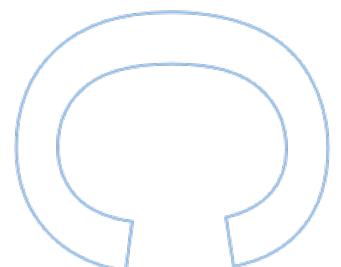
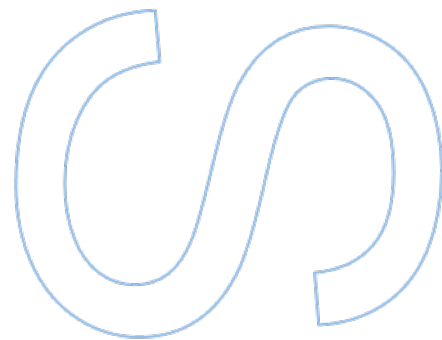
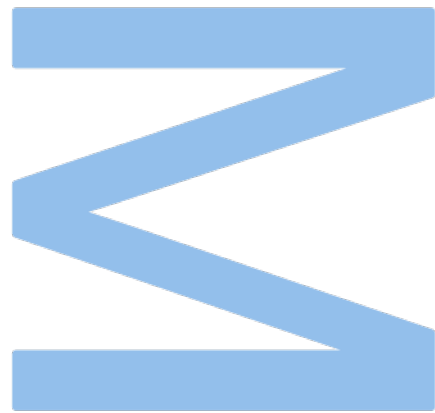


# **From Vacant Buildings to Pocket Parks: Integrating Small Green Spaces into Urban Green Infrastructure in Historic City Centres**

## **A Reflection on the City of Porto**

**Sina Horvat**

Master in Landscape Architecture  
Department of Geosciences, Environment and Spatial Planning  
Faculty of Sciences of the University of Porto  
2026



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Dissertation carried out as part of the Master in Landscape  
Architecture

Department of Geosciences, Environment and Spatial Planning  
2026

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In the following I hereby declare that I have written this work independently and have not used any resources other than those listed. The AI tool Perplexity (model: Perplexity) from Perplexity AI was used in the creation of this work. The AI tool was used for structuring the outline and as a translation tool. All generated texts were critically reviewed and revised by me and used only as a basis. I bear full responsibility for the content and factual accuracy of the text.

# Resumo

Esta dissertação investiga como os pocket parks (parques de bolso) nos centros históricos das cidades podem funcionar como elementos constitutivos da infraestrutura verde para dar resposta a desafios ecológicos e sociais. Utilizando o centro histórico do Porto como estudo de caso, a dissertação analisa o elevado número de edifícios devolutos, o aumento das ilhas de calor urbanas e a falta de espaços abertos acessíveis para o dia-a-dia dos residentes. Neste contexto, os parques de bolso são definidos como pequenos espaços verdes urbanos que combinam funções ecológicas, sociais e culturais - particularmente em áreas onde é difícil implementar parques de maior dimensão devido a restrições espaciais ou de preservação histórica.

Do ponto de vista metodológico, a dissertação combina uma revisão bibliográfica abrangente sobre infraestruturas verdes, soluções baseadas na natureza e regeneração urbana com uma análise detalhada do estudo de caso. É dada especial atenção a áreas no Porto, que ilustram a sobreposição entre edifícios devolutos, topografia desafiante e vulnerabilidade social.

Os resultados indicam que os parques de bolso proporcionam maiores benefícios quando, integrados nas estruturas existentes de edifícios e espaços abertos, são entendidos como parte de uma infraestrutura verde mais ampla e desenvolvidos através de processos cooperativos com os atores locais. Podem contribuir para a mitigação do calor, promover a biodiversidade urbana, melhorar a qualidade do espaço público e reforçar as relações de vizinhança. Ao mesmo tempo, enfrentam obstáculos financeiros, de planeamento e administrativos.

A tese formula recomendações para os municípios e os responsáveis pelo planeamento. Apela à criação de enquadramentos estratégicos para os espaços abertos, abordagens flexíveis de planeamento para a utilização de terrenos baldios e processos participativos que envolvam os residentes locais desde o início e de forma contínua.

Palavras-chave: Infraestruturas verdes, Centro histórico, Pocket Park, Cidades em declínio, Ilha de calor urbana

# Abstract

This dissertation investigates how pocket parks in historic city centres can function as building blocks of green infrastructure to address ecological and social challenges.

Using the historic centre of Porto for a Reflection, the dissertation examines the large number of vacant buildings, increasing urban heat islands and the lack of accessible everyday open spaces for residents. In this context, pocket parks are referred to as small urban green spaces that combine ecological, social and cultural functions - particularly in areas where larger parks are difficult to implement due to spatial or historic preservation constraints.

Methodologically, the dissertation combines a comprehensive literature review on green infrastructure, nature-based solutions and urban regeneration with a detailed analysis. Attention is given to areas in Porto, which illustrate the overlap between vacancy, challenging topography and social vulnerability.

The findings indicate that pocket parks deliver the greatest benefits when they are embedded in existing building and open space structures, understood as part of wider green infrastructure and developed through cooperative processes with local actors. They can support heat mitigation, promote urban biodiversity, improve the quality of public space and strengthen neighbourhood relations. At the same time, they face financial, planning and administrative obstacles.

On this basis, the dissertation formulates recommendations for municipalities and planners. It calls for strategic open space frameworks, flexible planning approaches for the use of vacant plots and participatory processes that involve residents early and continuously.

**Keywords:** Green Infrastructure, Historic city centre, Pocket Park, Shrinking cities, Urban Heat Island

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## List of Abbreviations

|        |                                                                     |
|--------|---------------------------------------------------------------------|
| DGES   | DIREÇÃO GERAL DO ENSINO SUPERIOR                                    |
| EU     | EUROPEAN UNION                                                      |
| FCUP   | FACULTY OF SCIENCES OF THE UNIVERSITY OF PORTO                      |
| GI     | GREEN INFRASTRUCTURE                                                |
| HRI    | HEAT RISK INDEX                                                     |
| IMI    | IMPOSTO MUNICIPAL SOBRE IMÓVEIS                                     |
| IPMA   | INSTITUTO PORTUGUÊS DO MAR E DA ATMOSFERA                           |
| MNUAG  | MUNICIPAL NETWORK OF URBAN ALLOTMENT GARDENS                        |
| NBS    | NATURE-BASED SOLUTIONS                                              |
| PDM    | PLANO DIRETOR MUNICIPAL                                             |
| SLOSS  | SINGLE LARGE OR SEVERAL SMALL                                       |
| UA     | URBAN AGRICULTURE                                                   |
| UGI    | URBAN GREEN INFRASTRUCTURE                                          |
| UHI    | URBAN HEAT ISLAND                                                   |
| UNESCO | UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND<br>CULTURAL ORGANIZATION |
| UP     | UNIVERSITY OF PORTO                                                 |

# Introduction

Historic city centres such as Porto are under significant environmental, social and economic pressures. They are characterised by dense, traditional development, heritage conservation requirements and high symbolic value for urban identity. However, they are increasingly affected by a housing shortage, tourism and a lack of accessible public open spaces close to residential areas. Porto is a typical example of this tension: Regardless of far-reaching transformation processes in the old town, many buildings stand empty or are underused, whilst rising rents are forcing residents out to the city's outskirts.

Against this background, issues of green infrastructure and climate adaptation intersect with debates on social justice and the future of historic city centres (Rieniets, 2009). Green spaces have gained in importance in urban planning, yet conventional models of large city parks reach their limits in compact historic settings, given building structures and cost constraints, as well as due to the built heritage. This raises the question of which spatial strategies and scales are suitable for improving the environmental footprint and quality of life.

Pocket parks - small open spaces within the existing urban fabric - are increasingly being discussed as a possible approach to address ecological and social challenges in densely populated cities. They are considered to have the potential to improve microclimatic conditions (Arup, 2016), promote urban biodiversity (Egerer et al., 2024), encourage social interaction and strengthen local identity (Zhou, 2025). In historic city centres with a high proportion of vacant buildings, pocket parks can fill unused spaces and integrate them into the urban green infrastructure.

This dissertation addresses these challenges by examining the role of pocket parks as elements of green infrastructure in the historic city centre of Porto. It explores the potential for reusing vacant buildings. These spaces are regarded as potential sites for small-scale interventions that can strengthen the green infrastructure network. The aim is to identify the spatial, social and institutional conditions to which pocket parks can contribute. It also seeks to identify their limitations and to examine how the proposed measures can be implemented in a comprehensive planning framework. Furthermore,

the dissertation investigates how local communities can be involved in, supported and empowered through this process.

Methodologically, this study combines a comprehensive literature review on green infrastructure, nature-based solutions and pocket parks with a specific application to the case of Porto. Chapter 1 introduces historic cities, their open spaces and their cultural heritage. Chapter 2 sets out the definition of pocket parks and explains the theoretical and conceptual foundations. Chapter 3 examines microclimatic effects, urban biodiversity and green infrastructure. It also explains the link to social impacts and the specific situation of southern European cities. Chapter 4 analyses the legal framework and institutional scope for action and outlines possible implementation strategies as well as alternative approaches. Chapter 5 presents transferable strategies - including examples from Porto - which translate the theoretical concepts into concrete projects and establish a link to pocket parks. Chapter 6 summarises the key findings and discusses their implications for design and planning practice, socio-economic dynamics and governance.

# 1. Historic City Centre and Vacant Buildings

## 1.1 Urbanization and Densification of Southern European Historic City Centres

Many historic town centres have evolved from medieval urban forms, shaped by defensive structures, limited space within the city walls and narrow parcels. This has resulted in dense block development and narrow, pedestrian-oriented streets. Over time, their spatial structure has been continuously shaped by the topography, political interventions (such as wars, changes of regime or large-scale restructuring projects such as Haussmann's redevelopment of Paris), and influenced by economic structural change, technological innovations, and demographic and social changes (Cesaretti et al., 2016).

Figure 1 shows the different zones in Porto that this dissertation will refer to. It is important to distinguish between the historic city centre (blue and red) and the city centre (orange). Since, despite similar typology and architecture, there is an area within the historic city centre that is a UNESCO World Heritage Site (blue), the historic area is subdivided.



Figure 1 - Development Plan of the Municipality of Porto (2003) with the UNESCO Historic City Centre (blue), the Historic City Centre (red) and the city centre (orange)  
Source: Edited Version of "Carta Militar de Portugal" of the Instituto Geográfico do Exército and "planta da Situação Existente" from the STCMP (Revision from the PDM)

Figure 2 shows the area designated by UNESCO as a World Heritage Site (green) in more detail. Buildings of historical significance are highlighted in yellow on the map. In the following chapters, this dissertation refers to these two areas and collectively designates them as the historic city centre. Buildings within the UNESCO-designated area are subject to stricter heritage protection regulations, which influences the proposals and implementation options developed in this dissertation.

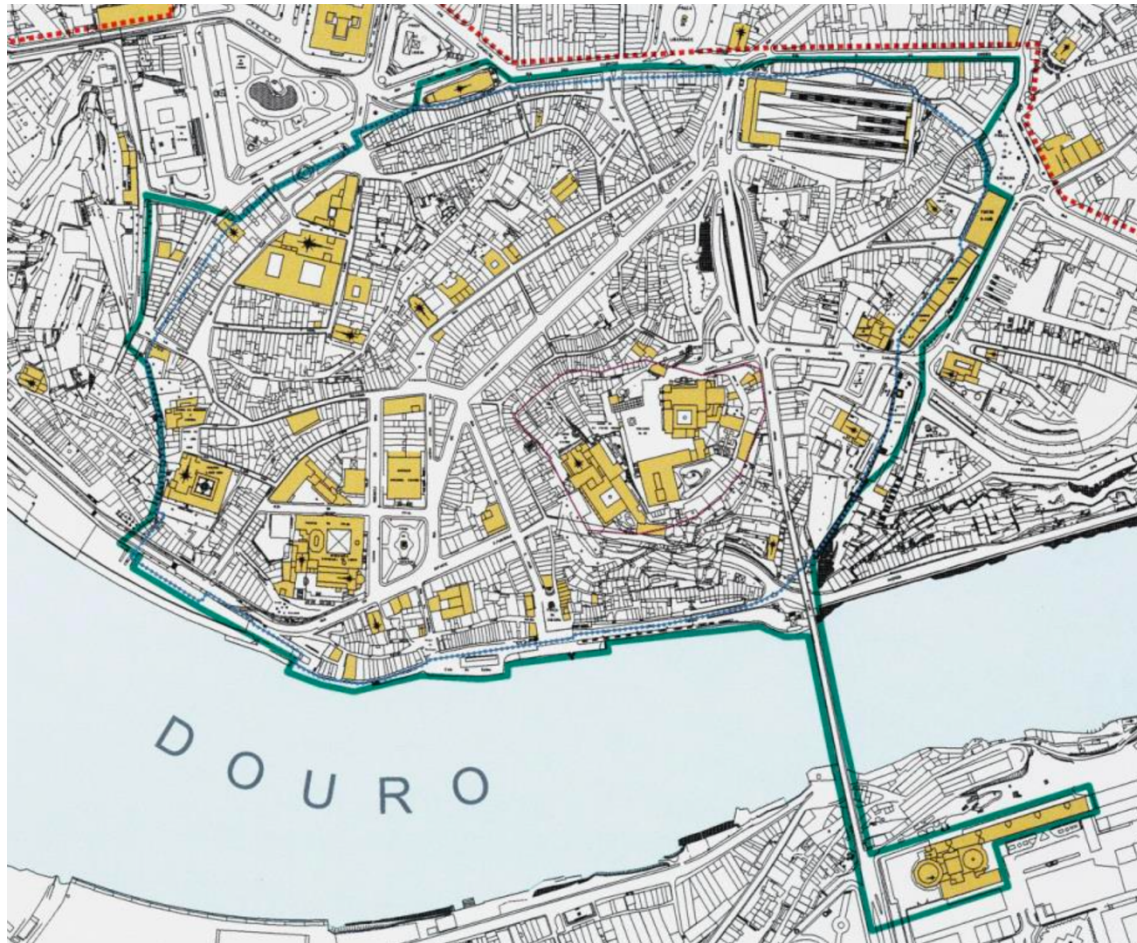


Figure 2 - Area Classified by UNESCO as World Heritage: Historic City Centre, D. Luiz Bridge and Serra do Pilar Monastery (green) and Protection Area (red), 1996  
Source: map based on the official UNESCO World Heritage boundaries | Credits: Tavares et al., 2018.  
DOI:10.14568/cp2017019

During the Second World War, Portugal remained officially neutral under the Estado Novo<sup>1</sup> regime and suffered no direct damage from bombing raids, despite having strategically important sites for air force and naval bases. Nevertheless, Salazar's

<sup>1</sup> The authoritarian-conservative dictatorship in Portugal under António de Oliveira Salazar and his successor Marcelo Caetano shaped the country from the early 1930s until the Carnation Revolution in 1974 and for decades thereafter. Strict rent controls and extensive regulation of the housing market ensured affordable rents on the one hand, but on the other hand significantly hindered private investment, renovation and modernisation, leading to a structural housing shortage that persists to this day.



policies led to economic weaknesses, inflation and supply shortages. This meant that both public and private investment in urban development was severely curtailed. These structural deficits are still visible in the urban fabric today.

Porto is characterised by a dense urban fabric with irregular, narrow streets and a high building density. The city's origins lie around the cathedral and in the city centre along the Douro, which has been a UNESCO World Heritage Site since 1996 (UNESCO, 2023). The city itself later expanded within the second city wall and, in the 19th century, subsequently extended northwards and westwards (Oliveira, 2014).

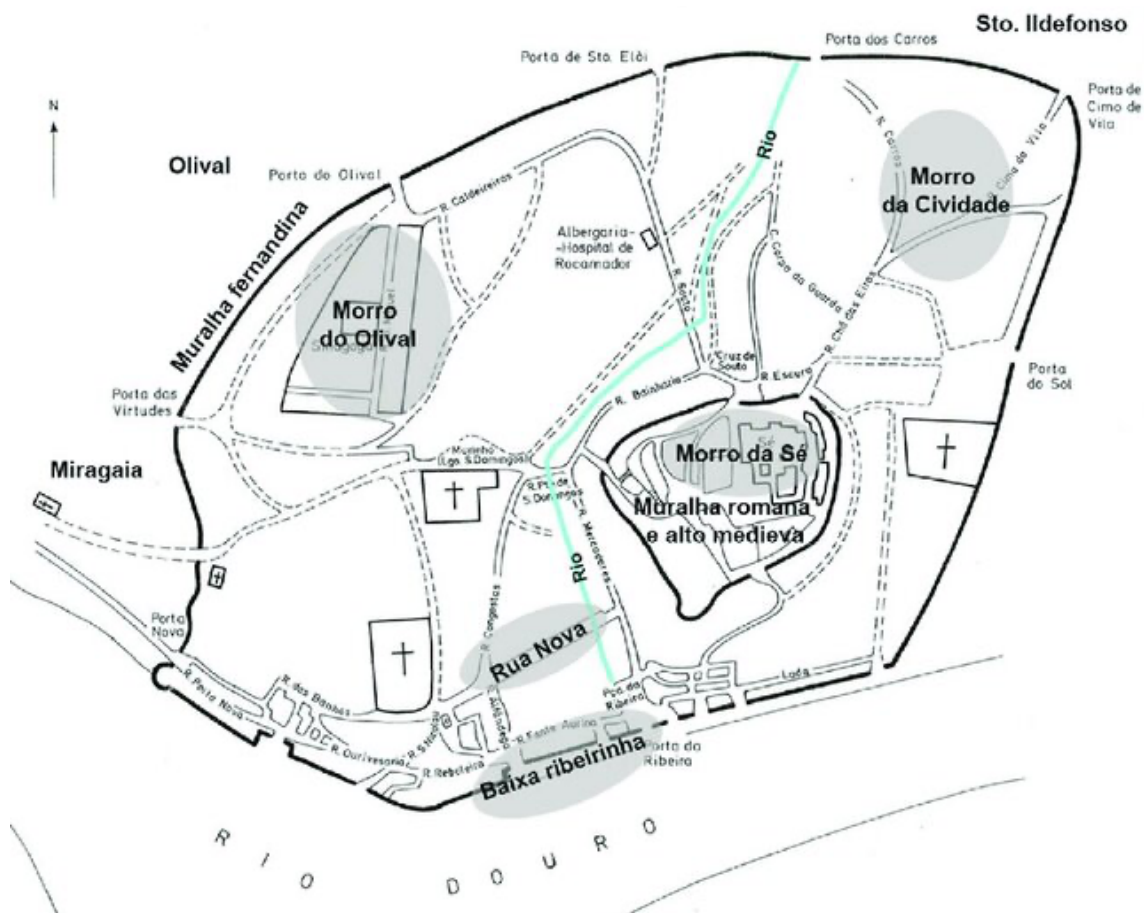


Figure 3 - Medieval Walls of Porto  
Source: Muralhas "fernandinas" do Porto (adapted by Marques et al 1990: 25)

Historic city centres are particularly vulnerable to further densification due to heritage protection regulations and a lack of space. UNESCO World Heritage cities are affected by rising property prices and uncontrolled urbanisation, which threatens their residents'

quality of life (UNESCO, 2023). By 2050, it is estimated that 70% of the world's population will live in urban areas (Kohlhase, 2013; UNESCO, 2023). To preserve cultural heritage, it is crucial to shape future urban development in a sustainable manner, using socially inclusive and environmentally friendly approaches.



Figure 4 - Façades of the UNESCO City Centre  
Source: <https://unsplash.com/de/fotos/eine-stadt-mit-vielen-gebauden-NwFxOSUn8yo>



1.2 Loss of Open Spaces

Over the last two centuries, urban growth has accelerated rapidly, a trend closely linked to global population growth. With industrialisation in the 19th century, cities expanded rapidly because of migration. Later, deindustrialisation and suburbanisation reversed this trend, leading to the phenomenon of so-called ‘shrinking cities’ (Rieniets, 2009). These dynamics have emerged particularly in early-industrialised regions such as Central Europe, the United States, Japan and transition countries of Eastern Europe (Oswalt & Rieniets, 2006). Portugal also experienced a massive rural exodus, starting mainly in the 1960s, which resulted in the depopulation of 80% of the territory (Almeida, 2020). Since the 1980s, Porto has also experienced a structural decline in population, which has particularly affected the municipality (Alves et al., 2016). Table 1 shows the population decline in the two metropolitan cities of Porto and Lisbon from 1991 to 2011. Since then, however, the Porto metropolitan area has experienced renewed population growth, with an increase in the number of inhabitants of 6,11% from 2013 until 2023 and has continued to grow since (The Portugal News, 2024).

| Metropolitan shrinkage | Change in population<br>1991 - 2011 | Change in population<br>1991 - 2011 (%) |
|------------------------|-------------------------------------|-----------------------------------------|
| Porto                  | - 64,881                            | - 21,5%                                 |
| Lisbon                 | - 115,661                           | - 17,4%                                 |

Table 1 - Population Change in Shrinking Portuguese Metropolitan Cities (Porto and Lisbon) from 1991 until 2011  
Source: Alves et al., 2016, p. 26

Today, urban areas are the predominant living environment for people (Rieniets, 2009), and issues relating to quality of life, resource consumption, and climate-related and social pressures are becoming increasingly acute. As the built environment adapts only slowly, many cities are facing rising vacancy rates (Rieniets, 2009). In Porto, family-based ownership structures, high maintenance costs and listed buildings further exacerbate this trend, particularly in historic city centres.

The housing market in Porto is increasingly shaped by speculative investment strategies. Vacant or dilapidated plots are acquired by (often international) investors, renovated, and rented out at prices that are unaffordable for a large part of the population (Rajado, 2025). Housing is thus viewed as a financial asset. Rajado (2025) describes this

development as a silent, economically motivated displacement of the established population toward the urban periphery.

Urban densification can be seen as a strategy for sustainable growth and resource-efficient urban development. However, the risk of losing public space with this approach should not be overseen. Where building land becomes scarce and property values rise, residual areas, buffer zones, and communally used outdoor spaces are often built over. Roof extensions, the conversion of industrial areas into residential space, or the development of courtyards reduce potential green buffer zones. However, even in cities with stagnant or declining populations, property values in attractive central locations can continue to rise, so densification and selective reinvestment accompany demographic decline. Simultaneously, decreasing population reduces pressure to the political measurements to preserve and expand public green spaces, allowing investor-driven projects to dominate. In such contexts, vacant plots increasingly become contested resources between housing, commercial uses and green spaces. The resulting competing demands on these areas can be addressed through various measures as for example green roofs and façades, roadside greenery, tree-lined avenues, and new small urban green spaces. In this work, I focus on one specific solution within this broad spectrum: pocket parks created on vacant sites in the historic centre of Porto.



Figure 5 - The City of Porto (1892)  
Credits: Map from Telles Ferreira, G., 1892. Source: <http://portoarc.blogspot.com/2012/05/vistas-gerais-do-porto-dos-seculos-xvii.html>



Figure 6 - Detail of the Historic City Centre of Porto, Illustrating the Built Density of the Urban Core  
Credits: Map from Telles Ferreira, G., 1892. Source: <http://portoarc.blogspot.com/2012/05/vistas-gerais-do-porto-dos-seculos-xvii.html>

The loss of open spaces fundamentally reduces the quality of life in communities. Extensive surface sealing intensifies climate-related risks such as flooding, reduced groundwater recharge, and the urban heat island (UHI) effect, while the lack of shade increases temperatures and contributes to higher stress levels. Green spaces must therefore be understood **not only as ecological** but also **as social infrastructure**. They provide the physical framework for neighbourhood interaction, intergenerational exchange, and psychological well-being. Their reduction, particularly in aging societies, intensifies social isolation and urban stress (Kabisch et al., 2017).

Appendix A shows that the sealed surfaces and built-up areas in the historic city centre have remained largely unchanged. Silva & Amorim named up to 20,000 vacant and partially dilapidated buildings in the greater Porto area by 2025. It is likely that a large proportion of these vacant plots are located in the city centre.



### 1.3 Specific Problems of Historic City Centres Like Porto

From an urban planning perspective, Porto is strongly shaped by its historic urban structures. Like many historic Southern European cities, it combines a compact, fine-grained block structure with a layered architectural fabric in which older buildings and contemporary interventions are closely interwoven. However, Porto was not significantly altered by large-scale reconstruction following natural disasters or war and has therefore remained largely intact, which contributes to the homogeneous streetscape and the high proportion of older buildings (Buces, 2022). Due to its narrow structure and dense development in closed blocks, the city has little room for expansion or the creation of new open spaces.



Figure 7 - Narrow Streets in the Historic City Centre of Porto  
Credits: Annie Spratt



This condition is further reinforced by the city's steep topography along the Douro valley, which significantly constrains accessibility, connectivity, and the development of continuous open space networks (Buces, 2022). Pedro Baganha, the former city councillor responsible for urbanism, public space, and housing, stated it as following: "We will probably never be a 100% accessible city because of our geographical condition and urban structure" (as cited in Buces, 2022).



Figure 8 - Steep Slopes and Staircases Withing Porto's Streets  
Credits: Claudio Luiz Castro

At the beginning of the twentieth century, Porto experienced phases of population growth and, at the same time, increasing suburbanisation. While the city attracted new residents in search of employment opportunities, residential preferences and housing supply gradually shifted towards the urban periphery. This led to selective out-migration of middle- and higher-income groups, reinforcing patterns of social segregation and inner-city decline. As early as the 1940s, the historic centre was affected by significant depopulation and social marginalisation, losing nearly 70% of its population between 1940 and 2001 (Lobato & Alves, 2012). The remaining population is disproportionately older and lower-income - a circumstance that increases the importance of age-appropriate open spaces in future urban and green space planning.

Today, however, we observe a reversal of this trend: driven by tourism, investment, and urban upgrading, the city centre has regained attractiveness as a residential and economic location. Simultaneously this development is accompanied by growing socio-spatial inequalities.

Porto's green structure reflects its historical development and remains highly fragmented. Its origins lie in seventeenth-century public promenades, located at scenic viewpoints and equipped with seating and railing elements, as seen in Passeio de Virtudes, Fontainhas, and Jardim de Cordoaria (Farinha Marques & Monteiro, 2023). Later, this system was expanded through tree-lined alleys and larger green areas within the urban perimeter, fulfilling aesthetic, social, and hygienic functions (Mota et al., 2025).



Figure 9 - Passeio das Virtudes, 1920  
Source: Arquivo Municipal do Porto





Figure 10 - Jardim de João Chagas / Cordoaria, 19th Century  
Source: Arquivo Municipal do Porto

Despite this historical development, the current green system lacks functional connectivity and remains spatially uneven (Farinha Marques & Monteiro, 2023). This is also reflected in the distribution and quality of public green spaces: Hoffmann et al. (2017) show that in Porto, 90% of the least deprived neighbourhoods (but only 75.8% of the most deprived ones) have at least one public green space within 800 m walking distance. At the same time, the average distance to an accessible green space is approximately 486 m in the least disadvantaged neighbourhoods and 546 m in the most disadvantaged neighbourhoods. Moreover, green spaces in low-income neighbourhoods are less well-equipped, in worse condition, and are perceived as less safe than those in wealthier areas (Hoffmann et al., 2017). This illustrates the unequal distribution of green space quality in Porto.

Larger green areas are predominantly located in peripheral zones, while the historic urban core has been shaped by private courtyards and gardens, resulting in a scarcity of accessible public open spaces within the city centre. Porto thus offers a concentrated view of the interplay between historic urban morphology, tourism pressure, social inequality and green space deficits, making clear why small-scale, low-threshold strategies such as pocket parks in unused vacant plots take on particular interest. Figure 11 shows the distribution of the larger park structures in Porto and their distribution predominantly outside the historic centre.



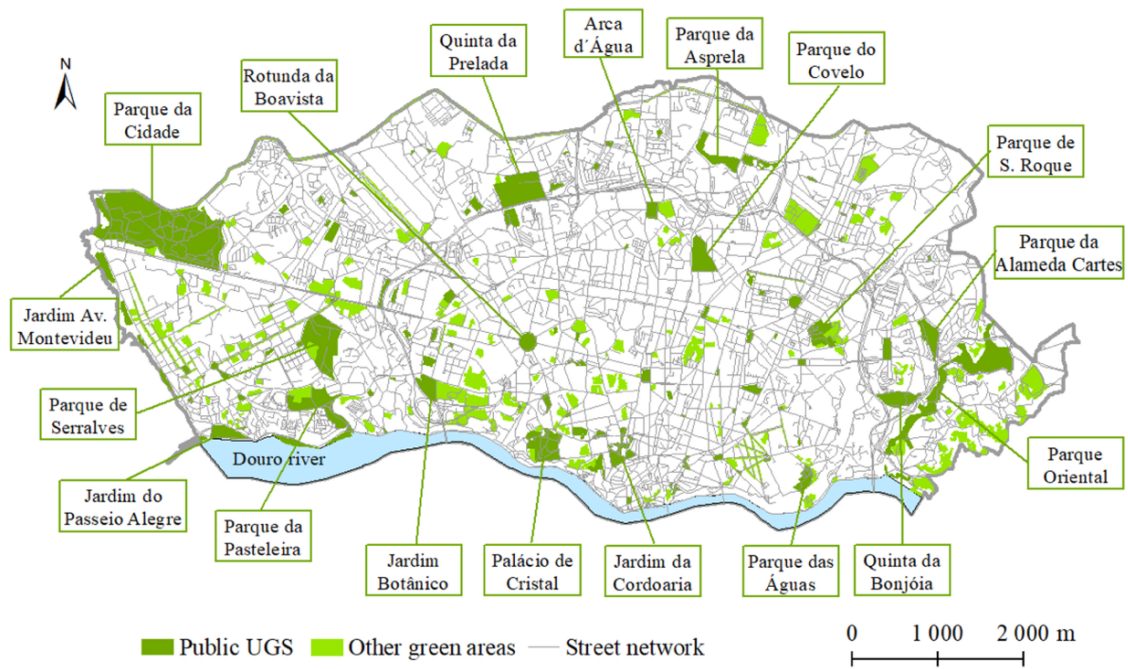


Figure 11 - Urban Green Spaces of Public Access in Porto (2025)  
Source: Alameida & Fonseca, 2025

## 1.4 Vacancy and Listed Buildings in Historic City Centres

Vacancy represents a distinctive phenomenon in many European historic cities and is closely intertwined with processes of urban restructuring and decline. Earlier studies estimated that around 40-42% of all large European cities were shrinking in the late twentieth and early twenty-first century and identified urban shrinkage as an emerging concern for European policymaking (Haase et al., 2013). In these contexts, vacant properties are increasingly understood as the spatial outcome of long-term demographic and economic shifts. They mark areas where usage and ownership structures no longer align, or have not met, with current demands for housing, work and open space.

Simultaneous, literature highlights the potential of vacant plots as a resource for reconfiguring urban form. Scientists, such as Schilling and Logan (2008), argue that in shrinking or restructuring cities, vacant properties can be strategically acquired, consolidated and reused as green infrastructure (GI), for example as pocket parks, community gardens or green corridors, as part of broader “right-sizing” strategies. Much of their work is based on post-war neighbourhoods and residential fabrics from the mid-to late twentieth century, where vacant plots are typically part of relatively standardized building stock. As contrast, the present dissertation examines vacancy in the context of historic city centres and listed buildings, where vacant plots, ruins and underused courtyards are often embedded in dense, small-scale and heritage-protected urban fabrics.

Vacancy encompasses various forms such as undeveloped land (i), ruins with only partially preserved building façades (ii), and vacant houses that are intact but unused (iii). These categories differ by state of preservation: Ruins feature more extensive visible remnants, while fallow land consists of fully built-up or unbuilt land. In historic centres, vacant houses with high renovation needs often dominate. Particularly in cities like Porto, there are sometimes entire areas with old buildings where only the building façade remains, and behind it are dilapidated structures or undeveloped land. The vacant plots, buildings, or properties that I will discuss in this dissertation are, in most cases, structures from category (ii). However, the term is used more broadly to also include buildings that have more than just façade remnants and, for example, have backyards suitable for pocket parks.



Figure 12 - Walled-up Abandoned House in Porto with Unused Green Space Behind the Remained Façade  
Source: Own Image

The phenomenon of vacant houses in Porto can partially be traced back to a housing stock that was subject to strict rent control: Under the Estado Novo, rents in cities like Porto were capped for over forty years (Vázquez, 1992), and many of the leases signed before 1990 are still valid today. The resulting low rents did not cover basic maintenance costs and discouraged renovations (The Portugal News, 2025).

In parallel, new buildings and self-built houses on the urban fringe were often economically more attractive than renovation in the existing stock, due to fewer regulatory constraints and lower land prices (Vázquez, 1992). Over time, the combination of rent control, limited returns, and restrained public investment accelerated the physical decay of the houses in the historic city centre. It contributed to the displacement of low-income households towards the urban periphery, despite a rising share of vacancy.

In Porto's historic centre, UNESCO heritage protection regulations further reinforce these dynamics by strictly regulating interventions in façades, load-bearing structures, window openings, materials, and changes of use, thereby making necessary adaptations more difficult. By 2011 the vacancy rate had reached around 19% in Porto (European

Commission, Joint Research Centre, 2022). With the approval of the revised Municipal Master Plan in 2021, Porto introduced instruments that aim to activate underused plots and pre-existing development rights. Under that law, building projects and property owners lose their permits if no urban planning procedure is initiated within a specified period. This indirectly addresses long-term non-activation of land and speculative ownership of development rights (Câmara Municipal do Porto, PDM 2021).

At the same time, the current legal framework Decreto-Lei n.º 10/2024 (Simplex Urbanístico) also opens up room for manoeuvre: certain measures can be implemented without extensive permitting procedures, facilitating the creation of green spaces behind façades or on derelict plots, for example through maintenance works without structural changes, internal alterations that do not affect structural stability, or small-scale play and recreational areas associated with the main building (MSS Advogados, 2025).

According to Kim et al. (2023), perspectives on urban vacancy have increasingly shifted toward its potential, with vacant properties in urban areas being understood more as an opportunity than a threat to the city: a planning tool to introduce GI, mitigate heat and flood risks and adjust overbuilt structures to current needs. In this dissertation, vacancy is likewise conceptualised as a resource. The term resource thus encompasses both built and unbuilt spaces and their potential to be transformed into green areas, in line with recent approaches that propose reusing vacant properties as GI and as an instrument for rightsizing shrinking cities. In this context, the tension between the heritage value and the utilisation barriers of listed buildings is examined as a spatial opportunity for new public green spaces and green corridors in Porto.

## 2. Theoretical and Conceptual Framework

### 2.1 Definition and Delimitation of Pocket Parks

Pocket parks, also referred to as mini-parks or vest-pocket parks, are small-scale, publicly or semi-publicly accessible green spaces in densely populated urban areas. They combine ecological, social, and spatial functions within a very limited area and are closely tied to their immediate urban environment. In the literature, they are often described as ranging in size from 100 m<sup>2</sup> to 1000 m<sup>2</sup> (National Recreation and Park Association, n.d), although some authors extend this range up to 3,000 m<sup>2</sup> (Wang et al., 2023).

Bruce (2017) describes pocket parks as “pocket sized” spaces, defining them as a “parklettes” - small in stature but addressing a multitude of community” and further describes them as “re-lifed spaces that have missed the economic booms of better times [...] where space is made available for community uses, allowing a link between people, place, and the environment“. Similarly, Spinelli (2010) uses the term “vest-pocket park” for small, natural spaces on vacant plots within a city block that fill gaps in the urban fabric. Bajwoluk and Langer (2023) define pocket parks more broadly as contemporary responses to dense urban development that transform decayed, underused areas into green spaces for recreation and leisure. These interventions often emerge on abandoned parking lots, vacant plots or other underused urban sites and have since diversified in form and function. They have become important everyday resources for the surrounding communities (National Recreation and Park Association, n.d.).

Historically, small gaps in the urban fabric have long been used in similar ways, with patios, cloister gardens, courtyards, and plazas acting as predecessors of today’s pocket park. These spaces have always been shaped by the social and spatial conditions of their time. After the Second World War, for example, many cities began to use vacant land for plazas, parks and playgrounds to improve urban living conditions. One example is Amsterdam, where Aldo van Eyck started in 1947 to transform bomb sites and derelict plots into open, freely accessible playgrounds that offered new spaces for children and neighbourhoods. Playgrounds that had previously been reserved mainly for wealthier residents through paid memberships were turned into everyday public places, fostering social inclusion and community building.





Figure 13 - Playground at Laurierstraat, Amsterdam  
Source: Aldo van Eyck, 1965. Photo by Ed Suister



Figure 14 - Dijkstraat, Amsterdam  
Source: Aldo van Eyck, 1954

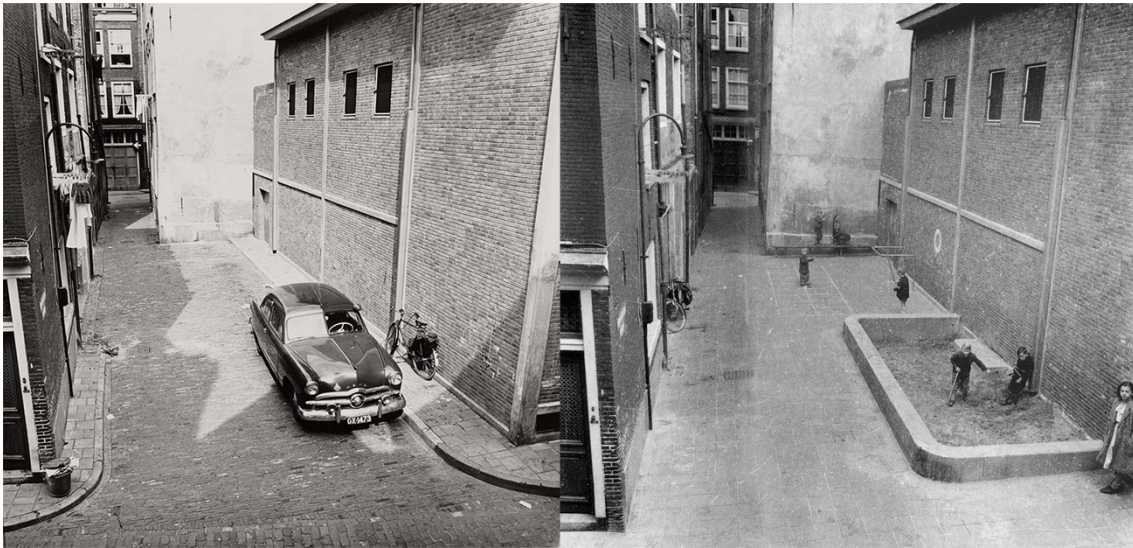


Figure 15 - Playground in Gordijnensteeg, Amsterdam  
Source: Aldo van Eyck, 1965. Photos by Ed Suister

Two decades later, the idea of using small, residual sites as public green spaces also gained awareness in New York. In 1965, the city established the Landmarks Preservation Commission in response to growing concerns about a lack of welcoming public spaces, limited opportunities for community engagement, and the progressive paving over of the urban fabric (American Planning Association, 1967). In 1967 ten vest-pocket parks were completed, drawing inspiration from European “adventure playgrounds”. In the same year, Robert Zion and Harold Breen designed Paley Park (Figure 16) on a vacant plot in the dense business district, creating a sheltered retreat with a waterfall, tree canopy and seating. Those Pocket Parks, one of them the Greenacre Park (Figure 17 and Figure 18), established a new form of local, green public spaces for everyday rest and recreation in dense inner-city areas of New York (Bajwoluk & Langer, 2023, p. 1).





Figure 16 - Paley Park, New York  
Source: Greenpark Foundation



Figure 17 - Greenacre Park During Construction (1971)  
Source: Greenacre Foundation, n.d.





Figure 18 - Greenacre Park  
Source: Greenacre Foundation, n.d.

Rather than being defined by fixed parameters, pocket parks are characterized by their multi-functionality. They combine ecological and social functions in a very limited area, ranging from microclimatic cooling to the creation of habitats for urban biodiversity. They also incorporate social use, increased permeability and water retention, as well as the partial unsealing of the urban fabric. In compact cities, where intensive development fragments and reduces land for green spaces, pocket parks enable an increase in the number and spatial distribution of green spaces (Nordh et al., 2009) and provide local recreational spaces and building blocks of urban green infrastructure.

The drawing in Figure 19 translates this logic to various types of green spaces that closely relate to pocket parks - including green strips, street trees, small gardens, community gardens and urban forest fragments - and illustrates how they can function as stepping stones within a wider urban green network. Within the framework of this dissertation, pocket parks are therefore understood as one element within a broader spectrum of green spaces, intended to connect urban vegetation.



#### PUBLIC GARDENS

- CAN BE HISTORICALLY BASED, MOSTLY FENCED
- OFTEN BOTANICAL GARDENS, ARBOREUMS OR PROMENADES
- CURATED PLANT COLLECTION; FORMAL GARDEN



#### COMMUNITY COURTYARD

- GREEN SPACE IN HOUSING BLOCKS
- OFTEN USED FOR URBAN GARDENING OR PLAYGROUNDS



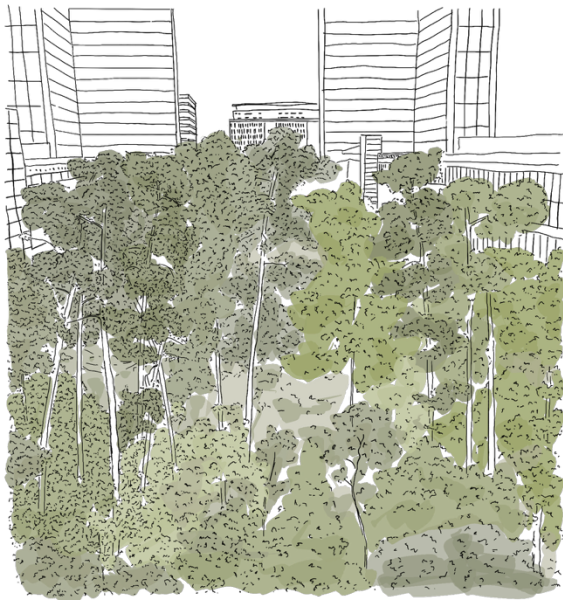
#### CITY PARKS

- LARGE SCALE
- PUBLIC ACCESSIBLE



#### STREET GREENERY

- PUBLIC GREENSPACES ALONGSIDE ROADS, PATHWAYS OR IN BETWEEN HOUSES
- MAIN ELEMENT FOR GREEN CORRIDORS!



#### URBAN FOREST

- HIGH DENSITY OF TREES
- PUBLIC ACCESSIBLE, VALUABLE COOLING EFFECTS + BIODIVERSITY

Figure 19 - Five Elements of Green Spaces for UGI  
Source: Own Illustration



In terms of design, pocket parks vary according to the number of green elements, surface types, seating options, play and sports facilities, artistic elements, and water or retention solutions. Pocket parks do not have to be completely green, as Nordh et al. (2009) note. They can be understood as “urban living rooms” that absorb and reshape local everyday practices. Most often, however, they feature a ‘key element’ that characterizes them and distinguishes them from other green spaces (Koudouna & Economou, 2020, p. 3). Some spaces tell stories of cultural interpretation and/or historical expression, whilst others help to heal the landscape, waterways, or communities. Some are carefully planned and highly detailed, while others are more organic or temporary, combining “hard” and “soft” elements and providing opportunities for art, play, discovery, and learning (Bruce, 2017). Over time, the discourse on pocket parks has shifted: while early examples strongly emphasized the provision of green spaces and recreational areas, contemporary approaches increasingly understand them as social spaces that enable active participation, co-production, and everyday use by local communities (Babalís, 2020).



Figure 20 - Passage 56, Paris  
Source: atelier d'architecture autogérée, n.d.<sup>2</sup>

Today, the initial conditions have changed - economic restructuring, vacancy and extensive sealing are more influential than war damage - but the central question remains similar: how can small, already available spaces be designed so that they bring missing qualities of stay, social contact and climatic relief into everyday life? The spaces usually already exist - and so does the demand - the crucial step is to be able to “read”

<sup>2</sup> The Pocket Park 'Passage 56' was a former passageway that was closed off after the construction of a new building. It was considered unsuitable for house construction, as it was lined with many windows and appeared abandoned. Now it is a public, green community space.

each place: its spatial structure, circulation patterns, existing uses, atmospheres, and financial and construction constraints.

A pocket park therefore does not follow a rigid template, but is adapted to the visitors, the neighbourhood, the urban context and the available resources. As Whyte (1980) observed in New York's public plazas, factors such as sun exposure, wind protection, movable seating and simple food offerings can decisively influence whether a small urban space is lively or empty. In this sense, a pocket park always operates as a socialscape: its quality emerges not only from its physical form, but from the way social practices, microclimate and spatial configuration interact. Ultimately, the quality of a pocket park emerges where design, use and context are brought into a coherent balance.

Synthesised from the literature (see Nordh et al., 2009; Zhou, 2024), pocket parks can be distinguished from three other types of urban green space. First, they do not function like classic city and landscape parks, which act as larger, independent recreational spaces in urban areas. Second, they are not comparable to private or semi-private green areas, such as courtyards, roof gardens or interim uses without public access, even if these may be similar in size or design. Third, temporary green interventions only fall under the definition of a pocket park if they are publicly accessible and function as usable urban open space within the urban fabric (Future of London, 2021). Although these other urban green spaces may exhibit similar design qualities, they do not necessarily fulfil the central conditions of pocket parks: at least temporary public accessibility or a clearly defined semi-public user group. In this sense, pocket parks are treated as one specific form of small, social public green space within wider green corridors and urban green infrastructure networks. Acting as spatial linking elements for example along streets, paths or other existing vegetation structures.

*Cities need green sizes S, M, L and XL,  
otherwise the human ecosystem is incomplete.*

Within the framework of this dissertation pocket parks are explicitly examined as interventions in vacant sites in the historic city centre of Porto. It investigates whether and how temporary or long-term redesigns impact Porto's quality of life and ecological functions. This approach is particularly relevant for the historic city centre, where space is limited and there is a high demand for climate-friendly, socially inclusive spaces (Egerer et al., 2024).

To illustrate the distribution of urban green spaces in Porto, Figure 21 shows three zones that refer with the municipal green space survey. In Zone 1 (historic centre and Foz Velha), only areas of at least 200 m<sup>2</sup> were mapped, according to the minimum mappable area defined for this zone (Área Mínima Mapeável, AMM) (Câmara Municipal do Porto, 2018). Very small and highly fragmented green strips in the dense inner-city fabric are not captured in the quantitative data used here. Under this methodology, Zone 1 shows an overall share of 16.3% urban green space, of which 6.0% consists of publicly accessible parks, gardens, and squares. Since this dissertation excludes Foz Velha, the effective share of green space in the historic city centre is lower than the reported 16.3%, which indicates that the proportion of green spaces in the city centre is remarkably low and unconnected. At the city scale, urban green spaces cover about 13.14 km<sup>2</sup>, corresponding to roughly 31.72% of the municipal area, with larger green spaces located in the outer urban ring, particularly towards the east and west (Câmara Municipal do Porto, 2018). Connecting these existing areas and transforming vacant and underused land into additional green spaces could form green corridors, a topic addressed in the following chapters of this dissertation.

Figure 22 shows the distribution and type of green spaces in the UNESCO historic city centre alongside a Proposal for Tree planting in 2019 (Câmara Municipal do Porto, 2021). The map shows that in 2019, a large proportion of the green spaces were privately owned and only a few public green spaces existed in the UNESCO historic city centre.



Figure 21 - Areas of the City of Porto Corresponding to Zones 1 (Historical Area), 2 (Centre) and 3 (Outer Ring)  
Source: Câmara Municipal do Porto, 2018

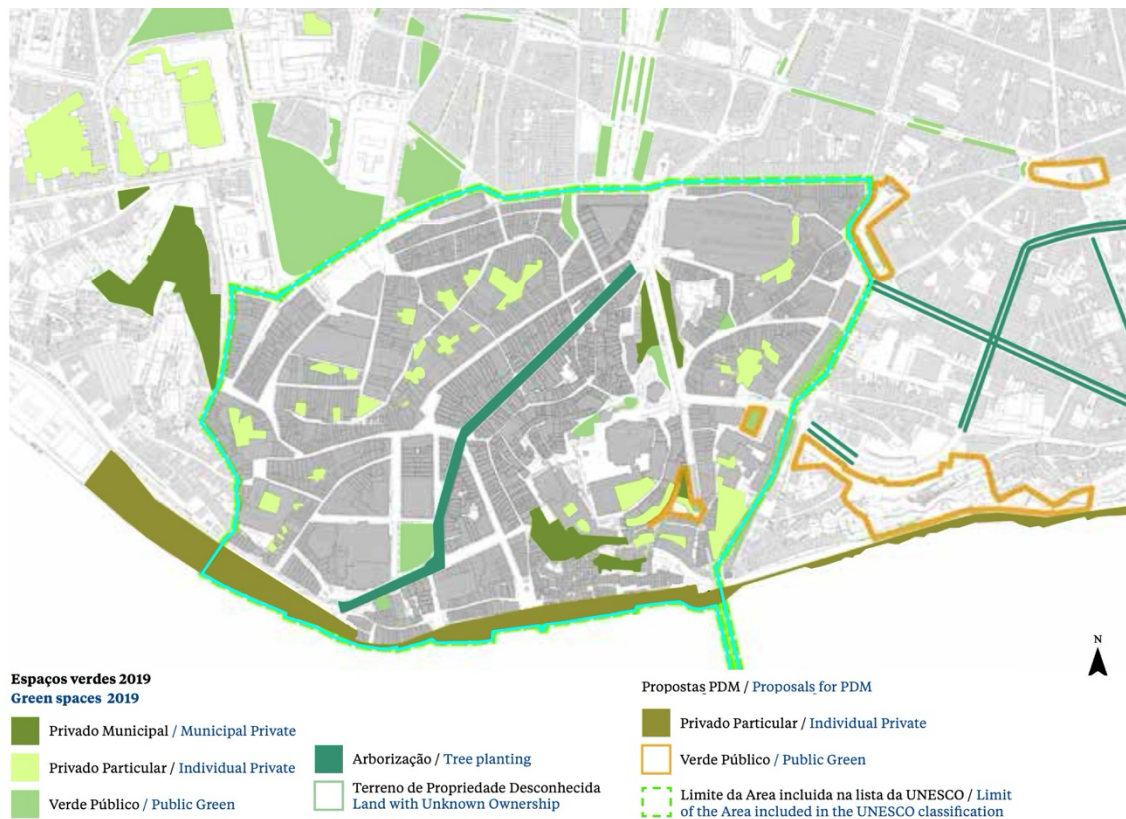


Figure 22 - Green Spaces in Porto's Historic City Centre 2019  
Source: Câmara Municipal do Porto, 2021



## 2.2 Importance of Pocket Parks for Urban Green Infrastructure

Compact urban development leads to the miniaturization and fragmentation of available space, limiting the creation of large parks and shifting the focus to micro-green spaces such as pocket parks (Zhou, 2024; Cheshmehzangi, 2022). This shift in planning focuses on small, decentralised green spaces and opens new possibilities for action in dense urban areas. It allows cities to reduce heat, improve air quality and water infiltration (Rajkovich & Holmes, 2022), and create places for rest and social interaction, even where space and construction budgets are limited.

The literature indicates that such small green spaces, when spatially connected, can form networks that facilitate ecological dispersal and movement and support the flow of ecosystem services in the city (Hansen & Pauleit, 2014). Hecker and Rosan (2016) describe pocket parks as integral parts of urban green infrastructure (UGI) systems alongside other vegetated surfaces such as lawns and street trees, while Ferguson et al. (2018) additionally emphasise the role of domestic gardens and green roofs. Their functions partly overlap: they provide nearby, short-term recreation and social quality of stay while contributing to climatic regulation through shading, evapotranspiration, and improved air exchange, thereby helping to mitigate UHI effects.

Pocket parks should not be regarded as isolated objects but as components within a larger green system, embedded in an urban network of natural and designed spaces. In this sense, they are not small leftover plots but integral components of the UGI, nature-based solutions (NBS), and climate adaptation strategies. In this context, pocket parks can also function as climate refuges, that is, small, easily accessible green spaces that offer shade, cooling and shelter during heatwaves, particularly for vulnerable groups. Their role is to connect ecological, social, and economic qualities while remaining resource-efficient and multifunctional (European Commission, 2015).

Nordh et al. (2009) perceived the restorative quality of small parks varies between sites but can reach high levels even in very small parks when vegetation structure and park components are carefully designed. Based on these findings, pocket parks can be understood to increase the number and distribution of green spaces in densifying cities, with their impact depending less on size than on their strategic position within the urban

system. As elements of GI, they can contribute to habitat connectivity by acting as stepping stones within corridors (e.g. street greenery, avenues, façade and rooftop greenery) and open-space systems, thereby enabling the movement and dispersal of species (Ikin et al., 2013).

Large-scale strategies such as the Paris greening programme and the 2024-2030 Climate Action Plan show how different types of green spaces can be combined into a coherent GI network for cooling and climate adaptation. In Paris, measures include roadside and promenade tree planting, the conversion of parking spaces into vegetated areas, the creation of “oasis” schoolyards and small squares, and the establishment of micro-forests on limited plots. These interventions span a continuum from shaded pockets parks and green strips along streets to larger parks and urban forest patches, demonstrating how different surface types and sizes jointly contribute to microclimatic regulation and biodiversity.



Figure 23 - The Unsealing of Place de Catalogne, Paris  
Source: Ville de Paris (2024). Credits: Guillaume Bontemps



Figure 24 - Aerial View of Place de Catalogne After Unsealing and Installing an Urban Forest, Paris  
Source: Ville de Paris (2024). Credits: Guillaume Bontemps

Landscape architecture plays a central role in mediating between spatial design, ecological function and social use, requiring an understanding of these interrelations and of what is actually feasible on site. The focus shifts from object-based design towards a more process-oriented understanding of the city: away from a relationship of “you” and “I” towards a collective “we”, in which users and residents actively participate in the shaping and maintenance of green spaces.

## 2.3 Pocket Parks as Instruments of Urban Systems

When understood as spatial interventions, pocket parks emerge as sites where ecological processes, social practices, and local governance intersect. This understanding allows them to be analysed through socio-ecological systems thinking, the concept of the urban commons, and the more action-oriented logic of tactical urbanism.

From a socio-ecological perspective, pocket parks are part of an **urban system** in which environmental functions, social use, and spatial form continuously interact. At the local level, they can improve microclimatic comfort, while at the neighbourhood scale they support everyday recreation, short walking access to greenery, and opportunities for social encounter. Even minor spatial changes can produce visible short-term improvements in quality of stay while also contributing to longer-term ecological resilience.

A second useful lens is the concept of the **urban commons**. In this framework, urban space is not understood only as administratively managed public land or as private property, but as a shared resource whose value emerges through collective use, care, and negotiation. Pocket parks can take on this role when they are not merely delivered as finished design objects but become spaces of commoning, that is, places shaped through participation, local stewardship, and shared responsibility. The aim is long-term collective management rather than the one-off provision of a physical product. This perspective is important because it sharpens the political dimension of pocket parks: their success depends not only on design quality but also on whether they remain genuinely accessible, socially embedded, and protected from exclusionary logics of improvement. Reasons why residents refrain from participation need to be carefully analysed and addressed. Studies on urban agriculture and community gardens identify several factors that can negatively affect the motivation to participate, including difficult access to the sites (Holland, 2011), experiences of theft and vandalism (Ilyniak & Khuns, 2013; Teig et al., 2009), racism, and a lack of time or availability to devote to gardening activities (Meenar & Hoover, 2012). There seems to still be a lack of detailed characterisation of these barriers in many contexts, which makes it difficult to design participation processes that are both inclusive and resilient to such challenges.





Figure 25 - Horta de Vilar, Porto  
Source: Own image, showing a Courtyard Community Garden in Porto

A third perspective is **tactical urbanism**. This approach focuses on small-scale, low-threshold interventions that allow spatial changes to be made quickly. Pocket parks fit this logic particularly well when they appear as temporary uses on vacant sites and are later further developed or redesigned. Their value lies in showing that even very small places - when well-located and carefully designed - can have noticeable effects on

comfort, use, and how the neighbourhood is perceived, and can thus help to initiate larger renewal processes - often referred to as “**urban acupuncture**”.

Finally, pocket parks can be understood as small-scale NBS. They work with vegetative and climate-regulating processes to address heat stress, soil sealing, and a lack of quality public space, particularly in dense neighbourhoods and historic centres. At the same time, critiques of NBS caution against a purely technical framing: when such interventions are discussed only in terms of efficiency and design quality, their social and political implications - such as gentrification, displacement, or exclusion - remain invisible. For pocket parks in vacant plots, this means that their potential is only fully realised when ecological, design, and social dimensions are considered together and embedded in inclusive, long-term governance and use structures.

## 3. Climate, Ecological and Social Functions

### 3.1 Climate mitigation

Urban microclimate refers to the climatic conditions at small spatial scales, for example within a street canyon, courtyard, or city block (Rajkovich & Holmes, 2022). In dense historic city centres, these microclimates are strongly shaped by compact urban form and building density. The use of heat-retaining materials with low-albedo<sup>3</sup> (such as natural stone, asphalt, and concrete) promote heat accumulation; Narrow streets reduce air circulation, while sparse vegetation limits evaporative cooling (Oke, 1987; Santamouris, 2001; Wong & Chen, 2009).

At the same time, heritage protection requirements often constrain large-scale structural interventions, making climate adaptation more challenging than in newer urban areas. In many historic city centres, compact perimeter blocks, narrow streets, and fragmented property structures limit the possibilities for creating large new parks. In these contexts, small-scale interventions such as street trees, façade and rooftop greenery, and pocket parks become pragmatic ways of introducing green infrastructure into the existing fabric. In Porto, these pressures overlap particularly in the historic core, where narrow roads, steep slopes and built-over waterways hinder surface runoff and restrict ventilation.

The UHI effect describes the phenomenon whereby significantly higher temperatures are measured in cities than in their rural or suburban surroundings (Arup, 2016, p. 24). It has become an environmental and public health concern in Southern Europe, as more frequent and intense heat waves have led to rising heat-related mortality and increased pressure on health systems and energy demand (Costa, 2026).

In Portugal, recent summers have been among the warmest and driest on record and even northern cities such as Porto, have experienced significantly increased mortality rates during extreme heat periods (Lusa, 2026). The Portuguese Institute for Sea and Atmosphere (IPMA) states that the year 2025 was the 5th warmest since 1931 (Figure 26) and the 3rd wettest of this century in mainland Portugal (January 2026).

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<sup>3</sup> Albedo describes the reflectivity of surfaces and indicates how much sunlight is reflected. Light surfaces have a higher albedo than dark ones and therefore have a cooling effect, in contrast to dark surfaces, which lead to heating.

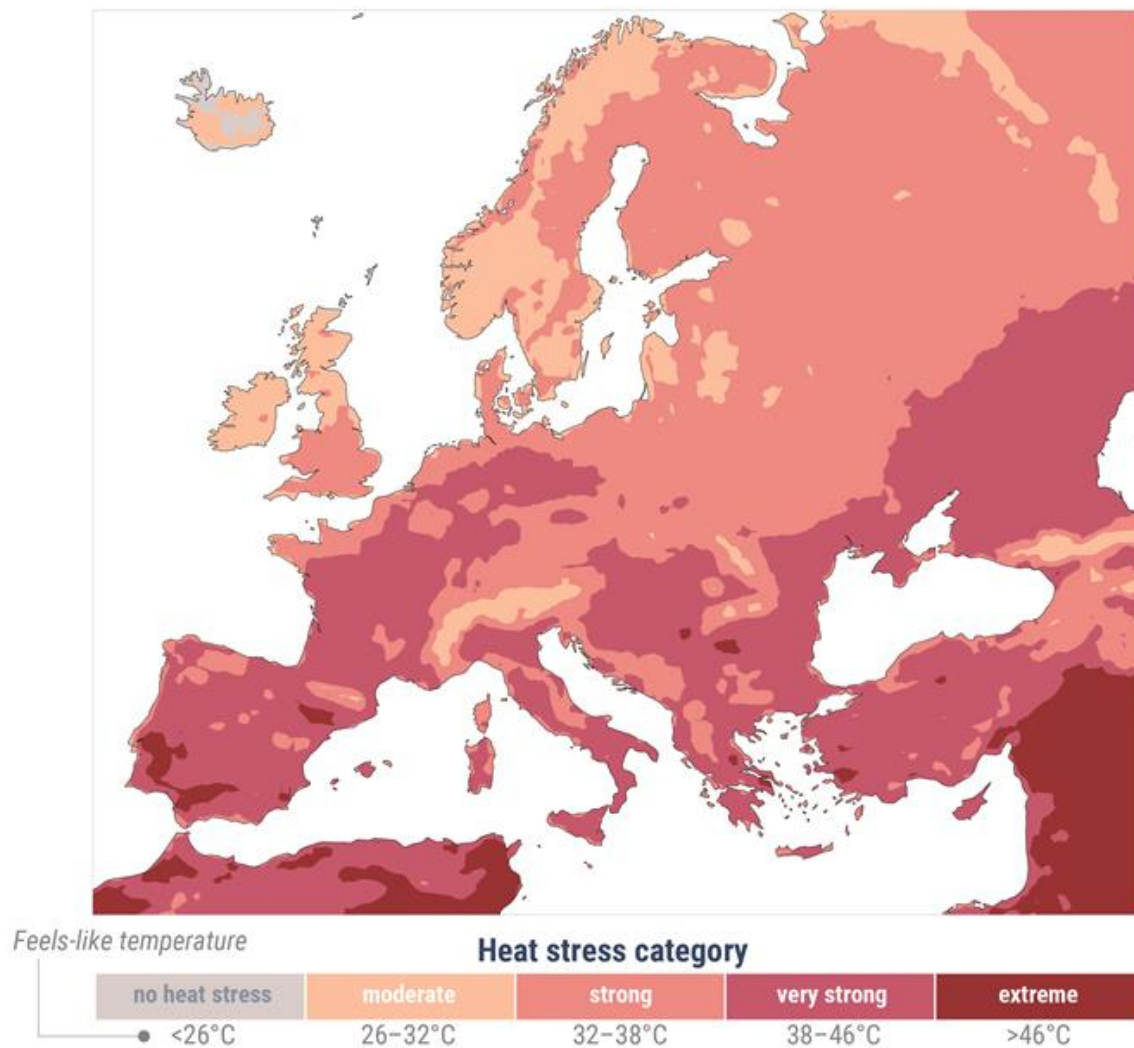


Figure 26 - Maximum Heat Stress Category Experienced in Summer 2025, Europe

Source: ERA5-HEAT UTCI- Credit: C3S ECMWF. <https://climate.copernicus.eu/european-summer-2025-hot-west-and-south-dry-southeast>

In Porto, thermal anomalies occur mostly in highly sealed areas, such as the city centre, especially in narrow, topographically constrained and heritage-protected areas (Farinha Marques & Monteiro, 2025). The North Portuguese climate results in a patchwork of heat-stress zones in summer, while intense rainfall in winter creates cooler, humid, shaded spaces, causing thermal discomfort across much of the year (Farinha Marques & Monteiro, 2025). The following maps illustrate climatic stressors in Porto, such as heat (Figure 27) and heavy rainfall events (Figure 28). From an urban planning perspective, expanding and improving UGI is one of the most effective strategies for mitigating the UHI effect. Vegetation lowers surface temperatures through shading and evapotranspiration: measurements show that grass surfaces can be up to 19 °C cooler than asphalt and 15 °C cooler than concrete (Ca et al., 1998; Arup, 2016). Even small increases in green cover can lead to measurable cooling and, in individual modelling



studies, temperature reductions of up to 2.5 °C (Gill et al., 2007; Arup, 2016). In addition, the colour and albedo of surfaces play an important role: light-coloured, highly reflective pavements and façades absorb less solar radiation than dark materials and therefore contribute less to local warming (Turhan et al., 2023).

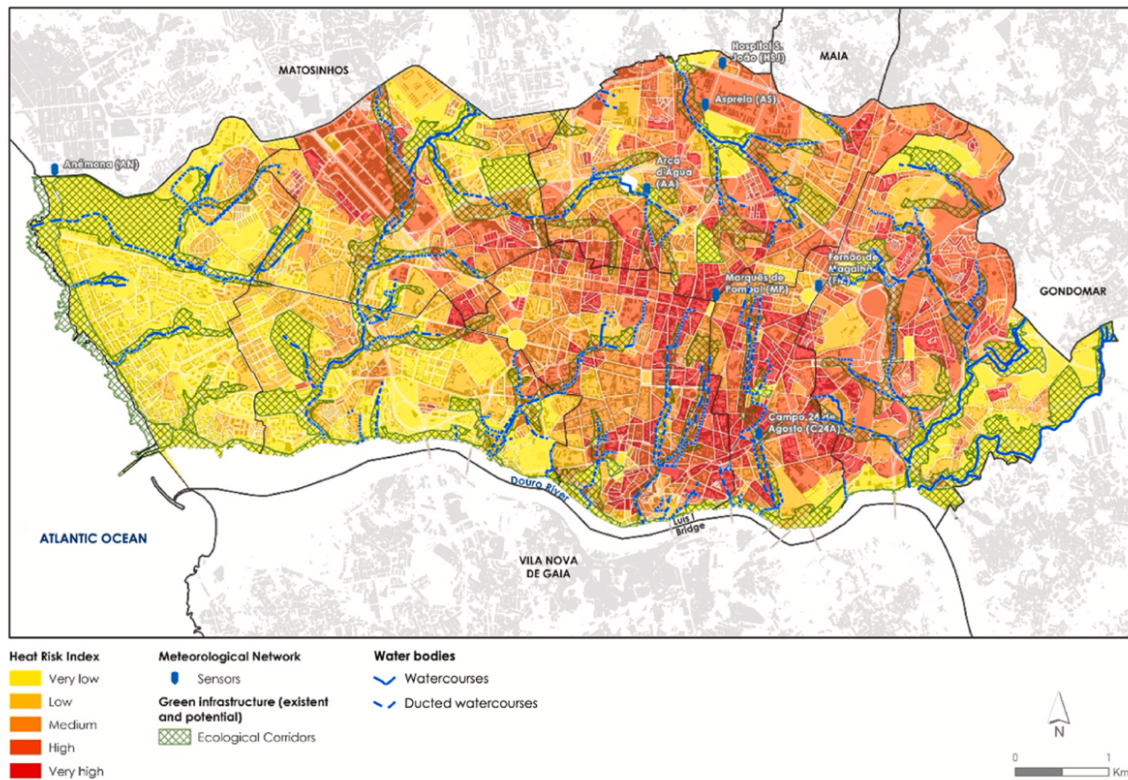


Figure 27 - Heat Risk Index (HRI), Green Infrastructure (Potential and Existing) and Distribution of Meteorological Network in the Municipality of Porto, 2025  
Source: Lopes et al., 2025, p. 10

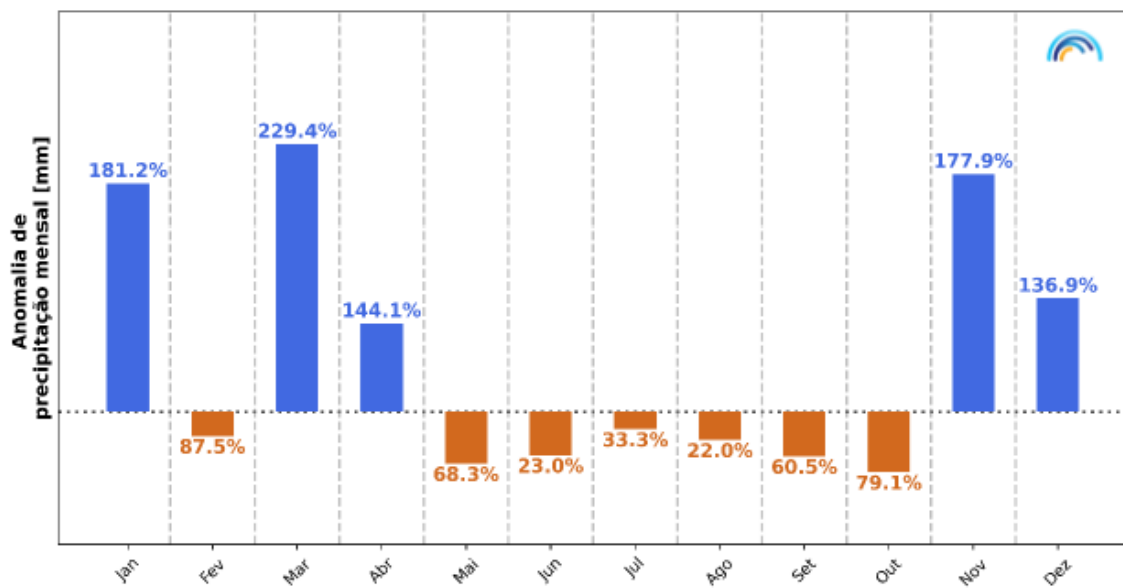


Figure 28 - Deviations of Total Annual Precipitation in Porto 2025 from the 1991-2020 Average Value  
Source: IPMA, 2026. <https://www.ipma.pt/pt/media/noticias/news.detail.jsp?y=2026&f=boletim-climatologico-anual-2025.html>

The microclimatic functions of small green spaces are particularly relevant in historic Southern European cities, where high levels of surface sealing and strongly articulated topography create mosaic patterns of thermal stress. In Porto, the whole municipality has shifted within a century from a “green city” with around 76 % green-space coverage in 1892 to a “grey city” with approximately 29 % in 2000 (Madureira, 2011). The Environmental Declaration<sup>4</sup> of the second Porto Master Plan (PDM) therefore emphasises the enhancement of green and open spaces, increased soil permeability, the reduction of existing environmental dissonances<sup>5</sup> and the promotion of linear street tree planting<sup>6</sup> to reduce urban heat islands, promote biodiversity and sequester CO<sub>2</sub>. In this context, small, strategically placed green spaces and tree-shaded seating areas can provide important micro-refuges within walking distance of dwellings and everyday routes (Farinha Marques & Monteiro, 2025).

Urban microclimate is also shaped by hydrological dynamics. Vegetation intercepts rainfall, slows surface runoff, and increases infiltration. As a result, it can help to relieve overloaded drainage systems and reduce flood risk during extreme rainfall events (Arup, 2016; Farinha Marques & Monteiro, 2025). Trees with dense canopies intercept a

<sup>4</sup> Declaração Ambiental

<sup>5</sup> Dissonâncias ambientais

<sup>6</sup> Arborização linear

substantial share of precipitation, while root systems significantly enhance soil infiltration capacity - a particularly important aspect in historic districts such as Porto, where sealed surfaces, culverted waterways and ageing drainage infrastructure exacerbate flooding (Farinha Marques & Monteiro, 2025). When small areas are used as swales, rain or infiltration gardens, such as vegetated vacant plots, they can function as micro-scale stormwater infrastructure that complements conventional pipe systems while simultaneously improving the quality of outdoor spaces (Arup, 2016). For Portugal, effective water management has become increasingly important due to intense winter rainfall events: IPMA's winter 2025 report (Figure 29) shows that it was the rainiest winter of the last 47 years, with accumulated rainfall reaching 905.6 mm between October 2025 and January 2026 - around 1.8 times the average hydrological-year value.

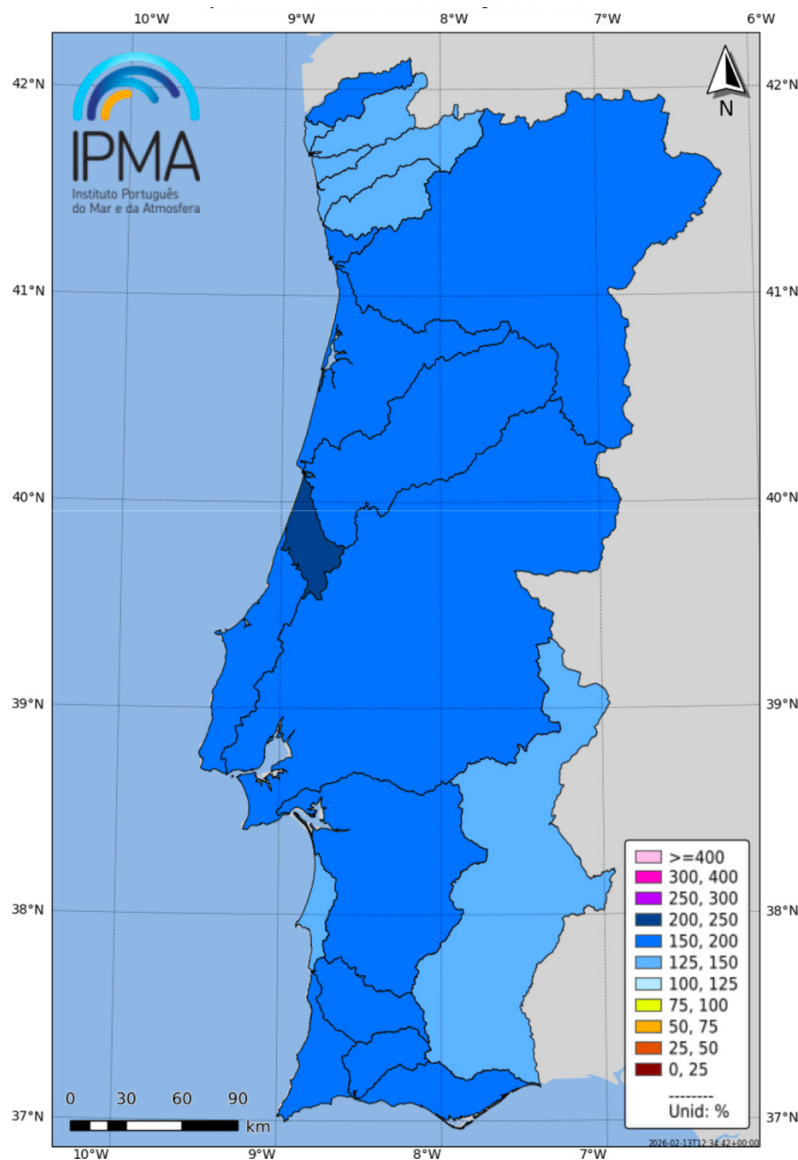


Figure 29 - Percentage of Total Precipitation in Relation to Normal 1991-2020, Hydrological Year 2025 (Oct-Sept)  
Source: Instituto Português do Mar e da Atmosfera, 2026

Studies also show that the microclimatic performance of green spaces depends strongly on their specific design and integration into the urban fabric. Structurally diverse combinations of trees and open grassland - sometimes described as a “savannah approach” - can combine shade, air movement and visual openness in ways that optimise cooling performance (Egerer et al., 2024). In addition, green elements such as vegetated façades, roofs and street greenery help filter air pollutants and dampen traffic noise, creating small zones of cooler, cleaner and quieter air (Arup, 2016). Figure 30 illustrates the severely degraded air quality, particularly in the densely built-up areas of Porto, where such measures would make a significant contribution. Design guidelines that recommend tree and shrub coverage of more than 30%, and an impermeable surface of less than 50% within a park, underline that it is not simply the presence of green spaces, but their density, structure and spatial arrangement that are associated with measurable thermal and air-filtering effects (Chang & Li, 2014).

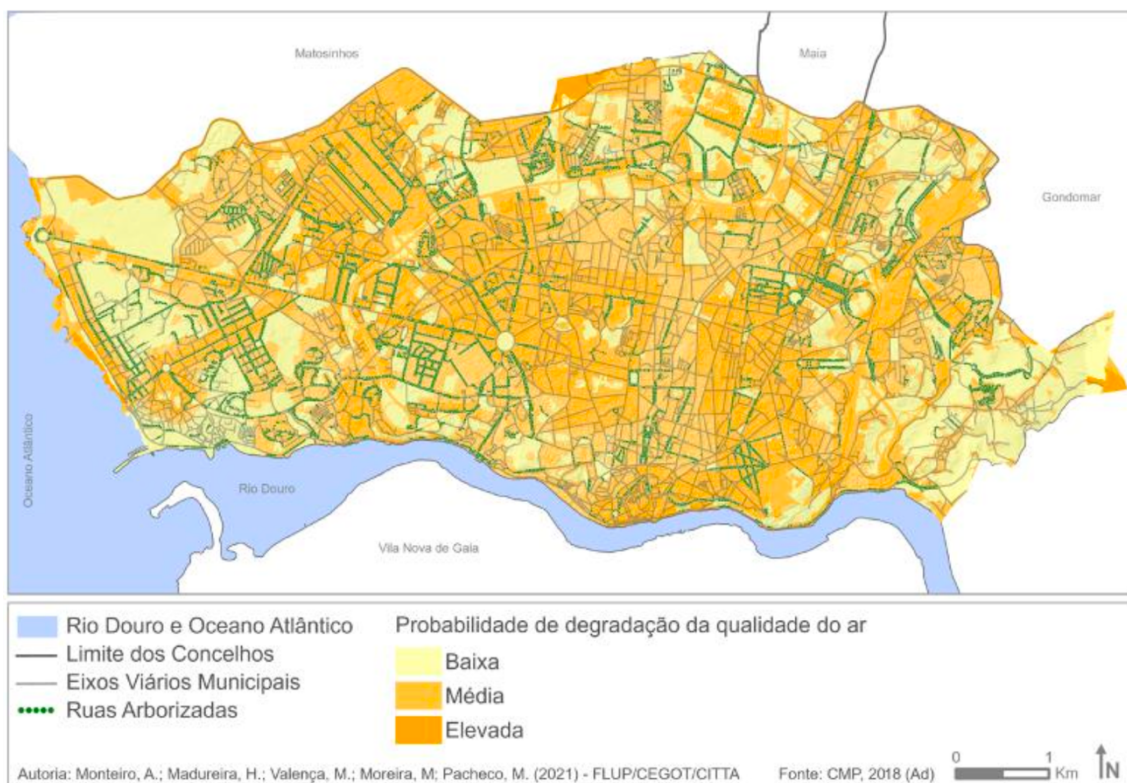


Figure 30 - Probability of Air Quality Degradation, 2021

Source: Monteiro et al., 2021, FLUP/CEGOT/CITTA, based on CMP, 2018 (adapted from Plano de Arborização da Cidade do Porto, Câmara Municipal do Porto, p.106)



Soltanifard and Amani-Beni (2025) emphasise that cooling effects become particularly effective when greenery is conceived as a connected system of corridors and multiple green spaces. Lin et al. (2017) similarly suggest that, at the city scale, the connectivity of green spaces is a key condition for allowing cooler air from parks and greenways to extend into adjacent neighbourhoods.

Beyond measurable temperature differences, the microclimatic role of pocket parks is closely to their social use and the ways in which people experience local climatic conditions. Cooler, more comfortable and aesthetically appealing small green spaces encourage people to stay longer, visit more frequently and use outdoor spaces in more diverse ways (Egerer et al. 2024). Visit duration and frequency are thereby shaped by structural characteristics such as tree density, perceived biodiversity and local microclimatic conditions (Egerer et al., 2024). Residents often perceive such small parks as upgrading the neighbourhood environment and improving quality of life, particularly where they support social interaction and everyday recreation (Koudouna & Economou, 2020). This social dimension is explored in more detail in Chapter 3.3.

Table 2 summarises key microclimatic issues and proposes small-scale green measures for pocket parks in historic city centres such as Porto.

| Microclimatic challenges                      | Urban context, causes and pressures                                                                                   | Small-scale mitigation measures                                                                                                                                                                                                                                                                              |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Urban heat island (UHI) and local heat stress | Compact urban form, high building density; Sealed and low-albedo surfaces; Low vegetation cover; Heritage constraints | Plant well-structured and dense vegetation (trees, shrubs, groundcover); Unseal and replace asphalt/ concrete with permeable, vegetated surfaces; Use high-albedo, light-coloured materials; Increase shading (trees, pergolas, canopies); implement “green oases” / small urban green spaces                |
| Intense rainfall and stormwater               | High surface sealing; obsolete or undersized drainage infrastructure and waterways; steep slopes concentrating runoff | Unseal and restore soils to increase infiltration; Implement rain and infiltration gardens on small plots and courtyards; Plant vegetation to intercept rainfall and slow runoff; Use vegetated vacant plots as micro-scale retention and delay volumes; Combine stormwater functions with small open spaces |
| Air quality                                   | Traffic-related emissions in narrow streets; limited ventilation                                                      | Trees and greenery along sidewalks and squares; Green façades and roofs to filter pollutants and dampen noise; Create shaded seating and waiting areas along everyday routes (pocket parks, squares)                                                                                                         |

Table 2 - Microclimatic Effects in Historic City Centres

## 3.2 Increasing Urban Biodiversity and Associated Ecosystem Services

Urban biodiversity refers to the variety of species, habitats and ecological interactions found within cities and underpins key ecosystem services such as pollination, seed dispersal, pest regulation, cooling, carbon storage and health-promoting experiences of nature (Cardinale et al., 2006; Hector & Bagchi, 2007; Arup, 2014).

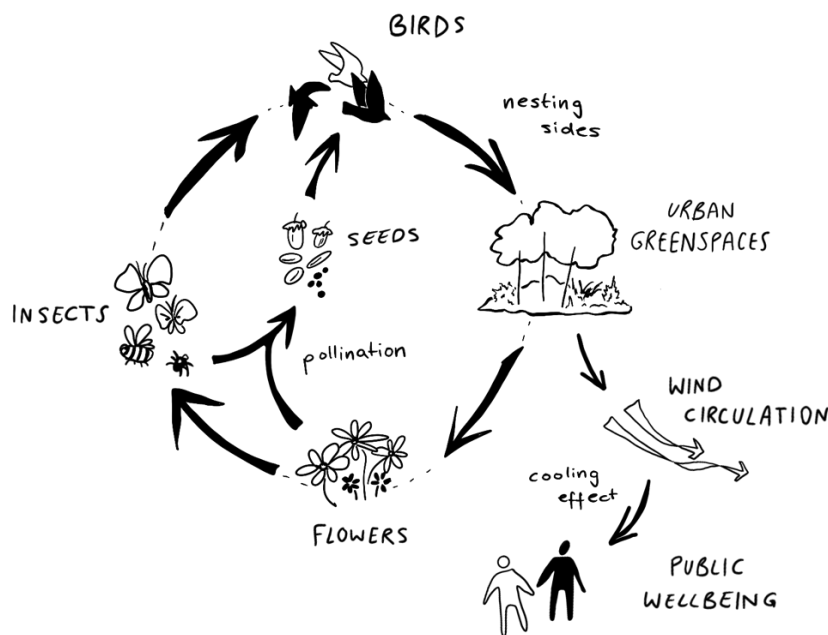


Figure 31 - Cycles and Interrelationships of Urban Greenspaces  
Source: Own Illustration

As cities densify and green spaces are lost, heat intensifies (Kaye et al., 2006), biodiversity generally declines (McKinney & Lockwood, 1999; Hahs et al., 2009) and air quality deteriorates (Xu, Haase and Pauleit, 2018), with negative impacts on human health and wellbeing (WHO, 2016). Biodiversity makes cities not only more ecologically resilient but also more economically and socially attractive. They, for example, providing opportunities to experience nature and contributing to lively everyday environments (Arup, 2014).

Habitat reduction and fragmentation are exacerbated by roads, railways and other infrastructure, so that formerly continuous habitats are broken into isolated remnants (Forman, 1995; Bennett, 1999; Fahrig, 2003). High residential densities and the dominance of parks with a limited range of plant species often support only a few species and individuals, even though they could function as important stepping stones within the urban fabric (Threlfall et al., 2017; Egerer et al., 2024). Simply adding greenery does not automatically translate into higher biodiversity when structurally rich habitats, large trees and connectivity are absent. The relationship between landscape composition and configuration can also be understood through the lens of habitat loss and habitat fragmentation, and there is growing interest in their relative importance for biodiversity (Fahrig, 2003; Lindenmayer & Fischer, 2006; Laurance, 2008; Thornton et al., 2011).

Recent research shows that small urban green spaces - including pocket parks - can contribute to biodiversity when they combine habitat quality and connectivity. Studies on the “single large or several small” (SLOSS) debate suggest that a constellation of several small patches can, through accumulation effects, support higher overall species richness than a single large site of equal total area (Riva & Fahrig, 2023; Egerer et al., 2024). Their ability to support biodiversity depends on plant species diversity, structural complexity (e.g. canopy, shrub and herb layers) and the surrounding degree of urbanisation (Threlfall et al., 2017; Egerer et al., 2024). Connectivity is key: small green spaces are most effective when they are not isolated but linked to other green and blue areas via corridors, street trees and further stepping stones (Soga et al., 2014; Ikin et al., 2013; Egerer et al., 2024). As spatial implementations NBS, pocket parks thus function both as decentralised habitats and as “stepping stones” that weave together fragmented patterns in ecological and social terms (Bajwoluk & Langer, 2023; Babalis, 2020; Surma, 2013).

Plant selection and habitat design are as crucial for biodiversity as the area itself. Different plant types provide different functions: deciduous trees, with their higher stomatal conductance, are effective at filtering gaseous air pollutants and are less sensitive to air pollution, whereas evergreen conifers - thanks to their needles and crown structure - capture particulate matter such as fine dust throughout the year (Stolt, 1982, cited in Forest Research, 2010; Arup, 2016). Smaller plants such as grasses, perennials and mosses are suitable for very limited spaces, help to provide cooling and bind



particles, are often low-maintenance and can complement pocket parks in narrow street canyons (Arup, 2016). At the same time, studies indicate that a heterogeneous mosaic of native and selected non-native species can be appropriate in urban contexts: some non-native pioneer species provide important food sources in winter or initiate ecological succession, so that the exclusive use of native species does not offer a straightforward response to biodiversity loss (Rastandeh et al., 2017; Clément, 2006; Hough, 1990).

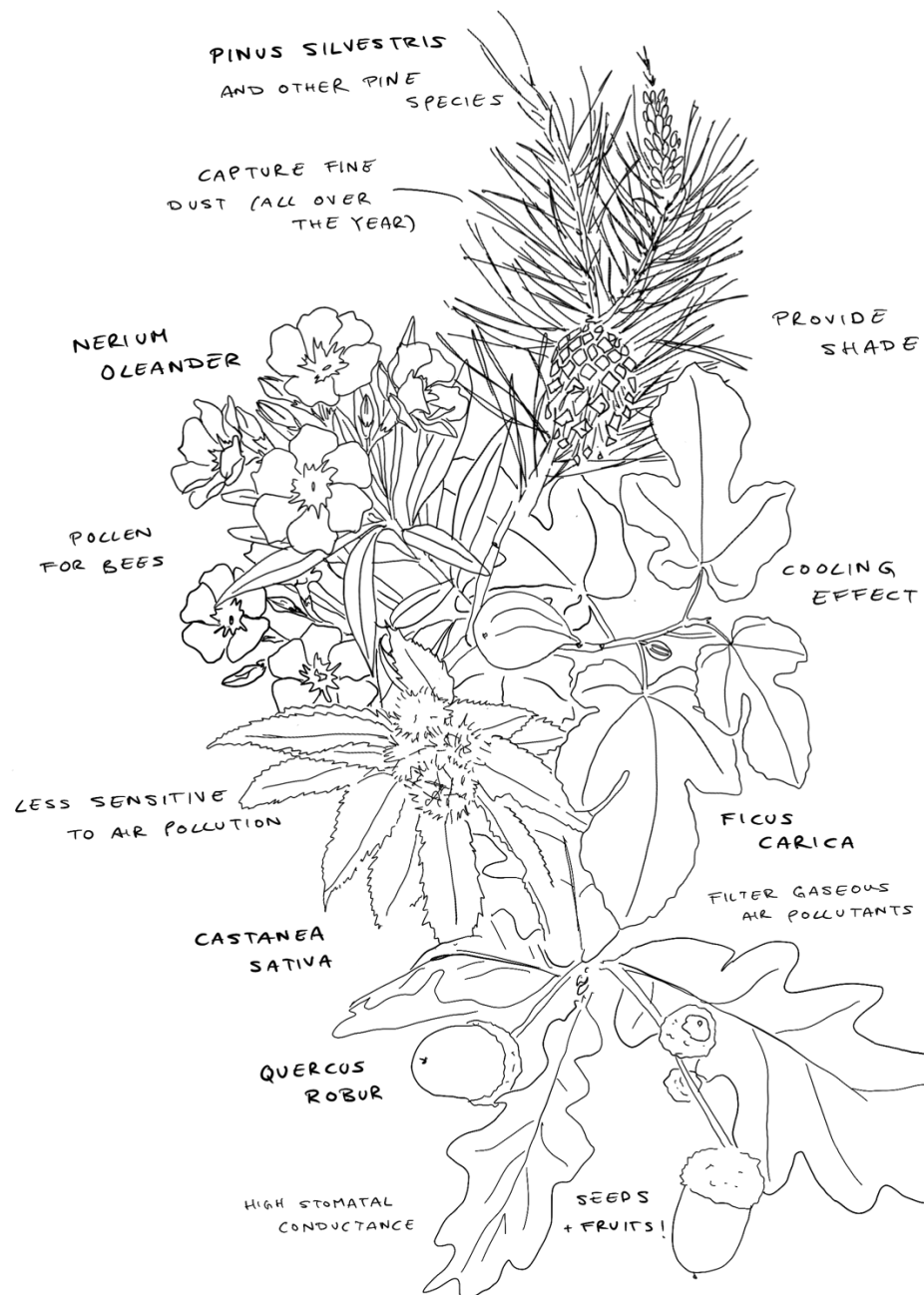


Figure 32 - Plant Selection for Porto, Promoting Species for a High Biodiversity and Enhancing Microclimatic Effects  
Source: Own Illustration

In Porto, the importance of urban biodiversity is increasingly embedded in planning frameworks. The Environmental Declaration of the Municipal Master Plan defines biodiversity as a central objective and seeks to improve environmental quality by increasing the extent and quality of green spaces and reducing soil sealing. Linear tree planting and green corridors are highlighted as a “factor of diffusion of biodiversity” within the municipal ecological structure, so that street trees, small green strips and pocket parks are understood as elements of a coherent ecological network (Farinha Marques et al., 2018). Against this backdrop, pocket parks and small green spaces in the dense historic fabric assume a dual role as microhabitats and stepping stones within the urban biodiversity network, while also contributing to climate adaptation and stormwater retention (Farinha Marques et al., 2018; Egerer et al., 2024).

### 3.3 Pocket Parks as Socialscapes

Small urban green spaces such as pocket parks are not only climatic or aesthetic elements but, above all, neighbourhood-scale social infrastructures. Because of their location in close proximity to buildings and residential environments, they become important everyday places for people who do not “seek out” public space but use it in passing. Particularly for elderly people, children and individuals with limited mobility. Proximate green spaces within a radius of around 300 m are described in the literature as being especially valued (Burgess et al., 1988) and more frequently visited (Grahm & Stigsdotter, 2003; Farin). Pocket parks therefore are part of daily movement and service routines.

Pocket parks are not socially neutral but potentially identity-forming places. Small-scale green spaces are particularly well suited to participatory formats such as co-design workshops, neighbourhood gardens or sponsorship models. Such forms of co-creation strengthen local responsibility, foster appropriation and increase the likelihood that these spaces will be maintained and used in the long term. Community gardens and pocket parks act in this context as places of public health and social inclusion that go far beyond purely leisure-oriented use (Cheshmehzangi et al., 2026; Egerer et al., 2024). Liu and Wang (2021) emphasise four main advantages in this regard: easy to access, promote community interaction and social bonds with nearby residents, and can contribute to improving disadvantaged neighbourhoods.

The effects of green spaces unfold in various terms. Visual connections to trees reduce mental and physical stress reactions (Parsons et al., 1998; McPherson et al., 2011). Mental fatigue and aggression are mitigated by nearby green spaces (Kuo & Sullivan, 2001), and a walkable green residential environment can increase the life expectancy and quality of older people (Takano et al., 2002). These forms of relief, in turn, create the conditions for successful social interaction: people who feel safe, comfortable and restored are more likely to use public space as a place of encounter. Diverse forms of vegetation, a high proportion of biologically active surfaces and multisensory qualities such as birdsong or water sounds support psychological comfort and increase the attractiveness of staying in these places (Ode Sang et al., 2022; Nitidara et al., 2022; Rosso, Cappa, Spitzmiller & Ferrero, 2022). Such forms of co-creation strengthen local

responsibility, foster appropriation and increase the chance that these spaces will be maintained and used in the long term.

Studies on small urban spaces show that urban green areas are used particularly intensively at peak times such as lunchtime - for sitting, sunbathing, picnicking or “nothing talk”; they are often used by office workers, but also by tourists and older people (Whyte, 1980). Whyte (1980) describes four key factors that form the microclimatic framework and significantly shape both the use and identity of urban spaces: sun, wind, trees and water. These parameters that must guide design: seating should always be in relation to these conditions - with sunny places for cool days, as well as shaded, well-ventilated areas under trees or near water as attractive refuges during hot weather. Sufficient and well-positioned seating is central for enabling social interaction and longer stays (Kaczynski et al. in Wang et al., 2023). The type and layout of urban furniture is also crucial for use and spatial effect. Movable furniture encourages appropriation and flexible use and has empirically proved to be less prone to vandalism than often assumed (Whyte, 1980). Furthermore, small, spatially enclosed parks can shield wind and thereby increase thermal comfort, whereas unshaded areas often remain unused during very hot weather (Whyte, 1980). Vegetation in pocket parks has a dual function: it structures small spaces and creates places to stay, while at the same time generating an “oasis effect” that provides perceived shelter and buffering from surrounding grey infrastructures - climatically, visually and acoustically (Chang & Li, 2014; Rosso et al., 2022; Cheshmehzangi et al., 2026). For older people, specific elements such as water features and easily accessible seating areas are especially relevant to support independent leisure and social participation (Arnberger et al., 2016; Wang et al., 2023).

Climate change and UHI effects exacerbate heat stress, while private outdoor spaces - balconies, gardens, roof terraces, courtyards - are limited in dense historic fabrics. Research indicates that in growing, warming cities a network of many small green spaces, rather than a few large parks, can be crucial to providing residentially proximate recreation, social interaction and microclimatic cooling (Nordh & Østby, 2013; Chang & Li, 2014; Rosso et al., 2022). In this context, pocket parks can function as fine-grained complements along everyday routes: they are located close to homes, schools, public transport stops or local services and thus offer easily accessible contact points for



different user groups: from children on their way to school to very old residents with limited mobility.

In the context of Porto, the aging population of the city has the pronounced practice of using public space as an extension of the home. They spend a lot of time outdoors but depend on short distances, safe crossings and clearly structured, easily overlooked places. Pocket parks can respond to these requirements if they are designed as neighbourhood-based, small-scale meeting places with accessible seating areas, both shaded and sunny zones, and easy orientation.

### 3.4 Green Corridors and Networks

Urban green infrastructure - including elements such as parks, public greenspaces, green corridors, street trees, urban forests, green roofs and private gardens (Tzoulas et al., 2007) links otherwise isolated habitats into ecological and social networks (Ferguson et al., 2018). Within this broader infrastructure, urban green corridors are linear or dispersed bands of vegetation - for example street tree alignments or roadside greenery - that connect isolated green patches such as parks or courtyards and thereby strengthen connectivity within the network (Gill et al., 2007).

This facilitates species movement, seed dispersal and the exchange of energy and nutrients (Bennett, 1999; Vergnes, Le Viol, & Clergeau, 2012). Connectivity is here understood as the spatial proximity and permeability between vegetated patches, which can support biodiversity and enhance microclimatic regulation by reducing heat and improving air circulation (Naveh, 1994; Honnay et al., 2003; Park et al., 2017). Read as spatial implementations of NBS, such corridors form part of a decentralised system of urban climate adaptation and habitat provision, in which individual sites are designed not only for convenience but also for multifunctional performance.

In landscape ecology, three forms of connectivity are often distinguished: structural connectivity, which refers to the physical arrangement and direct connections between habitat patches; functional or potential connectivity, which considers how organisms move through and respond to the matrix; and realised connectivity, which is inferred from empirical observations of movement paths. While structural connectivity can be relatively easily mapped from land-cover data, functional and realised connectivity are considerably more challenging to assess, as they depend on species-specific behaviour, dispersal abilities and barriers in the urban fabric.

Different forms of networks can be distinguished, Hellmund (1989) illustrated three types (Figure 33). One is the “Paul-Revere” type with one main corridor, connecting various patches. Second, the hierarchical network appears with one patch, individually being connected to several others. As a third network typology, the “Least Cost to User” network is shown. It prioritizes direct, comfortable routes with minimal distance for users. Translated into green structures, these typologies illustrate that it is not only individual

corridors but the overall pattern that determines habitats effectiveness and accessibility for the daily life.

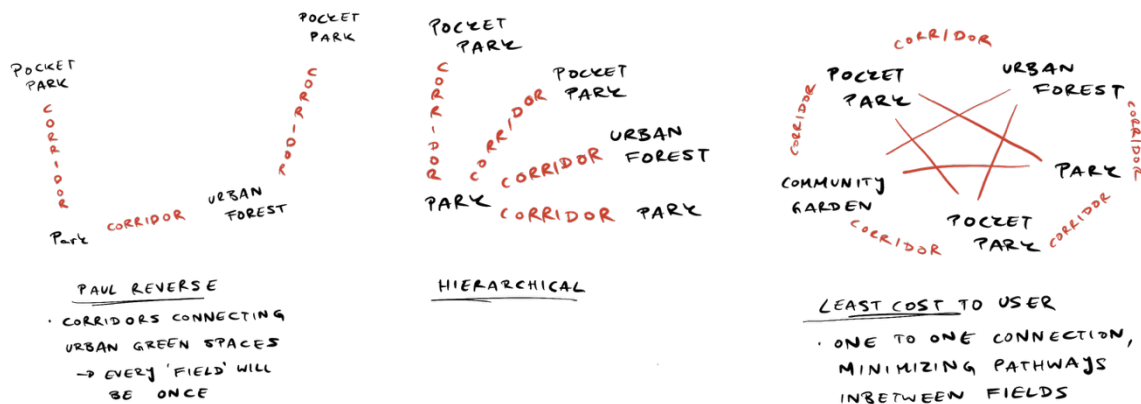


Figure 33 - Adapted Drawing of the Network Typologies Defined by Gilles Clément  
Source: Own Illustration

As stepping stones within a network of green connections they complement linear corridors, function as stepping stones and increase the density of accessible green islands in dense neighbourhoods, often by reusing vacant or underused land (Aram et al., 2019, Egerer et al., 2014). They also provide social benefits by improving the accessibility and continuity of pleasant, shaded routes and small green spaces, supporting everyday recreation, thermal comfort and opportunities for social interaction along daily paths.

Zhang et al. (2019) show that in shrinking cities, green corridors can be developed primarily using vacant land, extensive alley systems and existing public green space to connect city parks and facilitate connectivity. This provides a practical and replicable approach for expanding multifunctional GI. Rastandeh et al. (2017) propose designing such networks deliberately as heterogeneous systems: combining patches of different sizes and a mix of native and carefully selected non-native vegetation to provide diverse habitats and food sources throughout the year, mostly linked through green and blue corridors, while a small number of deliberately isolated refuges can help to limit the uncontrolled spread of problematic species.

In historically evolved city cores with limited space, such as Porto's historical centre, narrow streets, courtyards and small squares dominate, while large, continuous green

corridors are rare. The city already maintains a variety of parks, historic gardens and proximity green spaces that can be complemented with connected UGI (Hoffmann et al., 2017). Porto's strategic planning documents explicitly describe the "strengthening and redesign of linear tree plantings" as a tool for enhancing the connectivity of components within the urban ecosystem structure. New, functional green corridors, intended to connect habitat islands, promote biodiversity while simultaneously improving the microclimate and the quality of public space, contribute to climate-adapted, NBS at the city scale (Município do Porto, 2021; Farinha Marques & Monteiro, 2023).

Figure 34 illustrates a possible scenario for such a green infrastructure, achieved by corridors and small green spaces along a street (Rua dos Bragas) in Porto's historic fabric: On-street parking lots are converted into roadside planting and an avenue of trees, vacant buildings transformed into pocket parks, and selected surfaces are being unsealed. Together with courtyards and private green structures, this creates a green network in which pocket parks act as stepping stones and street trees provide the linear connections. Such a proposal addresses the tension between limited space, protected historic building fabric and the need for climate- and biodiversity-effective GI, showing that network thinking and NBS can be applied even at the scale of historic city centres. Furthermore, the drawing also shows that connectivity and its microclimatic effects are also channelled through private green spaces, even if these are not actively integrated into official urban planning measures.

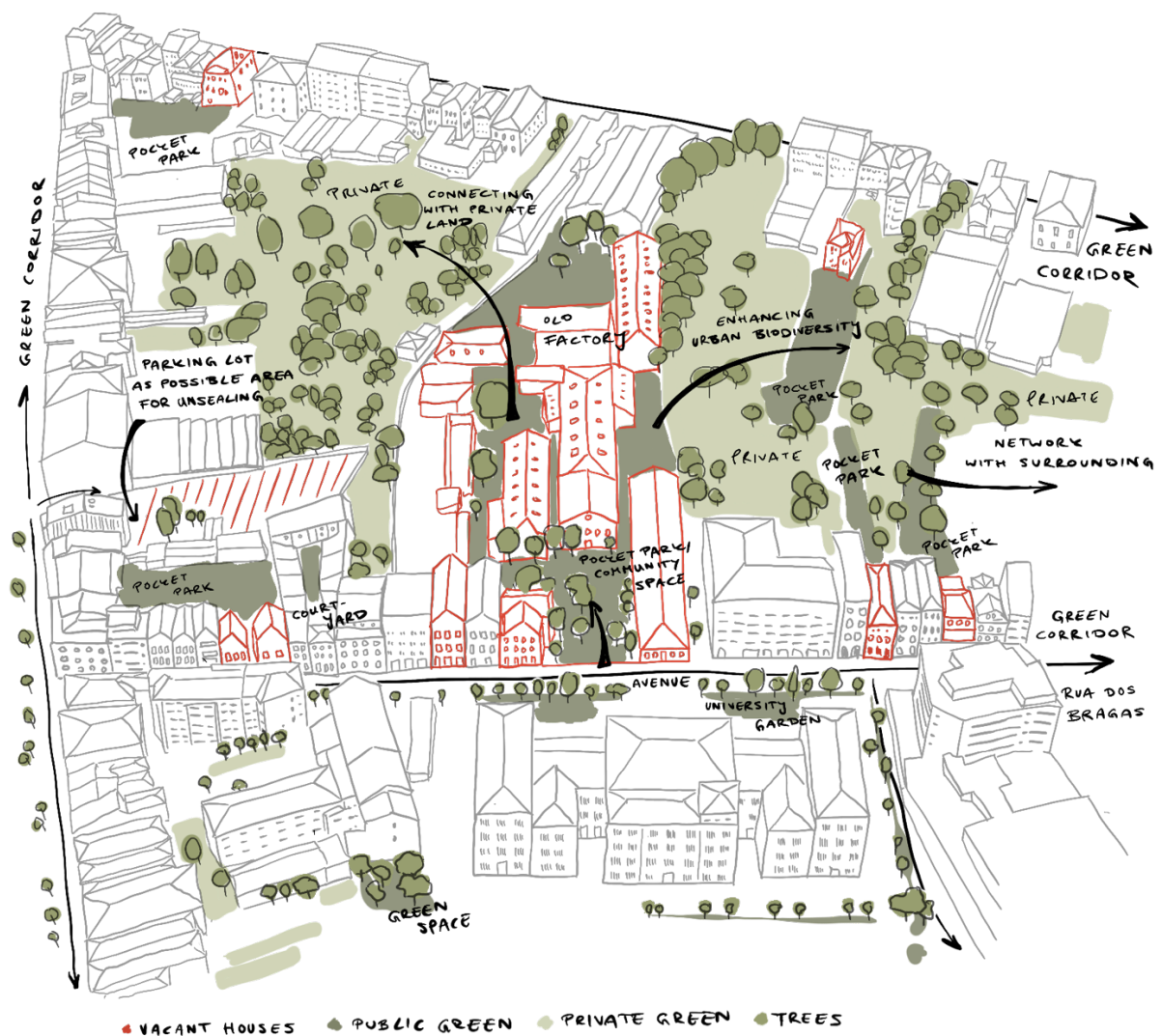


Figure 34 - Proposal of GI in Rua dos Bragas, Porto, Using Pocket Parks, Public Spaces and Street Greenery to Create a Green Network  
Source: Own Illustration



## 4. From Vacant Buildings to Pocket Parks

### 4.1 Spatial Potential of Vacant Buildings

The spatial potential of vacant buildings in historic city centres is closely linked to their location and architectural structure. Many vacant plots include courtyards, courtyards, or adjacent open spaces shielded from traffic. They are located in direct proximity to residential buildings and everyday routes for rest, play, gardening, or social gatherings (Babalís, 2020; Rosso, 2022). These "hidden" spaces are one of the few realistic ways to integrate green spaces into densely built-up city centres.

*Turning vacant lots to pocket parks can be an effective strategy with lower turn-over costs than developing larger parks.*

(Liu & Wang, 2021)

Pocket parks can fulfil a wide variety of uses. The spectrum ranges from green retreats and play-oriented facilities to more specialized uses (Liu & Wang, 2021). Some sites can accommodate playgrounds, skate parks, or sports parks and thereby promote activity and stimulate residents. Other types of parks include shaded rest areas, neighbourhood meeting points or community gardens. The spatial potential of pocket parks can be designed directly for residents or address a wider range of users. For example, to serve as outdoor seating areas for nearby cafes and restaurants or as venues for temporary art installations and cultural events. On a climatic level, they are used for rainwater retention or explicitly incorporated as retention areas within the urban fabric (Schilling & Lohan, 2008). Figure 35 illustrates possible park designs with various spatial uses, using the building structures of Porto's historic city centre as a base.

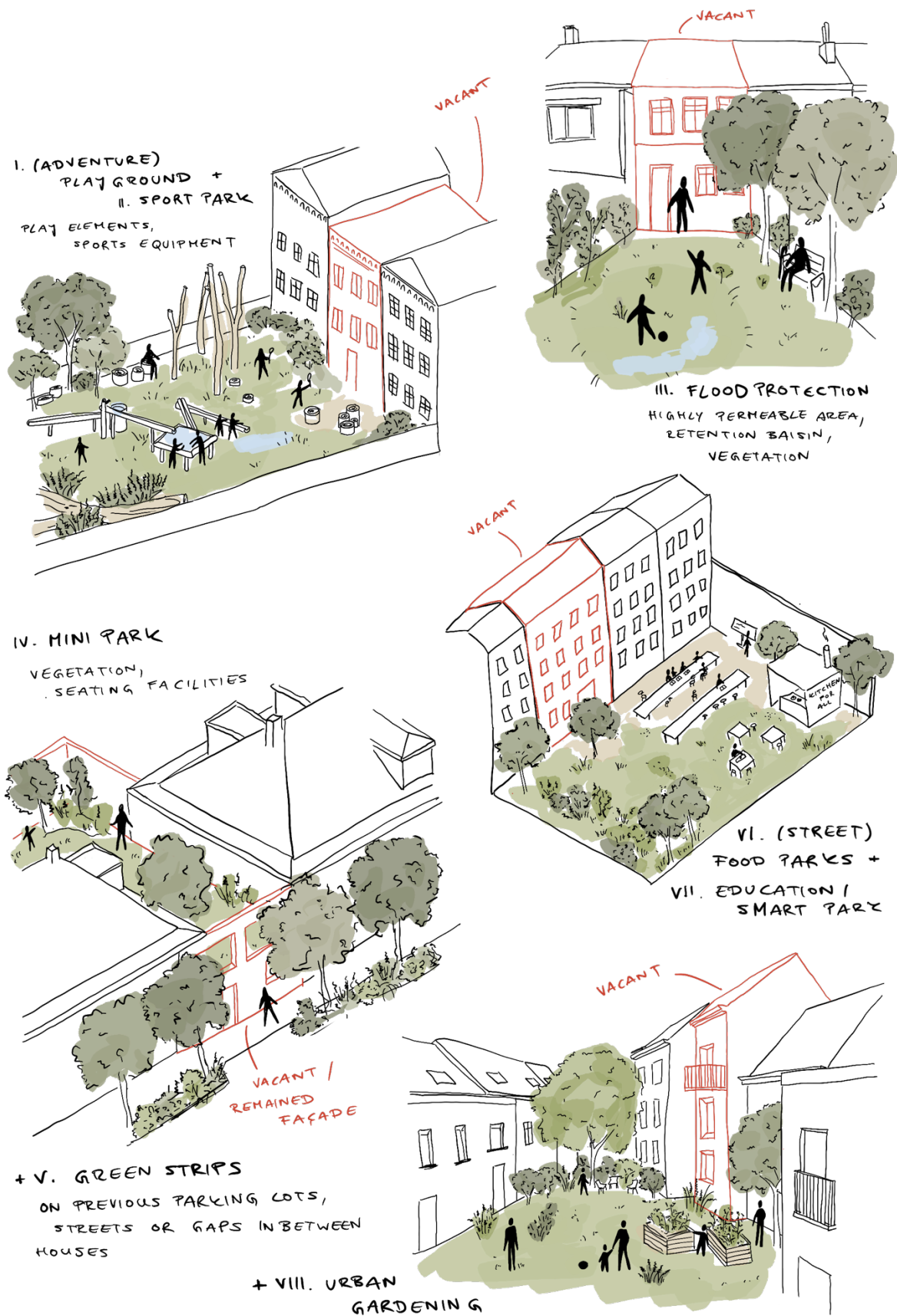


Figure 35 - Eight Potential Types of Pocket Parks  
Source: Own Illustration

Research on urban agriculture and community gardens shows that such urban spaces can promote local food supply, outdoor physical activity and social cohesion (Hnyes & Howe, 2004; Gurung, Karki, Bhandari & Ojha, 2025). In Porto's centre, activating vacant spaces within city blocks offers opportunities for community gardening or the creation of productive landscapes. Concepts that explicitly integrate urban agriculture (UA) into UGI, such as "Continuously Productive Urban Landscapes" or "Edible Green Infrastructure" demonstrate that productive areas are indeed compatible with UGI (Antunes et al., 2026). They can be designed to deliver multiple functions (food, recreation, ecology), strengthen spatial connectivity, and increase small-scale heterogeneity within the urban fabric (Antunes et al., 2026).

What makes these pocket parks particularly promising is their semi-enclosed character between buildings. Rather than being fully exposed on primary streets, many potential sites are framed by building volumes and walls, which allows them to develop a specific micro-scale atmosphere and a sense of privacy. Pocket parks can thus function as small urban "oases" that offer a retreat from the dense, noisy, and topographically demanding everyday environment (Liu & Wang, 2021). The spatial potential of vacant buildings and plots in Porto therefore lies less in a single, uniform solution and more in a differentiated set of small, place-specific interventions. A systematic assessment of location, structure, accessibility and network connections can help identify those sites that are most suitable for transformation into pocket parks and related uses. That analysis prepares the ground for the subsequent discussion of legal instruments, financial mechanisms and local initiatives that could support the first steps towards implementation.

## 4.2 Legislation, Governance and Planning Instruments for Conversion

In Portugal, there is no specific law for pocket parks. However, they can be embedded within the general legal framework for land policy, spatial planning and green infrastructure<sup>7</sup>, in particular through Law No. 31/2014 of 30 May, which sets out the fundamental principles of land, spatial planning and urban policy. In addition, Decree-Law No. 80/2015 of May 14 establishes the legal framework for territorial management instruments and requires municipal plans to include ecological structures and green spaces (Decree-Law No. 80/2015, 2015). These provisions are implemented in municipal land-use plans through the Municipal Ecological Structure, which defines the spatial framework for urban blue and green infrastructure.

Within this framework, cities like Porto can organize small green spaces, urban gardens, and pocket parks (Biodiversity Information System for Europe, 2020). Pocket parks, therefore, do not have their own legal category but are subordinate to the broader system of urban green spaces. They contribute to the objectives of climate adaptation, biodiversity and public green space, established in Law No. 31/2014 and Decree-Law No. 80/2015 (Law No. 31/2014, 2014; Decree-Law No. 80/2015, 2015).

In the Porto Municipal Afforestation Plan<sup>8</sup> by Farinha Marques et al. (2025), existing green corridors and potential network structures have already been identified. Building on this work, one proposal would be to identify the most suitable locations for pocket parks and other green spaces to develop a more continuous and effective green network across the city.

Recent measures such as the “Mais Habitação” (More Housing) programme and the rules on the municipal property tax (Imposto Municipal sobre Imóveis, IMI) are primarily designed to activate vacant housing. Under “Mais Habitação”, dwellings that have been vacant for more than two years and meet defined criteria can be subject to compulsory lease and incorporated into public housing programmes, as reported by the Governo de Portugal (2023). The IMI Code, introduced by Decree-Law No. 287/2003 of 12 November, allows municipalities to apply significantly higher tax rates to long-term

<sup>7</sup> They refer to sustainable land use, protection of natural and cultural values, consideration of environmental and climate risks. Lei de bases gerais da política pública de solos, de ordenamento do território e de urbanismo

<sup>8</sup> Plano Municipal de Arborização da Cidade do Porto

vacant or derelict urban buildings, particularly in high-pressure areas (Decree-Law No. 287/2003, 2003; PwC Portugal, 2026). To date, these instruments have mainly been used to address the housing shortage. This dissertation proposes to also link them to the development of a green network in which permanent and temporary pocket parks function as elements of GI.

Vila Nova de Gaia, south of Porto, serves as a good example for this proposal. There, the Municipal Network of Urban Allotment Gardens (MNUAG) was established in 2012 to create allotment gardens on land that became city property during urbanization - without relying on large budgets for land acquisition or agricultural parks. The Gaia master plan requires that for each new dwelling a defined share of land is ceded for public purposes such as roads, facilities and green areas. Once a terrain is identified, parishes or citizen groups can request the installation of an allotment garden, which is then built by the municipality and managed either by the parish or directly by the city in social housing areas. Users pay a modest fee, and leases are automatically renewed if they comply with rules on sustainable agricultural practices, composting, waste separation and the maintenance of clean and safe plots and common spaces (MVNG, 2018).

The MNUAG regulation explicitly aims to avoid “no-places” - residual urban spaces without clear function or identity - and sets objectives such as improving quality of life, promoting sustainable environmental practices and urban agriculture, fostering social interaction and outdoor recreation, supporting household budgets and providing environmental education through workshops (MVNG, 2018; Lorusso, 2025). This example illustrates how a Portuguese municipality can combine planning obligations, leasing arrangements and participatory management to turn unused land into socially embedded green spaces, offering a relevant reference for the development of the proposed leasing-based pocket-park strategies in Porto.

Ownership conditions are crucial for the implementation of pocket-park projects. Where a plot or building is already owned by the municipality of Porto, the city can use its planning instruments and internal land strategies to realise small-scale green projects. This can be done by designating courtyards, vacant plots or residual spaces within the



Municipal Ecological Structure as green areas with urban-ecological functions (Decree-Law No. 80/2015, 2015). Where a property is in private ownership and owners wish to retain it, a cooperative lease model offers an alternative to compulsory lease or expropriation. Existing IMI provisions create a strong financial lever: municipalities can substantially increase the tax burden on long-term vacant properties, but they can also create incentives by waiving or reducing surcharges where owners agree to cooperative use (Decree-Law No. 287/2003, 2003; PwC Portugal, 2026). Building on this, the city of Porto could offer to assume necessary safety works - such as stabilising collapsing façades. In return, they can conclude a fixed-term lease agreement that allows the site to be used as a pocket park or small green space. Short- to medium-term leases (for example three to ten or fifteen years with an option to renew) would provide planning certainty: The city can establish green spaces and integrate them into a wider green network, while owners receive short-term relief and retain medium-term options for later redevelopment.

Table 3 proposes a tiered recommendation that links the length of the lease agreement with the realistic design of a pocket park - in terms of costs, benefits and expected useful life. In short-term, small-scale interventions, maintenance can be organised primarily through local residents, with the municipality in a supporting role. As park designs become larger, more complex and cost-intensive, an increasing share of routine care and technical upkeep should be taken over by municipal services, while resident involvement continues in complementary forms such as neighbourhood programmes and co-partnership schemes.

| <b>Leasing duration</b>                     | <b>Vegetation</b>                                                                            | <b>De-sealing and soil</b>                                                                  | <b>Furniture and design</b>                                                                                               | <b>Infrastructure and water</b>                                                                                                                                      |
|---------------------------------------------|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Up to 3 years</b><br>(“moving” approach) | Trees and larger shrubs in containers; extensive ground covers in the ground                 | Limited de-sealing with reversible, low-impact interventions                                | Furniture and design elements not ground-anchored and easy to relocate                                                    | No major construction works; basic safety measures and - where feasible without high fixed costs - temporary water access (e.g. hose connections, mobile tanks)      |
| <b>Up to 5 years</b><br>(“moving” approach) | Trees in containers, extensive ground covers and shrubs in the ground                        | Selected de-sealing in parts of the site; measures should remain relatively easy to reverse | Furniture and design elements either freestanding or lightly ground-anchored, simple, modular components                  | Improvements to water access (e.g. simple taps; connections to existing lines) if costs are proportionate to the lease duration; no major infrastructure remodelling |
| <b>Up to 10 years</b>                       | Vegetation predominantly ground-based (fast growing trees, shrubs, perennials, ground cover) | De-sealing and soil improvement to support long-term plant growth and infiltration          | Furniture and design elements ground-anchored or moveable; basic path layouts; clearly defined activity and seating areas | Maintenance by municipal services and residents involved; more complex infrastructural changes feasible (e.g. water connections, drainage structures)                |
| <b>Up to 20 years</b>                       | Designs with fast to medium                                                                  | De-sealing and soil restoration;                                                            | Furniture and design elements ground-anchored                                                                             | Maintenance by municipal services and residents                                                                                                                      |

|                                           |                                                                                 |                                                                                                                   |                                                                                                                           |                                                                                                                                                                                          |
|-------------------------------------------|---------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                           | growing trees, structured shrub layers and diverse planting, Façade greening    | integration of retention swales and infiltration areas for stormwater management                                  | or moveable; basic path layouts; clearly defined activity and seating areas                                               | involved; more complex infrastructural changes feasible (e.g. water connections, drainage structures)                                                                                    |
| <b>More than 20 years / no time limit</b> | Green structure designed as permanent UGI with long-term ecological development | De-sealing and soil restoration; integration of retention swales and infiltration areas for stormwater management | Furniture and design elements ground-anchored or moveable; basic path layouts; clearly defined activity and seating areas | Maintenance by municipal services and residents involved; more complex infrastructural changes feasible; the park is protected as a permanent element of the city's green-space strategy |

Table 3 - Proposal for Levels of Intervention in Pocket Parks According to Lease Duration

The feasibility of such lease models is supported by international experience with converting vacant land into green spaces. Creative and diverse financing and partnership models are a key element for the development of new urban areas (Frantzeskaki et al., 2023). The greening of vacant sites could be financed through foundation grants, government funding programs, and municipal bonds. By involving numerous stakeholders and partnerships with public and private institutions, non-profit organizations, and residents, a diversified financing portfolio can be built. Schilling and Logan (2008) suggest that a neighbourhood-scale vacant land greening strategy could benefit residents by increasing property values and empowering communities. Municipal land-bank programmes in US cities such as Flint (Genesee County) and Cleveland (Cuyahoga County) acquire vacant, tax-delinquent properties and then make them available through standardised lease or licence agreements as community gardens, urban farms or pocket-park-like spaces (Cuyahoga Land Bank, 2014; Genesee County

Land Bank Authority, 2016). Programmes such as “Adopt-a-Lot” or “Lease-a-Lot” demonstrate that fixed-term lease agreements are a practical instrument for transforming vacant properties into small, distributed green spaces (Genesee County Land Bank Authority, 2016).

Beyond the legal framework, Porto can draw on various programmes and institutional approaches that support NBS and GI. EU-funded projects such as URBAN GreenUP, Connecting Nature and GrowGreen develop integrated “renaturing urban plans” in which pocket parks, urban gardens, greened streetscapes and water-sensitive green spaces are combined to address heat stress, flooding and air pollution (CARTIF Technology Centre, 2017; Frantzeskaki et al., 2023; NetworkNature, 2023). In Lisbon, a network of green corridors has been developed to connect major parks and greenways, improving the urban climate, stormwater management and access to green space (Interlace Hub, 2024). Municipal funding schemes, strategic green networks, interim-use models and green streets can be combined with lease agreements to integrate vacant and residual spaces into urban green infrastructure. For Porto, this suggests that the use of lease contracts with owners and the activation of vacant properties for pocket parks should be embedded in a broader strategy that combines the Municipal Ecological Structure, targeted funding programmes and cooperative governance approaches in order to build a coherent green network in the historic city centre over the long term.

| Legal instrument                                                                                                     | Function for GI / Pocket Parks                                                                                                                                                                                                                                                   | Implementation potential and missing provisions                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Law No. 31/2014 of 30 May</b></p> <p>General bases of public policy on land, spatial planning and urbanism</p> | <p>Establishes overarching principles for land and spatial planning policy, including sustainable land use, protection of ecosystems and biodiversity, and territorial resilience to climate change impacts. Pocket parks can be framed as contributing to these objectives.</p> | <p>Provides a strong normative basis for GI and small green interventions but contains no specific provisions on pocket parks or community gardens.</p>                                                                                                                                               |
| <p><b>Decree-Law No. 80/2015 of 14 May</b></p> <p>Legal framework for territorial management instruments (RJIGT)</p> | <p>Regulates the system of territorial plans and requires municipal master plans to identify and protect environmental assets and to define a Municipal Ecological Structure, within which pocket parks can be integrated as stepping stones of GI.</p>                          | <p>Enables the spatial designation and protection of GI but does not regulate ownership or leasing. Implementation of temporary or permanent green uses on private vacant land depends on municipal planning practice and voluntary agreements with owners.</p>                                       |
| <p><b>Decree-Law No. 287/2003 of 12 November</b></p> <p>Municipal Property Tax Code (IMI)</p>                        | <p>Creates the municipal property tax and permits municipalities to apply significantly higher tax rates to long-term vacant or derelict urban buildings, especially in urban-pressure zones, providing a lever to discourage vacancy and incentivise activation.</p>            | <p>Does not refer to GI, but higher IMI rates can be used as a negotiation tool: municipalities may offer reduced surcharges in exchange for lease agreements that allow temporary green uses such as pocket parks. This strategic use is possible but not explicitly foreseen in the legal text.</p> |
| <p><b>“Mais Habitação”</b></p> <p>(More Housing) programme</p>                                                       | <p>Introduces a regime of compulsory lease for certain dwellings that have been vacant for more than two years, allowing public bodies to take over units temporarily, carry out works and rent them at regulated prices to address housing shortages.</p>                       | <p>Focuses on housing and does not foresee the use of activated properties for green infrastructure. Allocating a share of these units or associated plots to pocket parks would require additional political decisions or policy guidelines at municipal or national level.</p>                      |



|                                                             |                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Municipal Ecological</b></p> <p>Structure in PDMs</p> | <p>Maps and protects areas, corridors and systems relevant for ecological functions and urban green infrastructure at city scale, providing the spatial backbone for networks of parks, green corridors and smaller green spaces, including potential pocket park locations (Biodiversity Information System for Europe, 2020).</p> | <p>Acts as a planning instrument rather than a contractual tool. Identifies where green infrastructure should be located or prioritised but does not regulate ownership, financing or leasing. There is still a gap regarding specific guidance for small, temporary green uses on privately owned vacant properties.</p> |
|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Table 4 - Legal Instruments and Their Relevance for GI and Pocket Parks in Portugal, Porto

### 4.3 Implementation and Low-Cost Conversion Strategies

A first step in implementation is a systematic analysis and clarification of responsibilities: identifying suitable plots, contacting owners and clarifying questions of structural safety, such as the stability of façades or the need for temporary supports. Once feasibility and basic building protection have been confirmed, the actual planning process can begin. From the outset, it is important to involve residents, to understand their needs and wishes, and to relate design decisions to the specific characteristics of each site. Residents should remain involved throughout the process, from early ideas to implementation and adaptation over time (Candiracci, 2023; Babalis, 2020). Antunes et al. (2026) highlight that publicly accessible productive spaces such as community and allotment gardens can play a central role in strengthening food security, social inclusion and everyday well-being.

In the implementation phase, low-cost approaches play a central role, particularly when interventions follow the logic of tactical urbanism. By avoiding complex and capital-intensive construction methods, planning and permitting phases can be significantly shortened, and small pilot projects can be realised more quickly. Recycled or locally available materials, modular and temporary elements, simple soil unsealing and minimal technical infrastructure help to keep investment costs manageable while still producing visible changes in the urban environment. Experiences from cities such as Paris show that programmes for revegetation, soil unsealing and the reinforcement of water elements can be bundled into coherent strategies for urban cooling and climate adaptation, rather than remaining isolated projects (Ville de Paris, 2024).

The everyday operation and long-term use of pocket parks require cooperation between the municipality, professional actors and residents. Municipal departments and external experts can provide technical support, ensure basic safety and coordinate integration into broader planning frameworks, while residents and neighbourhood groups contribute local knowledge, daily presence and informal supervision. Co-management arrangements, in which residents take responsibility for tasks such as cleaning, planting and minor repairs. This can strengthen social bonds and increase acceptance, while also reducing maintenance costs for the city (Babalis, 2020; Arup, 2014).

Temporary pocket parks are particularly relevant in contexts where only limited or time-bound use rights exist, for example under short-term lease agreements. In such cases, low-cost, modular and reversible designs become a deliberate strategy: plantings in movable containers, free-standing seating and play elements, raised beds and simple structures that can be disassembled and re-used elsewhere allow for site-specific design while acknowledging the temporary character of the intervention. When a leased plot can no longer be used as a pocket park, these elements can be removed with relatively little effort and installed on a replacement site, maintaining the investment in both materials and social practices. Within this dissertation, leasing-based, temporary pocket parks are therefore proposed as a flexible strategy to test uses and gradually develop a network of small green spaces in Porto's historic city centre.

Taken together, these considerations suggest a pragmatic implementation path for Porto: confirm feasibility and structural safety; involve residents early and continuously; use low-cost, modular and reversible design strategies; embed each intervention within a wider green-infrastructure logic; and employ leasing and temporary use as strategic tools rather than constraints.

Table 5 presents an adapted version of the Decalogue of Pocket Park Creation developed by Babalis (2020) as a set of planning principles for pocket parks as elements of UGI for Porto. The principles highlight broader requirements for their successful integration into the urban fabric. At the same time, the table underlines the importance of participatory processes, a clearly defined qualitative design framework, and good connectivity and accessibility to ensure high quality of stay, social interaction and ecological performance.

| Planning process                | Implementation steps                                                                                                                                                                                                                                                                                                                                                                                                                           | Core planning principles                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Preparation</b>           | <ul style="list-style-type: none"> <li>- Access and survey existing vacant sites (Condition, ownership, legal situation)</li> <li>- Identify revenue options, lease models and cooperative business models</li> <li>- Identify and address legal and administrative barriers (e.g. IMI surcharge, compulsory lease)</li> <li>- Inventory and map parks, open space, trails and vacant properties; identify potential green networks</li> </ul> | <ul style="list-style-type: none"> <li>- Pocket parks as targeted micro-interventions in socially and climatically vulnerable neighbourhoods</li> <li>- Embedding in overall strategy: Integration into municipal ecological structures, GI, and mobility networks</li> <li>- Resource efficiency: Simple, robust, low-maintenance solutions for temporary and permanent use</li> </ul>                                    |
| <b>2. Plan and Design</b>       | <ul style="list-style-type: none"> <li>- Participative neighbourhood planning to define local needs and uses</li> <li>- Propose site-specific design solutions and identify linkages to existing green spaces and everyday routes</li> </ul>                                                                                                                                                                                                   | <ul style="list-style-type: none"> <li>- Neighbourhood participation in planning, implementation, and maintenance to strengthen ownership and identification with the site</li> <li>- Qualitative design framework: Goals for quality of stay, microclimate, accessibility, and ecological performance</li> <li>- Connectivity and accessibility: Integration into everyday walking routes and public transport</li> </ul> |
| <b>3. Action and Governance</b> | <ul style="list-style-type: none"> <li>- Implementation from low-cost tactical interventions to more permanent layouts</li> <li>- Strategic acquisition, transfers, demolition and rehabilitation of</li> </ul>                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>- Functional clarity and greening: robust, low-conflict uses with climate-resilient, low-maintenance vegetation</li> </ul>                                                                                                                                                                                                                                                          |

|                                                                                                                   |                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| key sites                                                                                                         | - Network of small spaces                                                                                            |
| - Establish cooperative fixed-term lease agreements or land-bank-type municipal property tools                    | - User-friendly elements (e.g., lighting, information boards) only where they inclusively improve safety and comfort |
| - Build long-term partnerships with civic initiatives, NGOs and private actors for co-financing and co-management |                                                                                                                      |

Table 5 - Guidelines for Implementing Pocket Parks on Vacant Sites



## 5. Examples and Transferable Strategies

### 5.1 Bairro Leal

Bairro do Leal is a workers' neighbourhood in Porto that emerged during the city's twentieth-century expansion. Later shaped by outmigration, demolition and disinvestment the area resulted in vacant plots and ruins that exemplify precarious spaces in the city's historic fabric. The initiative *Apropriação do Bairro do Leal* (2021) by INSTITUTO responded to a fenced, overgrown and littered plot. The area was lacking accessible green space, and the approach was to reactivate it through a workshop with low-cost architectural and landscape interventions.

Under the guidance of Paulo Moreira and Tiago Antero, the site was redesigned together with architects, students and residents through a self-build process based on local knowledge, informal exchange and simple materials. Access was opened, small "rooms" and seating areas were created, and the vacant plot was gradually transformed into a collectively used open space. Through the participatory design process, it is the residents themselves who continue to care for and animate the site, turning a previously neglected piece of land into a collectively used and maintained urban common.



Figure 36 - Bairro Leal in Porto During the Implementation  
Source: Instituto, 2021 | Credits: Ivo Tavares

Building on existing vegetation, the former vacant plot was progressively greened and is now maintained jointly by residents and the municipal gardening service, which supports regular maintenance and cleaning. The project demonstrates how simple, low-cost measures such as cleaning, paint, timber structures, planting and artistic elements can function as nature-based solutions while strengthening appropriation, social interaction and long-term care. Such interventions in “forgotten” interstitial spaces can significantly improve everyday quality of life, reinforce local networks and contribute to a climate- and socially sensitive upgrading of inner-city neighbourhoods without triggering displacement through large-scale redevelopment.

Bairro do Leal illustrates how projects in Porto can emerge when design and architecture practices ally with residents to create a space of shared identification. It suggests that many of the abandoned plots and buildings in the historic centre could likewise be transformed through low-cost strategies and the creation of urban commons.



Figure 37 - Intervention Area of Bairro Leal  
Source: Instituto, 2021 | Credits: Ivo Tavares

## 5.2 As Hortas da Bananeira

The Gardens of Bananeira is a community garden project on the escarpment of Fontainhas in Porto, located on the slopes towards the Douro. Since May 2020, the previously littered and neglected terraces have been transformed through voluntary work. Waste was removed collectively, raised beds installed and the slopes cultivated. The site was re-discovered during the corona pandemic, when it first served as an alternative walking route and then gradually evolved into an ongoing gardening initiative (Teixeira, 2021). Materials such as timber, hoses and furniture were largely recycled or sourced locally and used to plant and maintain small plots along the hillside, making the project a low-cost, resource-efficient nature-based solution.



Figure 38 - Hortas de Bananeira During Cleaning  
Source: Moreira, 2022

The garden defines itself as a communal, self-managed project without legal status or profit orientation. It takes place across both private and municipal plots and symbolically as well as practically “giving back” a long-neglected area to the neighbourhood. Beyond gardening, diverse forms of community life have emerged, including collective harvests where vegetables are shared among participants, informal gatherings, concerts, workshops and planned open-air cinema evenings (Moreira, 2022). Bananeira thus functions as an urban common: an urban space that is neither purely private nor conventionally municipal, but sustained through collective use, shared responsibility and the continuous negotiation of rules. In the context of this dissertation, the project illustrates how urban gardening can activate derelict infrastructural spaces with simple means, strengthen neighbourhood relations and provide alternative, collectively



managed nature and open spaces that require little financial investment yet generate substantial social and ecological value.



Figure 39 - Bottom-up Hortas da Bananeira, Porto  
Source: Future Architecture Platform, 2021 | Credits: Ines Nepomuceno



Figure 40 - Horta da Bananeira Terraces Above Railway  
Source: Gailatlarge, 2018





Figure 41 - Terraces of Horta da Bananeira  
Source: Gailatlarge, 2018



### 5.3 Prinzessinnengarten, Berlin

Prinzessinnengarten is a public community garden in Berlin that has existed since 2009, where food and plants are collectively grown and everyday neighbourhood life takes place. Since 2020, the project has been located on the grounds of Neuer St. Jacobi cemetery in Neukölln, activating underused cemetery land through communal gardening in mobile raised beds and containers. The garden is maintained by a collective together with volunteers and local residents, who organise the daily work of planting, watering, harvesting and caring for the shared space.

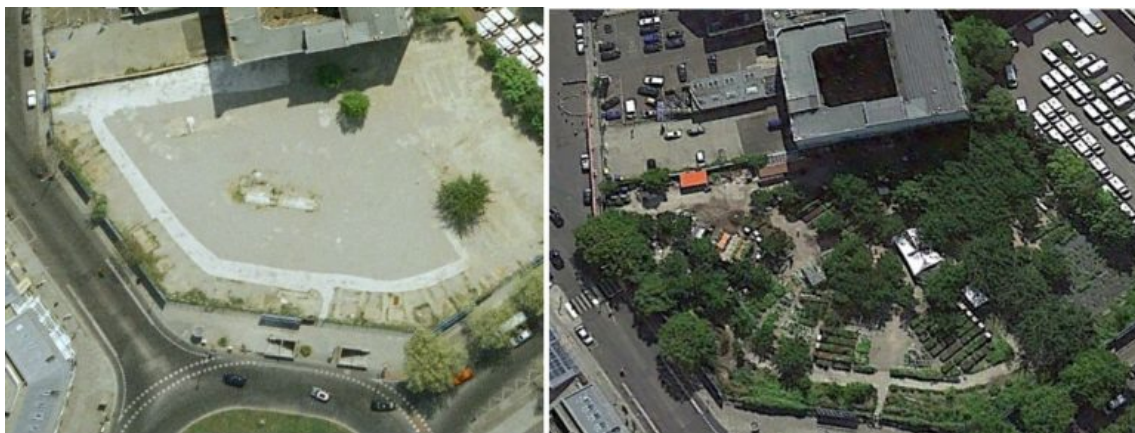


Figure 42 - Before and After of the Moritzplatz  
Source: Prinzessinnengarten (n. d.)

Beyond cultivation, Prinzessinnengarten functions as a social, educational and cultural meeting place. The programme includes communal cooking and eating, clothing swaps, language courses, workshops, concerts, theatre performances and informal neighbourhood gatherings, turning the garden into a low-threshold space for encounters and mutual support. The project understands itself as a self-managed, non-profit orientation, operating on temporarily available land and symbolically as well as practically “giving back” a long-neglected area to the neighbourhood.

Temporariness is the main principle into the design and governance of the garden. Most planting takes place in movable containers and modular structures so that the garden can adapt to changing conditions and, if necessary, be relocated when the lease or land-use agreement ends. If the city of Berlin or the church administration reclaims the cemetery land for another purpose, the “garden nomads” can move to another site,

supported by municipal coordination structures for urban gardens that help to identify and negotiate new locations. This combination of mobile design, temporary use agreements and community responsibility allows Prinzessinnengarten to operate as an urban common.

In the context of this dissertation, Prinzessinnengarten is relevant less as an urban gardening example and more as a model for how temporary community gardens can function on leased or otherwise time-limited plots. The project shows how simple, low-cost and reversible interventions - container planting, basic infrastructures, volunteer-based maintenance - can create multifunctional green spaces that provide ecological benefits, social infrastructure and cultural activities, even when tenure is uncertain. For Porto, where many potential sites for small parks are tied to private ownership, speculative vacancy or short-term leasing, the Prinzessinnengarten model suggests that temporary agreements between the municipality, landowners and community initiatives could enable nomadic forms of pocket parks. These parks would be conceived from the outset as movable and adaptable, yet still offer residents spaces for gardening, meeting and identification while they exist on a given plot.



Figure 43 - Prinzessinnengarten on Moritzplatz  
Source: Prinzessinnengarten (n. d.)





Figure 44 - Vegetation in Containers in Prinzessinnengarten  
Source: Prinzessinnengarten (n. d.)



Figure 45 - Prinzessinnengarten with Facilities for the Community  
Source: Prinzessinnengarten (n. d.)



## 5.4 Pocket Parks in Athens

In Athens pocket parks have been introduced as small-scale green interventions that transform neglected vacant plots into accessible neighbourhood spaces. "[...] Our goal [...] is to create a network of 10 pocket parks in Athens by the end of [2021]", Athens Mayor Kostas Bakoyannis said (GTP Headlines, 2021). Through tactical urbanism strategies the city and its residents created these small green spaces in response to the dense urban conditions of the Greek capital (Euklidiadas, 2023).

A central implementation tool is the "Adopt your city" programme, which allows companies, associations or citizens to take on the cost of urban improvements when municipal budgets are tight (Euklidiadas, 2023). This means that the Athenian model strongly addresses residents and other local actors as active contributors to green transformation. For the Kolonos pocket park, environmentally friendly materials have been used - such as green concrete, recycled wood, underground irrigation - and systems that ensure shade and ventilation throughout the year.



Figure 46 - Kolonos Pocket Park Shortly After Implementation, Athens, Greece  
Source: Kyvrikosaiois, 2021

In the context of this dissertation, the Athens project is particularly relevant because it demonstrates that residents can support the implementation of pocket parks rather than act as a barrier. However, while the Athens approach places especially strong emphasis on civic engagement and shared financial support, the leasing-contract approach expands this logic in important ways. It more explicitly integrates the state, investors and foundation programmes into planning and implementation processes. This is done within a coherent masterplan that defines concrete measures for financing, long-term maintenance and governance.

In Athens, the gradual linkage of pocket parks across different neighbourhoods creates a growing network of small green spaces. By contrast, in Porto the green space strategy is conceived more broadly, with pocket parks forming only one of several green elements that together shape the overall system of green infrastructure.



Figure 47 - Kolonos Pocket Park with Vegetation and Seating Facilities, Athens, Greece  
Source: Kyvrikosaiois, 2021





Figure 48 - Ano Kipseli Pocket Park, Athens, Greece  
Source: Enikos, 2022



Figure 49 - Ano Kipseli with Benches, Athens, Greece  
Source: Enikos, 2022

## 6. Discussion and Conclusion

### 6.1 Discussion

This dissertation has explored the intersection between vacant buildings, green infrastructure, and the integration of pocket parks within the historic urban fabric of Porto. The findings indicate that, when strategically implemented in underused or derelict spaces, pocket parks can function as a form of urban acupuncture - small-scale interventions with disproportionately large spatial, ecological, and social effects.

From a design and planning perspective, the reactivation of vacancy poses a challenge to conventional approaches to open space planning. In dense historic cities such as Porto, large-scale green spaces are difficult to realise due to heritage protection requirements, fragmented ownership, and a complex urban morphology. In this context, pocket parks are not a substitute for existing green systems, but an adaptive complement to them. As Arup (2016, p. 125) emphasises, increasing pressure on urban land calls for a rethinking of all available urban spaces as potential assets for ecological and social enhancement.

Urban green spaces - particularly designed small-scale spaces such as pocket parks - cannot be equated with natural ecosystems. As Bajwoluk and Langer (2023) point out, these are anthropogenically shaped environments with limited ecological value compared to natural landscapes. Nevertheless, they make an important contribution to the urban environmental system and to climate adaptation. What is crucial is not only their existence, but their integration into a spatially connected network that considers circulation, air movement, shading, and the quality of stay. Decisive is not the presence of individual parks, but their role within a spatially connected network that supports climatic conditions and everyday use.

The integration of pocket parks into the existing urban fabric requires more network-oriented and city-wide thinking from both landscape architects and urban planners. Rather than focusing on isolated projects, attention must shift towards interconnected systems, spatial relationships, and long-term maintenance and expansion concepts. Seen in this way, pocket parks become small-scale spaces within broader green

connections, improving continuity, accessibility and the overall quality of public space. They transform unused urban spaces in Porto into places of community.

At the same time, the implementation of such measures is associated with considerable challenges. In particular, the socio-economic effects of urban greening need to be critically examined. In many cities, green projects are still planned in a top-down manner, which often means that the needs and practices of marginalised groups are overlooked. A lack of, or merely symbolic, participation can lead to spaces that are formally “green” but socially exclusive, for example through design codes, usage regulations, or the absence of everyday-oriented functions. Good outcomes therefore require robust participatory formats, clear responsibilities for maintenance and management, and planning processes explicitly oriented towards diversity of use and low-threshold accessibility.

At the same time, the upgrading of vacant land is frequently linked to increases in property values. Wachter and Gillen (2006) show that properties adjacent to greened plots can experience value increases of around 17%, whereas proximity to vacant plots is associated with a value decrease of about 20% (cited in Schilling & Logan, 2008). These figures highlight a central tension: measures intended to improve quality of life can at the same time activate market forces that foster processes of social displacement and so-called green gentrification. The reactivation of vacant properties has been shown, both theoretically and empirically, to be associated with such processes (Eckerd, 2010; Morckel, 2013; Smith, 1979). This is particularly relevant in Porto, where housing costs are already high and many residents are pushed towards the urban periphery. Environmental improvements may contribute to those gentrification dynamics. The key question is therefore not whether green infrastructure should be expanded, but how this can be achieved without further aggravating an already strained social situation. Urban greening can only have a relieving effect if it is explicitly oriented towards the needs of vulnerable groups.

Overall, the analysis shows that pocket parks in Porto’s historic urban context can only unfold their full potential if they are understood simultaneously as ecological, social, and political interventions. They can improve microclimate and quality of stay and enable the

productive reuse of vacant spaces, but without careful planning, participatory governance and socially balanced accompanying measures they risk exacerbating existing inequalities. A future pocket park strategy must therefore adopt a systemic perspective: pocket parks need to be planned and managed as part of wider green connections, socially anchored through genuine participation, and framed by legal and housing policies that ensure that the people currently living in Porto remain the primary beneficiaries of these new green spaces.



## 6.2 Conclusion

In conclusion, this dissertation highlights the potential of pocket parks as a strategic tool for reactivating vacant properties and strengthening green infrastructure in historic urban settings. In Porto, where spatial constraints and socio-economic challenges are closely intertwined, these small-scale interventions offer a pragmatic yet flexible approach to urban transformation.

Figure 50 illustrates the different impact dimensions of vacant buildings and their transformation through pocket parks, summarising the associated risks and opportunities. Pocket parks influence social dynamics, microclimatic conditions and urban continuity, and thus create leverage points for targeted interventions that integrate previously isolated plots into a coherent system of green connections.

A central perspective for future development lies in linking planning strategies with existing legal and institutional frameworks and complementing them with measures that are explicitly geared towards green connections. In Portugal, instruments for expropriation or public acquisition of long-term vacant properties provide an opportunity to activate underused land for public purposes. If these instruments are coordinated and carefully balanced between the provision of housing and the creation of green infrastructure, they can support the gradual emergence of a network of pocket parks that is tied into larger green corridors and pedestrian routes rather than remaining a set of isolated projects.

The effectiveness of such measures depends strongly on their spatial integration. As Bajwoluk and Langer (2023) emphasise, the potential of individual pocket parks unfolds primarily in interaction with other green and open spaces. Their location, distribution and degree of connectivity determine accessibility, intensity of use and ecological performance. Future planning approaches in Porto should therefore focus not only on the design quality of individual sites, but also on their function within wider networks.

At the same time, the findings underline the importance of scale. Pocket parks cannot replace large urban parks, but they can extend their reach by increasing the availability

and proximity of everyday green spaces, particularly in dense neighbourhoods. As Nordh et al. (2009) demonstrate, even very small green spaces can provide high restorative quality and thus make a substantial contribution to well-being in compact cities.

This dissertation also points to several open questions that call for further research: the quantitative assessment of microclimatic effects at neighbourhood scale, the development of robust governance and maintenance models for community-based pocket parks, and a more nuanced analysis of social impacts, especially regarding gentrification and displacement. In addition, the transferability of this approach to other historic cities needs to be examined, given the strong influence of urban morphology, institutional arrangements and cultural practices on implementation.

Despite these uncertainties, the integration of pocket parks into Porto's historic urban fabric emerges as a promising pathway towards a more resilient, inclusive and liveable city. At the same time, they constitute a subtle intervention that unfolds behind the characterful façades of the historic city: green oases that gently embed themselves within the protected architectural heritage. They can transform existing gaps in the urban fabric into experiential spaces while maintaining a respectful relationship with the city's history, since they do not require the demolition or redesign of historic façades but instead render the interstitial spaces of the city newly tangible. This can be achieved through an approach that deliberately combines spatial design with urban heritage, legal instruments, housing policy and citizen participation. Pocket parks should therefore be understood not only as physical spaces, but as catalysts for broader urban transformation processes: each site, shaped by local conditions and shared responsibility, forms a small but significant stepping stone within a larger system of green connections.

To shape a better world we must shape better cities.  
The health and well-being of urban citizens should be the  
focus of design considerations in the future.

In this sense, making cities greener is not an optional design ambition but a necessity. In the context of climate change and growing urban populations, equitable access to high-quality green space becomes a central component of sustainable urban development. Pocket parks can contribute to this by offering a concrete, scalable and context-sensitive way to reconnect vacancy, green infrastructure and the everyday life of Porto's residents.

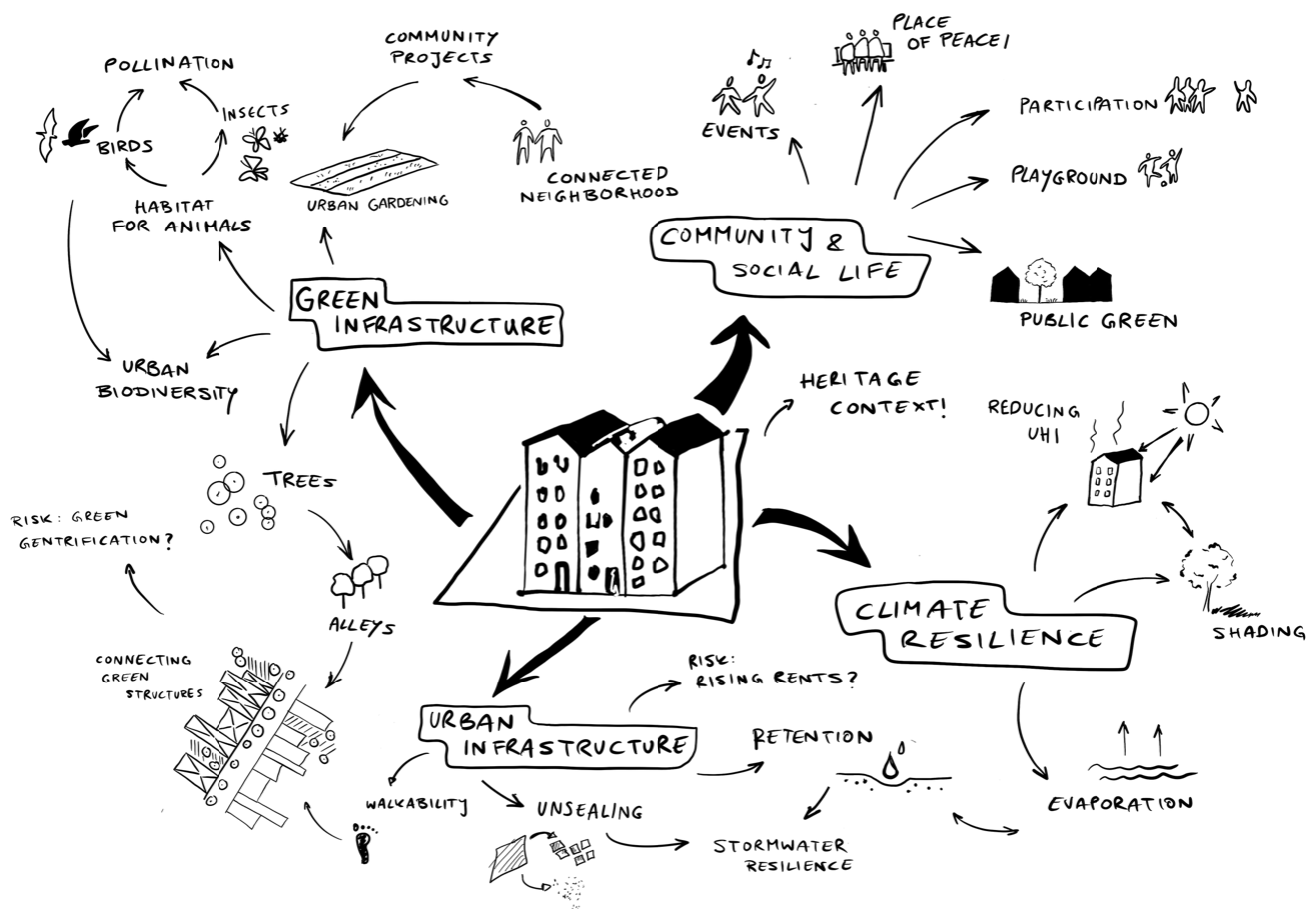


Figure 50 - Illustration of the Impact Dimensions of Pocket Parks in Formerly Vacant Plots  
Source: Own Illustration

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## Appendix A

[illegible]