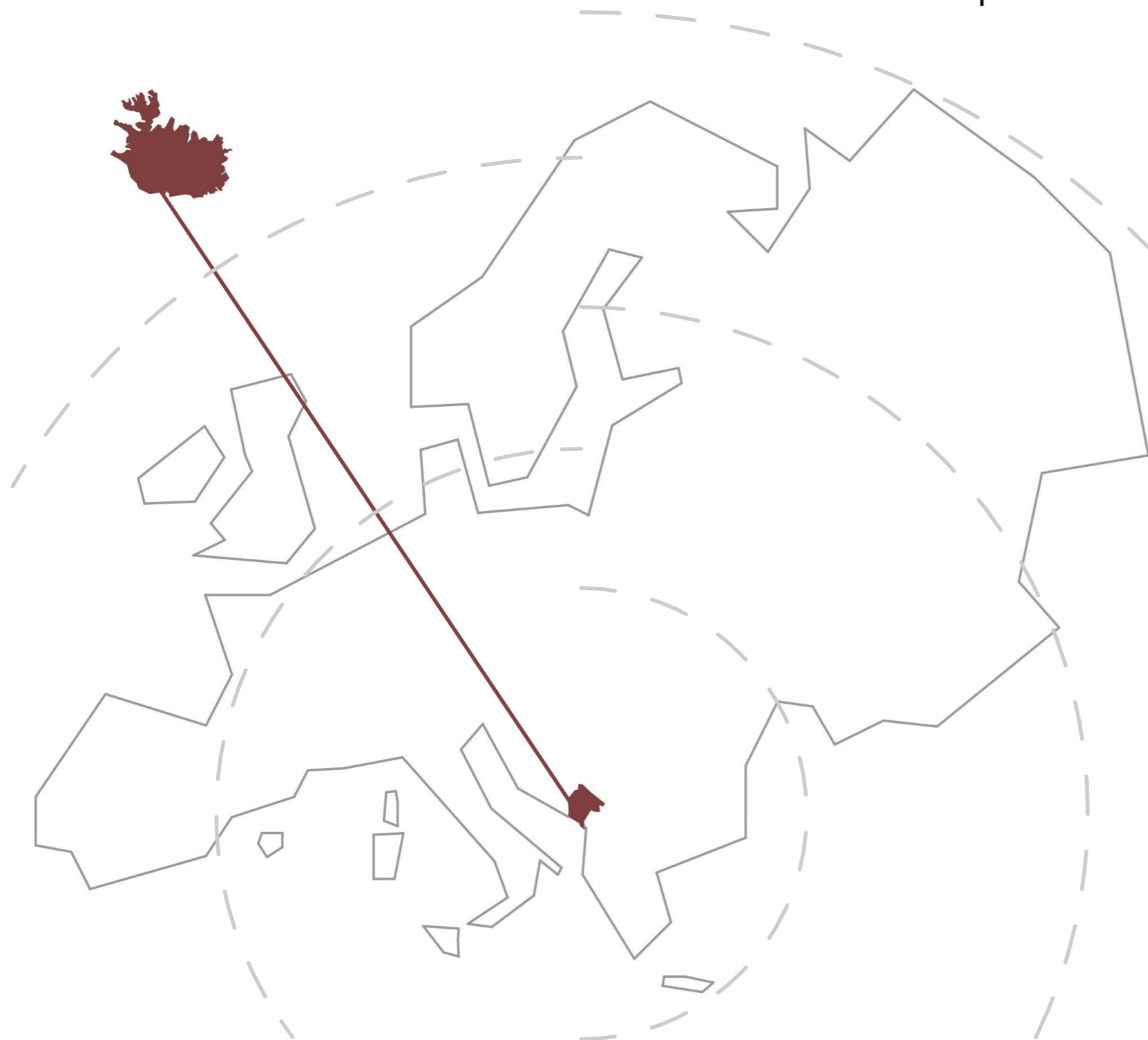


Revitalisation of Neglected Urban Waterfronts through Blue-Green Infrastructure:

A Comparative Study of Reykjavík, Iceland and Podgorica, Montenegro ■



■ **Bogdan Medenica¹, David Finger², and Nevena Mašanović¹**

¹ University of Montenegro, Faculty of Architecture, Podgorica, Montenegro

² Reykjavik University, Department of Engineering, Reykjavík, Iceland

■ **Session:** Integrated Approaches to Implementing Nature-Based Solutions in Urban Areas

■ **Conference:** EGU General Assembly 2026, Vienna, Austria, May 2026

■ **Abstract ID:** EGU26-6098

■ **Abstract:** <https://doi.org/10.5194/egusphere-egu26-6098>



Author's contact: bogdanmedenica.pg@gmail.com

01 Research Framework and Approach

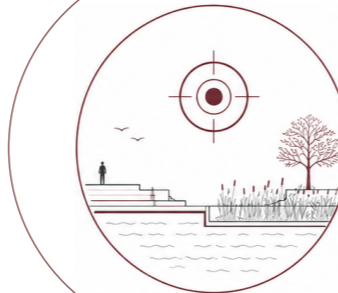
01. Research problem

Urban waterfronts frequently remain underused even where ecological value is high or physical regeneration has already taken place. This reveals a critical planning gap between spatial transformation, climatic comfort, and the everyday social use of waterfront public space.



02. Research aim

The aim of this research is to identify how blue-green infrastructure can contribute to the revitalisation of underused waterfronts in Reykjavík and Podgorica by addressing spatial disconnection, microclimatic stress, and limited public use.



03. Research question

Which spatial and microclimatic factors explain waterfront underuse in Reykjavík and Podgorica, and how have planning gaps and inadequate waterfront treatment affected accessibility, microclimatic comfort, and social activation?



04. Methodological approach

The study adopts a two-level comparative framework, combining cross-city comparison with within-city comparison between selected waterfront sites and adjacent urban areas. GIS-based spatial analysis was integrated with field observation, walking journals, surveys, and interviews.



02 Comparative Urban System Analysis

Reykjavík, Iceland

Green Infrastructure



Fragmented green structure limits continuity along the coastal edge.

Mobility Network



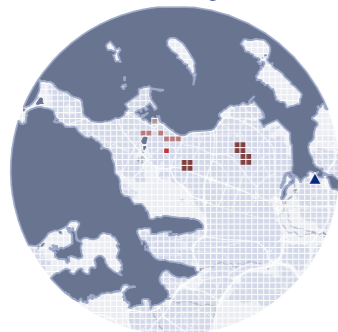
Pedestrian movement remains weakly aligned with the waterfront.

Urban Fabric



Recent urban growth has not fully integrated the waterfront into everyday urban life.

Social Activity Nodes



● Recreation ● Cultural
● Landmark ● Commercial

Access Barriers



● Airport Infrastructure
● Industrial Areas
● Harbour Infrastructure

Urban Microclimate



● High wind exposure zone



Podgorica, Montenegro

Green Infrastructure



The river corridor has high ecological potential, but limited public integration.

Mobility Network



The urban network does not translate into continuous access to the riverfront.

Urban Fabric



Industrial and informal development disconnect the urban fabric from the river.

Social Activity Nodes



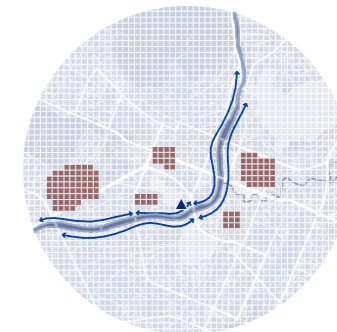
● Recreation ● Cultural
● Landmark ● Commercial

Access Barriers



● Wastewater Infrastructure
● Industrial
● Informal Housing

Urban Microclimate



● Urban Heat Island
● Cooling Corridor





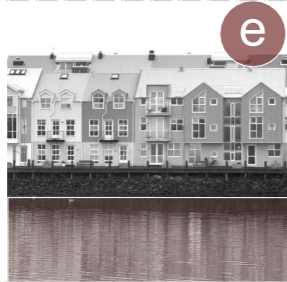
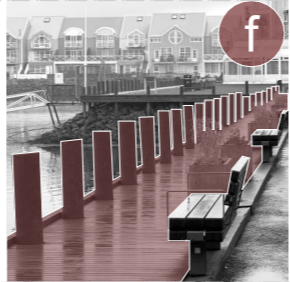




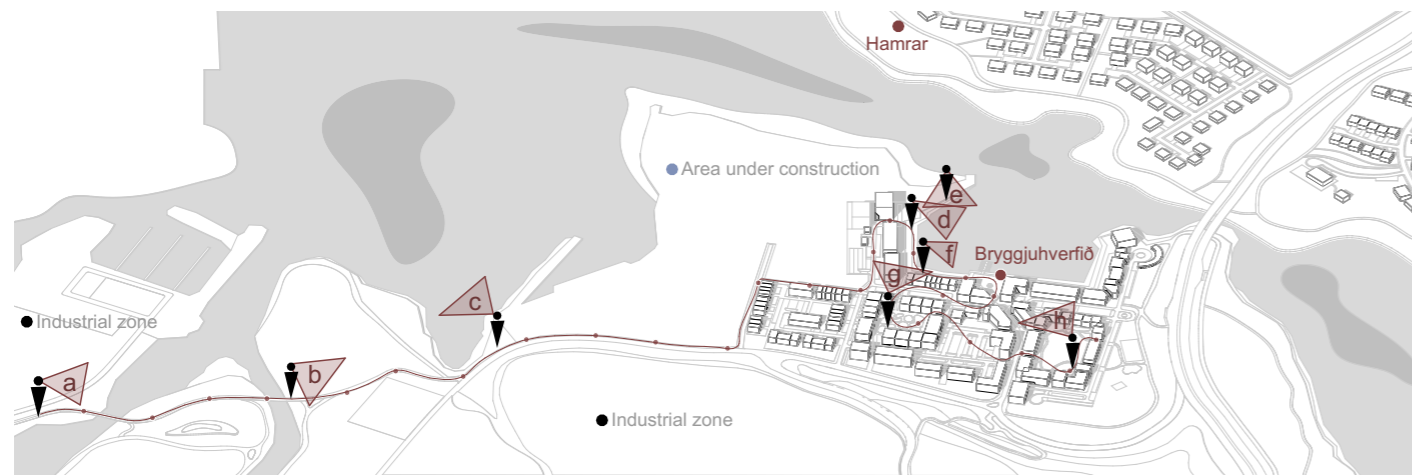
GIS analysis shows that the social use of waterfront space is strongly shaped by microclimatic comfort, accessibility, and the spatial integration of public space. In both Reykjavík and Podgorica, access to the waterfront is limited, pedestrian continuity is fragmented, and social activity is displaced away from the water. In this sense, water is perceived less as an active urban interface and more as an urban edge, in the Lynchian sense of a boundary condition within the city structure (Lynch, 1960). The detailed site analysis therefore focuses on Bryggjuhverfið in Reykjavík, a former industrial area transformed into a residential waterfront that remains weakly socially activated, and Kruševac in Podgorica, where informal housing and industrial occupation have produced a largely inaccessible riverfront with very limited public use. The comparison helps identify the spatial and planning gaps that are most relevant for waterfront revitalisation through blue-green infrastructure.

Source: authors' own visual material and analysis

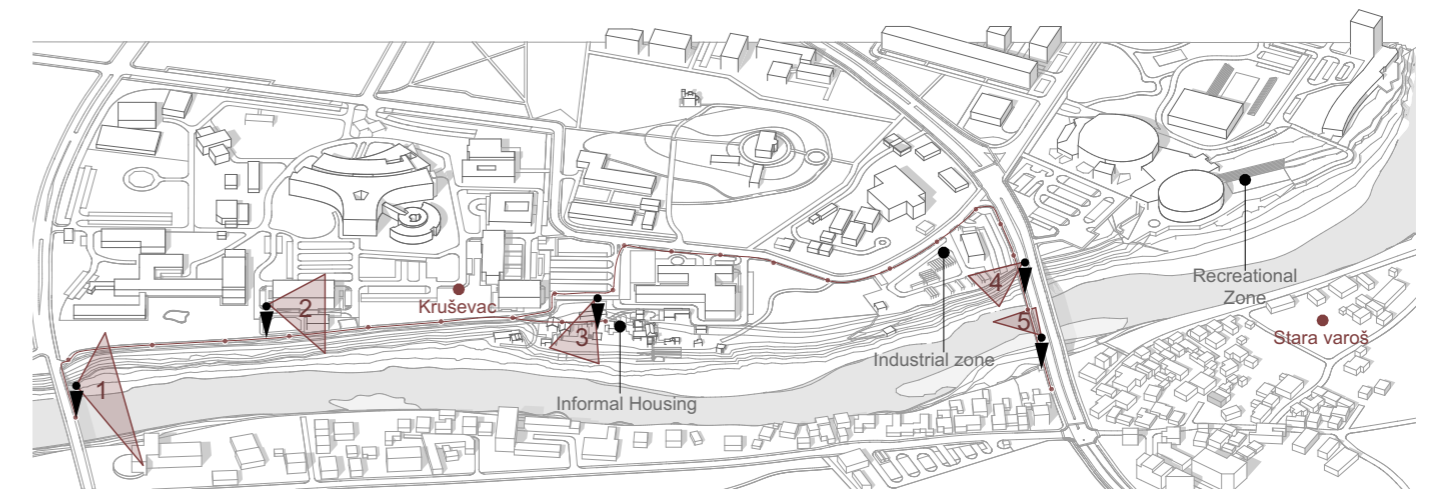
03

Field Photo Documentation: Key Spatial Conditions




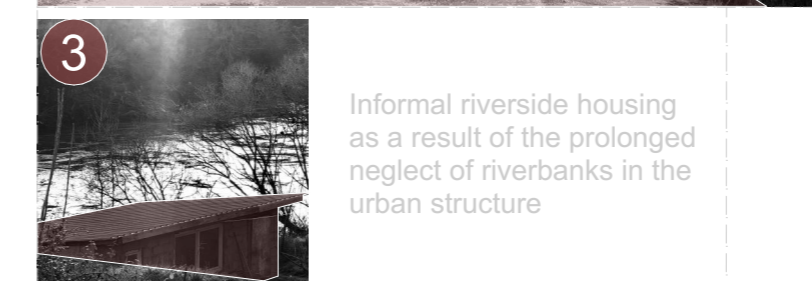


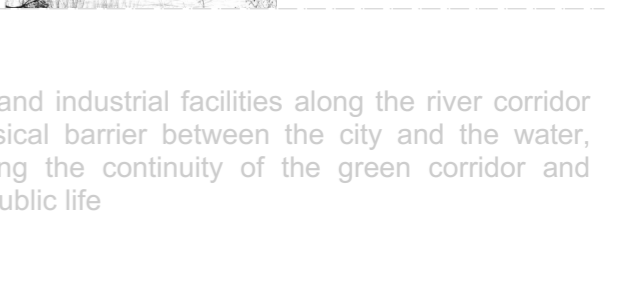
<p>Pedestrian and cycle connection to Bryggjuhverfið – Red Steel Pyramids Bridge</p> 	<p>Industrial infrastructure viewed from the pedestrian route - weak links to central Reykjavík</p> 
<p>Industrial occupation along the water – inaccessible waterfront zone and interrupted public access</p> 	<p>Bryggjuhverfið waterfront – newly designed residential neighbourhood with a boat mooring area</p> 
<p>Concrete waterfront with limited vegetation and weak connection to neighbourhood greenery.</p> 	<p>Designed promenade with seating – public amenities are present, but the absence of green structure limits social activity</p> 
<p>View from the inner courtyard – green space exists, but remains disconnected from the waterfront.</p> 	<p>Inner courtyard condition – buildings form enclosed blocks with internal courtyards, reducing visual and spatial proximity to the water</p> 



Bryggjuhverfið, Reykjavík



Kruševac, Podgorica

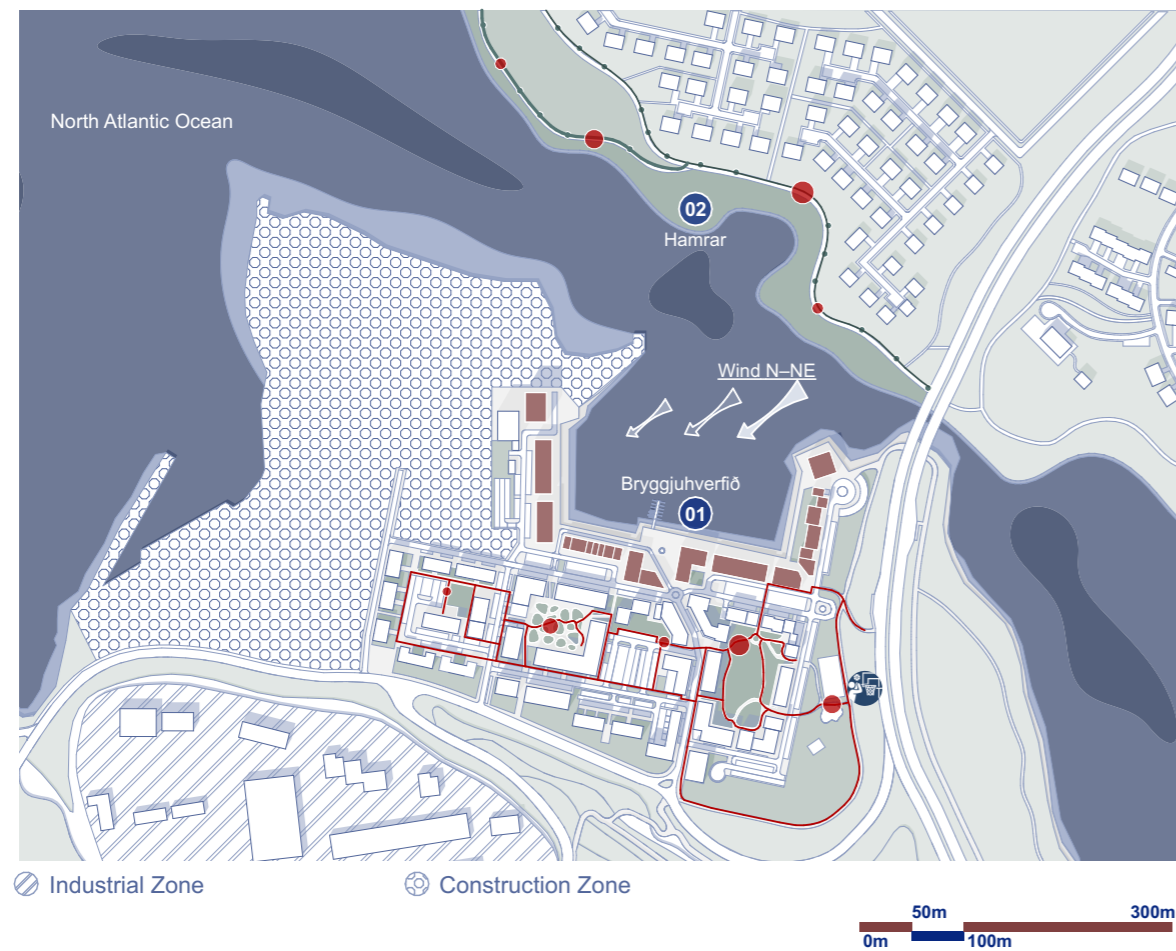
<p>Neglected riverbanks have facilitated the development of informal housing along the Morača, weakening the continuity between the urban fabric and the river corridor.</p> 	
<p>Unpaved riverside route along the Morača corridor – spatially underdefined, functionally inactive, and rarely used despite its direct proximity to the river</p> 	<p>Absence of a continuous promenade along the river corridor</p> 
<p>Informal riverside housing as a result of the prolonged neglect of riverbanks in the urban structure</p> 	<p>Absence of a continuous promenade along the river corridor</p> 
<p>Storage and industrial facilities along the river corridor – a physical barrier between the city and the water, interrupting the continuity of the green corridor and limiting public life</p> 	<p>Absence of a continuous promenade along the river corridor</p> 

Source: authors' own visual material and analysis

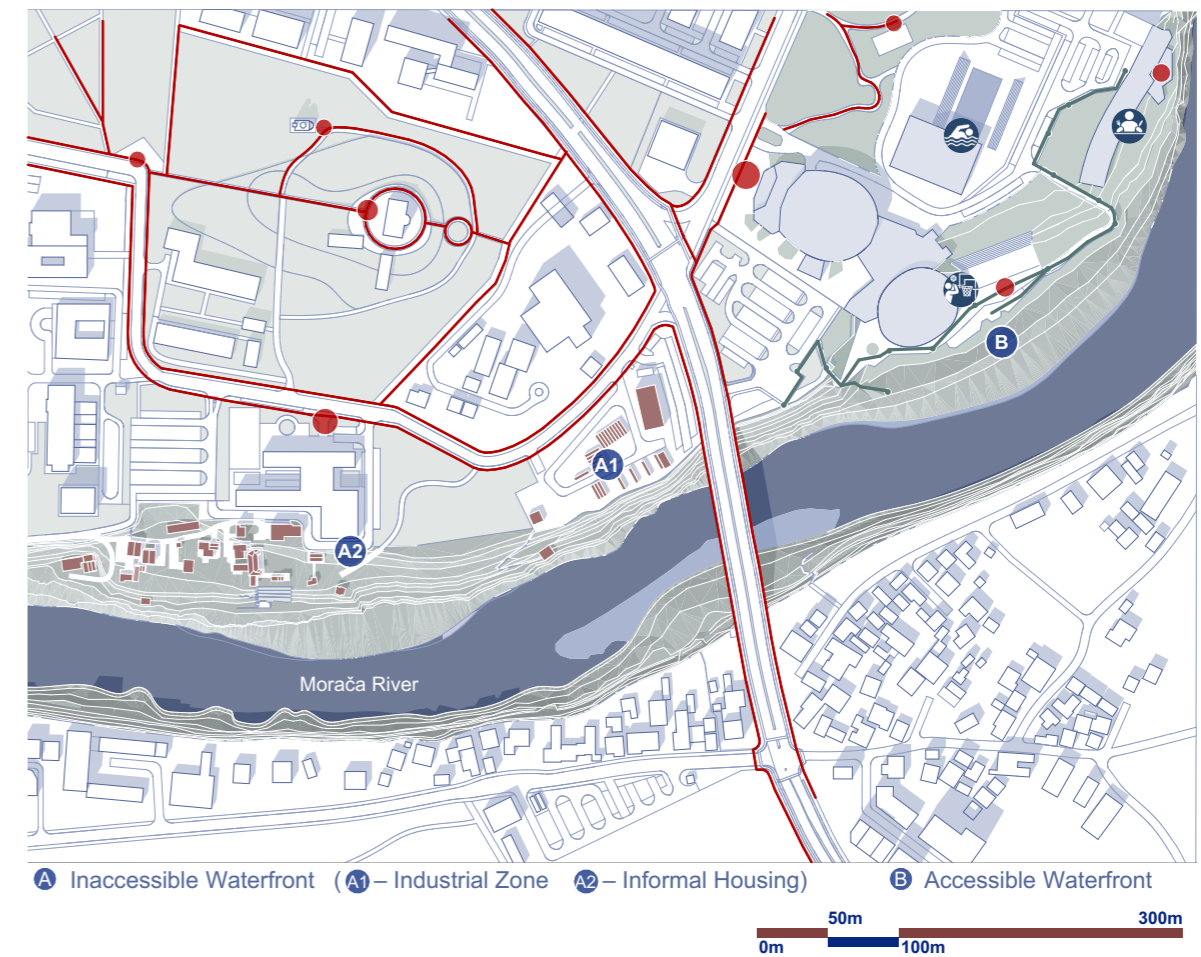
04 Site Context



Bryggjuhverfið, Reykjavík



Kruševac, Podgorica

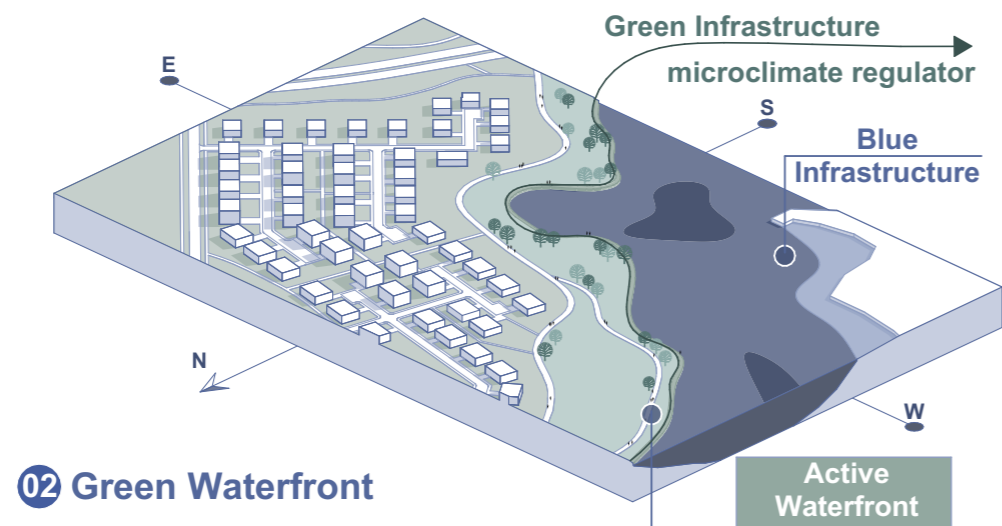
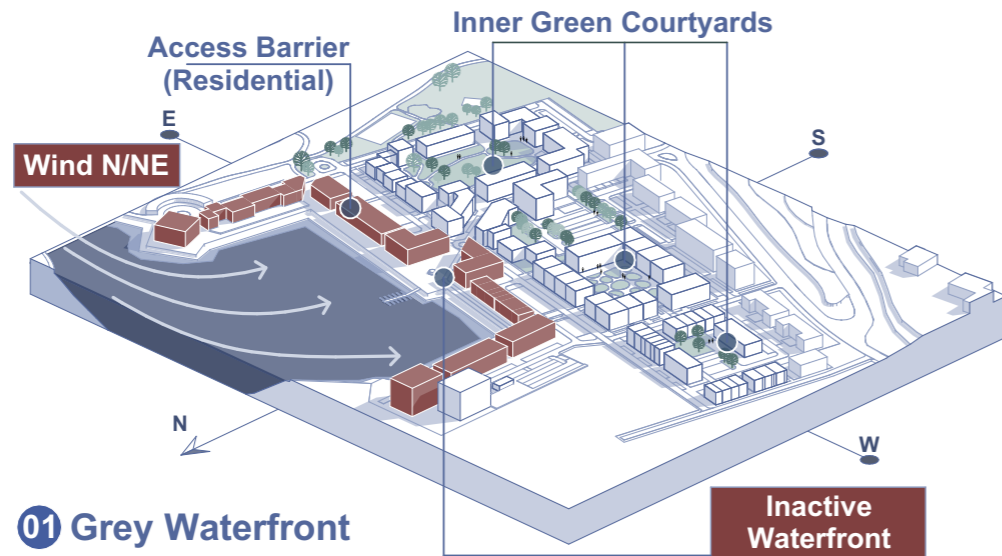


Source: authors' own visual material and analysis

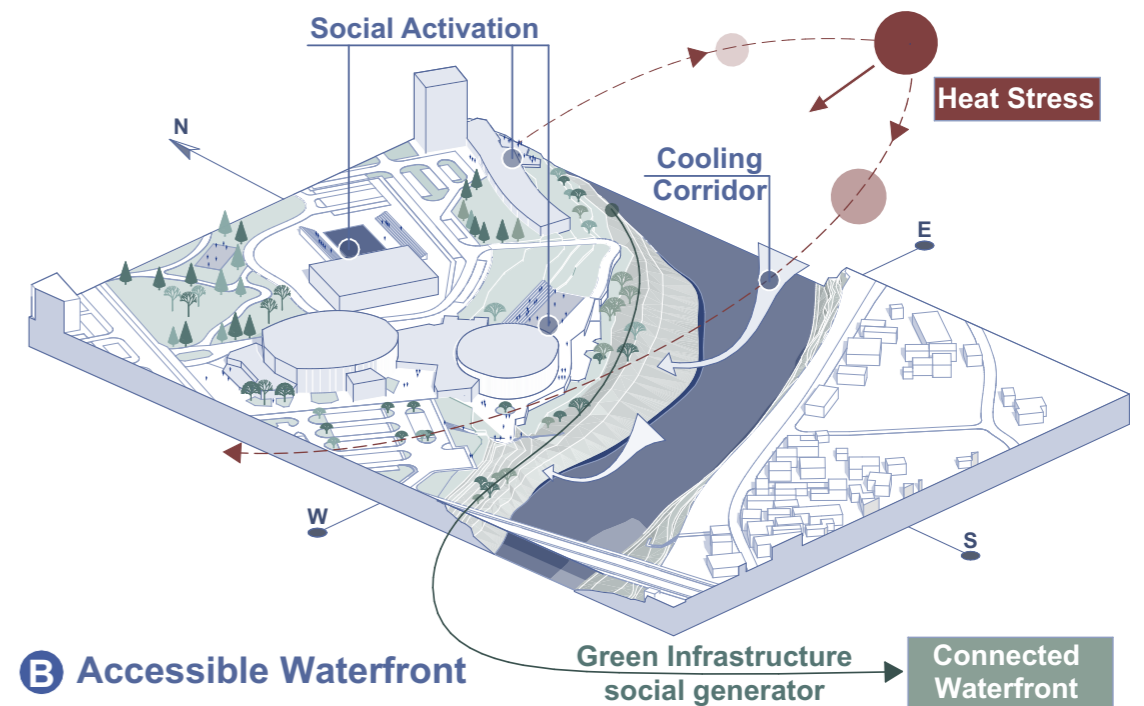
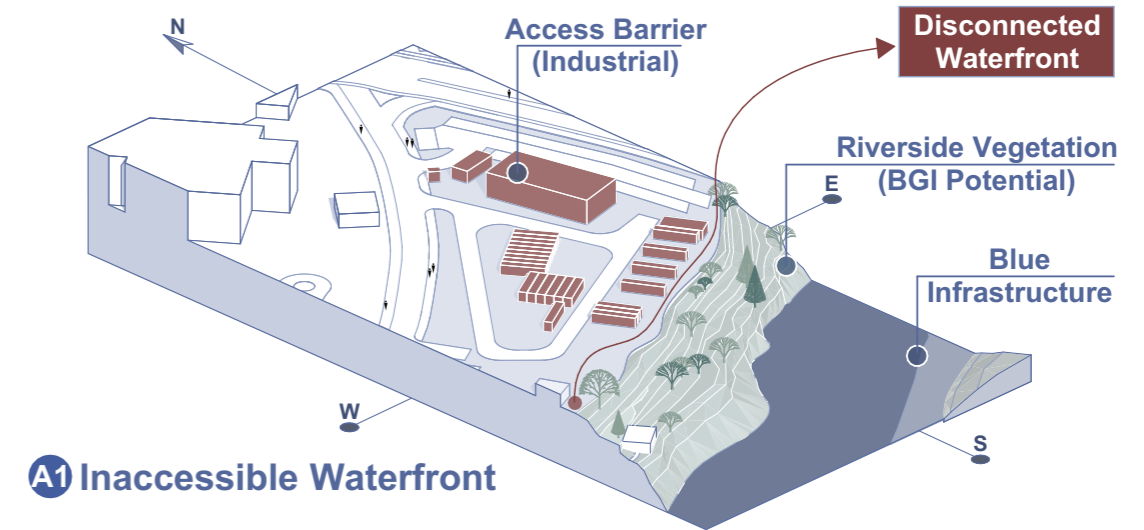
05

Spatial Performance of Blue-Green Infrastructure

Reykjavík, Iceland



Podgorica, Montenegro



The diagrams illustrate how the presence or absence of blue-green infrastructure shapes waterfront performance through its effects on microclimatic comfort, accessibility, and social activity. A within-city comparison was carried out in both Reykjavík and Podgorica in order to examine how different waterfront treatments under the same climatic conditions can generate contrasting spatial outcomes. This was further extended through cross-city comparison, making it possible to identify how blue-green infrastructure operates differently across two distinct urban and climatic contexts.

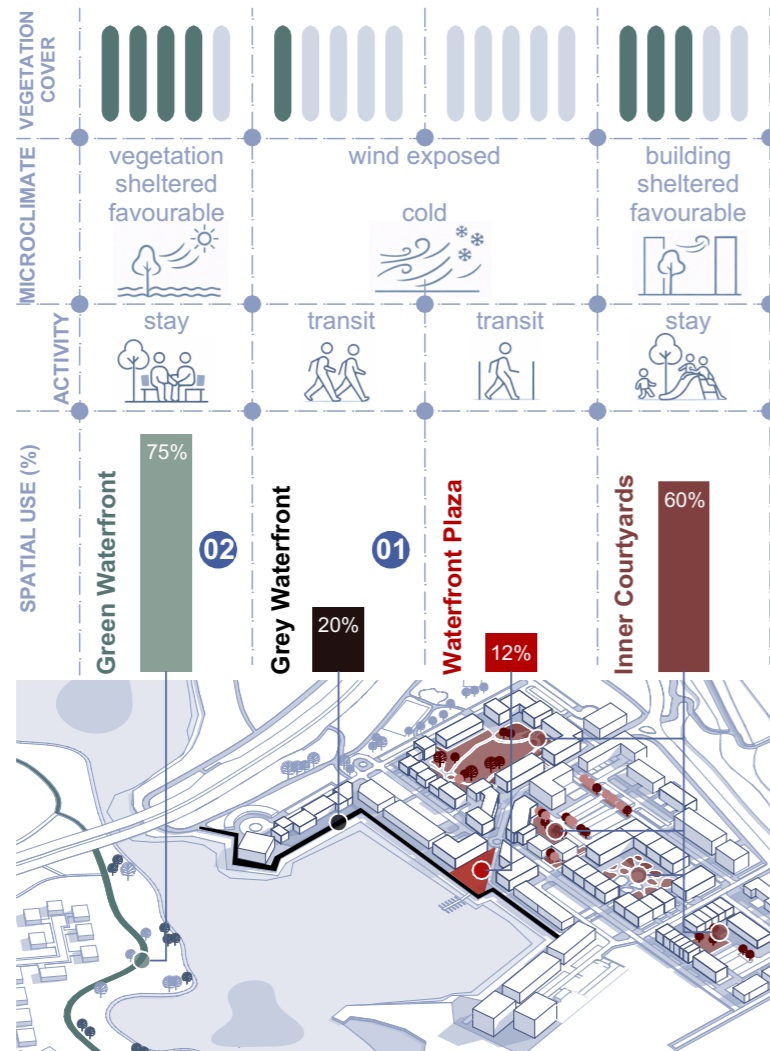
Source: authors' own visual material and analysis

06

Field Insights: Seasonal Observation Framework and Use Patterns

Fieldwork was conducted over three months in each city during climatically demanding periods: October–December 2025 in Reykjavík and July–September 2025 in Podgorica. These timeframes were intentionally selected to capture waterfront use under conditions in which winter wind exposure in Reykjavík and summer heat stress in Podgorica play a decisive role in shaping public-space behaviour.

Reykjavík, Iceland



Spatial use (%) was calculated from the average number of users recorded per 30-minute interval at each microlocation across six observation sessions. These values were then expressed as relative percentages in order to compare levels of activity across sites.

Data sources and interpretation:

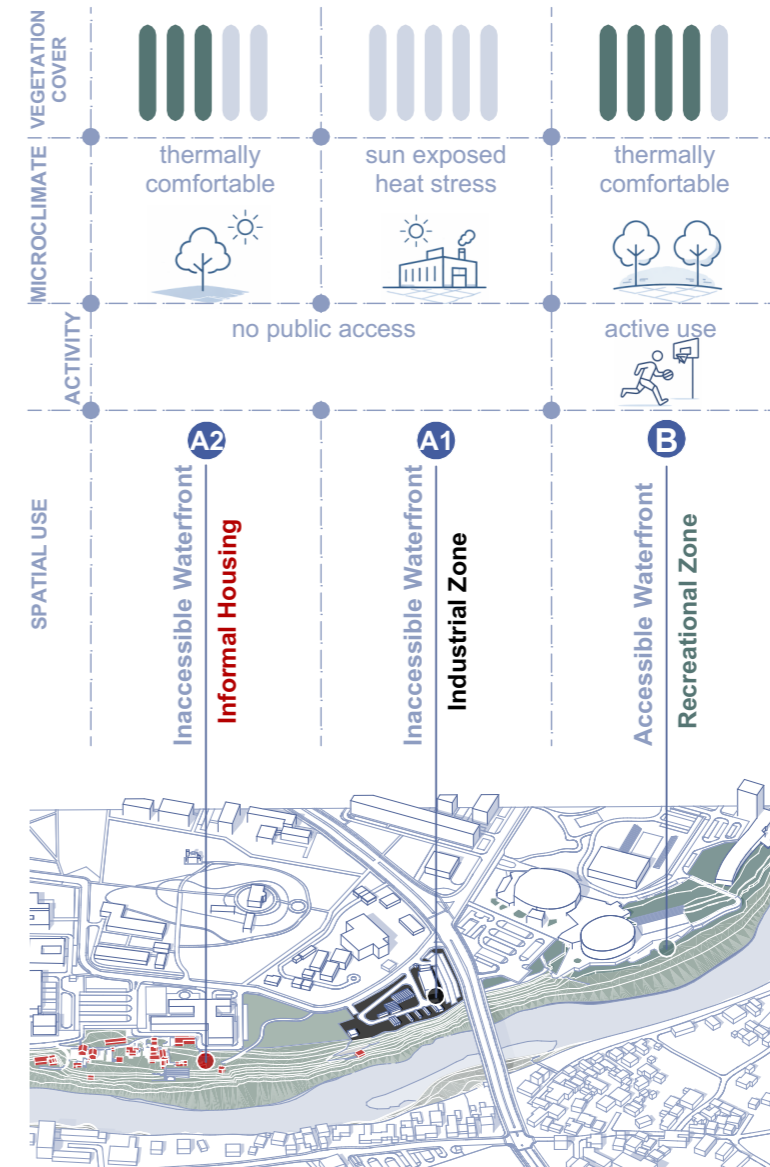
Vegetation cover — derived from GIS-based mapping analysis and verified through site observation

Microclimatic conditions — user interviews and perceived environmental comfort on site

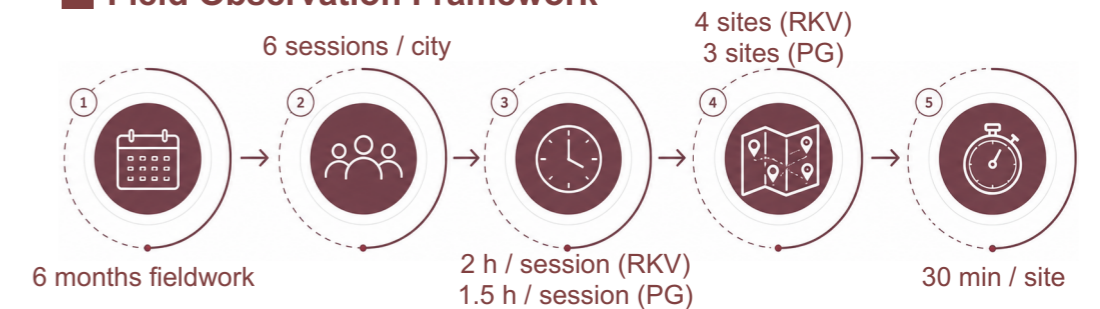
Activity patterns and user perception — direct observation recorded in walking diaries, supported by on-site surveys with local users

Spatial use (%) — calculated as a relative use-intensity index based on repeated observation sessions

Podgorica, Montenegro



Field Observation Framework



Source: authors' own visual material and analysis

07 Research Synthesis and References

Key Findings

The comparative analysis reveals two patterns of waterfront underuse. In Reykjavík, the study area has been transformed from an industrial zone into a residential waterfront, yet field observation and survey results indicate low staying activity along wind-exposed concrete edges. This suggests that physical redevelopment has not produced a socially sustainable waterfront. In Podgorica, underuse is shaped by spatial disconnection, as industrial occupation and informal structures interrupt access to the Morača riverfront. Fieldwork also shows that the riverside becomes important during periods of intense summer heat, functioning as a zone of thermal relief compared with nearby urban blocks exposed to greater heat stress. Taken together, the findings show that waterfront use is strongly shaped by microclimatic conditions and by the extent to which blue-green infrastructure supports comfort and social activity.

BGI Implications and Conclusion

Blue-green infrastructure emerges as a key spatial framework for creating usable and socially active waterfronts. In Reykjavík, the findings reveal the limits of concrete-led regeneration and highlight the need for sheltered green waterfront spaces that improve comfort and support everyday social use. In Podgorica, priority should be given to reconnecting urban green space with the river corridor in order to reduce hard riverbank surfaces and strengthen the continuity of the Morača cooling corridor through vegetation-based public-space interventions. Overall, the results indicate that integrating BGI into the planning process can significantly enhance the spatial, social, and microclimatic value of waterfronts across different climatic contexts.



Theoretical Framework References

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