BACKGROUND // MAY 2023

Triple Inner Urban Development

Definition, Tasks and Opportunities for an Environmentally Oriented Urban Development

Results of the Strategic Research Agenda for Urban Environmental Protection and the research project “Advancing the New European Bauhaus – AdNEB”

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1 Introduction and Understanding the Term of Triple Inner Urban Development

Urban spaces are confronted with diverse competing uses. There is high development pressure on inner-city land, especially in growing municipalities. In addition, the municipalities' access to urban land is limited, while land prices have risen rapidly in many cities. A key issue of sustainable urban development is creating a new approach to dealing with the scarce resource of land in the city – both in terms of built-up areas and in terms of transport, open and green spaces. Sustainable trends must be oriented towards efficient settlement, transport, open space and green space planning in growing as well as in rural and/or shrinking municipalities. For reasons of climate and resource protection, preservation of biodiversity, adaptation to climate change and to achieve a high quality of life and healthy environmental conditions for all inhabitants in cities, functions and uses in the city should be rethought and urban spaces or the city layout should be designed and used in a multi-dimensional way.

The urban planning model of triple inner urban development offers a framework for a new spatial distribution of areas for building, mobility and green space that meets the requirements of a liveable and resilient city. The model calls for further developing specialised planning with regard to its contribution to sustainable and health-promoting urban development.

Since triple inner urban development is still being developed as a planning model, this publication aims to contribute to an initial definition. How is 'triple inner urban development' to be understood from the perspective of environmentally oriented, health-promoting and socially-just urban and spatial development? And how can this planning model be scientifically substantiated?

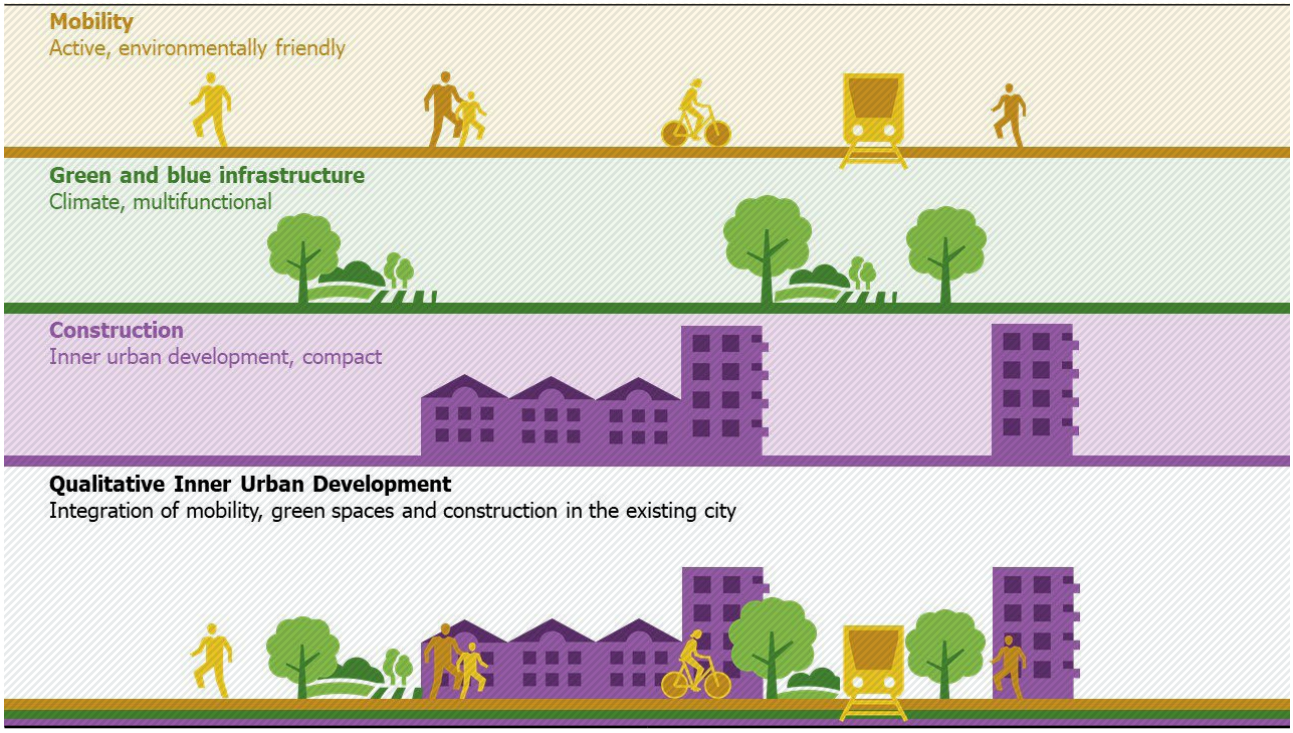
Triple Inner Urban Development

At the centre of the planning model of triple inner urban development is the question of how mobility, green and open spaces and building can be developed together in a qualified manner in order to achieve high quality of life for all city residents. This planning model thus extends the existing planning model of dual inner urban development (see p. 6) to include the spatial dimension of mobility. Traffic areas, seen as sealed areas of potential, are of great importance when dealing with current challenges. Mobility and the (re)designing road space is crucial for land use and have an influence on climate protection and adaptation, on the provision of recreational areas, the promotion of urban nature, air quality as well as noise pollution, and thus on human health. Land which is used for motorised transport not only has a negative impact on the environment and health but is also made unavailable for other important functions for other uses.

Figure 1

Schematic representation of triple inner urban development

Dovetailing mobility, green and open spaces and building in inner areas (re-densification) to create a good quality of life for all



Source: Karl Eckert, German Environment Agency

The planning model of 'dual inner urban development' was coined in 2006 in order to strengthen environmental qualities in the context of inner urban development of buildings by setting a vision to expand urban green spaces within the context of urban re-densification (Deutscher Rat für Landespflege 2006). It represents the central starting point for the present discussion. Dual inner urban development aims at sensibly using inner urban development potentials for construction and at the same time preserving, expanding, linking and improving inner-city open spaces. The planning model focuses on the diverse functions of green and open spaces for recreation, exercise, encounter and quality of life, climate adaptation and urban biodiversity (Böhm et al. 2016; Kühnau et al. n.d.).

The construction-focused concept of inner urban development itself was incorporated into planning law as early as the mid-1970s. The Act to Strengthen Inner Urban Development and Further Develop Urban Planning Law (*Gesetz zur Stärkung der Innenentwicklung und weiteren Fortentwicklung des Städtebaurechts im Baugesetzbuch*) in the Building Code (*Baugesetzbuch*) Section 1(5) p. 3 reaffirmed this concept as a target in 2013. A survey of major cities showed that this concept is broadly approved of in practice for the re-use of brownfield sites, closing gaps between buildings and re-densification (Böhm et al. 2016).

In addition to areas for building development and green and open spaces, the planning model of triple inner urban development expands the previous concept by including traffic. Not only do building development and urgently needed green and open spaces compete with each other for land, traffic areas also play a role. Mobility transition has the potential to redistribute existing road space and free up reserves for green spaces, open areas and active mobility. In this way, healthy living, environmental and living conditions can be improved in cities, and areas for green space, housing, climate adaptation, biodiversity, healthy and environmentally friendly mobility can be provided and used multifunctionally (cf. UBA 2017; UBA 2021).

Other important public services or thematic fields of sustainable urban development such as education, social infrastructure, communication and culture can be addressed within the planning model of a 'multiple inner development' (cf. Architektenkammer Nordrhein-Westfalen –2022). The following will, however, not consider these additional aspects in depth.

The planning model of triple inner urban development offers a great opportunity to achieve numerous environmental targets and to reduce and resolve conflicting objectives for environmentally oriented and health-promoting urban and spatial development. This requires suitable strategies and procedures so that various stakeholders involved in urban development can act in a networked and cooperative manner.

Conversion of a former four lane road into a space with sojourn quality, Luzern.

2 Triple Inner Urban Development as a Response to the Challenges and Goals of Sustainable Urban Development

The increasing pressure to act on inner urban development, securing green and open spaces and the mobility transition illustrates the growing importance of the planning model of triple inner urban development in recent years. The three focus areas highly important for a sustainable and resilient development of urban areas are discussed in more detail below.

Inner Urban Development

The growing demand for living space is to be met primarily through inner urban development and re-densification of existing buildings, while at the same time achieving healthy living conditions and social compatibility (UBA 2019). Quantitative and qualitative land policy targets for limiting land-take and prioritising inner urban development have existed for some time. In 2002, the 30-hectare target for new land-take for settlements and transport became integrated in the National Sustainability Strategy (*Deutsche Nachhaltigkeitsstrategie*) (Bundesregierung 2002: 99). In 2007, the national biodiversity strategy specified the goal of "inner urban development before external development at a ratio of 3:1" (BMUB 2016: 51). The current coalition agreement has set the goal of building 400,000 new housing units annually (Bundesregierung 2022). At the same time, inner urban development should be intensified, which corresponds to the further pursued target of reducing the daily new land-take for settlements and transport to less than 30 hectares by 2030 (Bundesregierung 2021). The Federal Government's 2016 Climate Protection Plan also aims at the perspective goal of a circular land economy by 2050 (net zero land-take) (BMUB 2016: 68). Relevant operationalisation is required to be able to achieve these goals, which will rely on planning law and planning specifications, accompanied by suitable incentive and funding programmes.

For some years there has been a high demand for building development in many growing regions. The influx of the population toward the cities and the following need for housing has led to building densification particularly in large cities and city conurbations. In 2020, a nationwide representative questionnaire survey conducted by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (*Bundesinstitut für Bau-, Stadt- und Raumforschung*) (BBSR) identified approximately 84,000 hectares of potential for inner urban development (vacant and brownfield sites) in cities and communities: this figure was around 120,000 hectares in 2012. The decrease of about 36,000 hectares implicates the actual implementation of inner urban development projects in Germany (BBSR 2022(a)).

In this context, 69 % of the surveyed communities explicitly prioritised inner urban development: in 2020, about 20 % of the communities indicated their "full" commitment to prioritising inner urban development, while another 49 % said that they were "rather" committed. In the same survey, the municipalities confirmed that they wanted to use a large proportion of the inner development potential for building. However, also in 2020, cities and municipalities assessed the use of potential areas for new green and recreational areas in the sense of 'dual inner urban development' more cautiously, as compared to 2012. About 6 % of the municipalities assessed the potential areas in 2020 as "fully" suitable for non-building development (renaturation, green and recreational areas, etc.) and about 20 % considered them "rather" suitable. This represents a decrease of about 4 % and 10 %, respectively, compared to 2012 (ibid.). Uses for building are apparently becoming more and more prominent. Consequently, creating and securing qualitative green spaces in German cities is still a pressing issue.

Inner densification for new housing in Leipzig

However, inner urban development is not only an issue in cities and regions experiencing a high growth demand. Stagnating and shrinking areas, where there is usually an existing potential for inner development sites, must also consistently prioritise the use of the potential in existing buildings to keep the follow-up costs of settlement development for technical and social infrastructure under control, to stabilise town centres and conserve resources. Cities must overcome the 'building-land paradox' where communities keep designating new building construction land on greenfield sites, thus promoting urban sprawl, although reusable land is available within the settlements (cf. Davy 1996. 193 et seqq.).

Green and Open Spaces

Urban green-blue infrastructure is a network of near-natural and designed vegetation and water dominated areas and elements in the city that provide a wide range of ecosystem services. They are just as important for a good and healthy life in the city as technical or social infrastructures (BfN 2017). Green and open spaces have to meet a wide range of requirements. They should serve as recreation, exercise and meeting places and contribute to the preservation of urban biodiversity, promote health and environmental justice and support the development of resilient urban structures. Against the backdrop of advancing climate change, the importance of urban green spaces for climate adaptation is coming to the fore. Through cooling, shading, water retention and storage, greenery in the city makes an important contribution to urban resilience and adaptation, for example with regard to heat, recurring dry periods, droughts and heavy rainfall events.

The average proportion of green space in German cities varies depending on the size of the city. According to surveys commissioned by the BBSR, the proportion of green space based on a nationwide satellite-based urban green grid ranges from 44.3 % in relation to the administrative urban area (or 30.2 % in relation to the settlement and traffic area) in large cities with at least 500,000 inhabitants to 59.4 % in relation to the administrative urban area (or 38.7 % in relation to the settlement and traffic area) in small towns with fewer than 10,000 inhabitants (BBSR 2022(b): 122). With regard to public recreation areas as part of the green space in the city, in German cities there is an average range of 13 to 6 square metres per inhabitant. In small towns, the proportion of vegetation and green open spaces in local areas is much higher than in large cities (ibid.: 95). Within cities, green spaces and green infrastructure are unevenly distributed. As case studies have shown, central locations are often characterised by low proportions of green space.

There is a particular need for action here for climate adaptation and an improvement in the supply and accessibility of green spaces (ibid.: 102f.).

Up to now, there have been no uniform federal guidelines on the proportion of green and open spaces in the urban area. The White Paper on Urban Green Space (*Weißbuch Stadtgrün*) (BMUB 2017) therefore called for the Federal Government to develop guidelines and characteristic values for the quantitative and qualitative provision of green and open spaces. The development of a technical convention with uniform federal guideline values for green space and recreational provision was anchored in the Urban Nature Master Plan (*Masterplan Stadtnatur*) (BMU 2019). As part of the implementation of the Urban Nature Master Plan, the Federal Agency for Nature Conservation (*Bundesamt für Naturschutz – BfN*) is currently supporting the initiation of a national convention on green space and recreational provision and, in this context, proposes a guideline value of 24 square metres of green provision (divided into neighbourhood, residential area, district and city-wide green spaces) per inhabitant (Blum et al. 2022: 43).

As early as the 1970s, the Conference of Garden Authorities (*Gartenamtsleiterkonferenz – GALK*) formulated orientation values for urban green and open spaces and introduced the value of 20 square metres of green space per inhabitant (GALK 1973). The BBSR has also adopted the minimum value of 20 square metres of green space per inhabitant, or a 10 % share of settlement area for green space by 2030 (with regional differentiation) as a target (BBSR 2017). However, there are also more differentiated specifications that address the various ecological, social and health-promoting functions of green spaces in the city. This makes it clear that a percentage or absolute target value for green spaces provides only limited information. Many municipalities work with their own qualitative and/or quantitative targets for green space provision and various obligations.

The coronavirus pandemic has also brought the importance of open and recreational spaces on the block, district and at city-wide level into even sharper focus as an important backbone of multifunctional and adaptable spatial structures and, in particular, highlighted their importance for recreation, exercise and meeting places (Adli et al. 2021; Langenbrinck/Schmidt 2022). At the same time, the overuse of green and open spaces for recreation and growing competition as well as littering from commercial services have become more apparent. Furthermore, the pandemic has highlighted the problem of socially unjust distribution and accessibility of urban green and open spaces (Rehling et al. 2021).

Deconstruction of roads creates space for living, greenery, recreation and encounter

Mobility Transition

Mobility describes the ability of people to reach their desired destinations and transport contributes to realising this mobility. Traffic volumes and transport services in Germany are dominated by leisure traffic, journeys to and from work and shopping. The largest proportion of journeys in urban areas is made by private car. On average, passenger transport in Germany as a whole increased by almost 34 % between 1991 and 2019, while motorised private transport (cars and motorcycles) increased by around 28.5 % in the same period (BMVI 2021: 219ff.).

Motorised private vehicles (MPV) in cities place a considerable burden on people and the environment in Germany. The share of private motorised transport depends on the type of urban area: in metropolitan areas it is 28 %, in regional cities and large cities it is 50 %, and in medium-sized cities it accounts for the majority of transport routes at 61 % (BMVI 2017). According to the Federal Statistical Office (*Statistische Bundesamt – DeStatis*), the car density in Germany increased by 12 % from 2011 to 2021, from an average of 517 to 580 cars per 1,000 inhabitants

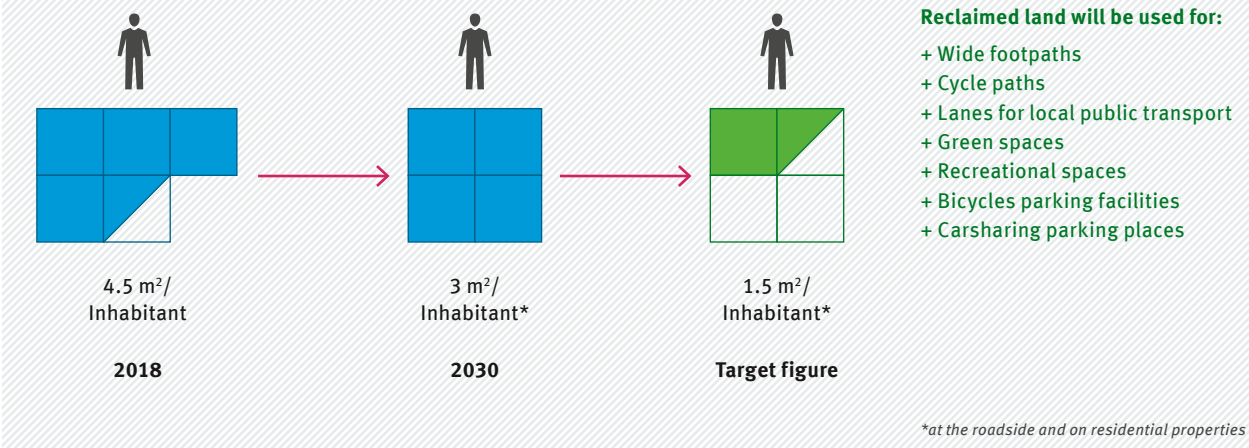
(DeStatis 2022). Private motorised transport is largely responsible for air pollution and noise emissions. In cities, road traffic is the most important emitter of nitrogen dioxide and particulate matter as well as noise. Although air pollution levels have decreased over the years, they are still relevant, especially for people living along main roads. 75 % of the population feel disturbed or annoyed by road traffic noise – especially in cities (BMUV, UBA 2022). Further, every fourth person living in a conurbation in Germany is exposed to noise pollution to an extent that long-term health effects cannot be ruled out. Urban traffic contributes to climate change through its greenhouse gas (GHG) emissions, albeit to a much lesser extent than medium and long-distance traffic. In addition, both moving and stationary car traffic in the city take up considerable space (see Figure 2). Transport in its current form is also socially unfair. Households with low incomes are disproportionately affected by traffic-related emissions, although they often contribute little to the traffic burden (UBA 2020). MPV also place a high burden on vulnerable road users such as the elderly and children, who are restricted in their freedom of movement and development.

If noise pollution and land-take caused by private cars are to be reduced, the number of cars and the number of passenger kilometres driven in German cities must be significantly reduced and at the same time the environmentally friendly modes of transportation (public transport, cycling and walking) must be significantly strengthened. The German Environment Agency has formulated the goal of reducing the number of private cars to 150 vehicles per 1,000 inhabitants in large cities with more than 100,000 inhabitants (UBA 2017: 5ff.). In order to ensure that people can continue to be mobile, an expansion of public transport as the backbone of urban transport is key. Likewise, the infrastructure for active mobility must be improved, for example through improved pedestrian infrastructure. The German Environment Agency has published a proposal for the nationwide pedestrian strategy envisaged in the coalition agreement (UBA 2018; Difu 2019).

The expansion of environmentally friendly modes of transportation is the basis for a mobility transition. This in turn is the basis for reducing land use competition and instead for the creation of new leeway for sustainable and resilient urban development. To achieve this, the existing distribution of (road) space must be fundamentally rethought, reprioritised and designed to be fair for all users.

Figure 2

Decreasing land demand for stationary motorised private transport in large cities can create space for new uses



Source: SRU 2020

3 Spatial Levels and Measures of Triple Inner Urban Development

The planning model of triple inner urban development has been discussed at various spatial levels. Sustainable development of cities and their interlinked areas requires various spatial functions to be integrated more strongly together, starting at the **regional level**. This is the prerequisite for achieving ecological objectives such as adapting to climate change, transitioning to sustainable mobility and reducing new land-take. This is illustrated for example by regional housing development concepts in conjunction with concepts for implementing mobility transition in cities and regions and securing and qualifying open spaces in suburban areas (UBA 2021(a)). It is also true at the regional level that the planning model of triple inner urban development could include additional spatial functions and their multiple interdependence in terms of integrated urban and spatial development (UBA 2021(a)).

The planning model of triple inner urban development is strongly focussed at the **neighbourhood level** which represents a key scale for actual implementation. “In addition to energy-efficient refurbishment of buildings [...], the central focus should be on linking construction, development of green spaces and mobility (triple inner urban development) and thus improving the quality of life in neighbourhoods, cities and urban regions” according to the New European Building position paper published by the Federal Ministry of the Interior and Community (*Bundesministerium des Innern – BMI*), (BMI 2021(a): 15). As far as neighbourhoods are concerned, they gather diverse challenges within a small space and must be addressed together if environmental and health-related aspects are to find their way into urban development. The challenges include adaptation to climate change (cf. e.g. März et al. 2020), conversion of existing buildings and re-densification, accessibility and qualitative improvement including recreational and health-promoting open spaces, and mobility transition within the neighbourhood. Neighbourhoods showcase competing uses, making the multifunctional use of existing spaces increasingly important. From an environmental perspective, the planning model of triple inner urban development on the neighbourhood scale reveals numerous actions for improving environmental quality, some of which will be discussed below. Triple inner urban development can only succeed if integrated planning is carried out at the neighbourhood level and the use demands of stakeholders are actively involved. Buildings and infrastructure (re) construction, open space and mobility must be more closely interlinked for creating a better quality of life and healthy living conditions.

Actions related to transport are crucial for implementing triple inner urban development. Previously monofunctional traffic areas can accommodate new functions for housing and urban greening. Current challenges such as climate protection and climate adaptation can be addressed within the scheduled restoration of transport infrastructure by incorporating green infrastructure into the retrofit, especially in settlement areas. For instance, traffic areas alleviated from their use through the repurposing of parking spaces can provide opportunities for more housing construction. Sustainable mobility services in new and existing neighbourhoods thus represent an important building block for better living, sojourn and quality of life in cities (UBA 2021(b)).

Vibrant public spaces provide high quality of life, Zurich.

Practical example

The Region Cologne-Bonn with its Agglomeration Concept is a pioneer in this context because the concept includes and substantiates the principle of triple inner urban development at the city-regional level. The planning model of triple inner urban development has been tested in real-world 'living labs' and is planned to be applied in both existing and new housing developments.

Attractive space-saving urban settlement structures can be created in this way to contribute to improved climate resilience:

"In addition to increasing building density and diversity of use (diversification), the extent and quality of open space must simultaneously be increased and local mobility offers optimised in a multimodal and climate-friendly way within triple inner urban development. This will help minimise the negative consequences of densification (sealing, traffic volume, vulnerability during climate change) from the outset" (Region Köln/Bonn e.V. n.d.: 28).

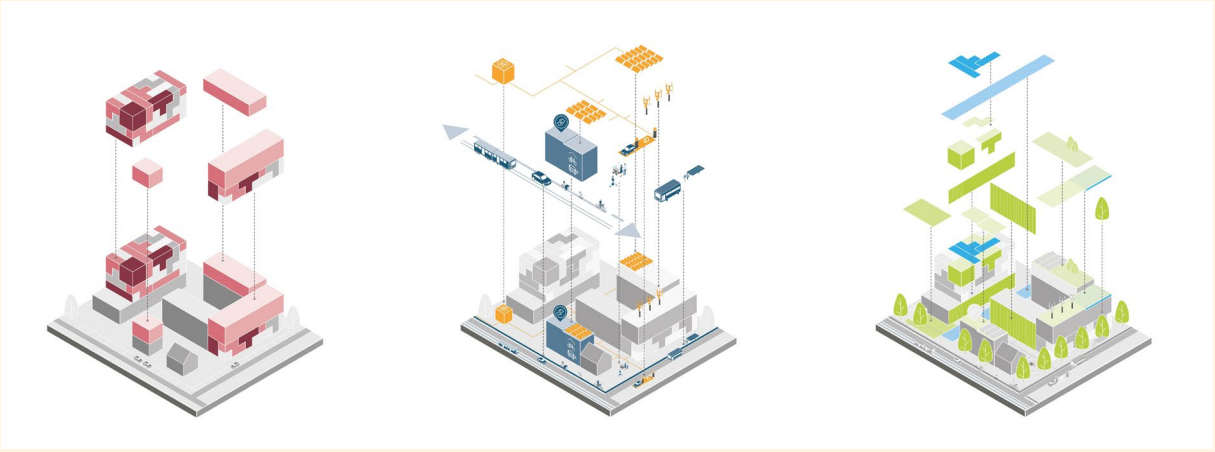


Figure 3 Schematic illustration of the principle of triple inner urban development.
Source: MUST Städtebau, 2022

The coupling of blue, green and grey (traffic and buildings) infrastructure, for example through the greening of road structures, planting trees or the partial de-sealing of traffic areas and thus increasing rain infiltration capacity, opens up a new design scope for the development of urban green spaces, for the management of urban water resources and directly supports the climate adaptation targets. In addition, this coupling offers new opportunities for biodiversity, natural climate protection, environmental education, and the experience of water and green spaces in cities (cf. Trapp & Winker 2020; Winker et al. 2019). Redesigning public space can help improve air quality, mitigate heat and heavy rainfall events, reduce traffic noise and improve overall sojourn quality.

Public road space must be redistributed in favour of active mobility, public transport and also non-transport uses such as sojourn, play and social activities. This redesigning and rethinking is currently not easy to implement and requires not only political will and support from citizens and civil society (UBA 2021(c)) but also a change in legal and sub-legal regulations and guidelines (UBA 2017(a), UBA 2021).

As with dual inner urban development, the preservation and further development of **open and green spaces** is also of particular importance for triple inner urban development. In view of re-densification, increasingly scarce green and open spaces are gaining in importance and are expected to fulfil more and more functions. Preservation and greening of open spaces and buildings has a direct effect on the microclimate. When networked with higher-level green corridors, they can also have positive effects at the overall urban and regional level. However, green spaces and green elements such as street trees are themselves affected by the consequences of climate change. Therefore, green space design must be adapted and the conditions for greenery in the street space improved. This includes, for example, the choice of appropriate shrubs and providing good conditions and more space for street trees. De-sealing and soil modelling can enhance infiltration and storage of precipitation and contribute to restoring natural soil functions.

When it comes to the term of urban resilience, the descriptive term ‘flexible expansion joints’ is utilized. It describes the spatial resources of a city that can be used or repurposed to cope with risks or disasters (BMI 2021(b)). Aspects such as appropriate planning tools and financial and human resources to respond to crises of different kinds also play an important role (ibid.: 14). Due to their multifunctionality and multidimensionality, the physical dimension of green spaces can be understood in this sense as potential ‘flexible joints’ for the city. Something similar is also conceivable for street spaces if they are no longer designed and used monofunctionally. For example, pop-up bike lanes were used to flexibly repurpose existing streets during the coronavirus pandemic was necessary for health protection. Temporary repurposing of street space for social purposes such as playful streets or for sojourn can also provide a more flexible use of space.

Measures at the **building level** are useful tools for triple inner urban development. Targeted re-densification on brownfield sites and gaps between buildings, and conversion and addition of new storeys to existing building structures in integrated urban locations can help reduce new land-take. At the same time, re-densification measures or urban renewal creates scope for strengthening environmentally friendly modes of transportation and simultaneously reducing motorised transport. Roof surfaces and façades can be used for planting greenery, roof surfaces are suitable for sojourn, water retention and regenerative energy generation. Building architecture can also contribute to a mix of uses and thus to a city of short distances, not only in terms of land designation at a neighbourhood level but also in the vertical sense within buildings. Development of existing buildings must therefore be given absolute priority in the course of triple inner urban development.

In practice, actions and the interlinkages between various scales cannot be strictly separated from each other; rather, triple inner urban development covers all technical and spatial levels of planning. It is important for mobility and transport design to consider the individual needs of each transport user’s mobility needs at the neighbourhood, city and regional levels and also provide areas for green space, water management and outdoor recreation. Ideally, open spaces are interconnected from the neighbourhood via the city to the regional scale and create recreational spaces, act as green corridors and reserves for fresh air generation and serve as biotope networks. Neighbourhood-level housing development can also be part of a regionally coordinated housing development concept (UBA 2021(a)). Technical planning and underpinning the mission statement of triple inner urban development must therefore take place by linking all spatial levels from the neighbourhood via the entire city to the urban region.

4 The German Environment Agency's Activities to Further Develop the Mission Statement of Triple Inner Urban Development

In the coming years, the German Environment Agency (UBA) will build on the results achieved so far in the focus areas of urban environmental protection, climate adaptation, urban green infrastructure, land conservation and sustainable urban mobility and further develop them within the in-house research project "Advancing the New European Bauhaus: Sustainable Mobility and Resilient Urban Spaces for a Better Quality of Life (AdNEB)". This project aims to contribute to central issues of resilient urban spaces with a high quality of life and to introduce these into the European discourse within the framework of the New European Bauhaus initiative.

One of AdNEB's central goals is to integrate environmentally compatible, socially equal, health-promoting and resilient urban development into the planning model of triple inner urban development. In so doing, the potentials of triple inner urban development for sustainable urban development must be worked out and recommendations for implementation established. Issues and sectoral goals that are often still considered individually must be looked at in an interdisciplinary and overarching manner.

Triple inner urban development can only succeed if specialist and urban planning issues are spatially, functionally and organisationally integrated for planning and implementation. This can be achieved by more efficiently linking landscape, transport and urban planning processes and prioritising environmental issues within urban land-use planning. Equally important is a better networking and cooperation among all stakeholders in municipal specialist units who are responsible for building and housing, urban development and real estate, urban green spaces and climate adaptation, environment and health, and mobility and transport. The same applies to housing and civil society stakeholders dealing with sustainable urban and neighbourhood development. AdNEB aims to support the communication among these stakeholders and investigate the intersections of specialist planning using the planning model of triple inner urban development. Courses of action for participatory planning must be identified and worked out for triple inner urban development so that stakeholders with their utilisation demands are actively involved in shaping the urban space.

At the European level, in addition to cooperation and networking with the diverse stakeholders in urban and spatial development, appropriate approaches to implementation and funding should be prepared, obstacles identified and solutions developed to overcome them.

At the national level, UBA research projects should model quantitative potentials for a new approach to land use in cities, analyse institutional prerequisites, opportunities and obstacles, and develop specific guidelines for planning and implementation. For this purpose, overarching goals must be underpinned by suitable practical implementation measures. Finally, best practice should show how triple inner urban development can be implemented. Synergies must be utilised and overarching recommendations developed using networking with departmental research projects that deal with handling urban green spaces under development pressure, sustainable housing development and climate adaptation in urban and neighbourhood development.

UBA, together with scientists, municipality and planning experts, would like to use these different research approaches at national and European level to further develop the planning model of triple inner urban development and demonstrate its potential to meet environmental and climate policy challenges of sustainable urban development.

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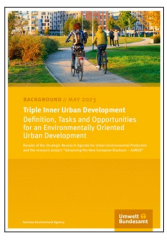

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