Article Type: Original Research

Integrated Blue–Green Infrastructure Matrix: From Regional to Urban Scale

Ebrahim Zargari-Marandi
Director of The Department of Urban and Regional plans, Urban Planning & Architecture Research Center of Iran [UARC].

Received: 15.03.2025
Acceptance: 16.03.2025
Autumn 2024, Vol 1, Issue 2, Pages (73-82)

Abstract

In the face of urban expansion, climate change, and environmental degradation, Blue-Green Infrastructure (BGI) emerges as an innovative urban and regional planning and ecological management concept. BGI integrates natural and semi-natural water management solutions, promoting sustainable urban water cycles, environmental preservation, climate adaptation, and resilience enhancement. This article examines BGI through a dual lens—regional and urban scales—highlighting their distinct roles, challenges, and synergies in sustainable spatial development. Key challenges include balancing ecological connectivity with human needs, addressing environmental justice concerns, and refining economic valuation methods to recognize ecosystem services costs and benefits. The article advocates for integrated approaches that bridge spatial scales, leveraging technological innovations, and participatory planning to enhance adaptive governance. Future research must prioritize interdisciplinary collaboration, standardized performance metrics, and context-specific strategies, particularly in water-limited and rapidly urbanizing regions.

Keywords: Blue-Green Infrastructure, Spatial Scale, Regional Planning, Urban Planning and Design.

1- Introduction

Blue–green infrastructure (BGI) has emerged as an integrative concept in environmental planning and urban design, aiming to merge ecological functionality with urban and regional resilience (McNabb, et al., 2024; Ahern, 2013; Benedict & McMahon, 2002; Tzoulas et al., 2007). At its core, BGI refers to the deliberate planning and management of water (blue) and vegetation (green) networks and assets to provide ecosystem services, enhance biodiversity, and mitigate the adverse effects of urbanization and spatial development (Benedict & McMahon, 2006). While the literature covers both regional and urban scales, each context presents unique challenges and opportunities in terms of planning, governance, and multifunctionality (Molné, et al., 2023; Kabisch & Haase, 2014).

BGI is an evolution of traditional grey infrastructure, shifting from hard-engineered solutions toward nature-based systems (Fletcher, 2023; Alves, et al., 2023). Blue infrastructure includes water bodies (rivers, lakes, ponds, wetlands), while green infrastructure encompasses vegetated areas (parks, green roofs and walls, regional and urban forests). Together, they provide ecosystem services such as stormwater management, cooling, and habitat restoration (Lovell & Taylor, 2013). The development of BGI is grounded in three main theoretical frameworks:

* Corresponding Author Email Address: ezargarimarandi@ut.ac.ir

- Ecosystem Services Approach: Emphasizes the benefits ecosystems provide to urban areas (Costanza, 2020; Veerkamp, et al., 2021; Jim & Chen, 2009).
- Resilience Theory: Focuses on adaptive capacities and multifunctionality and mitigation of climate change effects in urban systems (Meerow & Newell, 2017; Perrelet, et al., 2024).
- Nature-Based Solutions (NbS): Highlights the role of natural processes in urban sustainability (Pinto, et al., 2023; Depietri & McPhearson, 2017).

The concept of blue–green infrastructure has evolved to encapsulate a network of natural and semi-natural spaces and networks, including rivers, wetlands, parks, and urban forests, which collectively contribute to climate adaptation, flood management, and public health (Tzoulas et al., 2007; Bolund & Hunhammar, 1999). At the regional level, BGI is characterized by extensive ecological networks that cross administrative boundaries and support long-distance species migration and water quality regulation (Molné, et al., 2023; Benedict & McMahon, 2002; Molné, et al., 2023). In contrast, urban BGI typically focuses on localized interventions within the urban fabric—such as green roofs, urban parks, and permeable pavements—that aim to improve environmental quality and human well being (Kabisch & Haase, 2014; Wolch et al., 2014).

Researchers have developed various conceptual frameworks to understand BGI. Some scholars emphasize multifunctionality and ecosystem service provision as central to the design of BGI (Hansen & Pauleit, 2014; Gómez-Baggethun & Barton, 2013), while others focus on the spatial connectivity of habitats and the integration of water-sensitive urban design (Gill et al., 2007; Morrison, 2025). Moreover, the evolution of urban ecological theory has influenced how planners view the role of BGI in mitigating urban heat islands, improving air quality, and enhancing urban biodiversity (Beatley, 2011; McPhearson et al., 2016).

2- Regional and Urban BGI

2-1- Scale and Spatial Configuration

BGI planning differs significantly at the regional and urban levels. Regional BGI strategies often focus on watershed management, large-scale ecological networks, and rural-urban interactions (Ahern, 2013). Urban BGI, by contrast, prioritizes compact, site-specific solutions such as bioswales, rain gardens, and green roofs (Kabisch et al., 2016).

At the regional scale, BGI is generally understood as a large-scale landscape-level approach that incorporates ecological corridors, riparian buffers, and watershed management strategies (Benedict & McMahon, 2002; Lafortezza et al., 2013). These networks facilitate not only the mobility and movement of species (Berkes et al., 2000) but also the flow of water across diverse ecosystems, thereby supporting hydrological processes and long-term ecological resilience (Seto et al., 2012).

Table 1- Dimensions of Regional and Urban BGIs

Dimension	Regional BGI	Urban BGI
Spatial Scale	Large-scale networks (watersheds and river basins)	Site-based: city-wide and neighborhood level
Governance	Multi-jurisdictional collaboration frameworks	Municipal-level planning; Neighborhood Level design
Functionality	Flood control, biodiversity conservation, filtration, aquifer recharge, Afforestation, and ecological restoration	Heat mitigation, runoff attenuation and stormwater absorption, filtration, green space development, recreation, and aesthetics
Infrastructure Type	Riparian buffers, large lakes and wetlands, river valley restoration facilities, etc.	Green roofs and walls, inner-city river valleys, small wetlands, pocket parks, sponge city and permeable pavements, bioswales, etc.

(Author)

In urban settings, spatial constraints and heterogeneous land uses necessitate a more fragmented, yet highly integrated, approach to BGI (Kabisch & Haase, 2014; Hanna & Comín, 2021). Urban BGI often exists in a patchwork pattern where green spaces are interspersed with built infrastructure, requiring innovative designs to ensure connectivity and multifunctionality (Tzoulas et al., 2007; Lafortezza et al., 2013).

2-2- Governance and Planning Challenges

Regional BGI projects typically involve multi level governance structures that span local, regional, and national jurisdictions (European Commission, 2013; European Environment Agency, 2020). This complexity can lead to coordination challenges, yet it also offers opportunities for integrated planning across larger geographic areas (Newman & Kenworthy, 1999; Hansen, et al., 2017). Conversely, urban BGI planning is often constrained by higher population densities, competing land uses, and limited space, which can complicate stakeholder negotiations and policy implementation (Wolch et al., 2014; Nilon et al., 2017).

2-3- Economic and Social Dimensions

Economic analyses in the literature emphasize that BGI provides significant returns in the form of ecosystem services, such as reduced flood risk, enhanced property values, and improved public health (Jim & Chen, 2009; Gómez-Baggethun & Barton, 2013). Urban BGI has been linked to social benefits, including improved mental health and community cohesion, yet it can also raise concerns about gentrification and environmental justice (Wolch et al., 2014; Kabisch & Haase, 2014). At the regional level, investment in BGI often translates into broader economic benefits, such as tourism enhancement and agricultural productivity, and less irrigation costs for green spaces which underscore the need for coordinated funding mechanisms (Benedict & McMahon, 2006; Kabisch, et al., 2016).

2-4- Environmental Performance and Ecosystem Services

Environmental benefits of BGI are widely recognized across scales. Urban studies have shown that BGI can mitigate urban heat islands, improve stormwater management, and enhance local biodiversity (Beatley, 2011; Hanna & Comín, 2021). In regional contexts, the emphasis is on maintaining ecosystem integrity and connectivity to support large-scale biodiversity and resilient hydrological systems (Molné, et al., 2023; Benedict & McMahon, 2006). Moreover, the integration of blue and green components has been found to create synergistic benefits that exceed the sum of individual functions, reinforcing the importance of holistic planning (Gill et al., 2007; Ferreira, et al., 2024).

3- From Fragmentated Ecological Networks to Integrated Blue–Green Infrastructure Matrix

The growing body of literature scores the potential of blue–green infrastructure to transform regional and urban landscapes into resilient, multifunctional ecosystems. Through an analytical lens, while regional and urban BGI each present unique advantages and challenges, their integration is vital for addressing the hydrological, ecological, socio-economic, and governance issues inherent in water-limited settings.

Continued interdisciplinary research and adaptive policymaking are essential to refine these approaches and ensure that BGI can effectively support sustainable regional and urban development.

3-1- Ecological Connectivity and Biodiversity

The preservation of biodiversity is a cornerstone of BGI. Regional BGI, with its expansive networks, facilitates ecological corridors and supports species migration (Berkes et al., 2000; Lafortezza et al., 2013). Urban BGI, while more constrained, plays a critical role in maintaining habitat patches that can serve as refugia for urban-adapted species (Kabisch & Haase, 2014; McPhearson et al., 2016). The literature calls for improved metrics to assess connectivity and to guide the design of BGI networks that balance ecological and human needs (Gómez-Baggethun & Barton, 2013; Hanna & Comín, 2021).

Urban and regional green spaces provide critical habitats, foster biodiversity, and enhance ecological resilience, even in water-limited environments (Tzoulas et al., 2007; Elmqvist et al., 2015). While urban BGI often creates isolated “green islands” within built-up areas, regional networks can sustain larger populations of native flora and fauna (Gómez-Baggethun & Barton, 2013). Moreover, integrating native, drought-resistant species is essential for maintaining ecological balance and ensuring long-term sustainability.

The design and functional performance of BGI in arid contexts have attracted significant scholarly attention. It can be noted that traditional green infrastructure strategies require modification when applied to drylands due to differences in vegetation physiology, water availability, and soil characteristics (Boussema, et al., 2022; Vázquez-Rodríguez, et al., 2024). For example, water-sensitive urban design in arid cities areas incorporate drought-tolerant species and xeriscaping (Yang & Wang, 2017), innovative water harvesting techniques, and adaptive management practices. BGIs can offer rapid benefits in terms of microclimate regulation and stormwater management. Conversely, regional BGI projects—though more complex in their governance and implementation—have the capacity to restore degraded landscapes and re-establish critical ecological corridors (Monteiro, et al., 2022).

3-2- Water Management and Climate Resilience

Water-sensitive planning and design is a recurring theme in both regional and urban BGI studies. On a regional scale, managing floodplains and ensuring sustainable water flows are critical, especially under changing climate conditions (Seto et al., 2012). Urban settings, meanwhile, have focused on innovative solutions such as green roofs, permeable pavements, and constructed wetlands to manage stormwater (Mosrrison, 2025; Kimic & Ostrysz, 2021). These interventions not only reduce the risk of urban flooding but also enhance groundwater recharge and improve water quality (Ferreira, et al., 2024).

In arid regions, the hydrological function of BGI is paramount. Water scarcity necessitates innovative solutions for stormwater capture, groundwater recharge, and flood mitigation (Chakraborty, et al., 2025). Researchers emphasize the need for designs that integrate permeable surfaces and bio-retention systems capable of handling intense, short-duration precipitation events (Voskamp & Van de Ven, 2015; Pötz, et al., 2012). Furthermore, we can highlight the role of BGI in complementing traditional grey infrastructure, thus enhancing overall urban water security.

3-3- Social Equity and Public Health

The social dimensions of BGI are multifaceted. Urban blue–green spaces have been linked to improved mental and physical health outcomes, increased social cohesion, and enhanced recreational opportunities (Tate, et al., 2024, Wolch et al., 2014; Tzoulas et al., 2007). However, issues of social equity arise when access to these benefits is unevenly distributed across socioeconomic groups (Kabisch & Haase, 2014; Nilon et al., 2017). Regional approaches, while less directly focused on individual well-being, can indirectly improve livelihoods through enhanced ecosystem services and sustainable resource management (Newman & Kenworthy, 1999).

3-4- Policy Integration and Multi-Level Governance

Effective implementation of BGI requires integration across sectors and scales. Regional BGI often necessitates the alignment of policies across different administrative layers (European Commission, 2013; European Environment Agency, 2020). Urban BGI, in contrast, benefits from the potential for localized experimentation but must contend with fragmented urban governance structures (Wolch et al., 2014; Nilon et al., 2017). Scholars argue that successful BGI planning demands flexible frameworks that encourage collaboration among municipal agencies, community organizations, and private stakeholders (Hansen & Pauleit, 2014; Beatley, 2011).

3-5- Economic Valuation and Investment

The economic benefits of BGI—ranging from improved property values to reduced disaster recovery costs—are well documented (Jim & Chen, 2009; Gómez-Baggethun & Barton, 2013). Yet, there is still debate over the best methods for quantifying these benefits and integrating them into urban and regional planning (Benedict & McMahon, 2006; Kabisch, et al., 2016). Innovative financing mechanisms, such as public–private partnerships and ecosystem service payments, have been proposed as ways to bridge the funding gap for BGI projects (Newman & Kenworthy, 1999). Moreover, comparative economic analyses suggest that investments in regional BGI may yield broader benefits than those confined to urban areas, though both scales require tailored approaches (Hanna & Comín, 2021; Kimic & Ostrysz, 2021).

3-6- Technological and Design Innovations

The design of BGI is increasingly informed by advances in geographic information systems (GIS), remote sensing, ecological modeling, and sensor technologies [Real-time monitoring of water quality, stormwater flow, and soil moisture conditions] (Lafortezza, et al., 2013; Ferreira, et al., 2024). These technologies enable planners to map existing green and blue networks, identify gaps, and simulate potential impacts of various interventions (Gill et al., 2007; Mosrrison, 2025). Furthermore, case studies from cities around the globe illustrate how design innovations—ranging from multifunctional parks to adaptive water infrastructure—can enhance both urban livability and regional ecological integrity (Beatley, 2011; Hanna & Comín, 2021).

4- Future Directions and conclusion

The literature indicates that both regional and urban blue–green infrastructures are vital for sustainable development and climate adaptation, yet they operate under different constraints and offer diverse benefits (Benedict & McMahon, 2002; Molné, et al., 2023). Whereas regional approaches emphasize large-scale ecological connectivity and watershed management (Berkes et al., 2000; Lafortezza et al., 2013), urban interventions are geared toward immediate human benefits, such as improved health, social equity, and localized climate mitigation (Tzoulas et al., 2007; Wolch et al., 2014).

Despite their promise, several issues remain unresolved. The integration of governance across scales is a persistent challenge (European Commission, 2013; European Environment Agency, 2020), as is the development of standardized metrics for evaluating BGI performance (Gómez-Baggethun & Barton, 2013; Hanna & Comín, 2021). Furthermore, economic valuation methods need refinement to adequately capture the full spectrum of ecosystem services provided by blue–green networks (Jim & Chen, 2009; Benedict & McMahon, 2006). Addressing these gaps will require continued interdisciplinary research and policy innovation that bridges ecological theory with practical urban and regional planning (Newman & Kenworthy, 1999).

Future research should also examine the potential synergies between blue and green infrastructure in the context of rapidly urbanizing regions, with a focus on participatory planning approaches that empower local communities (Kabisch & Haase, 2014; Nilon et al., 2017). Advances in digital mapping and ecological simulation present promising avenues for integrating diverse data sources and informing adaptive management strategies (Lafortezza, et al., 2013; Kimic & Ostrysz, 2021). As cities and regions face the dual pressures of urban expansion and climate change, the role of BGI is likely to become ever more central to sustainable development strategies in spatial development (Gill et al., 2007; Ferreira, et al., 2024; Tate, et al., 2024).

This research has compared and analyzed regional and urban scales of blue–green infrastructures, highlighting how scale influences design, governance, and the provision of ecosystem services. While regional BGI emphasizes large-scale ecological connectivity and watershed management, urban BGI focuses on localized, multifunctional solutions that enhance quality of life and resilience. Critical issues remain in the areas of multi-level governance, economic valuation, and standardized performance metrics. Addressing these challenges through interdisciplinary research and innovative policy frameworks is essential for harnessing the full potential of blue–green infrastructure in both regional and urban contexts.

References

1. Abd-Elmabod, S.K., Gui, D., Liu, Q., Liu, Y., Al-Qthanin, R., Jiménez-González, M., & Jones, L. (2024). Seasonal Environmental Cooling benefits of urban green and blue spaces in arid regions. Sustainable Cities and Society, 115. 105805. 10.1016/j.scs.2024.105805.
2. Ahern, J. (2013). Urban landscape sustainability and resilience: The promise and challenges of integrating ecology with urban planning and design. Landscape Ecology, 28(6), 1203-1212.
3. Alves, A., Opstal, C., Keijzer, N., Sutton, N., & Chen, W. (2024). Planning the multifunctionality of nature-based solutions in urban spaces. Cities, 146. 104751. 10.1016/j.cities.2023.104751.
4. Beatley, T. (2011). Biophilic cities: Integrating nature into urban design and planning. Island Press.
5. Benedict, M. A., & McMahon, E. T. (2006). Green infrastructure: Linking landscapes and communities. Island Press.
6. Benedict, M. A., & McMahon, E. T. (2001). Green infrastructure: Smart conservation for the 21st century. Washington, DC: Sprawl Watch Clearinghouse Monograph Series.
7. Berkes, F., Colding, J. and Folke, C. (2000), Rediscovery of traditional ecological knowledge as adaptive management. Ecological Applications, 10: 1251-1262. https://doi.org/10.1890/1051-0761(2000)010[1251:ROTEKA]2.0.CO;2
8. Bolund, P., & Hunhammar, S. (1999). Ecosystem services in urban areas. Ecological Economics, 29(2), 293–301.
9. Boussema, S.B.F., Cohen, M., & Khebour Allouche, F. (2022). Green and blue infrastructure design in a semi-arid region. Frontiers in Environmental Science, 10, 1061256. doi: 10.3389/fenvs.2022.1061256
10. Chakraborty, S., Chatterjee, A., & Kumar, P. [eds.] (2025). Urban Water Ecosystems in Africa and Asia: Challenges and Opportunities for Conservation and Restoration. Routledge.
11. Costanza, R. (2020). Valuing natural capital and ecosystem services toward the goals of efficiency, fairness, and sustainability. Ecosystem Services, 43, 101096. 10.1016/j.ecoser.2020.101096.
12. Depietri, Y., & McPhearson, T. (2017). Integrating the Grey, Green, and Blue in Cities: Nature-Based Solutions for Climate Change Adaptation and Risk Reduction. In: Nadja Kubisch (Ed.), Nature-based Solutions to Climate Change in Urban Areas: Linkages Between

Science, Policy, and Practice, Springer.
13. Elmqvist, T., et al. [eds.] (2015). Urbanization, Biodiversity and Ecosystem Services: Challenges and Opportunities: A Global Assessment. Springer.
14. European Commission. (2013). The EU green infrastructure strategy. European Commission Publications.
15. European Environment Agency [European Commission: Joint Research Centre, Maes, J., et al.]. (2020). Mapping and assessment of ecosystems and their services in Europe. EEA Report, Publications Office of the European Union.
16. Ferreira, J. C., Costa dos Santos, D., & Campos, L. (2024). Blue-green infrastructure in view of Integrated Urban Water Management: A novel assessment of an effectiveness index. Water Research. 257. 121658. 10.1016/j.watres.2024.121658.
17. Fletcher, M. (2023). Back to the future: A personal perspective on water and climate change. Cambridge Prisms: Water, 1, e17, 1–8. https://doi.org/10.1017/wat.2023.11
18. Gill, S. E., Handley, J. F., Ennos, A. R., & Pauleit, S. (2007). Adapting cities for climate change: The role of green infrastructure. Built Environment, 33(1), 115–133.
19. Gómez-Baggethun, E., & Barton, D. N. (2013). Classifying and valuing ecosystem services for urban planning. Ecological Economics, 86, 235–245.
20. Haase, D., Frantzeskaki, N. & Elmqvist, T. (2014). Ecosystem Services in Urban Landscapes: Practical Applications and Governance Implications. AMBIO, 43(4). 10.1007/s13280-014-0503-1.
21. Hanna, E., & Comín, F. A. (2021). Urban Green Infrastructure and Sustainable Development: A Review. Sustainability, 13(20), 11498. https://doi.org/10.3390/su132011498
22. Hansen, R., & Pauleit, S. (2014). From multifunctionality to multiple ecosystem services? A conceptual framework for multifunctionality in green infrastructure planning for urban areas. Ambio, 43(4), 516–529.
23. Hansen, R., Rall, E., Chapman, E., Rolf, W., Pauleit, S. (eds., 2017). Urban Green Infrastructure Planning: A Guide for Practitioners. GREEN SURGE. Retrieved from: http://greensurge.eu/working-packages/wp5/
24. Jim, C. Y., & Chen, W. Y. (2009). Ecosystem services and valuation of urban forests in China. Cities, 26, 187–194. 10.1016/j.cities.2009.03.003.
25. Kabisch, N., & Haase, D. (2014). Green justice or just green? Provision of urban green spaces in Berlin, Germany. Landscape and Urban Planning, 122, 129–139.
26. Kabisch, N., Frantzeskaki, N., Pauleit, S., Naumann, S., Davis, M., Artmann, M., Haase, D., Knapp, S., Korn, H., Stadler, J., Zaunberger, K., & Bonn, A. (2016). Nature-based solutions to climate change mitigation and adaptation in urban areas: Perspectives on indicators, knowledge gaps, barriers, and opportunities for action. Ecology and Society 21(2):39.
27. Kimic, K., & Ostrysz, K. (2021). Assessment of Blue and Green Infrastructure Solutions in Shaping

Urban Public Spaces—Spatial and Functional, Environmental, and Social Aspects. Sustainability, 13(19), 11041. https://doi.org/10.3390/su131911041

28. Lafortezza, R., Davies, C., Sanesi, G. & Konijnendijk, C. (2013). Green Infrastructure as a tool to support spatial planning in European urban regions. iForest - Biogeosciences and Forestry. 6. 10.3832/ifor0723-006.
29. Lovell, S. & Taylor, J. (2013). Supplying urban ecosystem services through multifunctional green infrastructure in the United States. Landscape Ecology, 28, 1447-1463. 10.1007/s10980-013-9912-y.
30. McNabb, T., Charters, F.J., Challies, E., & Dionisio, R. (2024). Unlocking urban blue-green infrastructure: an interdisciplinary literature review analysing co-benefits and synergies between bio-physical and socio-cultural outcomes. Blue-Green Systems, 6 (2), 217–231. doi: https://doi.org/10.2166/bgs.2024.007
31. McPhearson, T., Pickett, S.T.A., Grimm, N., Niemelä, J., Alberti, M., Elmqvist, T., Weber, C., Haase, D., Breuste, J., Qureshi, S. (2016). Advancing urban ecology toward a science of cities. BioScience, 66(3), 198–212.
32. Meerow, S., & Newell, J.P. (2017). Spatial planning for multifunctional green infrastructure: Growing resilience in Detroit. Landscape and Urban Planning, 159, 62-75. 10.1016/j.landurbplan.2016.10.005.
33. Meerow, S., Natarajan, M., & Krantz, D. (2021). Green infrastructure performance in arid and semi-arid urban environments green infrastructure performance in arid and semi-arid urban environments. Urban Water Journal, 18. 10.1080/1573062X.2021.1877741.
34. Molné, F., Donati, G.F.A., Bolliger, J., Fischer, M., Maurer, M., & Bach, P.M. (2023). Supporting the planning of urban blue-green infrastructure for biodiversity: A multi-scale prioritisation framework. Journal of Environmental Management, 342: 118069. doi: 10.1016/j.jenvman.2023.118069.
35. Monteiro, C., Matos, C., Santos, C., & Briga Sá, A. (2022). Nature-based Solutions Contribution for Urban Resilience and Sustainability. Proceedings of ICEUBI2022: “International Congress on Engineering, Innovation and Sustainability PraxisAt: UBI, Covilhã.
36. Morrison, R. (2025). Urban Biodiversity: The Role of Blue-Green Infrastructure. construction21 International. https://www.construction21.org/articles/h/urban-biodiversity-the-role-of-blue-green-infrastructure.html
37. Newman, P., & Kenworthy, J. (1999). Sustainability and cities: Overcoming automobile dependence. Island Press.
38. Nilon, C., Aronson, M., Cilliers, S. & Dobbs, C., Frazee, L., Goddard, M., O'Neill, K., Roberts, D., Stander, E., Werner, P., Winter, M., & Yocom, K. (2017). Planning for the future of urban biodiversity: A global review of city-scale initiatives. BioScience, 67(8), 719–728.

39. Perrelet, K., Moretti, M., Dietzel, A. et al. (2024). Engineering blue-green infrastructure for and with biodiversity in cities. NPJ: Urban Sustainability, 4, 27. https://doi.org/10.1038/s42949-024-00163-y
40. Pinto, L., Inácio, M., & Pereira, P. (2023). Green and Blue Infrastructure (GBI) and Urban Nature-based Solutions (NbS) contribution to human and ecological wellbeing and health. Oxford Open Infrastructure and Health, ouad004. 10.1093/ooih/ouad004.
41. Pötz, H., Bleuzé, P., Sjauw En Wa, A., & van Baar, T. (2012). Urban green-blue grids for sustainable and dynamic cities. Delft: Coop for Life.
42. Seto, K. C., Güneralp, B., & Hutyra, L. R. (2012). Global forecasts of urban expansion to 2030 and direct impacts on biodiversity and carbon pools. Proceedings of the National Academy of Sciences, 109(40), 16083–16088.
43. Tate, C., Wang, R., Akaraci, S., Burns, C., Garcia, L., Clarke, M., Hunter, R. (2024). The contribution of urban green and blue spaces to the United Nation's Sustainable Development Goals: An evidence gap map. Cities, 145, 104706. https://doi.org/10.1016/j.cities.2023.104706.
44. Tzoulas, K., Korpela, K., Venn, S., Yli-Pelkonen, V., Kazmierczak, A., Niemelä, J., & James, P. (2007). Promoting ecosystem and human health in urban areas using green infrastructure: A literature review. Landscape and Urban Planning, 81(3), 167–178.
45. Vázquez-Rodríguez, G., Zuñiga Estrada, M. & Ortiz-Hernández, J. (2024). Blue and Green Infrastructure: History and Experiences in Mexico and the Arid and Semi-Arid Global South. In: Liliana Lizárraga-Mendiola, et al. (eds.), Sustainable Spaces in Arid and Semiarid Zones of Mexico (pp.69-89), Springer.
46. Veerkamp, C., Schipper, A., Hedlund, K., Lazarova, T., Nordin, A., & Hanson, H. (2021). A review of studies assessing ecosystem services provided by urban green and blue infrastructure. Ecosystem Services, 52, 101367. 10.1016/j.ecoser.2021.101367.
47. Voskamp, I., & Van de Ven, F. (2015). Planning support system for climate adaptation: Composing effective sets of blue-green measures to reduce urban vulnerability to extreme weather events. Building and Environment, 83, 159-167. 10.1016/j.buildenv.2014.07.018.
48. Wolch, J. R., Byrne, J., & Newell, J. P. (2014). Urban green space, public health, and environmental justice: The challenge of making cities 'just green enough'. Landscape and Urban Planning, 125, 234–244.
49. Yang, J., & Wang, Z. (2017). Planning for a sustainable desert city: The potential water buffering capacity of urban green infrastructure. Landscape and Urban Planning, 167, 339-347. 10.1016/j.landurbplan.2017.07.014.