crises at all. The memorandum proposes a “competence center” for urban resilience and a “task force” to support affected regions in a crisis. The flood disasters in the summer of 2021 in Ahrtal in Western Germany showed how important such “backup units” would be: a task force of urban development with mobile homes and planning capacities.

#### 5. Aspects of Resilience in Planning Tools and Planning Models

##### 5.1. Planning Tools and Urban Redevelopment

The German planning system is mainly based on formal planning tools at the level of the municipality, such as land use plans and zoning plans following the planning regulation act (“Flaechennutzungsplan” and “Bebauungsplan” in Baugesetzbuch). These formal planning tools are combined with informal tools such as urban development plans or urban development funding programs. Aspects such as resilience, risk prevention, climate adaptation, and health must be linked much more closely with all planning tools in the future. They should become integral to the informal, integrated urban development concepts (“Stadtentwicklungskonzept”). In addition, they must be anchored in the formal urban land use plan—although numerous options for fixing them have long existed and only have to be implemented.

An important planning tool is the redevelopment law and urban redevelopment funding (“Sanierungsrecht” and “Staedtebaufoerderung”). Aspects such as climate adaptation, health, and hygiene are already explicitly mentioned in §§ 136ff Baugesetzbuch. However, unlike in the 1970s, this should not lead to extensive demolitions, even if this would be preventively and partially possible in particular areas with high risks (flood areas). Based on extensive urban analysis, specific redevelopment goals can be set in the redevelopment area. Supplemented by urban development funds, targeted measures can be implemented to strengthen resilience in the affected districts. With this set of tools, it would be possible to implement measures such as qualifying public space, realizing more green and blue infrastructure, and also demolishing selected buildings. The aspects of resilience have to be mandatory for all funding programs of urban development and urban planning tools—but they have not been implemented by the Federal government until now.

##### 5.2. Extension of the Urban Planning Model

The Covid-19 pandemic affects all settlement structures equally, regardless of their density. Extreme weather

events can also affect all regions due to climate change. Studies on the impact of climate change on urban structures show that the planning model of the compact city serves both climate protection and climate adaptation—because it is efficient, robust, compact, and concentrated (Bundesinstitut fuer Bau-, Stadt- und Raumforschung, 2009; Knieling et al., 2012). So, it is not necessary to fundamentally question the objectives of the Leipzig Charter. However, it is therefore important to further develop the compact city model in the face of climate change and resilience to provide more greenery close to the home, greater risk management, and a qualified public space. This includes the multiple use of public spaces and the reduction of car parking facilities (Koeksalan, 2021; Rettich, 2021).

In the face of more home offices, overheating neighborhoods, and greater health awareness, it can be assumed that some city residents will move to rural areas. Because of the tense housing markets in the major cities in Germany, this could have a partial relieving function—but it could also be the starting point of a new wave of suburbanization. In the future, it will be important to focus on strong regional planning institutions to balance spatial inequalities.

## 6. International Case Studies of Urban Resilience

Germany has so far been less affected by natural disasters, so risk studies were considered less important than in other parts of the world. However, the pandemic has shown that it can affect all countries equally, and climate change also has global effects. The discussion about the memorandum on urban resilience made it clear that Germany needs a stronger international exchange of expertise on this topic. In the context of the Leipzig Charter and the National Urban Development Policy, appropriate international exchange formats should be established between the cities to learn from each other. Cities, especially in Asia, but also in the USA or the

Netherlands, already have experience with resilience concepts that are integrated into urban development policy. A lot of them are connected in the resilient cities network (Resilient Cities Network, 2022). In the following, the two cities of Vienna and Rotterdam will be focused on as case studies (BMI, 2021).

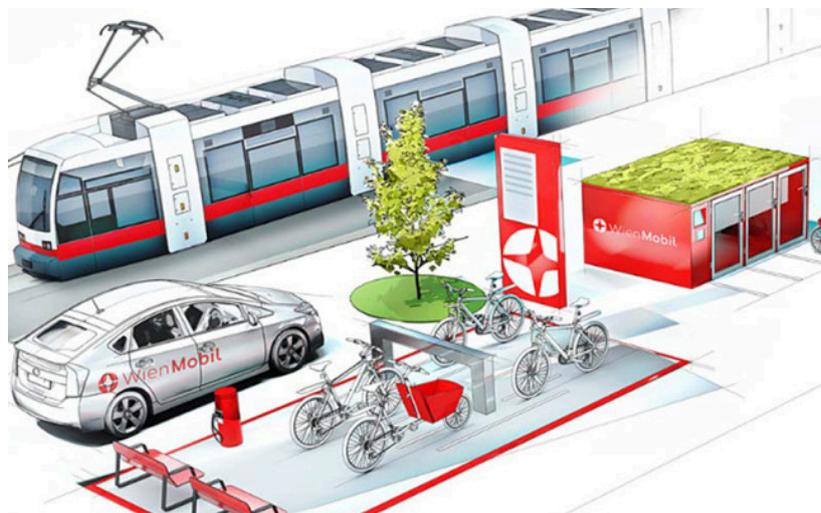
### 6.1. Case Study: Vienna

Vienna has had a strong integrated urban development policy for decades. The “Smart City Vienna” framework strategy is about transforming the city to sustainability, combined with new challenges of digitization and climate change. The objective is to balance maximum resource conservation with a high quality of life for everyone in Vienna. Any form of innovation shall be supported to enable this transformation, including technical and digital innovations and social innovations. The strategy is accompanied by a large participation process.

There are 12 different target areas combined with the three target dimensions of climate protection and climate adaptation, gender and diversity, and social innovation. The strategy focuses on cross-cutting issues across all target areas. The concept relates to the 17 Sustainable Development Goals of the UN. Currently, the strategy is under development to integrate aspects of pandemic and resilience. Examples of implementation are mobility hubs to combine car traffic, public transport, and bike traffic to decrease car traffic and parking facilities in the inner city (Figure 1). Another example is the “Biotope city” (Figure 2), which combines a dense urban structure, energy efficiency, green facades, green roofs, and walkable public space (City of Vienna, 2022).

### 6.2. Case Study: Rotterdam

Because of the special location of Rotterdam in the delta of the Rhine and Meuse, and because it is an urban area that is almost 80% under the sea level, water



**Figure 1.** Mobility hub in Vienna. Source: City of Vienna (2022).

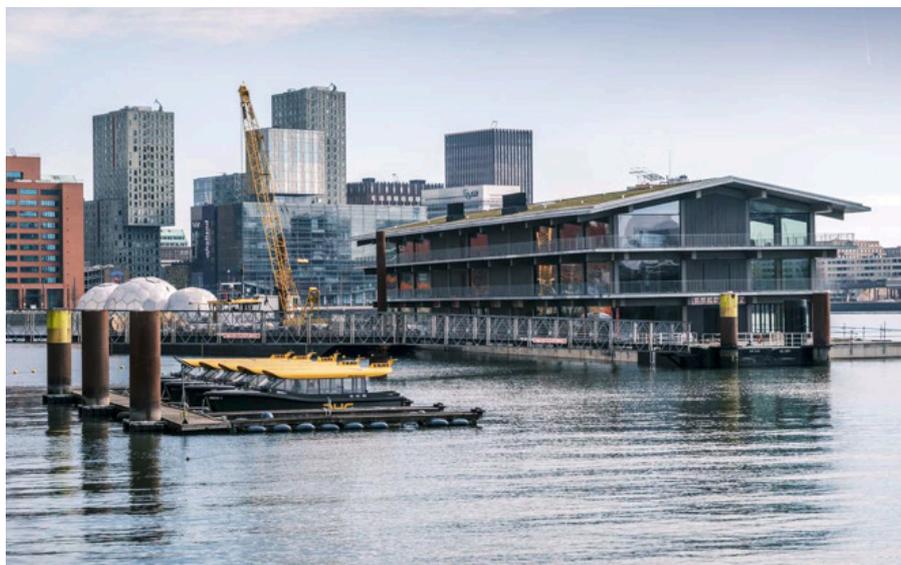


**Figure 2.** Biotope city in Vienna. Source: City of Vienna (2022).

management and climate adaptation play important roles in urban development. Rotterdam has an excellent resilience strategy that includes all aspects, from climate change to coastal protection and social consequences. Resilience is to become part of all city plans and all areas of everyday life. Especially in the field of urban planning, resilience must be constantly kept in mind. Rotterdam also announced its goal to become 100% climate-proof by 2025, when the city should be able to survive any extreme weather situation almost without any economic or social impact.

The main general objectives of the “action plan” are: a balanced society, a port with clean and reliable

energy, a cyber port city, a climate adaptation strategy, retrofitting of infrastructure, a new social network, and anchors for resilience in the city. These goals are to be implemented by so-called actions. Examples are floating offices (Figure 3) or cyber protection for the harbor. Rotterdam’s resilience strategy stands out in particular through its focus on water management and climate adaptation strategies. Because of its geographical situation, the city dealt with the consequences and possibilities of climate change at an early stage. But not just the adaptation strategies of urban development are in focus, but also the further development of society (Resilient Rotterdam, 2022).



**Figure 3.** Floating offices in Rotterdam. Source: BMI (2021).

## 7. Conclusions

Especially in times of crisis, it is important to develop visions, and positive images of the future, based on current experiences. Only if there is an idea of a better city in the future can we have objectives for urban development concepts. In terms of sustainable urban development, future generations' interests must be considered in particular. Sustainability also means shaping future challenges in a socially balanced and economically viable manner. In terms of participatory urban development concepts, there is a need for visions of the future that are developed together and are reversible and flexible. The objectives of sustainable urban development and of the Leipzig Charter have to be extended with aspects of urban resilience, especially concerning pandemics and climate change.

The memorandum for urban resilience of the Federal Ministry of Housing defines resilience not only as a rebound but also as adaptation and transformation, in the context of integrated urban development. But the memorandum has not been implemented until now: there have been no detailed criteria for measuring risks and vulnerability, and as yet, no change in planning tools and funding. The war between Russia against Ukraine makes it clear that there is an urgent need to implement the memorandum for urban resilience as fast as possible on all planning levels in Germany, but especially at the municipality level—as opposed to project-related incrementalism that ignores precautionary measures.

### Conflict of Interests

The author declares no conflict of interests.

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**Detlef Kurth** has served as a professor at the Technical University of Kaiserslautern, Chair for Urban Planning since 2017, and has previously been a professor at the University of Applied Sciences in Stuttgart. He has also been a visiting professor at the Universities of Cardiff in the UK, Krakow in Poland, and Hong Kong in China. His main research activities include sustainable urban development, energy-efficient cities, urban regeneration, social cities, self-driving cars, and new forms of mobility.

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