Planning Sustainable and Resilient Waterfronts in the Mediterranean _ Insights from Athens and Lisbon

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Abstract. Urban waterfront development is a major challenge in spatial planning around the world, given the ongoing climate crisis. Mediterranean cities, particularly those with a historic center and a port, are important due to the increasing trends of coastalization, touristification, and overtourism, all of which threaten the local identity, sustainability, and resilience of their waterfronts. The article compares Athens and Lisbon to determine whether and how development and planning practices and policies affect the quality and sustainability of coastal ecosystems. A special focus is given to how both cities have ensured the spatial continuity of their waterfronts and their integration into the urban fabric and daily life. To address the research question, a multifactorial methodology, based on spatial criteria, is developed to assess the two cases and identify essential factors in their waterfronts' quality and dynamics. The proposed methodology seeks to divide the Athens and Lisbon waterfronts into pockets so as to better understand their characteristics and assess the role of planning in their sustainability. Key parameters related to waterfront planning that played a critical role in shaping the research context are: I) its existence and connection to urban planning; II) its ability to address current challenges and ensure the public character of the shore; and III) implementation barriers and local consequences. The article concludes with findings that open new paths of research and consideration on waterfront planning and its role in urban development.

Keywords: coastal cities · sustainable urban development · waterfront planning · spatial policies · typological classification · resilient cities and communities

1 Introduction

Waterfront planning is at the forefront of research interest due to the critical role it plays in coastal developmental policies. However, it has gained special importance in the last 20 years, owing to the climate and energy crises as well as rising trends of coastalization, touristification, and overtourism, all of which threaten the identity, viability, and resilience of coastal cities and their waterfronts [1–4]. Indubitably, the current conjuncture has led to significant changes in the relevant problematic, affecting the formulation

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of coastal policies at the international and European levels. The concern focuses on how coastal cities can effectively deal with these challenges while preserving their identity [5]. The answer is not easy. Nonetheless, the key issue is the need to reconsider coastal planning with a focus on adaptability to constantly changing circumstances, as well as the prioritization of the following principles: a) protecting the coastline; b) managing natural and cultural resources; c) adapting to climate change impacts; d) ensuring vibrant public coastal areas; and e) reinforcing new governance structures and participatory processes.

Contemporary evidence indicates that the qualities and vulnerabilities of each case preclude the unquestioned implementation of development and planning models that do not correspond with the unique characteristics of the locales and their ecosystems [6–9]. Experience has shown that preserving the sustainability of urban coastal fronts is only possible if they are integrated into the overall planning of their cities. Basic issues in this direction include ensuring the waterfronts' spatial continuity and integration into the city, and utilizing public space as a uniting feature between sea and city.

In this context, two cities are chosen: Athens and Lisbon, which have similar qualities and dynamics but appear to be taking distinct approaches to the development and planning of their waterfronts. The goal of their simultaneous monitoring is to identify good practices and potential barriers to ensuring their quality and local identity [5]. On the one hand, Athens' waterfront has numerous unresolved concerns such as coastline deterioration, coastalization, multifunctionality and incompatible uses, accessibility, sustainable mobility, and a lack of public space. Nonetheless, the successful completion of continuing interventions is projected to preserve the spatial continuity of the urban coastal front, even if its connection to the city's key locations remains a low priority. On the other hand, Lisbon can serve as a good paradigm, as it has made significant progress in ensuring the connectivity of its riverfront to the city.

The two cases are studied using a multifactorial methodology and spatial criteria that were successfully applied in Athens [10] and are now being tested in Lisbon with the goal of drawing conclusions about the sustainability of the two cities' coastal planning (Sect. 2.2). The typological classification of Athens' and Lisbon's waterfronts is presented as an essential tool for better understanding and evaluating their spatial continuity and integration into the city. Key parameters related to waterfront planning that played a critical role in shaping the research context were: I) its existence and connection to urban planning; II) its ability to solve current challenges (e.g. climate crisis, green development, blue economy) and ensure the public character of the shore; and III) implementation barriers and local consequences (i.e. participants, stakeholders, spatial focus areas, sectoral priorities, citizen participation). The goal of combining the above parameters is to assess the effectiveness of coastal planning at the local and supralocal levels for achieving *sustainability* (i.e. quality, spatial continuity, city integration, etc.) and *resilience objectives* (i.e. climate adaptation, energy neutrality, circular economy, sea level rise, water quality, disaster management etc.). It is stated that this correlating method yields significant discoveries that will add to current discussion and open up new challenging paths in the creation of a more comprehensive coastal policy.

The research on the two waterfronts concentrates on the era following the 1980s, when the current dispute about their development began. References are also made to earlier periods where planning interventions influenced waterfront identity and its

supra-local role (i.e. the early 1900s, a period linked with the installation of significant infrastructure projects such as embankments, marina development, road/railway extensions, etc.).

The article is divided into seven sections. The first presents the research object; the second refers to the spatial field of study and the research methodology; the third covers the issue of sustainable waterfront development management and the importance of planning (discussion, policies); the fourth investigates the spatial transformations on the waterfronts of Athens and Lisbon and evaluates the factors that contributed to the current situation and its dynamics; The fifth defines the proposed methodology for the typological classification of their waterfronts, with the goal of understanding their specificities and evaluating the role of planning in their sustainability and resilience; the sixth presents the findings from the parallel investigations, while the seventh expresses thoughts on a more sustainable waterfront development.

2 Spatial Reference and Methodology

This section briefly describes the spatial field of investigation (Athens and Lisbon) and the research methodology (Sects. 2.1 and 2.2, respectively).

2.1 Athens' and Lisbon's Waterfronts as Research Laboratories

The selection of Athens and Lisbon was not at random. Both cities are coastal capitals of Mediterranean countries (Greece, Portugal) with a rich natural and cultural heritage, a long coastline dotted with cities and settlements, and a vibrant network of international ports. Both cities have historic centres and ports that play an important role in the global transport network. In addition, Athens and Lisbon have waterfronts that are diversified and very fragile. However, they are also active because of the supralocal uses they incorporate, mainly in the shipping, tourism and services sectors. At the same time, the study sites have similar population densities and dynamic trends in coastal development, tourism and overtourism. The Athens waterfront studied is part of five of the six coastal municipalities of the South Athens regional unit (i.e. Kallithea, Moschato-Tavros, Palaio Faliro, Alimos and Elliniko-Argyroupoli), while the Lisbon waterfront belongs to the homonymous municipality, which is divided into 24 sub-units known as "freguesias" (Fig. 1).

In order to provide a more comprehensive assessment of the two cases, the study was carried out at two geographical levels (metropolitan - municipal/inter-municipal). The focus was on their waterfronts (Figs. 1 and 2). More specifically:

Metropolitan Region: In the Athens Metropolitan Region, the western end of the study area (Faliro) is 5 km from the port of Piraeus and 9 km from the historic centre of the city. Instead, a part of the Lisbon Metropolitan Region's waterfront serves as a port [i.e. container terminals (*Alcantara* central area, *Beato* eastern district), cruise terminals (*Santa Apollonia*), and three terminals for maritime connections to the southern part of the Tagus (one in the western part of *Belém* and two in the central)]. The historic centre is adjacent to the riverfront (*Baixa* area), and *Praça do Comércio* serves as the city's main opening to the river.

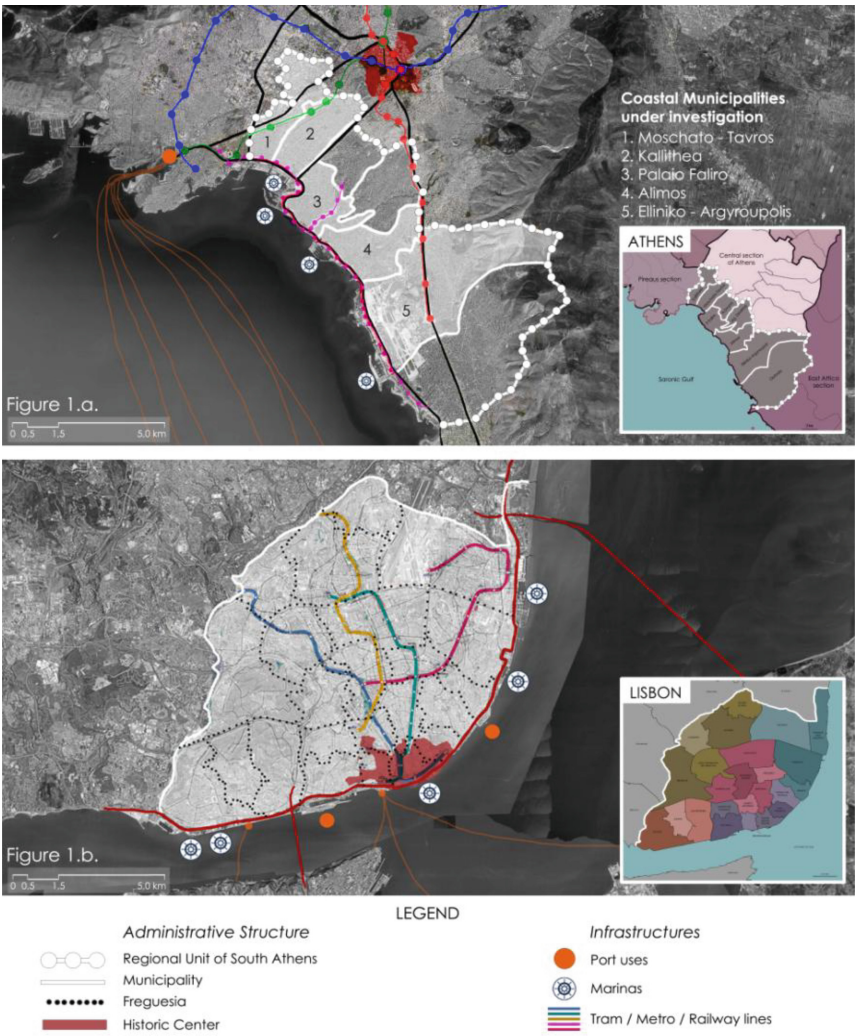


Fig. 1. (a) Athens (Regional Unit of South Athens) and (b) Lisbon [own elaboration]

Municipalities*:* The two waterfronts studied are characterised by two poles of supralocal extent. Athens' two poles are *Faliro* (west) and *Helliniko* (east), while Lisbon's are *Belém* (west) and *The Park of Nations* (east). These spatial units are of particular relevance because they serve as the cities' main watergates; yet, planning decisions have resulted in differing perspectives on their long-term viability and effective transformation into landmarks. The *Praça do Comércio* in Lisbon serves as both a recreational destination and a landmark. In contrast, works on the rehabilitation of *Faliro Bay* and *Helliniko* continues in Athens, with persistent conflicts over the *Helliniko* coastline's public nature and future physiognomy. In both cases, the study focuses on the waterfronts between

the coastal avenue and the water, i.e. the Saronic Gulf in Athens and the Tagus River in Lisbon.

2.2 Methodological Approach and Main Steps of Investigation

The proposed methodology seeks to analyze and asses the spatial-functional evolution of the studied waterfronts. Special emphasis is placed on: a) the development model / investment strategy; b) planning concepts (direction and priorities); c) management methodology; d) land ownership / development policy; and e) legal framework. The methodology was previously tested on the Athens waterfront and is currently being applied in Lisbon. The aim is to link the two cases and draw conclusions on the sustainability of their waterfronts and the key factors that have contributed to this.

In the context of this spatiotemporal methodology, the main exploration parameters were: (a) ***coastline*** (geomorphological features, natural and cultural wealth, degree of alteration); (b) ***coastal urbanization*** (form, structure, intensity, type, dynamics, rate of change); (c) ***transport networks*** [category (roads, public transportation means, etc.), organisation/correlations (hubs-flows), range of service)]; (d) ***technical infrastructure projects*** (type, location, extent, range); and (e) ***human activities and functions*** (i.e. type, intensity, compatibility, range) focusing on those, that have determined the supra-locality of the investigated areas (i.e. services, trade, culture, sport, recreation, tourism). The above parameters provide the framework for defining the reference themes relating to the factors driving the development of the areas (1st study) and the criteria for assessing the spatial and functional transformations that have taken place in the coastal municipalities studied (2nd study) and their waterfronts (3rd study). The criteria are: (i) ***coastline***; (ii) ***natural and cultural wealth***; (iii) ***centrality of the location*** (linked to and dependent on the prevailing conditions of accessibility, connectivity, proximity); (iv) ***density of the built-up area***; (v) ***use of land/buildings***; and (vi) ***public space***. In order to put this methodology into practice, specific surveys were carried out to estimate/evaluate spatio-functional transformations and to study development and planning options at the spatial level of the coastal municipalities of the study areas, as well as to identify pockets using a typological classification [10].

The implementation of the methodology in the two cases resulted in discrete coastal areas (pockets) with different levels of vulnerability/dynamics. Three pockets have been identified on the Athens seafront (i.e. $\mathbf{A^{Ath}}$, $\mathbf{B^{Ath}}$ and $\mathbf{C^{Ath}}$), and five on the Lisbon's riverfront (i.e. $\mathbf{A^{L}}$, $\mathbf{B^{L}}$, $\mathbf{C^{L}}$, $\mathbf{D^{L}}$ and $\mathbf{E^{L}}$), with varied planning priorities due to diverse features/needs (Sect. 5). Both investigations relied on geographical analysis and evaluation methods. Primary sources included literature, legislation, planning proposals, aerial photographs, databases and fieldwork.

3 Sustainable Waterfront Planning: The Current Debate

This section provides a brief overview of current debate on sustainable waterfront development and policies, focusing on the last two decades, and concludes with two key planning concerns.

3.1 The Discussion

In the 1970s, coastal planning put economic expansion ahead of environmental and cultural preservation. Since 1980, waterfront planning has grown dramatically, with a focus on spatial concerns. The emphasis was on revitalizing urban coastal fronts with architectural interventions that would increase competitiveness by using natural and cultural assets. Until the 2000s, there was concern about the environmental impact of maintaining the coastal areas' natural balance and biodiversity [13, 14]. From 2000 to 2020, coastal planning approaches became more multidisciplinary and flexible. As a result, a more in-depth conversation about coastal planning arose, with the purpose of addressing current issues such as climate adaptation, energy neutrality, sustainable resource management, and the incorporation of waterfront planning into overall city planning [15–17]. In this regard, waterfront master plans have begun to include critical themes such as water management, the circular economy, and sustainable mobility, all within the larger context of green and blue economy, natural disaster management, and Agenda 2030's 17 sustainable development goals.

To this end, it is essential to preserve the spatial continuity of the coastal fronts and their unique interaction with the water, and efforts are underway to integrate the fronts into the urban fabric and the daily lives of residents /visitors. Public space, land use planning, and coastal accessibility are becoming increasingly significant [10, 18, 19]. Undoubtedly, the current discourse highlights the importance of maintaining connected waterfronts and integrating them into the urban fabric through liveable public spaces, sustainable mobility and soft multifunctionality. The focus is on disaster management, building the resilience of local communities and integrating coastal and marine planning through a multi-criteria approach that takes into account environmental, cultural and socio-economic considerations [10, 20, 21].

3.2 The Policy Scenery

The presentation is divided into two main levels: global and European, with key topics including coastal and marine management, environmental protection (natural and cultural), climate change adaptation, and natural disaster management. Specifically:

Global Level: Sustainable development initiatives have existed since the 1970s. Since then, regulations have been devised to control coastal and maritime areas and protect environmental quality through territorial resource management [22–25]. Between 1980 and 2000, there was a focus on integrated coastal resource protection, which included initiatives to connect the land and marine environments [26]. During the same period, biodiversity and the natural and cultural environment were popular topics [27, 28], and policies addressing climate mitigation [29] and natural disaster management [30] were established. During 2000 - 2020, there was a significant gap in integrated coastal zone management, with no new policies developed despite 20 years of policy modifications. The goals/objectives for coastal planning state initiatives in a larger policy framework [31]. However, the development model focuses on more integrated approaches to sustainable development, climate change, resilience, as well as natural disaster management [10, 32–34].

European-EU Level: A similar, holistic approach to Europe and the EU (as part of related research [10]) focuses on safeguarding both natural and cultural assets in the 1970s and 1980s [35, 36]. Integrated Coastal Zone Management (ICZM) developed as an essential protection/control strategy in the 1990s, with suggestions for implementation issued many years later [37]. Since 2000, the maritime space has attracted significant attention [38, 39], and rules addressing climate change are being adopted [40–42]. The convergence of development-oriented policies towards an integrated coastal and maritime policy framework, as well as a gradual transition to energy neutrality, is currently ongoing [44, 45].

3.3 Key Planning Concerns for Resilient Waterfronts

The following concerns emerge from the simultaneous follow-up to the current debate on the development and planning of waterfronts and related policies:

Development perspective: Environmental protection, climate adaptation, energy neutrality, cultural heritage management, and other critical characteristics should all be considered when developing a sustainable waterfront. To achieve sustainability and resilience, the concerns identified above require a transition to a completely new perception that focuses on new government structures and participatory planning.

Planning perspective: Spatial planning (density, land uses, mobility, connectivity, accessibility, public space, etc.) and coastal carrying capacity evaluation (evaluation methodologies, criteria, and indicators) should be prioritized. The emphasis should be on a multi-factorial study of the spatial-functional transformations of coastal fronts over time (timeline), in order to identify the critical factors that have played a key role in this direction.

4 Assessing the Dynamics of Athens' and Lisbon's Waterfronts

This section examines Athens and Lisbon at the metropolitan and municipal/intermunicipal levels, with emphasis on the latter. Firstly, it outlines their characteristics, transitions, and trends. Secondly, it focuses on waterfront master plans and planning, referring to their broader area or specific sectors (i.e. transportation, infrastructures).

4.1 Features, Particularities and Spatio-Functional Transformations

After applying the proposed methodology and the criteria (Sect. 2.2.) in both cases, the following outcomes are reached (Fig. 2):

Athens. From the end of the war until the 1960s, the Athens waterfront remained natural and the coastal area became a famous tourist destination. The city-sea dynamic changed dramatically in the 1960s, when the coastal zone became both a transit center (with motorways and the Hellinikon airport) and a recreational and tourist destination. After 1970, the urbanisation of the waterfront increased due to the expansion of vacation homes and tourism. During this decade and beyond, the coastal topography underwent

significant transformations as a result of initiatives such as embankments (particularly in Faliro Bay), new roadways (e.g. Vouliagmenis Avenue), marina development (e.g. Palaio Faliro and Alimos), the operation of the Hippodrome (current Stavros Niarchos Foundation Cultural Center), and sports facilities.

Lisbon. The development of the city's port led to the construction of huge embankments (1887), occupying a significant part of the coastal zone for industrial purposes. In the late 1930s, the Portuguese World Exhibition in *Belém*, together with the development of the embankments and coastal boulevards in front of *Praça do Comércio*, shaped the cultural and recreational character of the waterfront. By the late 1970s, the port had built commercial stations and infrastructure such as the metro system and the main bridge linking the city to the south side of the river. Lisbon's deindustrialisation in the 1980s led to urban voids, especially in the eastern part of the city. Expo'98 reinvigorated the relationship between the city and water, leading to the establishment of *Parque das Nações*. In the 2010s, the historic quarter was rebuilt, changing *Praça do Comércio* into a liveable open public space (Fig. 2). Nine green corridors were created in 2012 (with more under construction) to connect key areas of the city, including the riverfront, while addressing climate change mitigation/adaptation.

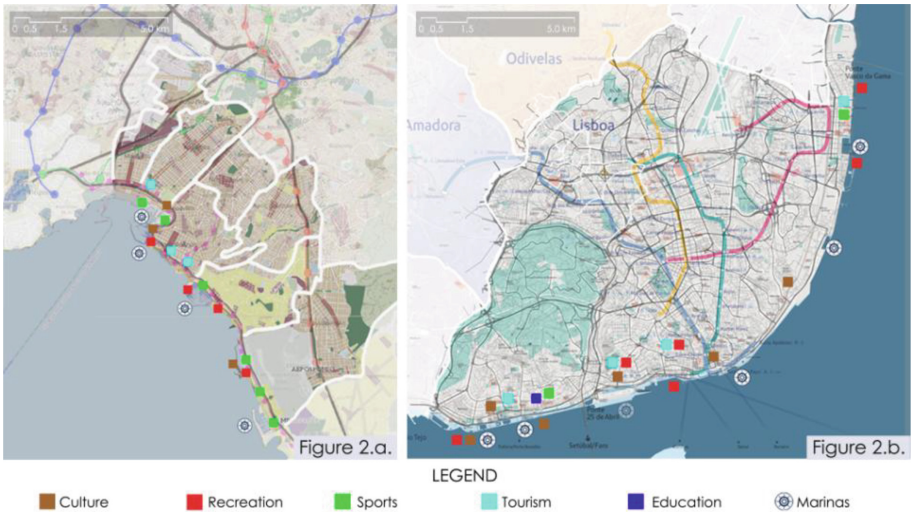


Fig. 2. Human Activities of Supralocal Scope in: (a) Athens and (b) Lisbon [own elaboration]

Particularly interesting is the comparative monitoring of the two cases, from which the following emerges:

Athens and Lisbon. Following the concise demonstration of their transformations, some disparities may be identified between the two case studies. Specifically:

In the 1970s, the Athens waterfront underwent significant changes, with natural shorelines preserved in certain parts. The area is rich in both natural and cultural features, but access to it is limited due to transport and connectivity issues. Density along the coast

varies between municipalities. The urban coastal zone is highly concentrated. There are few public spaces with a local character [19]. Both *Faliro* and *Elliniko* will be transformed into large green parks.

Lisbon's waterfront, on the other hand, has evolved since the late eighteenth century, with different areas designated to serve the Port. The city's cultural significance is evident in the central and western coastal areas, although the entire riverfront retains a cohesive identity thanks to efficient transport and sustainable movement. There is a significant population above the coastal road. This is despite the fact that the coastal zone has several high quality public spaces.

4.2 The Effects of Development and Spatial Policies on Waterfronts' Identity

After reviewing the characteristics and features of the Athens and Lisbon coastlines (Sect. 4.1.), the focus of this section is to assess the impact of the development and planning alternatives that have been put forward and implemented so far on the structure, character and dynamics of the two examples.

Athens. There have been several different plans for the Athens waterfront. The Stavros Niarchos Foundation Cultural Centre (SFNCC), the Olympic facilities and the marinas are examples of supra-national developments that have increased the significance of the seafront, while at the same time posing serious local consciences and risks. The current approach to the area is fragmented. It lacks a coherent vision. The coastal zone is referred to as a hyper-local zone in the Athens-Attica Regulatory Plan (Law 4277/2014), but there are no defined guidelines and it has not been amended. Except for Elliniko-Argyroupoli, the current General Urban Plans (GUPs) do not include the waterfront. The Presidential Decree of 2004 (Government Gazette 254/D/2004), the only attempt at an integrated planning strategy for the coastal area from Faliro to Agia Marina in Kropia, excludes Faliro and Elliniko, which are treated independently. The lack of comprehensive, clearly defined long-term planning at regional and inter-municipal level makes cooperation and coordination between stakeholders problematic.

Lisbon. Lisbon's coastal planning reflects an ambitious and unified vision, and the 2008 General Intervention Plan for the Waterfront (PGIFR) guides its implementation. It also appears to be consistent across the different planning stages since the 1990s. At the same time, the 1992 Lisbon Strategic Plan (PEL) set out a new urban development framework that focused on connecting the city to the river while protecting the port. Its urban planning decisions were incorporated into the 1994 General Municipal Plan (PDM), which included proposals to increase river connectivity. This logic is in line with current planning approaches (Strategic Vision: Lisbon 2002–2012, Lisbon Strategic Map 2010–2024, PDM of 2020) and promotes sustainable development, preservation of local identity, environmental sustainability and promotion of culture. Planning projects benefit from cooperation between a single municipality and the port authority. This leads to more efficient decision-making processes.

Athens and Lisbon. The comparative monitoring of the two cities confirms the significance of the above conclusions, which show that:

On the one hand, Athens' waterfront landscape is constantly evolving. This has attracted the interest of investors and a great deal of planning. Over the last sixty years, significant supralocal infrastructure has been developed. These include the international airport, marinas, Olympic facilities and the Stavros Niarchos Foundation Cultural Centre. Fragmented coastal planning, lack of vision and inefficient management prevent spatial continuity and integration of the waterfront into Athens city.

On the other hand, the strategy of Lisbon is more coherent and better coordinated. The city's planning activities are evidence of a commitment to the preservation of the area's cultural and historical identity, while at the same time promoting long-term growth. The successful regeneration of a riverfront is based on a clear vision, long-term planning concepts and efficient decision-making processes. These guarantee its integration into the city and everyday life.

5 Athens' and Lisbon's Waterfronts Spatial Continuity and Integration into the City: A Typological Classification Based on Spatial Criteria

This section briefly presents the results of the classification of the Athens and Lisbon waterfronts using the specified criteria [(i)-(vi)] (Sect. 2.2). The goal is to highlight the unique aspects of each case (pockets and features), while also highlighting pockets with similar demands and dynamics in both cities.

5.1 Athens: A Seafront in Transition

The study found three distinct areas ('pockets') inside Athens' shoreline and defined them based on their distinctive features/dynamics, as follows: **Pocket A^{Ath}**: *Culture and Recreation Center of Faliro*; **Pocket** B^{Ath}: *Coastal Zone of Local/Supralocal Character in Transition*; and **Pocket C^{Ath}**: *Metropolitan Pole: Recreation Park of Elliniko-Agios Kosmas*. **Pockets A^{Ath}** and **C^{Ath}** have the potential to be supranational poles. However **Pocket B^{Ath}** has a local and supralocal scope [10]. Specifically:

Pocket A^{Ath}: *Culture and Recreation Center of Faliro:* This area, which administratively belongs to the municipalities of Moschato-Tavros and Kallithea, is very important for two reasons. First, it serves as the main gate to the sea for the historic city of Athens (via Syngros Av). Second, the supralocal aspect of its operations makes it a unique landmark. In particular, the coexistence of leisure and sports infrastructures, as well as tourism and cultural activities, creates an ideal environment for the development of a super-local coastal pole that will have a significant impact on the seascape, especially once the planned marine park with indoor and outdoor facilities is completed.

Pocket B^{Ath}**:** *Coastal Zone of Local/Supralocal Character in Transition* This area belongs to the municipalities of Palaio Faliro and Alimos. It is characterised by a distinct spatial and functional organisation, natural and cultural attractions and landscapes, and potential for recreation, sports and tourism development. The link between the city and the sea has been gradually restored in various sub-areas, creating favourable conditions for the future.

Pocket C^{Ath}: *Metropolitan Pole: Recreation Park of Elliniko - Agios Kosmas* This area administratively belongs to the municipality of Elliniko-Argyroupoli. This part defines a high concentration of conflicting coastal activities: recreation and sport (i.e. Olympic facilities). However, what made this stretch of coastline famous throughout the world is the ongoing debate about the regeneration of the area of the former Athens International Airport, until it was relocated to Spata (*Eleftherios Venizelos*). According to current plans, this place will be the city's new landmark. A series of interventions (e.g. architectural, urban, transport, etc.) will be crucial in this direction, as well as an increase in tourism, sports/leisure activities and the construction of a coastal park to connect the city to the sea (part of Poseidonos Avenue will be underground).

5.2 Lisbon: A Liveable Riverfront

The study pointed out five distinct areas ('pockets') along Lisbon's riverfront based on their features/dynamics, as follows: **Pocket A^L**: *Belém Cultural Center*; **Pocket B^L**: *Alcantara Port Uses Area*; **Pocket C^L**: *Coastal Historic Center Area*; **Pocket D^L**: *Beato Port Uses Area*; and **Pocket E^L**: *Metropolitan Pole of the Park of Nations*. **Pockets A^L**, **C^L**, and **E^L** are supranational poles, whereas **pockets B^L** and **D^L** are parts of the urban riverfront with mainly port-related functions. More specifically:

Pocket A^L: *Belém Cultural Center:* is a dynamic site with a high degree of spatial coherence along the riverbank. In terms of the specific part's connection to the city, the 'upstream' and 'downstream' parts of the coastal boulevard have been treated as a single unit in terms of use (mainly cultural and recreational) and public space. However, the coastal road and railway lines act as barriers.

Pocket B^L: *Alcantara Port Uses Area:* has seen significant infrastructure development in recent years, particularly in transport and public services. In addition to the port's uses and administrative services, the renovation of old buildings has revitalised the immediate cultural and social urban environment. New parks and recreational areas have linked the coastal zone to the urban fabric, providing spatial continuity in areas without port activity.

Pocket C^L: *Coastal Historic Center Area:* represents the opening of the city to the water. It is a supralocal pole in the immediate proximity of the historic center, with cultural, commercial, and touristic significance. The area maintains spatial continuity and integrates with the urban environment. The narrow coastal road and lack of railway along the riverbank, together with planned efforts to improve the public realm and support sustainable mobility, appear to be positively integrating the area into the city.

Pocket D^L: *Beato Port Uses Area* is primarily used for port operations. The western edge (close to the historic city centre) includes a cruise terminal and public space, providing spatial coherence with other redevelopments around the central square. To the east, the *Santa Apollonia* railway station (above the coastal road) and the port container depot (below the coastal road) separate this area from the urban fabric.

Pocket E^L: *Metropolitan Pole of the Park of the Nations*: it was built in the area where the Expo of 1998 was set up for the first time. The Expo has played a significant role in changing the character of the surrounding area, mainly by incorporating residential,

business, leisure and tourism activities. Although there is spatial continuity with a well-planned public realm, there is a lack of integration into the urban fabric. The area has taken on the characteristics of an isolated urban environment. It faces difficulties at a local level, despite sufficient hyper-local accessibility.

5.3 Athens and Lisbon: A Comparative Approach of Their Waterfronts

Following the study of 'pockets' on the investigated waterfronts, it appears that both cases have considerable similarities (Fig. 3).

First, certain areas of waterfronts have been identified as potentially supralocal poles, namely **Pockets A^{Ath}** (*Faliro Bay*) and **C^{Ath}** (*Elliniko*) in Athens, and **Pockets A^{L}** (*Belém*), **C^{L}** (*Historic Center*), and **E^{L}** (*The Park of the Nations*) in Lisbon. On the one hand, **Pockets A^{Ath}** (*Faliro Bay*) and **C^{L}** (*Historic Center*) share parallels in how they depict the city's relationship with the water, while both emphasize sports, culture, and recreation. On the other hand, **Pockets C^{Ath}** (*Elliniko*) and **E^{L}** (*The Park of the Nations*) arise independently of the metropolis that basically surrounds them, without necessarily forming interaction and networking links. The result is a unique situation: Autonomous neighborhoods are organised within the urban fabric of their cities.

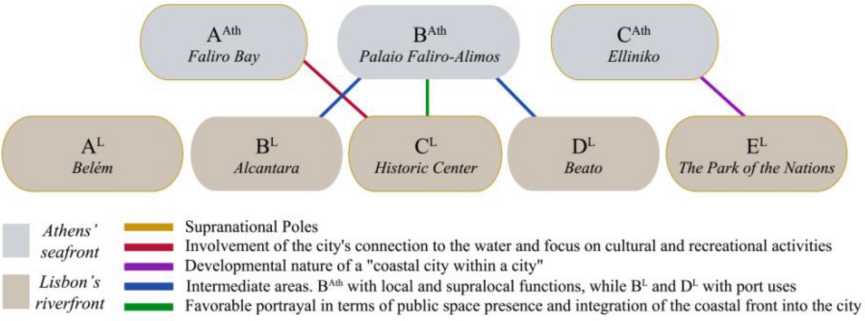


Fig. 3. Comparative analysis of Athens and Lisbon waterfront pockets [own elaboration]

Second, in terms of the wider areas surrounding the identified pockets, the following are highlighted: **Pocket B^{Ath}** (*Palaio Faliro-Alimos*) in Athens' waterfront balances local and supralocal functions, while **Pockets B^{L}** (*Alcantara*) and **D^{L}** (*Beato*) in Lisbon's waterfront face serious urban sustainability, waterfront access and environmental quality challenges due to intensive port activity.

Third, the spatial continuity of the waterfronts and their integration into the urban fabric is a concern in both cities. Public space plays an important role in both cities. In Athens, the arrangement of public space along the coast is inadequate, despite previous attempts to maintain spatial continuity along the water. Unfortunately, the issue of connecting the waterfront to surrounding public spaces does not seem to be resolved in the overall logic of green corridor design. Regarding the two super-local waterfronts [i.e. **Pockets A^{Ath}** (*Faliro*) and **C^{Ath}** (*Elliniko*)], public space concepts are promising, but

no significant action has been taken. On the other hand, Lisbon has made tremendous progress in developing the entire riverfront, with the exception of **Pocket D^L** (*Beato*), while in Pocket C^L (*Historic Center*) there have been notable efforts to integrate the urban front into the metropolis.

6 Concluding Remarks

The following are the findings from the correlated follow-up of the two cases in the broader context suggested by the key parameters (I, II and III) that have established the basic framework of the investigation (Sect. 2.2.):

- ***I) The existence of waterfront planning and its connection to urban planning***

  Waterfront Planning: Both cities have plans for their waterfronts. In Athens, however, these plans are generally out of date and fragmented. In Lisbon case, however, coastal planning is based on a more comprehensive rationale.

  Coastal and City Planning: In Athens, the coastal front is separated from urban planning. This affects spatial and socio-economic coherence of the city. In Lisbon, on the other hand, despite the existence of specific plans that deal mainly with the port, there are links between the riverfront and the city as a whole. This is beneficial to the quality and sustainability of the waterfront.

  Vision: Athens lacks a coherent, long-term vision for its waterfront and its relationship with the city. Lisbon, however, has a more comprehensive approach in recognition of the importance of its waterfront to the growth of the city.

  Focus Sectors: Athens seeks economic growth mainly through the expansion of tourism/recreation, but culture is not promoted in terms of sustainability or landscape protection. Lisbon, on the other hand, encourages the promotion of local identity and the landscape in order to boost tourism.

  Participants -Stakeholders: In Athens, there is a permanent inter-municipal problem, which raises concerns about cooperation. In Lisbon, despite incompatible objectives, significant progress has been made in co-operation between the municipality and the port authority.

- ***II) The ability of waterfront planning to address current challenges and ensure the public character of the shore***

  Climate - Energy Neutrality: Athens is in the early stages. Infrastructure projects (e.g. sewerage, flood protection, undergrounding of coastal road sections) are under development, while consultations on sustainable mobility plans are ongoing. Lisbon, on the other hand, seems to have demonstrated a more proactive approach, taking into account environmental factors and promoting energy efficiency solutions. This includes implementing green corridors and tree planting initiatives (throughout the city and along the water) to mitigate the adverse effects of pollution and climate change. To reduce the risk of damage from flash floods, natural drainage systems and nine rainwater retention stations are being implemented.

  Natural and Cultural Heritage and Landscape: Athens is at an early stage in addressing these issues, while Lisbon has made significant progress since 2008 with green initiatives in urban planning, renewable energy and water management (Tagus estuary clean-up and wastewater reuse), as well as the circular economy.

Coastalization: In Athens, the increase in coastal urbanisation has resulted in dense urban areas with insufficient open spaces for public use and recreation. Lisbon, on the other hand, by providing accessible open spaces and well-designed public footpaths throughout the city and coastal zone, has made concerted efforts to minimise the impact of coastal urbanisation.

Supralocal vs. Local: The Athens waterfront faces significant problems. These include the creation of large-scale activities and infrastructure that are incompatible with residential areas, and overexploitation of resources, which often leads to conflict. The current range of functions and the complexity of transport networks (e.g. roads, public transport networks, and marinas) exacerbate spatial pressures. This has a number of local impacts on both the environment and the city. On the other hand, Lisbon is better placed to deal with some of these problems because of the hyper-localised nature of its riverfront.

The Public Character of the Shore: Some areas of the Athens seafront are preserved. In particular, the **Pocket B^{Ath}** (*Palaio-Faliro-Alimos*) provides access to the sea, while the **Pocket C^{Ath}** (*Elliniko*) faces obstacles such as limited accessibility, inadequate networking, poor quality and security issues. On the other hand, Lisbon stands out for maintaining a strong public character along its entire riverside, with the exception of the parts designated for port use. The commitment to public space is evident in the continuous accessibility and open nature of the waterfront, fostering a sense of community and providing recreational opportunities for residents / visitors.

- ***III) Implementation barriers in waterfront planning and local consequences***

Pockets: In Athens, regeneration initiatives in the **Pockets A^{Ath}** (*Faliro*) and **C^{Ath}** (*Elliniko*) are not progressing as planned. On the other hand, projects concerning Poseidon Avenue and wider water management to prevent flooding are underway. **Pocket B^{Ath}** (*Palaio Faliro-Alimos*) has a better situation, especially in areas where the city-sea connection has started to work. In the case of Lisbon, there is significant planning activity in the **Pockets A^{L}** (*Belém*), **C^{L}** (*Historic Center*) and **E^{L}** (*The Park of the Nations*). On the other hand, the implementation of regeneration plans in **Pockets B^{L}** (*Alcantara*) and **D^{L}** (Beato) is very limited due to their focus on port facilities.

Planning Priorities: In the Athens waterfront, in the **Pocket B^{Ath}** (*Palaio Faliro-Alimos*), the focus should be on preserving the coastline, protecting natural resources and providing quality public spaces. The ongoing planning in **Pockets A^{Ath}** (*Faliro*) and **C^{Ath}** (*Elliniko*) is expected to deliver results in the coming years. On the other hand, along Lisbon's riverbank, planning strategies in **Pockets A^{L}** (*Belém*) and **C^{L}** (*Historic Center*) seek to sustain cultural identity while creating vibrant public spaces. **Pocket's E^{L}** (*The Park of the Nations*) regeneration plan is carried out independently of city planning, with a focus on the establishment of a vibrant urban core featuring recreational activities and facilities. Finally, **Pockets B^{L}** (*Alcantara*) and **D^{L}** (*Beato*) demonstrate a variety of environmentally friendly port management practices, with a focus on community sustainability.

7 Planning Sustainable Urban Waterfronts: Open Issues

The simultaneous examination of the three key parameters (I, II and III) in both cities described above (Sect. 6) raises the unresolved question of how to ensure liveable waterfront planning. In this context, the planning challenges of sustainability are the preservation of the spatial continuity and integration of the waterfront into the urban fabric, while the resilience issues are mainly climate adaptation and energy neutrality, circular economy, water quality and disaster management. In this respect, the main findings from the two cities include the following:

Sustainability objectives*:* Both Athens and Lisbon include themes in their waterfront master plans to ensure the spatial continuity of the waterfront and varying degrees of integration into the city. The difference is that Athens' waterfront development is based on a more fragmented planning strategy, i.e. focusing on specific areas without a clear vision for the entire waterfront. Thus, the Athens waterfront has sections where steps have been taken to ensure sustainability by creating liveable urban spaces and coastal routes, as in **Pocket B^{Ath}** (Palaio Faliro-Alimos), while **Pockets A^{Ath}** (*Faliro*) and **C^{Ath}** (*Elliniko*) still have a long way to go, despite having master plans. In contrast, spatial continuity is guaranteed along a significant part of the Lisbon riverfront. Barriers are mainly located in the **Pockets B^{L}** (*Alcantara*) and **D^{L}** (*Beato*), where port functions are concentrated. The links between the riverfront and the urban fabric are maintained mainly through the public space, the land uses (leisure and cultural functions) and the quality of access in the **Pockets A^{L}** (*Belém*) and **C^{L}** (*Historic Center*), especially in the latter. The results show a significant difference in the way the two cities manage their waterfront gateways, i.e. **Pocket A^{Ath}** (*Faliro*) in Athens and **Pocket C^{L}** (*Historic Center*) in Lisbon, respectively.

Resilience objectives: There are major discrepancies along this axis. On the one hand, the adopted waterfront strategies in Athens show little concern for resilience objectives. It is only in the last decade that comprehensive green transport strategies and large-scale infrastructure projects with positive environmental impacts have been developed. In Lisbon, on the other hand, two components have been identified that have played an important role in making Lisbon the European Green Capital 2020. Firstly, the promotion of walking, cycling and public transport as means of sustainable mobility; and secondly, the focus on public space as a means of creating a vibrant network of green corridors along the waterfront and across the city.

The comparative study between Athens and Lisbon revealed weaknesses in the planning of the Athens waterfront. These weaknesses are mainly due to the lack of a clearly defined vision, inconsistent planning decisions, lack of implementation of strategic regional planning and lack of cooperation between administrative groups and key stakeholders. The research also found that the development of the Lisbon riverfront appears to be a success story, demonstrating interesting concepts of spatial continuity and integration into the city through an overall long-term strategy and mutually reinforcing best practices.

Regardless of how effectively the waterfronts have been used in the urban regeneration of the two cities, the study found that coastal planning must take into account the challenges posed by the current climate/energy and socio-economic crises [4, 10]. In these circumstances, coastal communities need to treat their waterfronts as an essential

natural and cultural element [5, 18]. Such an initiative requires close cooperation and sharing of best practices. In this respect, it is crucial to take into account local differences rather than the unquestioning adoption of development models. Last but not least, creating new and flexible governance structures and adopting democratic and participatory planning are equally important parameters.

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