

Healthy Blue Spaces

The Frankfurt Riverfront from a Perspective of Urban Design and Health

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In cities, rivers can contribute significantly to quality of life. The transformation of riverfront areas in Germany from transit zones of the car-friendly city to spaces of movement and encounter for pedestrians and cyclists is a complex and protracted process. In many cities, main traffic arteries interfere with integrated urban development, creating barriers for nonmotorized, physically active mobility. Frequently, the rivers themselves are federal waterways, meaning that responsibility for them lies not with a municipality, but with a federal agency, which complicates planned modifications of riverfront zones. Involved as well are growing demands for flood protection and climate adaptation. Finally, transformations in commerce and remote working represent a fundamental shift in the utilization of downtown areas, and this includes open spaces and public ground-floor zones along downtown riverfront areas. Why, then, address the promotion of health and mobility as an additional aspect when designing downtown riverfront zones?

In cities, large, interconnected surfaces of water, our so-called blue infrastructure, contribute substantially to the promotion of health and to climate adaptation. A »blue space« is defined as an outdoor space whose identity is shaped by bodies of water, because it is either physically accessible or perceptible in audiovisual terms. Examples include coastlines, riverbanks, lakes and canals, and squares with pools or fountains. These offer numerous possibilities for coming into contact with water on a daily basis: people may enjoy the sight, sound, smell, or feel of being near water; they may be active on or near water, by cycling, jogging, swimming, rowing, sailing, or traveling via water taxi. Blue spaces therefore feature a multitude of health-promoting amenities that enhance the quality of life; they can even be quantified in relation to the increased life expectancies of local residents (Roe et al. 2021).

The term *walkability* refers to the potential of a built environment to promote active bodily everyday mobility in the general population (Bucksch et al. 2014). In general, we distinguish between five different dimensions: there is the *density and diversity* of utilizations, the *accessibility* of

destinations, the *distance* to the public transport infrastructure, and the *design* of urban space (Ewing and Cervero 2010). From the perspective of urban planning in Germany, walkability is being discussed to an increasing degree against the background of climate protection, as well as of the enhancement of the urban fabric (Tran 2018). At this point, however, there are very few up-to-date studies on the reconfiguration of downtown riverfront zones in major German cities. The aim of this essay is to elaborate relevant structural aspects as well as planning strategies designed to optimize the positive public health impacts of blue spaces. Investigated for this purpose, with reference to the case study of the Mainkai in Frankfurt, Germany, are the value and the role of walkability in municipal planning instruments, as well as structural and programmatic developments over the past thirty years.

Background

Frankfurt has 765,000 inhabitants and is an international financial center, trade fair venue, and mobility and internet hub. Approximately 380,000 people commute daily into the center of the Rhine-Main Metropolitan Region, which has 5.8 million inhabitants. The modal split is 33 percent via motorized individual transport, 21 percent via public transport, 26 percent via pedestrian travel, and 20 percent via bicycle (Stadt Frankfurt am Main 2020). This positions Frankfurt in the middle range for German cities with regard to the share of active mobility (see Buehler et al. in this publication). Frankfurt has seen a steadily rising number of overnight stays, around 11 million involving 6.2 million guests in the year 2019, with the highest share of international guests in Germany, and a large number of additional day visitors (Stadt Frankfurt am Main 2021). Many of these visit Frankfurt's recently reconstructed and unveiled old town, the historic Römer market square, the museums of the downtown area, and the adjacent northern riverbank area of the Main River, known as the Mainkai (→Fig. 1).

Alongside streets, walkways, squares, green spaces, parks, sports facilities, and cemeteries (19.5 percent), as well as forests and groves of

Fig. 1 Map of Frankfurt's downtown (author's depiction)



trees (15.9 percent), approximately 2.2 percent of Frankfurt's publicly accessible spaces (amounting altogether to 36.7 percent of the developed land) consists of bodies of water such as harbor basins, watercourses, and standing bodies of water. This is a far lower proportion than cities such as Hamburg (7.6 percent), Berlin (6.6 percent), and Cologne (4.8 percent), and is comparable with Dresden (2.1 percent), but somewhat higher than Munich (1.4 percent) (Bundesstiftung Baukultur 2021). In urban Frankfurt, the Main River has a width of 120 meters. By comparison, the river has a breadth of 350 meters in Cologne's city center.

The Beginnings

Located near the former ramparts of the city center, which is referred to as Nice for its mild inland climate, was Mainlust, an island with tourist cafes originally separated from the mainland by a tributary (→Fig. 2). Arriving later were bathing boats, and around 1900, riverside bathing

areas, where generations of Frankfurters frolicked (Blecken 1993). Only the last third of the twentieth century saw a renewed interest in reshaping the riverfront zones for the sake of greater cultural, leisure, and recreational use. In Frankfurt, however, this process has been slow. While the downtown shopping mile was transformed into a pedestrian zone during the 1970s, parts of the southern riverbank continued to be used for parking cars well into the 1980s (Wekel 2016).

The rediscovery of the Main River began in 1978 with the origins of the Museumsufer (Museum Embankment) under the motto »Culture for All,« and continued in the 1980s with the project known as Stadtraum Main (Main River Urban Area), which included plans for residences, shops, and promenades in connection with the planned Olympics bid for the year 1992. To begin with, residential buildings with direct waterside locations were created on Westhafen, in the vicinity of the European Central Bank on Osthafen, and on the

Fig. 2 View of Frankfurt with the Mainlust island, prior to the filling in of the tributary known as the Kleiner Main in circa 1858 Quelle: Historisches Museum Frankfurt



Sachsenhausen side. Pursued with the Museumsufer was a concept that propelled the rediscovery of open space along the water through the networking of cultural facilities on both sides of the Main (Wekel 2016). On the Sachsenhausen side, the green areas at the level of the Museumsufer along Tiefkai, redesigned during the early 2000s, have become popular spaces for movement and amenities. Located close to the riverside between the Eiserner Steg (Iron Bridge) and Friedensbrücke are thirteen museums, with an equal number accessible by foot from both sides of the river. Beginning in 2007, all of these institutions have presented themselves collectively as the Frankfurt Museumsufer and attract more than 2.5 million visitors annually (Kulturamt Frankfurt am Main 2021).

Some of the freestanding museum buildings are former upper-class villas; others were designed beginning in the 1980s by internationally renowned architects (Burgard 2020). Discussed in the beginning were two divergent concepts. The Speer Plan of 1976 envisioned a »museum park,« with motorized traffic diverted in an east-west direction along Berliner Straße at a considerable distance

from the Mainkai. This concept envisioned an integrated landscape, protected from traffic, on both sides of the Main River. Going beyond the riverfront zone itself, it was to have encompassed the publicly accessible open spaces of the museums as well (→Fig. 3). Instead, in addition to Berliner Straße (four lanes) and the Mainkai (three lanes, 20,000 autos daily), two main traffic arteries along an east-west axis were built. Both of these palpably segregate the riverfront, reserved for pedestrians and cyclists, from the city center.

Advent of Transformation

The city center development concept of 2010 attests to the disintegration of portions of the downtown and the riverfront area as a consequence of the heavy burden of motorized traffic. Emphasized here was the diversity of urbanistic forms (high-rises, row houses from the 1950s and 1960s, timber construction), as well as programmatically (commercial, consumer-oriented, culture), which gave rise to divergent identities such as the banking district and the old town. These were to be strengthened further by future development. It also became

Fig. 3 The Leitplan Museumsufer (Museumsufer Master Plan) of 1976 shows a cohesive landscape zone as a component of Frankfurt's green and blue infrastructure. (Source: AS+P Albert Speer und Partner GmbH)



clear that there existed few route connections along the north–south axis. Proposed then was an extensive network of routes for pedestrians that would span the downtown area in combination with a network of cycling paths that would feed at selected points into cycle streets (along Berliner Straße, for example). This network for active, everyday mobility was to have been supplemented by a uniformly shaped, integrated circular route through the green spaces of the former city ramparts. The relocation of streetcar stops, the partial limitation of access for private vehicles, and the creation of additional bus lines were intended to improve the traffic infrastructure along the north–south axis. The redesign of the Mainkai was presented as a recommendation for action that would fulfill two aims: first, it would reinforce the identity of the lower old town, oriented toward the river, and secondly, it would strengthen green mobility (Stadtplanungsamt Frankfurt am Main 2010). This meant that the city center concept of 2010, which intended to provide a solid point of departure for a movement-friendly riverside, was firmly anchored in the five dimensions of walkability.

The Current Situation

In the late 2010s, the redesign of the Mainkai was taken up again against the background of discussions concerning climate adaptation and quality of life in Frankfurt. This is evident, for example, in the vision of the downtown open areas as surfaces for movement and encounter, with the Main River as a central linchpin (→Fig. 4). In contrast, the current situation is sobering. At the level of the central pedestrian crossing Eiserner Steg (Iron Bridge) and the Alte Brücke, the Main River is characterized by residential buildings with dispersed cultural and gastronomic amenities. In open areas, these are supplemented by additional gastronomy and kiosks, as well as boat moorings. Together with the offerings of the old town, this leads to notable density and a variety of destinations that are reachable from the Eiserner Steg on foot. Alongside the main arteries that arrive through the Alte Brücke and the Untermainbrücke, the network of routes toward the north and the city center is shaped by the connection across the historic market square (Römer). The numerous pedestrian routes in between are ancillary, and

Fig. 4 Frankfurt am Start-Sport findet Stadt
(Frankfurt at the Start: Sport Finds City)
(Source: AS+P Albert Speer und Partner GmbH)



are used far less frequently (Pandit et al. 2020). Accessibility via public transport is provided via streetcar stops and a subway stop in the old town, as well as a bus stop on the opposite side of the river. Depending upon the specific location, these lie up to 500 meters from the Mainkai, which can already confront mobility-restricted individuals with challenges. The Mainkai itself has no public transport stops. With regard to the promotion of movement and accessibility, the design of urban space here has obvious gaps. With its marked gradients leading from the Mainkai to both bridges, the topography presents an impediment for those with restricted mobility. Only the Eiserner Steg is barrier-free (it can be reached via elevator). The play and green areas at the bridge heads are used heavily, but dominant along the Mainkai are areas paved with material such as asphalt. In some areas, orientation is a challenge as well, given the absence of continuous guidance or lighting systems (Knöll et al, 2020).

A much-heralded transport and urban planning experiment was conducted in Frankfurt between July 2019 and October of 2020: the three-lane roadway of the Mainkai was temporarily closed to motorized traffic. Recorded during this stoppage—which coincided to a large extent with restrictions related to the COVID-19 pandemic—was an up to

40 percent increase in bicycle use, a 20 percent increase in wheelchair users, and 1150 percent more children cycling independently. Registered as well was heavier use by pedestrians along north-south connections, which was distributed uniformly throughout all routes. In green areas along the Main River there were a greater number and diversity of leisure activities, engaged in for more extended periods of time, including sports, picnicking, and recreation (Pandit et al 2020). In November of 2020, the street was reopened to car traffic, with the result that by July 2021, the use by cyclists of the Mainkai had fallen again to the levels recorded prior to the experiment of 2019 (see Pandit in this publication). These figures however do not take into account that in late July 2021, one lane formerly used by motorized traffic was converted into a cycle street.

One objective of the Integrated Urban Development Concept (ISEK) Frankfurt 2030+, which appeared in June 2019, was to increase the share of cyclists, pedestrians, and public transport use, within the modal split for Frankfurt. Among other things, this is to be achieved through a reconfiguration of the street space, as well as through the development of public transport options and bicycle routes. An additional aim is the promotion of affordable living space (to include existing housing

Fig. 5 A future design scheme should be attentive to climate adaptation through desealing and water retention surfaces; it should also have the potential to create additional amenities along the Mainkai through greater interaction with (rain)water. (Design concept: Emilia Kühn, Muriel Stemmler | TU Darmstadt)



stocks), and the qualification of open areas in the city center. The »continuing redesign of the Main riverbank,« which includes a lighting concept, is part of the plans of Frankfurt 2030+ (Stadtplanungsamt Frankfurt 2019). This points up the recognized need for further action to improve mobility and amenity qualities along the Mainkai.

Conclusion

It appears unlikely that many of the positive effects that accompanied the temporary closure of the Mainkai in 2019 and 2020—including an increase in active mobility, improved connections to the city center for pedestrians and cyclists, and heightened use of green areas—will be achieved with cars retruning to Mainkai street and given the current allocation of space. Improvements for bicyclists can be expected from the cycling lane, but this will need to be evaluated scientifically over some time. Future solutions need to go further. Common use by cyclists and motorized vehicles of the street as a shared space could make a substantial contribution to further reducing traffic speed along the Mainkai as a whole. The paving material should be redesigned as a visually unified movement and encounter zone, with

zones for pedestrians clearly recognizable for people with visual impairments and according to the two senses principle. A decisive renaturation of the asphalt roadway that is freed up in this way, with far-reaching desealing and dispersed shady areas with trees, would make the Mainkai more responsive to the needs of pedestrians. Necessary as well is due consideration to the reprogramming of selected ground floor zones for the sake of increased public use. In coordination with the agencies responsible for historic preservation, it should be possible to open up buildings toward the Mainkai; outdoor gastronomy and informal cultural uses should also be strengthened, with the aim of establishing and invigorating additional amenity qualities along Mainkai. Inherent in the concept of the Museumsufer (Museum Embankment) is still unused potential—here, it is a question of taking advantage of additional spaces in the downtown area, including underutilized office space and open spaces. In this regard, Burghard (2020) mentions, among other things, the requirements of the Museum of World Cultures, which is currently attempting to procure its own premises.

Worth considering for the sake of improved accessibility to the Mainkai is an additional public

transport connection to the riverside. One interesting option could be the use of self-driving mini-buses, but they would need to be integrated into the above-described spatial reconfiguration and into an overarching mobility concept for the city center based on limited car traffic, especially they are to enhance accessibility for individuals with mobility limitations. Conceivable as well might be water taxis as an integrated component of Frankfurt's public transport system, of the kind already in use in Hamburg and in London, where it is used to link together the museums that are set along the Thames.

It would also be useful to adapt the design of riverway areas directly along the banks of the Main to the altered and decelerated velocity of pedestrians, including those with restricted mobility and parents with small children. The new requirements described here highlight the need for a supplement to the guiding design principle of a paved, urban Hochkai (high quay). Increased interaction with the waterway along Mainkai would promote enhanced mobility and public health. This could be achieved through a far-reaching desealing of open spaces, as well as through hybrid concepts that are analogous to plans implemented in Rotterdam and Copenhagen. Specifically, this means that during dry periods, sport activities or social encounters could take place in the empty retention basins with seating areas along the edges, as well as in shady zones created by trees; during periods of heavy rainfall, in contrast, they serve as storage facilities for rain water, ready to interact with for pedestrians (↳Fig. 5).⁰¹

Although the planning instruments of the city center development concept and in the Frankfurt 2030+ masterplan have been structurally anchored in values of walkability since the 2010s, actual implementation continues to fall short of objectives. With the traffic experiments along the Mainkai, the difficulties and potential of city-center blue mobility zones came strongly into focus. Urgently required now is genuine follow-up on the positive dynamic for active mobility, along with an experimental testing approach and scientific verification of interdependencies. The accompanying controversy and passionate discussion,

as well as the decision to reopen and, from August 2022, close Mainkai to cars during school holidays, evening hours, and weekends, highlight the necessity for supplementing traffic experiments with formats such as the »real-life laboratory.« In addition to supplying information and encouraging participation they investigate the potential added value for the citizens and render it concretely tangible in optimal ways. This is shown elsewhere by temporary interventions, even with more minimal investments, which clearly demonstrate an immediate effect on the bodies and well-being of residents (Roe et al. 2019). Expedient in this situation would be strengthened transdisciplinary exchanges between citizens and experts from the realms of politics and science, including planners and architects. The shared goal should be to better integrate the long-term planning aims and visions with incremental and yet powerful temporary interventions and scientific evaluations.

⁰¹ Further selected results of the urban planning concept »City Center of the Future« can be viewed at https://www.architektur.tu-darmstadt.de/urbandesign/lehre_udp/sose_2020_udp/innenstadt_der_zukunft_ergebnisse.de.jsp (accessed on March 8, 2022).

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