TeMA
Journal of
Land Use, Mobility and Environment

print ISSN 1970-9889 e-ISSN 1970-9870
FedOA press - University of Naples Federico II

DOAJ anvur Rivista scientifica di classe A - 08/F1 Scopus WEB OF SCIENCE

Special Issue 1.2025

Innovation, green infrastructures and urban form

Towards regenerative city models

In the contemporary global context—characterized by increasing environmental pressures, demographic asymmetries, and socio-economic fragmentation and structural inequalities—the relationship between urban form, ecosystem services, and territorial innovation acquires unprecedented strategic value. This Special Issue intends to critically explore and foster a new interdisciplinary debate aimed at rethinking the urban project within a framework of regenerative and systemic transformation.

TeMA is the Journal of Land Use, Mobility and Environment. The Journal publishes papers which adopt unified approach to planning, mobility and environmental sustainability. With the ANVUR resolution of April 2020, TeMA Journal and the articles published from 2016 have been included in the A category of scientific journals. The articles published on TeMA are part of the Core Collection of Web of Science, since 2015, and of Scopus database, since 2023. The journal is in the Sparc Europe Seal of Open Access Journals and the Directory of Open Access Journals.

TeMA Journal of
Land Use, Mobility and Environment

Special Issue 1.2025

Innovation, green infrastructures and urban form.
Towards regenerative city models

Published by
Laboratory of Land Use Mobility and Environment
DICEA - Department of Civil, Architectural and Environmental Engineering
University of Naples "Federico II"

TeMA is realized by CAB - Center for Libraries at “Federico II” University of Naples using Open Journal System

Editor-in-Chief: Rocco Papa
print ISSN 1970-9889 | online ISSN 1970-9870
Licence: Cancelleria del Tribunale di Napoli, n°6 of 29/01/2008

Editorial correspondence
Laboratory of Land Use, Mobility and Environment
DICEA - Department of Civil, Building and Environmental Engineering
University of Naples "Federico II"
Piazzale Tecchio, 80
80125 Naples (Italy)

https://serena.sharepress.it/index.php/tema
e-mail: redazione.tema@unina.it

The cover image: Aerial view of River Bay Singapore, 2017, CC0. Source: https://pixabay.com/photos/singapore-asia-landscape-bay-river-2118682/

TeMA - Journal of Land Use, Mobility and Environment offers researches, applications and contributions with a unified approach to planning and mobility and publishes original inter-disciplinary papers on the interaction of transport, land use and environment. Domains include: engineering, planning, modeling, behavior, economics, geography, regional science, sociology, architecture and design, network science and complex systems.
With ANVUR resolution of April 2020, TeMA Journal and the articles published from 2016 are included in A category of scientific journals. The articles published on TeMA are included in main international scientific database as Scopus (from 2023), Web of Science (from 2015) and the *Directory of Open Access Journals* (DOAJ). TeMA Journal has also received the *Sparc Europe Seal* for Open Access Journals released by *Scholarly Publishing and Academic Resources Coalition* (SPARC Europe). TeMA is published under a Creative Commons Attribution 4.0 License and is blind peer reviewed at least by two referees selected among high-profile scientists. TeMA has been published since 2007 and is indexed in the main bibliographical databases and it is present in the catalogues of hundreds of academic and research libraries worldwide.

TeMA Journal of
Land Use, Mobility and Environment

Special Issue 1.2025

Innovation, green infrastructures and urban form.
Towards regenerative city models

Contents

TeMA Journal of Land Use, Mobility and Environment

TeMA Special Issue 1 (2025) 129-146
print ISSN 1970-9889, e-ISSN 1970-9870
DOI: 10.6093/1970-9870/11178
Received 22nd September 2024, Accepted 28th February 2025, Available online 30th June 2025

www.tema.unina.it

Towards bicycle infrascapes. Active mobility as an opportunity for urban regeneration and open space redesign

Chiara Centanaro [a]*, Emanuele Sommariva [b]

[a] Polytechnic School, Department of Architecture and Design; University of Genoa, Italy
e-mail: chiara.centanaro@edu.unige.it
ORCID: https://orcid.org/0009-0005-7615-1854
* Corresponding author

[b] Polytechnic School, Department of Architecture and Design; University of Genoa, Italy
e-mail: emanuele.sommariva@unige.it
ORCID: https://orcid.org/0000-0002-0954-3373

Abstract
With mounting urban challenges such as climate change, pollution, traffic congestion, and sedentary lifestyles, cities worldwide are rethinking their policies, and two concepts are at the forefront of this transformation: active mobility and green infrastructure. Active mobility prioritizes modes of transportation like walking, cycling, and using micro-mobility solutions (e-scooters, e-bikes), while green infrastructure strategically integrates natural elements into the urban fabric. Remarkably, when active mobility and green infrastructure are coupled, the impacts become amplified, offering a powerful solution to create more liveable, sustainable, and equitable cities. With a particular focus on diversified greening trajectories for cities, this contribution wants to trace a comparative exploration in the frame of *Bicycle Infrascapes* research developed by the GICLab of Genoa University, aimed at defining a framework of international urban design and landscape projects where the notion of green infrastructure become multi-fold especially when connected to the reorganisation of mobility patterns and open space re-design.

Keywords
Bicycle infrastructures; Active mobility; Multi-modality; Open space; Post-car cities

How to cite item in APA format
Centanaro, C. & Sommariva, E. (2025). Towards bicycle infrascapes. Active mobility as an opportunity for urban regeneration and open space redesign. *TeMA - Journal of Land Use, Mobility and Environment*, SI1, 129-146. http://dx.doi.org/10.6093/1970-9870/11178

1. An open multifunctional interpretation of green infrastructures

In recent decades the concept of *Green Infrastructures* (Benedict & MacMahon, 2006; EU, 2013), understood as a variable geometry network of natural, semi-natural green areas and other open spaces designed to foster multifunctional environmental features for urban communities and beyond, has become widely established. (MEA, 2005; Mell, 2010; EEA, 2011; Austin, 2014; Galan, 2015; Artmann et al., 2017; Ying et al. 2022) Parks, water bodies, riverfronts, street boulevards, public gardens, ecological corridors, ecotones, urban-rural fringes, agricultural spots, wetlands, urban woodland, pedestrian and cycle routes, community spaces, sport fields, school grounds, allotment gardens, leisure areas, are among others the variable components and integral parts of scattered or continuous green infrastructures. (Natural England, 2009; British Design Council, 2013; German Federal Agency for Nature Conservation BfN, 2017).

Although the term has been adopted in academic debate, research and planning documents to support environmental conservation principles through actively maintaining, restoring, and supporting ecosystem services and green connectivity, today green infrastructures expand its range of applicability in a multi-fold and systemic perspective (Naumann et al., 2011; Ying et al., 2022). In fact, one of the best and most appropriate planning tools based on this approach is the application of green infrastructures to counter-balance urban development impacts, by redefining the relationship between biotic (people, flora, fauna), abiotic (soil, water, air), cultural and artificial (buildings, roads, infrastructure) components of an urban ecosystem (Brady et al., 2001; Schäffler & Swilling, 2013). It implies a condition far from any state of permanence, particularly when related to the assessment of service provision, the reorganization of functions, adaptability, and alternative forms of stability through locally generated positive externalities.

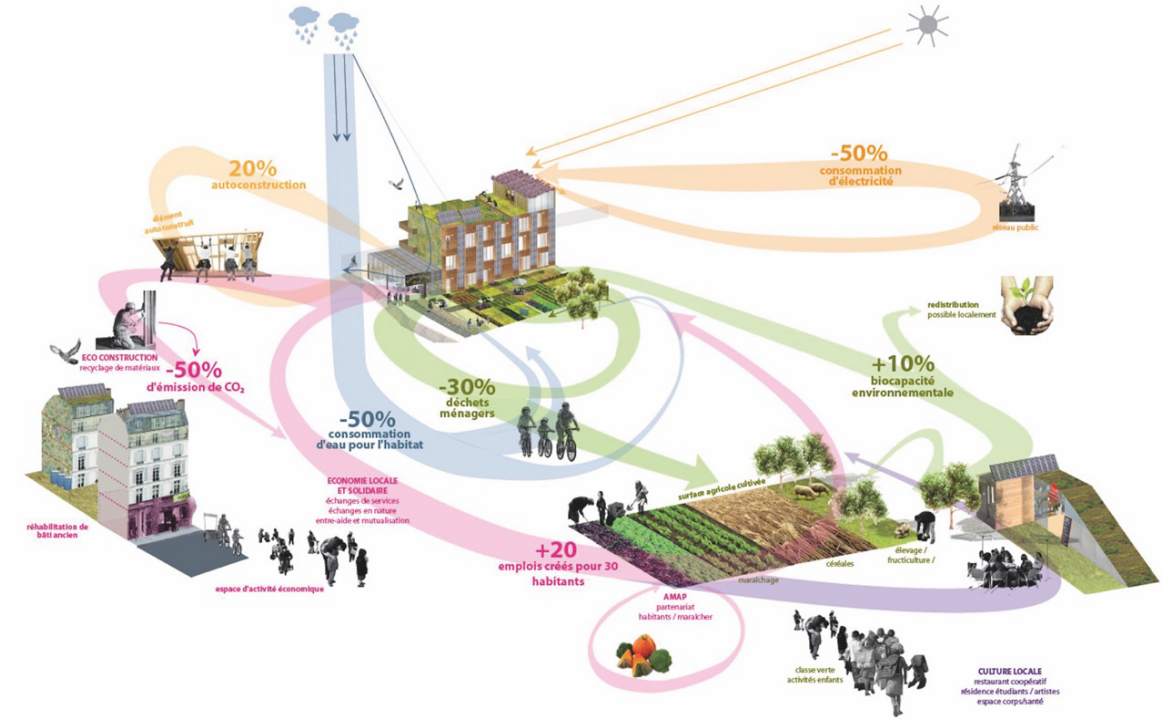

Fig.1 Diagram of green infrastructure components and its mutual relationships to foster resilience and active living

In this way, due to its multifunctional character, a green infrastructure inherently encapsulates a spatially and strategically idea of *ecological resilience*[1] among its components (Holling et al., 2002; Wright, 2011; Mell et

[1] The idea of resilience has a long history in ecology and engineering, but its application to urban and recovery planning is relatively recent (Berkes 2007). In engineering, resilience is concerned with disturbances that threaten the functional stability of materials and infrastructures. In ecology, Holling (1973) uses resilience to describe an evolutionary process of ecosystem dynamics towards different forms of stability. The two concepts are used in hybrid systems theories and

al., 2017). Consequently, it needs to be delivered fostering natural green potentials at every scale of intervention and aggregation on different semantic levels: from the local neighbourhood pockets parks to every kind of urban surfaces, even those not originally conceived to accommodate ecological functions, towards larger territorial *land-links* (Gausa, 2020) which contribute to urban well-being such as metropolitan greenbelts and territorial eco-structures (Fig.1).

As Wright (2011) points out the ambiguity that accompany the definition of green infrastructure, relates to the complex and operative nature of the concept, which inevitably evolves and develops in relation to different uses and contextual conditions. At the same time, it represents an integrative approach aiming to bring together multileveled stakeholders around common societal objectives with different application areas, such as open space re-design and landscaping, climate adaptation, remediation and nature-based solution, public transportation and active mobility (Gargiulo & Sgambati, 2022; Oguz & Tanyas, 2024), city attractiveness, livability and social cohesion (Fink, 2016; Frantzeskaki et al., 2017; Anguelovski et al., 2018). Extending this notion and designing more effective greening trajectories for cities pass by the capacity to enhance the unexpressed potentials of every kind of urban surfaces, even those not originally conceived to accommodate eco-infrastructural functions (i.e., backyards, parking spots, vacant plots, infrastructural corridors, state-owned areas, collective commons, rooftop surfaces in line with the typological reinvention of residuals (*délaissé*) and fallow lands (*friche*) as exposed by Gilles Clément in the *Manifesto of the Third landscape* (2005).

As such, the architecture of a green infrastructure has evolved into a processual (design-oriented) approach, which implement open configurations and diverse connectivity of natural-mediated elements able to adapt to heterogeneous urban ecosystem demands and diverse landscape functional treatments. (Band et al., 2005). In this regard, urban open space can be a pivotal area for green innovation, by directly affecting the quality of peoples' daily lives. Promoting awareness regarding the socio-economic impacts of green infrastructure development, at different spatial and temporal scales, can nurturer environmentally impoverished contexts, such as urban streetscape, becoming a valid means of compensating and mitigating the impacts generated by the traffic congestion and metropolisation of the territory. It is a strategy that facilitates the transition to car-free cities, even in densely populated regions, by overcoming the relational ontology of 'City-in-Nature' or the dialectical dualism of 'Urban landscapes' and 'Nature and Society' (Swyngedouw et al., 2005; Moore, 2011).

1.2 Surface re-design and new potentials for urban ecological transition

Although the articulation of urban green systems has increasingly gained prominence in public debate and urban agendas (Pultrone, 2023), by supporting participation in health-enhancing physical activity in daily routine through the *Active Healthy Cities* approach (Duhl, 2005; Edwards & Tsouros, 2008; Dorato, 2020), the care and equitable access to safe urban space has not accounted the same attention.

People are willing to walk or bike if the surroundings provide them with a pleasant wandering on safe routes passing through public green spaces. Steven Mouzon calls this 'cycle-pedestrian propulsion' (2010): a beneficial side effect that prompts people to travel a longer route than necessary, if properly compensated with a qualified journey experience. In this way, enhancing urban attractiveness and street life represents a significant driver for successful placemaking interventions and green infrastructure development. Promoting a vibrant urban experience, enhancing the sense of place by encouraging inclusiveness through open space re-design are the main principles to guide the reclamation of underused space from vehicles or other grey infrastructures. As demonstrated by numerous high-profile urban recycling projects (Ciorra & Marini, 2011;

socio-ecological systems (Berkes, Folke 1998), but in relation to green infrastructures, they mostly concern the effective mitigation of urban environmental deterioration, ensuring local ecological security, and maintaining spatial sustainability. (Lennon & Scott, 2014).

Ricci, 2012), such as the High Line in New York[2] or the Elevated Garden of Sants in Barcelona[3] (Fig.2), the recycling of rail mobility infrastructure to create new urban connections, pathways, and design possibilities can increase property values, potentially driving speculative tendencies and gentrification. Nonetheless, these projects also foster new layers of accessibility and sociability, provide escapes from urban congestion, and enhance aesthetic quality in dense urban environments.

On the other hand, especially in situation of peripheral contexts or of diffuse urban sprawl, the quest for urban sustainability is more and more connected to the role, qualities and characteristics of the public space structure (Bell, 2012; Haase et al., 2020). Planning the new post-urban condition when places become both dense and diverse it means thinking not only the spatial form of the cities, which is always subject to change, but to conceive its forms of aggregation on urban streetscapes, where the principles of walkability and cyclability becomes new quality standards, as well as to strive for resilience or adapt to climate change when planning for and managing urban concentrations (Gausa, 2012; Costa et al., 2014; Gausa, 2020). Beyond boosting neighbourhood morphological qualities, making mobility infrastructures aesthetically and functionally appealing for citizens is a matter of urban and landscape design, optimizing their limits/borders accessibility through multifunctional programs (Beatley, 2012). If the manipulation of surfaces has been always a constant for landscape design, transforming an element that usually bears a flat coding into an active, complex, mutating field can inform also new mobility pattern and functional options to the streetscape. The exploration of new multi-level surfaces for public space use is central to MVRDV's temporary project for the Rotterdam Rooftop Festival. The Walk allowed visitors to experience pathways at a height of 30 meters, showcasing new possibilities for rooftop reuse (Fig.3). Many of the most promising ideas, in this regard, are the reformulation of the *in-betweens* (Gausa, 2009): partitioning of open spaces and articulation of clustered activities, which don't fit neatly together, but producing new integrated land-uses, including quirky, jerry-built adaptations or additions to existing functions with the intent of promoting *urban mixitè* and ultimately facilitate the potential of new scenarios for active, safe and sustainable mobility.

Drosscapes, terrain vague, residual surfaces (Berger, 2007; Barron & Mariani, 2013; Gasparrini & Terracciano, 2017) open up new areas of applicability for green infrastructures. The last few decades, in fact, have confirmed the evidence of a renewed demand of accessible and quality public spaces, place of exchange and networking in our daily life. Vital to sustain civic engagement and co-creation of changes through flexible solutions —as experienced during the pandemic period, when social distancing measures have shown the limitations of our public reorganization of logistic and mobility systems— the active mobility and green infrastructure, when coupled, can sustain the extension of green mobility lines, offering a powerful solution to increase porosity and permeability of the urban fabric. In this regard, urban designers are tasked to make the streetscapes a significant and attractive experience capable of diverse uses on different temporal patterns, according to the concept of shared streets, for which the beautification through landscaping, urban mixite and wayfinding become important features.

---

[2] The High Line (2006-2009) is a linear park designed by Diller Scofidio + Renfro and Field Operations, on a disused section of New York's West Side Line. Since the founding of the Friends of the High Line organization in 1999, the local community has mobilized to transform the infrastructure into a public space. Numerous workshops, forums, and meetings were held to gather community input, leading to the launch of a design competition for the park. The result is an elevated pedestrian pathway that alternates between landscape-inspired "rooms" featuring gradients and colors reminiscent of pioneer plant species. The High Line is part of a broader urban strategy to promote a more livable, sustainable city, with a strong focus on soft mobility. In this sense, it complements New York's cycling infrastructure. For more info see Dimendberg E. (2013).

[3] The Elevated Gardens of Sants (2016-2018) covers a the main est-west railway and metro corridor in Barcelona, creating a new urban connection over a complex artificial topography rich in plantings of shrubs, trees and ground cover. Designed by Godia + Molino Architects, the elevated gardens constitute a new 5km green corridor with pleasant terraces and bike path. Retrieved from: https://urbannext.net/raised-gardens-in-sants/

Shifts in urban planning practices have revealed desires by both residents and local governments to embrace the idea of complete or shared streets, as a «convenient open space re-organization, environmentally rich in nature-based solution, safe, comfortable, suitable for inter-modal shift between private cars, foot, bicycle, and public transport, regardless of age and ability». This change in dynamics places an emphasis on reorienting roads mainly for pedestrians and their movements freedom, towards multiple transit options within a network, requiring connectivity hubs according to a Transit Ordinated Development hybrid model (Cervero et al., 2002). While green infrastructure is important, it alone is not sufficient for achieving a healthy and green urban environment. Therefore, as underlined by the Urban Agenda and the EU Thematic Partnership 'Greening Cities', the integration of green infrastructure into other sectors – beyond the protection of biodiversity and addressing the climate challenge – is of high relevance. In the same vein, as greening cities is a holistic concept, it is important to approach the theme in a more integrated manner coupling green infrastructure and urban open space design, particularly intertwining other policy areas such as traffic reduction, clean energy transition, sustainable mobility, urban regeneration, circular economy (Franco, 2023) and public health.

Therefore, a growing number of projects are experimenting street-space reallocations fostering intentional, programmatic and temporary re-design of street functions, manipulating surfaces, limits configuration and multi-modal regulation to explore systemic change in urban mobility (D'Amico, 2023; Lahoorpoor et al., 2022). In this regard, "Bicycle Infrascapes: bicycle mobility towards responsive public cities" research project (UniGe-PRA 2022) defined an international collection of 18 urban design and landscape projects, where the notion of green infrastructure becomes operational for its transformative impact related to the reorganisation of urban surfaces and able to promote a wide spectrum of applied strategies to foster cyclability and walkability in cities. The investigation aims to build a framework of international experiences in urban and territorial design for new infrastructures dedicated to active mobility, focusing on projects that are either completed or currently under implementation.

Fig.2 Elevated gardens of Sants: linear park and new urban connection in Barcelona (2016-2018)

Fig.3 Roofscape reuse fosters the transition to a multi-layered green city during Rotterdam Rooftop Festival (2022)

2. Operational options of green infrastructure to support new urbanities

Moving towards a walking world requires actions. These actions concern visions and strategies, safe and efficient transport systems, creating liveable environments, sensing place conditions and implementing responsive solutions. The practicality of these actions is illustrated by a series of emerging figures and case studies from across the world. The selection criteria adopted for case studies insight for *Bicycle Infrascapes*, range from place-making effects produced by urban design-oriented projects through the definition of new green infrastructures, the re-naturalization of post-metropolitan contexts, the enhancement of urban resilience as well as the opportunity to upgrade infrastructural programme though new meanings and new values. All the projects deal with significant regeneration programmes produced in place, the creative reactivation and reuse of existing infrastructures and the enhancement of green actions able to support *Context Sensitive Solutions* (Dondi et al., 2011; Laaly et al., 2017; Kraus & Koch, 2020) applied on 3 key-figures of intervention on public space[4]. Responding to this challenge, this paper aims to collect multiple perspectives and contributions that support context-sensitive bicycle infrastructure designs, by considering community' values and perception on landscape enhancement produced in place after the completion of these interventions as well as their perspectives on necessary trade-off choices.

The identified case studies focus on both the repurposing of infrastructure and new forms of active mobility across three themes of public space intervention. These projects were analyzed to uncover multiple

[4] Context Sensitive solutions, firstly introduced in 1998 International Conference 1998 'Thinking Beyond the Pavement', refer to holistic approach for road reorganization wherein safe transportation solutions strive to balance functional, scenic, aesthetic, environmental and natural resources, as well as community demand for new user-centered transportation services, such as demand responsive transport, bicycle highways, active public spaces. See: Stamatiadis, N. & Hartman, D. (2011); Hilbers, A.M. (2024)

approaches within different territories, categorized through a multidimensional classification: territorial scale, urban scale, and local scale.

- *Management of Climatic Events:* The adaptation of obsolete or non-functional infrastructure to manage climatic challenges is reconsidered for the seasonal use of public spaces through new infrastructure, nature-based solutions, and enhanced accessibility.
- *Re-naturalizing Ecosystems:* The projects analysed enhance socio-ecological structures, promote multi-species ecosystems, and increase biodiversity with an ecosystem-focused approach.
- *Inhabiting the Infrastructure:* The redesign of disused or previously inaccessible infrastructural areas increases the quantity and quality of public spaces through a multi-use and multigenerational approach, redefining these spaces for local communities.

2.1 Management of climatic events

Rethinking public space infrastructure to address climate and environmental challenges creates opportunities for new forms of active, accessible mobility (Clemente, 2022) and stronger connections with public domain. New York City, severely affected by Hurricane Sandy in 2012, needed to rethink an integrated coastal infrastructure to overcome its vulnerability (NYC, 2020).

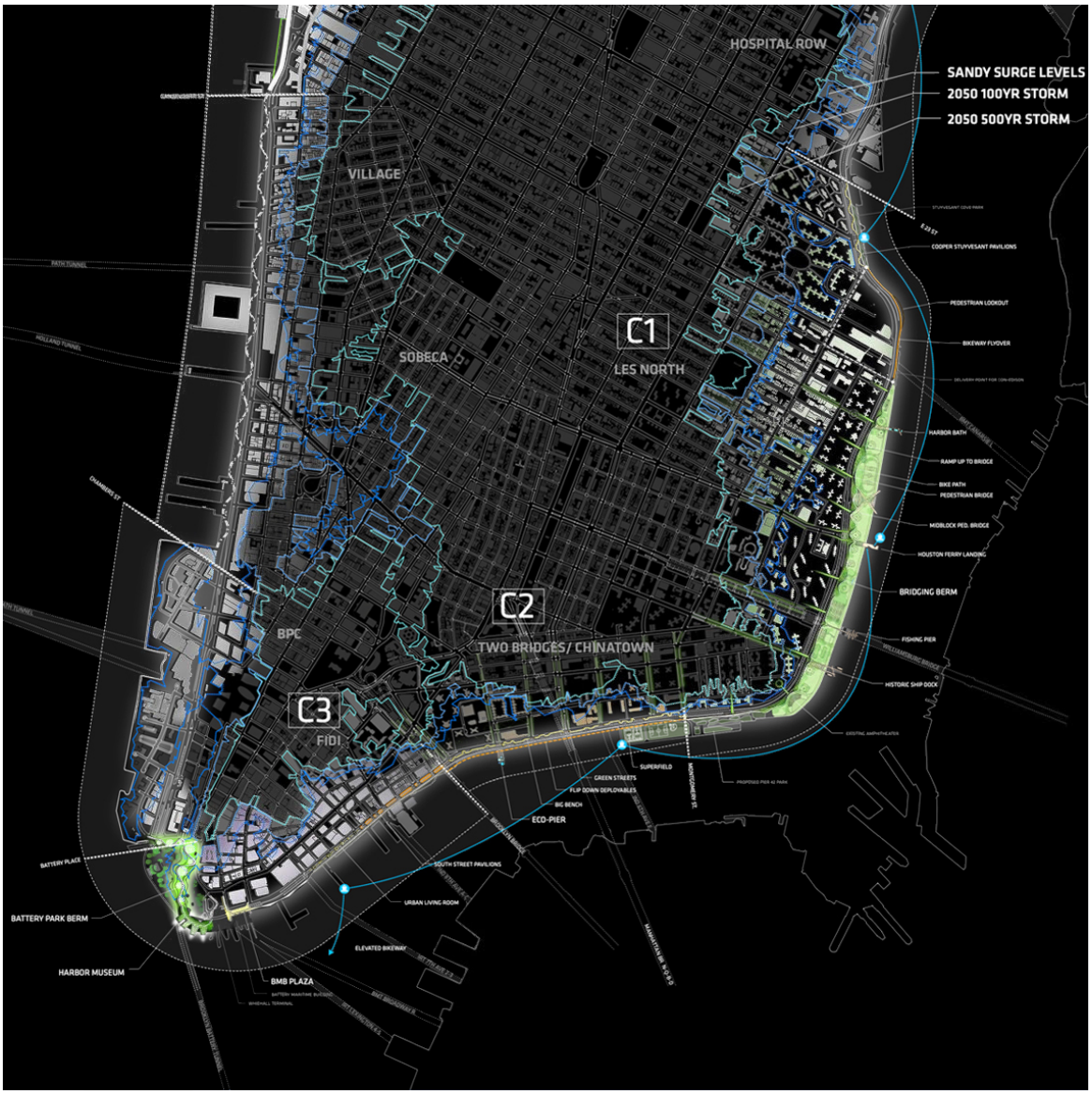

Fig.4 Different flood-risk zones are encompassing new accessibility levels in South Manhattan (2013-ongoing)

The post-Sandy focus produced several studies and initiatives that were central to the Lower Manhattan climate resilience programme, including New York's Special Initiative for Rebuilding and Resilience (SIRR), the NY Rising Community Rebuilding Programme through the Governor's Office of storm recovery, the federal Rebuild by Design competition, Mayor Bill de Blasio's One NYC Plan, informing the Southern Manhattan Coastal Protection Study. Against this backdrop, the Big U project by BIG Bjarke Ingles Group (2013 – ongoing) reimagines the southeast coast of Manhattan by rethinking a continuous public space corridor through a series of baffles in case of sea level rise. This led to the redefinition not only of the coastal defense line but of the public green infrastructure as a whole, reconsidering access points, closure systems, barriers, built spaces, amenities, public terraces and the connection system along the riverfront. From this preliminary vision phase, the city developed specific planning tools for each target areas (NYC, 2020; FIDI; Seaport, 2021). It is a territorial-scale project, re-designing a complex multi-levelled coastline over 15 km. The urban design strategy deals with three main river segments: East River Park, Two Bridges and Chinatown, Brooklyn Bridge and the Battery (Fig.4). Each compartment includes physical flood protection and hydraulic solutions which separate and isolate flash floods from the other areas: the compartments are designed as unique elements while remaining connected with one another. The project was developed with significant participation from associations and local and federal stakeholders while addressing, at the same time, new accessibility levels through walkable and cycling infrastructures along the coast. Working with local communities, in fact, brings the resilient project toward a socio-spatial definition of user-centered solution towards risk awareness and understanding of the surrounding urban environment. This is why BIG defines The Big U as "an example of what we call social infrastructure," where both flood protection components and new collective spaces are rethought in a holistic view.

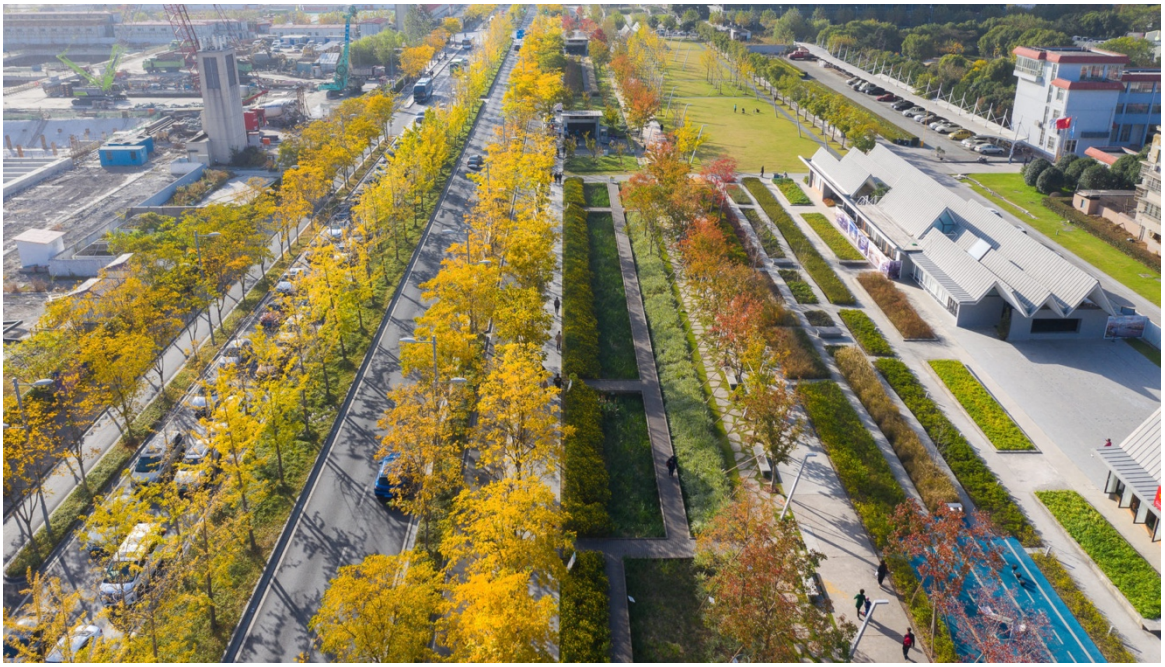

Fig.5 The new layout of Yunjin Road promotes bicycle accessibility into Xuhui Runway, Shanghai (2015-2020)

At urban scale, the Xuhui Runway Park designed by Sasaki (2015-2020) in Shanghai —located on the Yangtze River and crossed by the Huangpu River— redevelops the disused airfield at the former Shanghai Longhua Airport through a comprehensive landscape reclamation process of the whole area. The main concept is to create a core urban green infrastructure where only a pedestrian and bicycle path system can provide access, and implement stormwater management systems into the surface design (Ming-Jen, Zhang 2019). The project still preserves some portions of the former runway (Sasaki, 2020) by offering at the same time different open-

air sport programs and fostering social accessibility for people of all ages and backgrounds, through a sequence of spaces structuring linear "park rooms". The park also supports local response to flash and stormwater retention (sponge effect), which acts as an extensive blue-green infrastructure with 5.760 sq.m gardens and an 8.100 sq.m wetland along the bordering parkways (Sasaki, 2020). This is the first weather management garden built in the city of Shanghai. While runoff from the upper half of the site passes through the multiple park rooms into the main drainage channel, the southern half drains through a series of edges designed as filtering wetlands. Channels are designed mimicking natural ditches to reduce the speed of water runoff, along with wetlands that have been planted and filtered, helping to minimize the amount of suspended sediment and pollutants in the water from road surfaces. Ultimately, all the runoff from the site flows into the Jichang Canal, which then drains into the Huangpu River. The creation of the park and the addition of new bicycle pathways have facilitated the growth of inter-modal hubs connected with pivotal metro stations for the neighboring residential areas. These new pathways blend in the park structures creating connectivity layers which capillary responds to land-use organization and vegetation pattern definition (Fig.5).

2.2 Re-naturalizing ecosystems

The approach to enhancing multi-species ecosystems and increasing biodiversity (Lazzarini et al., 2024) by investigating socio-ecological structures is intertwined with developing new forms of mobility and experiencing the territory (Pinto & Fossati, 2020). Repurposing previously inaccessible spaces due to being reserved for heavy infrastructure or large urban and territorial voids left by decommissioned European industries has led to improved quality of life, connections, green spaces, and biodiversity.

Fig.6 Re-naturalization of the Emscher channel as regional bicycle infrascape at NODU Park in Duisburg (1990-2002)

The memory of places and the history of communities serve as the defining elements of the NODU project by Latz and Partner for the Duisburg Landschaftspark (1990-2002), where the disused industrial heritage of what was one of Europe's main steel ecosystems (Stilgenbauer, 2005) integrates with the reclaimed green landscape. Here the concept of green infrastructure intertwines with new cultural and leisure programmes through the reinvention of the abandoned infrastructural industrial and mining assets merging together to

create unexpected landscapes, privileged viewpoints, and new forms of slow, integrated mobility. The traces left by old railway lines, now colonized by plant life, give rise to new landscape elements such as watercourses and connection systems offering long regional hiking and bicycle trails (Fig.6). Additionally, the post-industrial nature of the region is reinforced with reclamation of high ecological value of Emsher channel, which soil and water contamination has been processually designed as a landscape reclamation machine. Today, Duisburg Park contributes to the conservation of new natural and endangered species which found here a new living habitat, through an intermediate nature of artificial and new landscape configurations. The project's connectivity layer works also at the territorial scale, including NODU park as a new green lung in a system of regional landscape parks, stretched along 250 km sequence of disused industrial landscapes and former agricultural areas. Duisburg Park generates new meanings while preserving the readable productive past of those communities, from their agricultural vocation to their conversion into a steel-producing territory. The project, through the re-naturalization of polluted sites, ensures new multi-species green ecosystems, in which humans, with their slow mobility, become a component.

Fig.7 The exaptation of the former motorway along Rio Manzanares into Madrid Rio river-park (2006-2011)

The re-design of new green connecting areas born from the desire to stitch together existing fabrics and identify processes of reclaiming natural elements within the urbanized context is the objective of the Madrid Rio project by West8 Burgos & Garrido, Porras La Casta, and Rubio & Álvarez-Sala (2006-2011). The landscape exaptation of the large road infrastructure along the riverbanks of Rio Manzanares, through the creation of underground road infrastructure, has thus allowed for the liberation of a 25-meter-wide space extending over 649 ha. After the construction of the underground tunnel, development plans for individual components of the river were created: Salón de Pinos, Avenida de Portugal, Huerta de la Partida, Jardines del Puente de Segovia, Jardines del Puente de Toledo, Jardines de la Virgen del Puerto, and Arganzuela Park. The central focus of the project is the creation of a large river-park with the planting of 30,000 trees and 110 ha of new green equipped

areas along both riversides. A collection of open-air sports grounds and public facilities are connected with 30 km of new bike lanes, 10 children's areas, 6 civic centers, a sandy beach, and a kayaking rowing centre. The park has reconnected the northern and southern metropolitan area of Madrid (West8, 2011). The project entails various connectivity layers related to multi-modal access and directions: a longitudinal underground axis that maintains a fast road crossing, and a surface slow mobility system with new bridges to allow river accessibility and the ecological connectivity with the new river park (Fig.7).

2.3 Inhabiting Infrastructure

Fig.8 The public rooftop park and The Silo in the Nordhavn area, Copenhagen (2008 – ongoing construction)

Colonizing and resizing the impact of megastructures that have characterized the expansion of cities and communication routes over the last century offers new ways to redefine urban areas previously inaccessible and improve human-scale living, starting from the rethinking and redefining the public space through new slow connections, new uses of space, and therefore new ways of inhabiting the infrastructure.

One of the ongoing projects regenerating a post-industrial fabric is the Nordhavn development in Copenhagen by Cobe (2008 - under construction). The project covers a vast area of 360 ha which results to be the largest redevelopment harbour eco-district programme in Scandinavia. 800 citizens participated in the decision-making process for public space co-design alongside policymakers, architects, landscape architects, and engineers. The project is conceived as an urban archipelago of islands connected by metro lines, local public transportation and cyclo-pedestrian trails (Cobe,2008). The space of the large port infrastructure is resized through the use of canals, generating finer-grained spaces and public amenities (Fig.8). The creation of land-sea interaction surfaces allows for gradual land reclamation and urban development over time, reintroducing marine habitats and maintaining an urban scale redesigned to human dimensions. To connect the district to city of Copenhagen, a mobility corridor called "The Green Loop" has been designed, which crosses the

archipelago and will consist of an elevated metro and a bicycle highway. It's a green infrastructure primarily devoted to urban connectivity but able to support also a green linear park development. The new urban district has been planned to follow the model of the 5-minute city, with public transportation and services available within a 5-minute walk. An interesting intervention involves the typological reinvention and reuse of the old silos and industrial buildings repurposed for new uses in the harbour area. An example of this approach is The Silo, a project for the recovery of a disused concrete tower that previously served as a grain warehouse. Inhabiting the infrastructure is also seen in the JaJa studio's multi-story car park project, which includes a public park on the building's roof, thus multiplying the land available for functions open to all. The rethinking of port elements goes so far as to imagine a hotel suite inside the engine room of a historic crane, The Krane.

Fig.9 New car-free public areas and bicycle infrastructures in the Jernbanebyen district of Copenhagen (2021 – ongoing)

The reclaiming of large disused infrastructural areas is the subject of the project at Jernbanebyen by Cobe (2021-on-going), an industrial site of the Danish national railway company DSB in central Copenhagen. The area has been a freight station and train workshop since its opening in the early 20th century, gradually expanding over the years (Bøje-Kovács et al., 2023). The urban masterplan converts the industrial function into new eco-housing concepts, introducing car-free green infrastructures and local public inter-modalities. The ecosystem service provision in the new districts is supported by 11 ha of new wooded spaces and equipped parks which balance the transformation of the site. The old warehouses and buildings, enlisted as industrial heritage, will be transformed into laboratories for creative companies and start-ups (Cobe, 2021). The transformed historic industrial buildings and railway tracks, flanked by green urban spaces, will give access to 4,500 new apartments, shops, co-working spaces, restaurants, and community services. To scale down the spaces and make them accessible for the residents, Jernbanebyen is divided into distinct smaller urban quarters, each with its own character, using the specific qualities and challenges of each place as a starting point, while a network of green urban infrastructures creates the overall public space layout (Fig.9). The inclusion of linear green corridors in the reclaimed space is a central element of the entire project alongside five types of green loops identified within the fabric: Cultural Nature, Railway Nature, Local Nature, and Infra-

Nature. The green spaces themed as Cultural Nature are three large parks that connect the district from north to south with minor green areas. The Railway Nature comprises the spaces along the railroad, creating a connection from east to west. The Local Nature areas feature several equipped grounds and open spaces—all related to the former industrial buildings— giving each individual quarter a civic meeting place. The Infra Nature areas, located in close proximity to main road connections, aim to localize the intermodal parking hubs for support the car-free programme of the district and give access to the extensive bicycle infrastructure which will connect Jernbanebyen with the southern part of Copenhagen metropolitan area (Cobe, 2021).

Fig.10 The Bentway bicycle infrastructure supports urban regeneration projects in Toronto (2016–2018)

Inhabiting the infrastructure is an urban recycling strategy which offers the opportunity to rethink the spaces beneath large mobility corridors, which often become barriers between parts of the city and inaccessible areas. The Bentway, formerly known as Project: Under Gardiner, done by Public Work Office for Urban Design and Landscape Architecture (2016-2018), is a 1.75 km cyclo-pedestrian path under the Gardiner Expressway, commissioned in partnership by the Judy and Wilmot Matthews Foundation, WATERFRONToronto, and the City of Toronto. The project has transformed the underside of the viaduct into a public space where visitors can experience a variety of activities and programs. The project connects seven Toronto neighborhoods with nearly 100.000 residents, expanding access to key attraction point of the city, such as the Fort York National Historic Site, creating a new continuous public space, by improving connectivity to the city's waterfront (Public Work, 2018). The first development phase of the Bentway project opened in January 2018 with the Skate Trail and the section next to Strachan Gate. The vision for the project includes the continuous multi-use trail for pedestrians, skaters and cyclists, a grand staircase at Strachan that doubles as seating for an urban theatre, and a series of flexible tactical urbanism approach interventions to support year-round performance and programming spaces that can be used by the community. The multifunctional space demonstrates how the recovery and reuse of existing monofunctional infrastructure can support new forms of public activities. The

initiative is focused on helping citizens to reclaim and transform this underused space towards an active common ground for events, from farmer's markets to chamber concerts, dance competitions to experimental theatre, street art festivals to kids' camps: the possibilities for this new space are endless (Fig.10).
The expressway's series of concrete support columns, called bents, create 55 civic rooms that can function together or independently to provide spaces for a wide variety of programs and events which extend over three main sections (Public Work, 2018). The ability to create multi-use and seasonal spaces is the strength of the project in reclaiming and resizing the infrastructure spaces to a community-scale use.

3. Conclusion: walking and biking challenges as (under) valued resources

Moving towards a more accessible, walkable and bicycle-friendly city model requires concrete actions. Giving consistency to the large spectrum of benefits identified in this essay would need the definition of a holistic car-free transition strategy. No single measure, whether road pricing, transit-oriented development (TOD) or limited traffic areas, will be successful in achieving sustainable mobility in cities if not coupled with an extensive and multi-fold approach to green infrastructures to support alternative (slow) mobility choices.
From the idea of greening actions that gives meaning and beauty to physical urban spaces and open spaces, the urban planning action related to sustainable mobility should address a wide range of contribution to support post-car societal transition, by bringing economic and financial returns to a wide range of stakeholders. Businesses and property owners can in fact benefit from more walkable and bicycle-friendly places. Increased footfall has been linked to higher dwell times in city centres and increased retail revenue. Together, these can have an impact on property value, especially when linked with transport hubs or nodes where massive footfall is created. Among the consequences, gentrification processes can be identified, as seen in Copenhagen. Although the city serves as a case study in promoting soft mobility, this phenomenon has been observed in neighborhoods such as Vesterbro and Nørrebro.
The creation of bike lanes and the enhancement of pedestrian infrastructure have attracted high-income investors and residents, resulting in rising property prices. In these contexts, soft mobility has improved the quality of life while simultaneously accelerating social exclusion processes for the most vulnerable populations. Within urban regeneration processes, tools for monitoring social and economic changes in neighborhoods could serve as a basis for developing social and housing policies aimed at preventing exclusion, particularly for low-income individuals and immigrant communities.
Increasing walking also has wide-ranging benefits for the public. It creates a safer and more convenient urban environment, with less car traffic, congestion and potentially fewer accidents. It can also improve air quality (through less driving) and improve health through more active lifestyles; together, these improve public health and reduce health costs. Invest in cycle-pedestrian infrastructure can also save public investments and reduce urban negative externalities, such as pollution, noise, traffic congestion, heat island effects, etc.
Therefore, to address the complexity of the recent urban mobility issues, a kaleidoscopic set of actions and policies is required, when related to spatial challenges in diversified urban contexts. While great public spaces may be formal or informal, grandiose in scale or subdued and relaxed, they all share similar qualities that give people a reason to linger, and return. Biking places are more compact, dense with mixed uses.
Streets have to be well connected with more shade from sun and rain, green spaces, trees and public spaces. And we must pay more attention to the quality of public spaces, not just providing quantity of walkable space. In the framework of the studies developed for Bicycle infrascape research project the relationship between green infrastructure, urban well-being, ecosystem service provision and public space re-design have been recognized as an influential field of investigation for spatial planning.
The public debate on these topics is supported by extensive literature where the dialectical models of the ecological city, the inclusive city and the car-free city find new convergence and a common interpretation of green infrastructures as a strategic urban and landscape design tool for the open space valorisation.

References

Anguelovski, I., Baró, F., Cole, H., Argüelles, L. & Connolly, J. (2018). *Green Trajectories. Municipal policy trends and strategies for greening in Europe, Canada and United States (1990-2016)*. ERC Project 'GreenLULU' report. BCN Lab on Urban Environmental Justice and Sustainability. Bonn: ICLEI

Artmann, M., Kohler, M., Meinel, G., Gan, J., & Ioja, C. (2017). How smart growth and green infrastructure can mutually support each other – A conceptual framework for compact and green cities. *Ecological Indicators, 96*, 10–22. https://doi.org/10.1016/j.ecolind.2017.07.001

Austin, G. (2014). *Green Infrastructure for Landscape Planning, Integrating human and natural systems*. London-New York: Routledge.

Band, L., Cadenasso, M., Grimmond, C. & Pickett, S. (2005). Heterogeneity in urban ecosystems: patterns and process. In G. Lovett, K. Weathers (Eds) *Ecosystem function in heterogeneous landscapes*. Berlin: Springer, pp. 257-278

Barron, P. & Mariani, M. (2013). *Terrain Vague: Interstices at the Edge of the Pale*. London-New York: Routledge.

Beatley, T. (2012). *Green Urbanism: Learning from European Cities*. Washington D.C.: Island Press.

Bell, S. (2012). *Landscape Pattern, Perception and Process*. Oxon: Routledge

Benedict, M. & MacMahon, E. (2006). *Green Infrastructure: Linking Landscapes and Communities* Washington D.C.: Island Press.

Berger, A. (2007). *Drosscape: wasting land in urban America*, New York: Princeton Architectural Press

Berkes, F. & Folke, C. (1998). *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*. Cambridge: Cambridge University Press

Berkes, F. (2007). Understanding Uncertainty and Reducing Vulnerability: Lessons from Resilience Thinking. N*atural Hazards, 41*, 283–295. https://doi.org/10.1007/s11069-006-9036-7

BfN – Bundesamt für Naturschutz (2017). Urban green infrastructure Basis for attractive and sustainable cities. Notes for municipal practice. Retrieved from: https://www.bfn.de/suche?k=englisch

Bøje-Kovács, B., Eriksson, A., Stenfeldt, L. & Thestrup, S. (2023). Applying data for urban neighborhood development, *BUILD Rapport, 4.* Aalborg: Aalborg Uni Press. Retrieved from: https://vbn.aau.dk/ws/portalfiles/portal/554025959/ Applying_data_for_urban_neighborhood_development.pdf

Brady, A., Brake, D. & Starks, C. (2001). The Green Infrastructure Guide Planning for a Healthy Urban and Community Forest, Princeton: The Regional Planning Partnership, Retrieved from: http://plansmartnj.dreamhosters.com/wp-content/uploads/2011/10/GIG.pdf

British Design Council. (2013). Green Infrastructure: An integrated approach to land use-Position Statement, London: Landscape Institute. Retrieved from: https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2016/03/Green-Infrastructure_an-integrated-approach-to-land-use.pdf

Cawrse, A., Chrisco, Z. & Clauson, C. (2020). Xuhui Runway Park. *Sasaki. Landzine.* Retrieved from: https:// landezine-award.com/xuhui-runway-park-2/

Chen, Y. (2016). Regenerating Urban Waterfronts in China. The Rebirth of the Shanghai Bund, *Waterfronts Revisited*, Routledge: London.

Ciorra, P. & Marini, S. (2011). *Re-cycle Strategie per l'architettura, la città e il pianeta*. Cataloghi MAXXI. Milano: Mondadori Electa

Clèment, G. (2005). *Manifesto del Terzo Paesaggio*. Macerata: Quodlibet

Clemente, A. A. (2022). The cycle network: a latent environmental infrastructure. *Tema. Journal of Land Use, Mobility and Environment,* 213-226. http://dx.doi.org/10.6092/1970-9870/8584

Cobe (2008). Resilient city - the Copenhagen way*. Cobe.* Retrieved from: https://www.cobe.dk/projects/nordhavn

Cobe (2021). A creative, livable city district *Cobe.* Retrieved from: https://cobe.dk/idea/jernbanebyen

Cobe (2023). Jernbanebyen, Copenhagen. *AV Proyectos, 115*, 18-19. Madrid: Arquitectura Viva

Costa, J., Figueira de Sousa, J. & Silva, M. (2014). Climate Change adaptation and urbanism: A developing agenda for Lisbon within the twenty-first century. *Urban Design International*, *19*, 77-91. https://doi.org/10.1057/udi.2013.15

D'Amico, A. (2023). Urban spaces and pedestrian mobility: the role of urban design for enhancing walkability. *TeMA - Journal of Land Use, Mobility and Environment*, 16 (3), 639-644. https://doi.org/10.6093/1970-9870/10327

Deichmann, J. (2008) *Nordhavn: blueprint for a 5-minute city*. *Ramboll.* Retrieved from: https://www.ramboll.com/ projects/real-estate/nordhavn-blueprint-for-a-5-minute-city

Díaz Orueta, F. (2015). Megaproyectos urbanos y modelo de ciudad. El ejemplo de Madrid Río. *Cuaderno urbano Espacio, Cultura, Sociedad, 19*, 179-200. Corrientes: Universidad Nacional del Nordeste

Dimendberg, E. (2013). *Diller Scofidio+Renfro: Architecture after Images*. New York: Monacelli Press

Dondi, G., Simonea, A., Lantieria, C. & Vignalia V. (2011). Bike lane design: the context sensitive approach, *Procedia Engineering*, *21*, 897-906. Elsevier: Amsterdam. https://doi.org/10.1016/j.proeng.2011.11.2092

Donnellan, C. (2022). *The Complex City: Social and Built Approaches and Methods*, pp. 37-47, Vernon Press: Wilmington

Dorato, E. (2020). *Preventive Urbanism. The Role of Health in Designing Active Cities*. Macerata: Quodlibet

Duhl, L. (2005). Healthy Cities and the Built Environment. *Built Environment*, *31*, 356-361.

Duisbur Kontor (2018). *Landschafts Park*. Retrieved from: https://www. landschaftspark.de/en/

Edwards, P. & Tsouros, A. (2008). A healthy city is an active city: a physical activity planning guide. World Health Organization. Regional Office for Europe. https://iris.who.int/handle/10665/341088

EEA., (2011). Green infrastructure and territorial cohesion: The concept of green infrastructure and its integration into policies using monitoring systems. Copenhagen: European Environment Agency. Retrieved from: http://www.eea.europa.eu/publications/green-infrastructureandterritorial-cohesion/at_download/file

EU Commission (2013). Green Infrastructure (GI) – Enhancing Europe's Natural Capital, COM/2013/0249 final. Retrieved from: https://environment.ec.europa.eu/topics/nature-and-biodiversity/green-infrastructure_en

FIDI (2021). *Climate Resilience Masterplan*. Retrieved from: https://fidiseaportclimate.nyc

Fink, H.S. (2016). Human-Nature for climate action: nature-based solutions for urban sustainability. *Sustainability*, *8*, 254-258 https://doi.org/10.3390/su8030254

Franco, S. (2023). Circular economy in urban areas: evidence from global cities. *TeMA - Journal of Land Use, Mobility and Environment*, *16* (1), 239-243. http://dx.doi.org/10.6093/1970-9870/9821

Frantzeskaki, N., Broto, V., Coenen, L.& Loorbach, D. (2017). *Urban Sustainability Transitons*. New York: Routledge

Galan, J., 2015. Landscape in Green Infrastructures & Interscalar Planning. Aalto, Finland: Aalto University. Retrieved from: https://aaltodoc.aalto.fi/handle/123456789/17239

Gargiulo, C. & Sgambati, S. (2022). Active mobility in historical districts: towards an accessible and competitive city. The case study of Pizzofalcone in Naples. *TeMA - Journal of Land Use, Mobility and Environment*, 31-55. http://dx.doi.org/10.6092/1970-9870/8395

Garrido Colmenero, G. (2017). Madrid Río, o el retorno de la urbe a la geografía del Manzanares, *Revista PH, 91*, 100-117. Sevilla: Instituto Andaluz del Patrimonio Histórico

Gasparrini, C. & Terracciano, A. (2017). *Dross City. Metabolismo urbano e progetto di riciclo dei drosscape*. Trento-Barcelona: ListLab

Gausa, M. (2009). *Multi-Barcelona, Hiper- Catalunya. Estrategias para una nueva Geo-Urbanidad*. Trento-Barcelona: ListLab

Gausa, M. (2012). Re-naturalizing the Multi-City. In M. Ricci (ed.) *New Paradigms*, 50-58, Trento-Barcelona: ListLab

Gausa, M. (2020). *Resili(g)ence, Intelligent Cities, Resilient Landscapes*. New York-Barcelona: Actar Publishers.

Haase, D., Pauleit, S. & Randrup, T. B. (2020). Urban open spaces and the urban matrix: elements, form and functions. In M. Jansson, & T. B. Randrup, Urban Open Space Governance and Management (pp. 30-50). Oxon: Routledge.

Hansen, R., Rall, E., Chapman, E., Rolf, W., & Pauleit, S., 2017. Urban Green Infrastructure Planning: A Guide for Practitioners. Green Surge. Retrieved from: https://www.e-pages.dk/ku/1340/html5/

Hilbers, A.M. (2024). *Citizens' values and tough trade-off choices in road infrastructure planning: developing context-sensitive road infrastructure design*. Doctoral Thesis. Groningen: Groningen Uni Press: Groningen https://doi.org/10.33612/diss.993565737

Holling, C., Gunderson, L. & Lance, H. (2002). Resilience and Adaptive Cycles. In L. Gunderson & C. Holling (Eds.) *Panarchy: understanding transformations in human and natural systems*, 25-62, Washington D.C.: Island Press.

Hsueh, M & Zhang, D. (2019). High-quality urban environment out of "slow design": review and prospect of urban design pactices in China, *Land scape Architecture Frontiers, 7* (6). Beijing: Higher Education Press. https://doi.org/10.15302/j-laf-1-030008

Ingels, B., Siegel, J., David, S., Visconti, A. & Lu, N. (2017). Resilient flood protection infrastructure: the East Side Coastal Resiliency Project of New York City, *Landscape Architecture Frontiers, 5* (6) Beijing: Higher Education Press. https://doi.org/10.15302/J-LAF-20170611

Justesen, R. (2016). Nordhavnen – a city district at the water*, Portus Plus, 32*, Venice: Rete Publisher

Kraus, S. & Koch, N. (2020). Effect of pop-up bike lanes on cycling in European cities. *Active Transportation. Eco-counter*. Retrieved from: https://www.eco-counter.com/ressources/data-prove-it-pop-up-bike-lanes-increase-cycling/

Laaly, S., Jeihani, M., & Lee, Y.J. (2017). A Multiscale, Transit-Oriented Development Definition Based on Context-Sensitive Paradigm. *Transportation Research Record*, *2671*(1), 31-39. https://doi.org/10.3141/2671-04

Lahoorpoor, B., Wu, H., Rayaprolu, H. & Levinson, D. (2022). Prioritizing active transport network investment using locational accessibility. *TeMA - Journal of Land Use, Mobility and Environment,* 15 (2), 179-192. https://doi.org/10.6093/1970-9870/9174

Latz, P. (2017). *Rust Red: The Landscape Park Duisburg Nord*. Munich: Hirmer Publisher

Latz, P. (2022). Constructing the landscape: the erosion of time. In L. Latini & S. Zanon (Eds.). Soil as a Landscape – Nature, crossings and immersions, new topographies, 92-105. Treviso: Fondazione Benetton Studi Ricerche

Lazzarini, L., Mahmoud, I.H. & Pastore, M.C. (2024). Urban Planning for Biodiversity. *TeMA - Journal of Land Use, Mobility and Environment*, SI 1 (2024), 45-60. http://dx.doi.org/10.6093/1970-9870/10197

Lennon, M. & Scott, M. (2014). Delivering ecosystems services via spatial planning: Reviewing the possibilities and implications of a green infrastructure approach. *The Town Planning Review, 85* (5), 563-587. https://doi.org/10.3828/tpr.2014.35

Lennon, M. (2014). Green infrastructure and planning policy: a critical assessment. Local Environment: *The International Journal of Justice and Sustainability, 20*(8), 957-980. https://doi.org/10.1080/13549839.2014.880411

MEA – Millennium Ecosystem Assessment (2005) *Ecosystems and Human Well-being – Current State and Trends*. Retrieved from millenniumassessment.org/en/Condition.html#download

Mell, I. C. (2017). Green infrastructure: reflections on past, present and future praxis. *Landscape Research*, *42* (2), 135–145. https://doi.org/10.1080/01426397.2016.1250875

Mell, I.C. (2010). *Green infrastructure: concepts, perceptions and its use in spatial planning*. PhD Thesis School of Architecture, Planning and Landscape. Newcastle Uni Press. Retrieved from: https://theses.ncl.ac.uk/jspui/handle/10443/914

Moore, J. (2011). Transcending the metabolic rift: a theory of crises in the capitalist world-ecology. *The Journal of Peasant Studies*, *38*. London: Taylor&Francis

Mouzon, S.A. (2010). *The Original Green: Unlocking the Mystery of True Sustainability*. Miami: New Urban Guild Foundation

Natural England. (2009). *Green Infrastructure Guidance* (NE176). Retrieved from: http://publications.naturalengland.org.uk/publication/35033?category=49002

Naumann, S., McKenna, D., Kaphengst, T., Pieterse, M., & Rayment, M. (2011). Design, implementation and cost elements of Green Infrastructure projects. Final report to the European Commission, DG Environment, Contract no. 070307/2010/577182/ETU/F.1, Ecologic institute and GHK Consulting, Retrieved from: https://www.fondazionesvilupposostenibile.org/f/sharing/GI_Design,%20implementation_cost%20elements%20of%20Green%20Infrastructure%20projects.pdf

Nicklin, A. & Ryan M. (2018). The Bentway project. *Public Work*. Retrieved from: https://publicwork.ca/projects/the-bentway

NYC (2020). *The East Side Coastal Resiliency Project.* Retrieved from: https://www.nyc.gov/site/escr/index.page

Oguz, S. & Tanyas, M. (2024). Technological applications in sustainable urban logistics: a systematic review with bibliometric analysis *TeMA - Journal of Land Use, Mobility and Environment*, 17 (3), 487-502. http://dx.doi.org/10.6093/1970-9870/10844

Perini, K. (2016). *MadridRío,Spain – Strategies and Techniques*. In K. Perini, P. Sabbion (Eds.). Urban Sustainability and River Restoration: Green and Blue Infrastructure. Hoboken: John Wiley & Sons

Pinto, F. & Fossati, A. (2020). "Itinerario Cicloturistico Adda". A route between a variety of territories, landscapes and identities. *Tema. Journal of Land Use, Mobility and Environment, 13* (1), 81-97. http://dx.doi.org/10.6092/1970-9870/6608

Pultrone, G. (2023). TransformActive Cities facing the ecological transition. Cha(lle)nges, practices and scenarios in the EU Panorama. *TeMA - Journal of Land Use, Mobility and Environment*, SI 1(2024), 79-96. http://dx.doi.org/10.6093/1970-9870/10210

Ricci, M. (2012). *New Paradigms*. Babel International. Trento-Barcelona: ListLab

Schäffler, A. & Swilling, M. (2013). Valuing green infrastructure in an urban environment under pressure. The Johannesburg case. *Ecological Economics, 86*, 246-257. https://doi.org/10.1016/j.ecolecon.2012.05.008

Septiandiani, F. & Raharjo, W. (2018). Delivering smart city system through experimental smart building concept. Design case of Nordhavn Community Centre. *IOP conference proceedings. Earth and environmental science*, *158* (1), 12047, Bristol: IOP Publishing. https://doi.org/10.1088/1755-1315/158/1/012047

Stamatiadis, N. & Hartman, D. (2011). Context-Sensitive Solutions versus Practical Solutions: What Are the Differences? *Transportation Research Record*, *2262* (1), 173-180. https://doi.org/10.3141/2262-17

Stilgenbauer, J. (2005). Landschaftspark Duisburg Nord - Duisburg, Germany, *Places, 17* (3), San Francisco: Place Journal. Retrieved from: https://placesjournal.org/assets/legacy/pdfs/landschaftspark-duisburg-nord.pdf

Swyngedouw, E., Heynen, N. & Kaika, M. (2005). *In the Nature of Cities: Urban Political Ecology and the Politics of Urban Metabolism*, New York: Routledge

West 8 (2011) *Madrid Río.* Retrieved from: https://www.west8.com/projects/madrid-rio/

World Architecture Festival (2020) *Xuhui Runway Park.* Retrieved from: https://www.worldbuildingsdirectory.com/entries/xuhui-runway-park/

Wright, H. (2011). Understanding green infrastructure: The development of a contested concept in England. *Local Environment*, *16* (10), 1003–1019. https://doi.org/10.1080/13549839.2011.631993.

Ying, J., Zhang, X., Zhang, Y. & Svitlana, B. (2022). Green infrastructure: systematic literature review, *Economic Research-Ekonomska Istraživanja*, *35* (1), 343-366. https://doi.org/10.1080/1331677X.2021.1893202

Image Sources

Fig.1: R-Urban strategy in Colombes, Paris _ Programme Life+ AAA, 2010-12, CC BY-NC-ND 2.0 FR.

Fig.2: Jardins de la rambla de Sants 5, RdA Suisse, 2022, CC-BY-2.0, Retrieved from: https://bit.ly/3CswrTz

Fig.3: Rotterdam Rooftop Walk, harry_nl, 2022, CC BY-NC-SA-2.0, Retrieved from: https://bit.ly/4hJyR0x

Fig.4: BIG, 2013.

Fig.5: Insaw P., 2020.

Fig.6: Oberhäuser R., 2018.

Fig.7: Musch J., 2011.

Fig.8: Hjortshøj R., 2008.

Fig.9: Cobe, 2021.

Fig.10: Lehoux N., 2018.

Author's profile

Chiara Centanaro

Architect, PhD, Research Fellow of Urban Design and Landscape Planning at University of Genoa UNIGE-DAD since 2023 and member of UniGE GIC-Lab research group. She is part of the UniGe-DAD research group of NRRP founded project RAISE 'Robotics and AI for Socio-economic Empowerment' - Innovation Ecosystem. Her research activity and interests focus on the relationship between the use of media technologies in urban design through participatory co-design processes, crowd-sourced mapping tools and urban resilience. Her investigation concerns public space and architecture in a multi-scalar dimension in a transdisciplinary approach. In 2024, she participated as a speaker at the 14th Biennale of European towns and town planners. She will be holder of a RAISE Digital Citizenship Training Course - free, online and interactive – in UNIGE on mapping with media tools, from remote sensing to crowd-sourced maps and AI tools.

Emanuele Sommariva

Architect, PhD, Associate Professor of Urban Design and Landscape Planning at University of Genoa UNIGE-DAD since 2020 and member of UniGE GIC-Lab research group. He has been University Researcher at the Faculty of Architecture and Landscape Sciences, LUH Hannover from 2012-2020. Visiting scholar TU München (2011) and Universiteit Antwerpen (2018) and Institute for Advanced Architecture of Catalonia (2020-2021). His research activity and interests focus on urban recycle and active mobility, urban metabolism and resilience, urban-rural strategies, urban coastal regions, public space and landscape infrastructures.