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Special Issue Reprint

Urban Landscape Transformation vs. Heritage

Edited by
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This is a reprint of the Special Issue, published open access by the journal *Land* (ISSN 2073-445X), freely accessible at: https://www.mdpi.com/journal/land/special_issues/W8598YP8CE.

For citation purposes, cite each article independently as indicated on the article page online and as indicated below:

Lastname, A.A.; Lastname, B.B. Article Title. *Journal Name* **Year**, *Volume Number*, Page Range.

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About the Editors

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Bojana Bojanic Obad Scitaroci is a retired professor at the University of Zagreb, Faculty of Architecture, Department of Urban Planning, Spatial Planning and Landscape Architecture. She is a graduate, authorized architect and town-planner. She earned her M.Sc. degree in Architectural Heritage in 1986 and obtained her Ph.D. in 1990 with her doctoral dissertation on "Research of the continuity of architecture on the territory of the central part of the island of Hvar". Since 1991, she has worked as an independent scientific researcher, planning engineer, and town-planner. She is the author/co-author of seven books, more than forty scientific articles, ten scientific studies, forty town-plans and studies, and thirty designs from the field of garden and landscape architecture. She has actively participated in scientific research projects in Croatia and abroad in the field of landscape architecture and urbanism. She was a coordinator of doctoral research in the Heritage Urbanism research project financed by the Croatia Scientific Foundation (HERU project, 2014-2018). She has taken part in national and international scientific expert conferences with topics in the field of cultural heritage protection, traditional architecture, landscape architecture, tourism, cultural landscape, soundscape, walkscape, and space syntax.

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Nerma Omićević is an assistant professor for the Architecture Program within the Faculty of Engineering and Natural Sciences of the International University of Sarajevo. She holds a Master's degree in architecture and urban planning from the University of Sarajevo and a Ph.D. from University of Zagreb. The topic of her doctoral dissertation was "The Urban Rehabilitation Model of Post-War Urbanscape - Defining Sarajevo as the Memorial", under the mentorship of prof. Bojana Bojanic Obad Scitaroci. Since 2011, she has lectured various courses within the program, supervised students' design projects, and contributed to many administrative duties at the program, faculty, and institutional level. She is the author/co-author of one book, one book chapter, and four scientific articles related to the study of post-disaster and memorial landscapes, as well as diverse design projects in the field of architecture and landscape design.

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Preface

This Special Issue explores architectural, urban, and landscape heritage in the context of urban landscape transformation around the world. The aim is to compare heritage sites within their contemporary context by understanding the (trans)formative processes of constant urban change. The motivation and inspiration for "Urban Landscape Transformation vs. Heritage" lies in the heritage urbanism approach developed by the HERU research project, University of Zagreb, Faculty of Architecture (2014–2018, led by academic Mladen Obad Šćitaroci, PhD), where heritage is observed holistically as an active subject in urban development instead of a passive object in society. We wish to thank all 54 authors for their contributions and hard work which resulted in redefining heritage based on insights from fifteen valuable settings—eight from Europe, six from Asia, and one from North America. Overall, this Special Issue reprint is a part of Urbanscape Emanation research.

Bojana Bojanic Obad Scitaroci, Nerma Omićević, and Tamara Zaninović
Guest Editors

Editorial

Approaches to Urban Landscape Transformation vs. Heritage

Bojana Bojanić Obad Šćitaroci [1], **Nerma Omićević** [2] **and Tamara Zaninović** [1,*]

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1. Introduction

Cities are systems composed of urban and natural landscapes with intangible and tangible layers, continuously developing and overlapping [1]. Based on this perspective, the layer of heritage is inherent to urban transformation and is a part of the continuous process of urban change. However, urban transformations can have different, possibly unwanted outcomes.

As cities today are facing the consequences of rapid population growth and uncontrolled urbanisation [2,3], as well as the impacts of environmental changes and disasters, there is a growing pressure in terms of land resources and limited usable land being available in urban areas. Within this rapidly shifting, everchanging, and globally evolving urban context, rethinking the role of heritage as an integral part of urban landscapes and land usage requires new attention, definitions and comparisons.

The Special Issue titled 'Urban Landscape Transformation vs. Heritage', therefore, employs the term 'heritage urbanism' [4], an internationally recognised research approach for the restoration and revitalisation of cultural, natural and mixed heritage in order to address the following questions:

- How can urban landscape transformation contribute to the protection and preservation of heritage?
- Does urban landscape transformation, in fact, transform heritage?
- Can urban landscape transformation generate, create, and develop new heritage?

    This Special Issues invites manuscripts that address the following themes:

- Urban landscape transformation through heritage preservation;
- Urban landscape transformation through the active use of cultural and/or natural heritage;
- Urban landscape transformation as an opportunity for using heritage to support change towards sustainability and resilience;
- Urban landscape transformation as a catalyst for creating new heritage;
- The evaluation and prediction of heritage-related issues in urban landscape transformation;
- Assessing the impact of environmental factors on cultural and natural heritage sites amid urban landscape transformation;
- Cultural and natural heritage between climate change and urban landscape transformation.

2. Observing Heritage in the Context of Urban Landscape Transformation: Architectural Heritage, Urbanscape as Urban Heritage, and Landscape as Cultural Landscapes

The fifteen papers within this Special Issue book cover a range of valuable research topics, observing urban landscape transformation and heritage from various perspectives and spatial contexts.

All examples (Table 1) explain that urban landscape transformation influences heritage and its relationship to wider urban contexts, thus redefining heritage.

Table 1. Overview of topic "Urban Landscape Transformation vs. Heritage".

Heritage Type	Research Location (City, Country)	Key Research Aspects (Based on Keywords Provided by Chapter Authors)	Contribution to Redefining Heritage
Architectural Heritage	London, UK	urban regeneration; critical system dynamics; heritage transformation; urban dynamics; deep cities; participation	Urban public space Methods and criteria for understanding layers and values in urban dynamics
	Xi'an, China	urban landscape transformation; heritage sites; heritagisation; multi-value	Reuse modes on heritage sites Enables detection via multi-value evaluation
	Split, Croatia	heritage; urban transformation; urban landscape; imageability	Architectural and urban cultural heritage Criteria for understanding urban change
	Shanghai, China	Muslim; historic urban landscape; minorities; adaptive reuse	Reuse of religious architectural complex Enables detection via case study
	Dubrovnik, Croatia	urban transformation; archival sources; visual sources; hypothetical reconstruction; medieval urban life; social values	Social aspects and urban cultural heritage Redefine understanding of lost and preserved values
Urban Heritage	Beograd, Srbija	urban landscape transformations; mass housing estates; landscape quality assessment; heritage assessment criteria	Modernistic urbanism Criteria for understanding and assessing
	Uppsala, Sweden	car traffic; compact cities; green space; infill development; neighbourhood satisfaction; open space management; perceived qualities; planning	Modernistic urbanism Redefining understanding of lost and preserved values in densification
	Beirut, Lebanon	historic urban landscape; cultural heritage; natural heritage; landscape heritage; heritage identification; modern heritage	HUL method review and contextualized Redefining understanding of lost and preserved values
	Pittsburgh, USA	urban heritage; urban morphology; urban palimpsest; heritage urbanism; historic districts	A city as a system and urban integration (space syntax) Redefine our understanding of heritage
	Sarajevo, BiH	urban landscape; architectural heritage; contemporary interventions; social tolerance; transformation	A city as a system and heritage protection Criteria for understanding
Landscape Heritage	Beijing, China	world heritage site; plant landscape change; multitemporal; historical photographs; mono-photogrammetry; georeferencing	Summer villa and landscape heritage Redefining our understanding of lost and preserved values
	Dubrovnik, Croatia	summer villa landscape; protective zone; urban integration	System of summer villas Redefining our understanding of lost and preserved landscape values
	Hangzhou, China	titled landscape; cultural landscape; Ten Canal Scenes; Grand Canal; eight-scene culture	Criteria for understanding and redefining heritage Methodological research on canalscape
	Krk, Croatia	park heritage; heritage urbanism; urban transformations; climate change;	Landscape heritage of islands Redefining our understanding
	Isfahan, Iran	urban design; walkability; pedestrian friendly; pedestrian movement patterns; place making; social interactions; cultural heritage site; space syntax	Historical landscapes Criteria for understanding walkability issues via space syntax

The gathered research observes examples of architectural heritage and protected urban and landscape settings. The comparative approaches enabled the following research con-

tributions. First, some contributions define the criteria for understanding the relationship between urban change and heritage layers in scales of architecture, urban planning and cultural landscape. Second, some contributions enable the detection of heritage reuse modes. Third, some contributions redefine our understanding of lost and preserved heritage values within their specific processes of urban transformation.

3. Recent Developments and Open Questions for Future Research

In the contemporary context of diverse "urbanisms" theories, common planning goals can be found in the concepts of integration instead of fragmentation in order to increase quality of life [5]. As such, the integration of heritage into urban landscape transformations is seen as an inevitable basis and evaluation criteria. Increasing quality of life through urban transformation and planning resilient urban infrastructure systems [6–8] includes exploring and solving walkability issues and preserving the urban and architectural values of historical cultural heritage. In the case of the landscape values of summer villas and their gardens and surrounding cultural landscapes, it is questionable if the lost values can be regained or if urban devastations can be mitigated.

Recent research presents dynamic shifts in urbanism where cities, as well as projects, are not observed in their static states but instead are designed and explored as processes [9–11]. The aim is to predict the possible scenarios and their role in a constantly changing world where reuse and multifunctional criteria apply [12]. Rethinking heritage from a dynamic urban perspective remains a constant question when connecting the past, present and future.

Modernistic and functional urbanism is required knowledge for understanding the 20th-century city and its development, and as such, examples of modernistic urban planning have been established as heritage, so their contemporary situation needs careful consideration [13–15].

Altogether, the mentioned theories and presented research (chapters) raised important issues for future research and design practice in the context of urban landscape transformation:

- Climate change vs. landscape conservation strategies where cities are observed as urban ecosystems balancing natural and human habitats while carefully protecting landscape values for raising biodiversity [16];
- Connecting various cultures into coherent tolerant communities where urban memory is supported by participatory and other mixed planning practices [17,18].

Perception and awareness of previous layers is important because they can guide planners and designers towards understanding contextual limitations and solving spatial and social problems by achieving stronger interconnections (Figure 1). Each urban landscape transformation builds on previous layers, and through the rediscovery and reinterpretation of these layers, we can form a basis for achieving new values such as heritage for future generations.

Figure 1. The urban landscape transformation of the city of Zagreb in Croatia. The author of the collage: Jelena Bule, a student work from 2013 under the mentorship of Prof. Dr. Sc. Bojana Bojanić Obad Šćitaroci (Urban Landscape Workshop at the Master Studies of Architecture and Urban Planning, Faculty of Architecture, University of Zagreb.

Conflicts of Interest: The authors declare no conflicts of interest.

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Unpacking the Dynamics of Urban Transformation in Heritage Places through 'Critical System Dynamics': The Case of Beresford Square, Woolwich

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Abstract: Rapidly growing research in urban heritage studies highlights the significance of incorporating participatory approaches in urban transformation projects. And yet, participation tends to be limited, including only certain segments of the population. It is also acknowledged that cities are 'dynamic' and 'complex' systems. However, there is extremely limited research that captures the dynamic transformation mechanisms in historic urban environments. This paper aims to illustrate a novel, mixed-method and dynamic approach to unfold the dynamics of urban heritage areas. We do so by focusing on the historic area of Woolwich, a South-East suburb in London, UK. To do so, we apply 'critical system dynamics' for the analysis of a mixed dataset which incorporates architectural surveys, interviews, online surveys, social media data and visual observations of material change through light archaeology. Within the framework of 'deep cities', the article argues that the transformation of a place is a complex process that can be captured not only based on 'what we see' but also on 'what we cannot see'. In other words, the invisible (values, emotions, and senses) is as significant as the visible. This is of paramount importance as most urban planning policies tend to be based on material, visible remains and less on the spirit or soul of a place.

Keywords: urban heritage; urban regeneration; critical system dynamics; urban heritage transformation; urban dynamics; deep cities; participation

1. Introduction

This article explores how the constant and 'deep' transformative character of a historic urban environment can be captured through participatory and dynamic methods to inform present and future sustainable urban transformation practices. We do so by approaching a historic urban environment through the lens of a 'deep city', that is a city that consists not only of the historic, visible material layers we can see but also the 'layers' we cannot see, yet we feel and experience [1]. Given the complex nature of urban transformation, our investigation draws on a novel, cross-disciplinary theoretical and methodological approach which conceptualises heritage and transformation as dynamic social practices, the continuation or interruption of which depends on the dynamic interactions of several social, cultural, economic, political and other variables [2]. In this article, we conventionally name this approach 'urban heritage dynamics' in order to stress that heritage and transformation, as any form of dynamic practice and process, constitute a dynamic, complex system of

interrelated elements [2]. The scope of 'urban heritage dynamics' is thus to explore how urban heritage interconnects over time with the wider socio-economic, environmental and other dimensions of an 'urban system' [2].

At this point, it is worth noting that there has been a remarkable shift in how heritage, and in particular urban heritage, has been conceptualised over the years. In academic literature and practice, the concept of heritage has evolved from a 'thing' that needs to be 'managed' due to 'threats' and 'risks' [3,4] into a socio-cultural, meaning-making process [5,6]. More recently, and partially in response to emphasis on the 'discursive' nature of heritage [5], heritage has been approached as an 'assemblage' of both human and 'non-human' agents as well as material and immaterial qualities [7–10]. In all these approaches and conceptualisations, the dynamic nature of heritage is recognised [2]. Heritage is indeed subject to constant change. This change is sometimes viewed as a threat that merits the development of management [11] or adaptation strategies [2]. Other times, change is viewed as a value itself that can be studied and integrated in conservation and urban planning [1]. However, despite the universal recognition of the complex and dynamic nature of heritage, very few studies unpack this theoretically and methodologically [2]. Furthermore, these studies are still in early stages, only 'scratching the surface' in terms of using relevant theories [12] or methods [13]. A limited number of published works [2,14] take a step further in unfolding methodologically and theoretically the systemic, complex, dynamic nature of heritage in diverse heritage contexts by utilising the method of 'critical system dynamics' including a study on modelling change through the same method [15]. It should be noted here that the lack of such studies may be explained by the fact that gathering longitudinal qualitative data can be a resource-heavy and time-consuming process. We are thus in the unique position to contribute an article that is based on observations and surveys gathered over the last 10 years on the urban heritage regeneration of Woolwich.

If sustainable heritage management is about developing strategies for heritage that enable adaptation to changing socio-economic and environmental challenges while also contributing to sustainable development [16], then it is imperative to apply and further refine theories and methods that can best capture the dynamic nature of heritage. In view of this, we contend that 'critical system dynamics' is a suitable method to this end. As explained below, 'critical system dynamics' denote a method of system dynamics that allows pluralistic and multi-method approaches to data collection and analyses. It is usually applied in contexts where critical matters such as social justice and equality are of research interest. We intend to apply this method in the analysis of the dynamic transformation of the historic urban area of Woolwich Town Centre, South-East London, UK. The case of Woolwich was chosen because it has been one of the most deprived areas in London but also an area that has been subject to rapid transformation over the last twenty years. In addition, as aforementioned, the lead author has been monitoring the transformation of the area over the last ten years through annual visits with postgraduate students. While our original intention was to conduct an analysis on the Town Centre, the Beresford Square and the Royal Arsenal (see Figure 1), we soon realised that such an in-depth and complex dynamic analysis in the scope and timeframe of the project could only be achieved if we narrowed down the focus. Hence, we decided to focus on Beresford Square and its Gate, which is a critical zone lying between the traditional Town Centre and the conservation area of the Royal Arsenal that is currently undergoing rapid redevelopment.

(**a**)
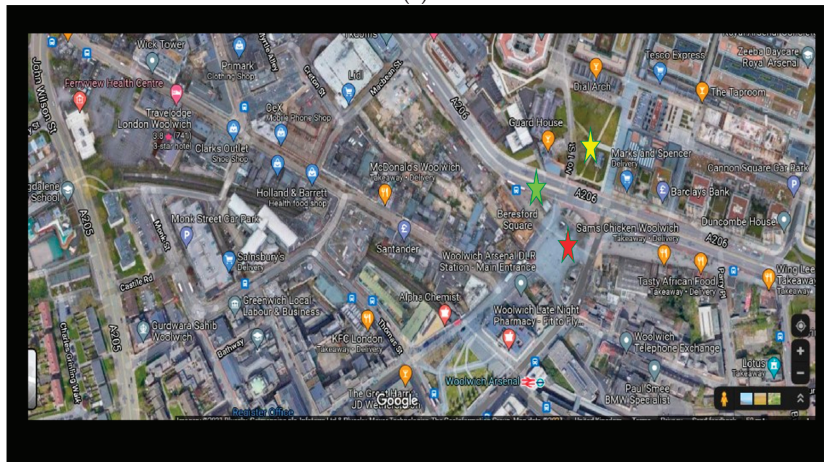
(**b**)

Figure 1. On the top (**a**), Beresford Gate is depicted with the Beresford Market in the foreground and with the Royal Arsenal development beyond (Photo by Kalliopi Fouseki, Date: 22 July 2023). On the bottom (**b**), a Google map view pinpoints the location of Beresford Square and Beresford Gate highlighted with a red star. Opposite to the square indicated by a red star, the Plumstead road can be seen (green star) which separates Beresford Square and its nearby town centre with from the Royal Arsenal area (pinpointed by a yellow star).

1.1. Spatial Context

As aforementioned, the focal point of our study in this article is located in Beresford Square where the High Street (Powis Street) of the Woolwich Town Centre leads. Beresford Square is marked by the presence of the Royal Arsenal Gatehouse. The Gatehouse is also known as the Beresford Gate, which provided the access point for thousands of workers with occupations in the factories manufacturing weaponry at the site of the Royal Arsenal (Figure 1).

Both Beresford Square and its Gate are located in the conservation area surrounding the Town Centre, which was designated in 2019. The Royal Arsenal is located on the other side of Plumstead Road, which currently divides Woolwich Town Centre from the Royal Arsenal. The Royal Arsenal, a conservation area since the 1980s, has been redeveloped since the early 2000s [17]. The redevelopment has been characterised by the conservation and

adaptive reuse of the existing historic buildings as well as by the construction of high-rise blocks of apartments.

The plans of the Greater London Council to approve the widening of Plumstead Road took place at a time when the Royal Arsenal site was closed in the 1960s. The closure of the Arsenal triggered discussions for new developments on the site and its surroundings. Indeed, as soon as the Arsenal closed, the Royal Arsenal Gatehouse 'was earmarked for demolition by 1969 to permit the widening of Plumstead Road when the Greater London Council was building Thamesmead' [17] (p. 163). However, plans for the demolition were faced not only with delays but also with opposition from the local community and heritage groups. Eventually, Beresford Gate was listed in 1979, alongside a number of buildings located within the main Royal Arsenal site [18]. The listing and consequent protection of Beresford Gate led to the rerouting of Plumstead Road to its north in 1984–1986, the reuse of the Gate as a backdrop to the square, as well as the pedestrianisation of the square [17] (p. 163) which, at that time, was accessed by trams and via other public transportation means.

1.2. Conceptual Approach

Although our analysis will zoom in on the area of Beresford Square, co-relations with the wider area's transformations will also be made. As aforementioned, our analysis will be framed within the concept of 'urban heritage dynamics' [2]. This approach draws on diverse but interrelated theories including urban dynamics, complexity, systems thinking with emphasis on participatory system thinking, grounded theory and assemblage theories, e.g., [19]. These theories derive from different traditions, including hard and soft science traditions, but merge into a common theoretical toolbox being developed within heritage-led urban studies. A common ground for these approaches is critical urban theory [20]. The phrasings within critical urban theory, such as 'right to the city' and 'cities for citizens' through the reinvigoration of participatory urban civil societies, resonate with the aim of implementing a complex methodological approach captured through theories of urban dynamics, complexity, systems and assemblages.

Urban dynamics is one of the fundamental theoretical underpinnings of 'urban heritage dynamics'. Urban dynamics looks at the growth or decline of cities as the result of dynamic interconnections between available land, housing, industries and populations [21]. Joy Forrester was the first to develop an urban dynamic theory, still in use today, simulating how an 'empty land' evolves into a dense urban area through the construction of new housing and businesses [21]. According to Forrester, new housing attracts a managerial, professional population, a phenomenon that contributes to the overall attractiveness of the area and the growth of new businesses. This urban growth though reaches an equilibrium followed by gradual decline due to the deterioration of housing and business infrastructure. The attractiveness of the area declines with inhabitants abandoning the area. The newcomers are inhabitants occupying lower-paid jobs while overcrowding the already deteriorated housing stock [21]. As a result, depopulation occurs due to the deterioration of the material fabric, closure of business, overcrowding of houses and unemployment. Demolition is often proposed by urban planners as the way forward for regrowth and revitalisation [22].

Through an 'urban heritage dynamics' perspective, we intend to offer an alternative approach by which urban 'renewal' occurs on a land that is occupied by 'obsolete structures' of heritage value revived through adaptive reuse. Through the adaptive reuse of 'obsolete' and 'abandoned' heritage buildings and sites, a socio-economic and cultural revival is achieved [2]. It should be noted here that this 'revival', often termed as 'heritage-led' or 'heritage-driven' regeneration, is not without its unintended, negative consequences, with gentrification leading to displacement of local, deprived communities being one of those [23,24]. It is, therefore, imperative to examine the dynamic interplay of the various factors mobilised during urban transformation programmes in order to prevent unintended socio-economic and cultural consequences. The method of 'critical system dynamics' can provide a useful tool in this direction [25]. The use of this method calls

for a re-conceptualisation of heritage as a dynamic, complex 'system' or 'assemblage'. Such reconceptualization can benefit from reviewing 'assemblage', 'systems thinking' and 'complexity theories'.

The idea that heritage is a 'complex', 'dynamic' 'assemblage' subject to constant change and transformation implies that heritage is not a 'thing' but a 'process', or even better, a socio-cultural practice. As a socio-cultural practice, the ways in which urban heritage emerges, evolves, persists, disappears or revives over time can be the object of study of 'urban heritage dynamics'. For Shove et al. [26], who have been studying the dynamics of social practices, there are three key fundamental elements upon which the continuation or disappearance of social practices depends. These elements include materials, competencies (knowledge/skills) and meanings. In the context of urban heritage as a social practice, Fouseki [2] has identified additional elements that are critical for the continuation or disappearance of urban heritage transformation. These include 'senses and emotions', 'space/place/environment', 'time' and 'resources'. The 'agents' driving these practices are omnipresent [2] (p. 8).

In detail, 'materials' connote the physical fabric associated with heritage such as buildings, ruins, archaeological remains. 'Values' and 'meanings' refer to the significance attributed by individuals or groups to heritage objects, sites, places and practices. 'Senses' and 'emotions' connote the deeper feelings attached by those who have a deeper connection to a place. 'Place' and 'space' denote on a micro-level the individual homes/settings and on a macro-level, a neighbourhood area. 'Competencies' or 'skills' include the background knowledge of how to perform a practice. 'Time' is conceptualised in its broadest possible sense. It can, for instance, connote the ways in which time is experienced or the time span that a heritage practice covers. 'Resources' refer to financial, human or other resources needed to materialise a heritage action [2].

The dynamic continuation of urban heritage practices will depend on how the afore-mentioned dynamic elements are perceived by the various stakeholders as connected, disconnected or reconnected over time [2]. These dynamic elements are connected through non-linear relationships, the investigation and mapping of which requires mixed data including both quantitative and qualitative information [27,28]. This approach aligns with principles of complexity theory, critical realism and 'critical systems thinking'. In critical realism, the object or subject of observation is imbued with non-linear relationships, multiple causality, interplay between structures and agency [29] (p. 2). In 'critical systems thinking', the world is conceptualised as composed of complex systems—that is, a group 'of interacting, interrelated, or interdependent parts that form a complex and unified whole that has a specific purpose' [30] (p. 2).

'Complexity theory' and 'critical systems thinking' share elements in common with assemblage theories [31,32]. DeLanda, whose work has been particularly influential in the field of heritage studies, e.g., [7,8,33], regards assemblages as 'wholes' whose properties emerge from the interactions of their parts [32]. It is worth noting here that Buchanan criticises such an approach as object and material-centric, which contradicts with the initial assemblage theory of Deleuze and Guattari approaching assemblage as a dynamic arrangement between two (or more) semi-autonomous formations that encompasses the organisation of bodies and the organisation of discourses [34] (p. 113). However, what all the above theories share in common is that an 'entity' or 'process' is subject to constant transformation, a transformation that depends on the dynamic interactions of several factors and parameters that cover the wider spectrum of social, environmental, economic, cultural and other dimensions [2]. This complexity thus calls for the application of a method that can capture the dynamic and complex nature of urban heritage and, in particular over time, of a historic urban environment.

2. Materials and Methods

Given our conceptual approach of 'urban heritage dynamics', we decided to deploy the method of 'critical system dynamics' for the unveiling of community power dynamics

and social relationships in the case study analysis. 'Critical system dynamics' denote the use of 'system dynamics' for the analysis of problems related to disadvantaged and oppressed groups. The ultimate goal of using this method is to 'advance democracy and justice using system dynamics tools' [35] (p. 23).

The underpinning conceptual foundation of 'critical system dynamics' is 'critical systems thinking'. 'Critical systems thinking' is questioning the methods, practice and theory framing a social problem. 'Critical systems thinking' is also committed to pluralism in that it insists that all system approaches, qualitative or quantitative, have a contribution to make [36], p. 12; see also [37]. Our analytical approach aligns with principles of 'critical systems thinking' in that we have been critically debating and questioning our methodological tools and techniques while adopting a pluralistic methodological approach that combines qualitative and quantitative data while being aware of the need to improve urban policies through our results; see also [15].

It is worth clarifying at this point that the term 'system' refers to a set of things and/or people interconnected in such a way that they produce their own pattern of behaviour over time [36,37]. In other words, events and patterns, or things that we observe, are driven by systemic structures and hidden mental models [38]. By using 'critical system dynamics' in complex social contexts, we intend to gain an in-depth understanding of how certain elements interconnect to form a pattern, behaviour or phenomenon [39]. As mentioned in the previous section, the notion of 'dynamic system' connotes a 'complex entity' of interconnected elements which change over time. This 'entity' can be a social practice, a building, a city. The underlying premise is that changes on any of the dynamic elements of the 'system' will affect the entire system because a complex system comprises non-linear, multiple, interconnected loops which change over time, with some loops disappearing or re-appearing under certain conditions [40].

The application of 'critical system dynamics' requires to first delineate the problem under investigation. From a 'critical system dynamics' point of view, the focal problem usually revolves around social justice and equality issues. In this article, the problem, the complexity of which we endeavour to unfold, relates to the gradual decline of Beresford Square and its market in Woolwich Town Centre, as well as the growing social disparity between Beresford Square and the nearby 'Royal Arsenal' riverside, which has been subject to rapid transformation over the last twenty years. By deploying 'critical system dynamics', the factors that have contributed to the growth and decline of Beresford Square and its market as well as the social division between the two areas can be unveiled. By revealing these factors, we can inform future urban planning strategies and policies for the wider area.

Having identified the problem, the next methodological step is to map the non-linear cause and effect relationships between the 'dynamic elements' that have been instrumental in the dynamic transformation of the urban area. We accomplished this by looking at the thorough *Survey of London* (Volume 48) which focuses specifically on the development of Woolwich and its built heritage since the 17th and 18th centuries. The information extrapolated from the *Survey of London* was complemented by qualitative data on perceptions and attitudes of those living or working in Woolwich towards the local heritage and the urban transformation in the area with particular emphasis on Beresford Square, Beresford Gate and its market. More specifically, we drew on 29 in-depth, lengthy, semi-structured interviews (with an average duration of 1.5 h each) conducted by the UCL (University College London) and University of Edinburgh/University of Stirling teams of the CUR-BATHERI project (19 conducted in 2018 by the UCL team and 10 conducted in 2021 by the Edinburgh/Stirling team). This large number of in-depth interviews resulted in more than 100,000 words for thematic analysis. The longitudinal interviews allowed us to capture any perceived change in heritage values over the last three years of the most intense and rapid transformation programmes. The interview data were further complemented by 98 responses to an online questionnaire carried out by postgraduate students at UCL's Institute for Sustainable Heritage in 2020 during the COVID-19 pandemic.

The interview data were first thematically coded using a software for qualitative analysis, NVivo 12. The data were coded both by each individual UCL researcher and the lead author independently before the researchers as a team concluded on the final thematical analysis. Hence, by conducting double coding, we minimised inevitable interpretation biases. Following the principles of grounded theory according to which the data drive the theory [41], interview data were initially coded through an open coding process, identifying as many variables and themes as possible related to the key research questions.

A series of 'cause and effect' relationships between the various codes were then identified and mapped on the NVivo 12 software [42]. This analysis was further corroborated by findings emerging from the online questionnaire and the *Survey of London*. The identification of the 'cause and effect' relationships formulated the basis for drawing a 'causal loop diagram' on Vensim PLE 64 software, visualising the feedback loops that are identified as having caused the behaviour of key variables over time [43]. In other words, causal loop diagrams depict the causal links among variables with arrows from cause to effect, creating a series of non-linear relationships and loops. The loops are cause-and-effect relationships which can exponentially grow (reinforcing loops) or start declining and bridging the gap between a desired and an actual goal (balancing loops). Each cause–effect relationship is indicated with + or − depending on whether the relationship is positive and reinforcing (e.g., the more . . . the more) or balancing (e.g., the more . . . the less).

The causal-loop diagram provided the basis for developing a 'stock' and 'flow' system dynamics model. The 'stock' and 'flow' model simulates what accumulates over time (stocks) and what drives this accumulation (flows). Each relationship between 'stocks' and 'flows' is described with simple mathematical equations enabling the simulation of the dynamic hypothesis created. This action can prove particularly challenging [15]. From a 'critical system dynamics' perspective, it could be argued that abstract concepts—such as heritage values or cultural meanings—cannot be represented via mathematical equations. Through critical discussions with system dynamic modelists, it became apparent that the effort to map the relationships of different variables with simple mathematical equations forced us to think even more about how these interrelationships behave [15].

The socio-cultural data were further complemented with material data related to the material change and transformation of Beresford Gate. To this end, the method of light archaeology was utilised. Light archaeology is a stratigraphic and non-destructive research method of historical archaeology used for the investigation of complex spatial contexts (and not just single sites) [44]. Its formation took place progressively between the 1970s and 2000s within (mainly) the medievalist Italian archaeological community. In light archaeology, the 'stratigraphical observatory' is key. This refers to a targeted building or architectural complex selected to investigate historical themes and territorial systems on a regional scale [44]. For the analysis of the Woolwich case, the selection of the targeted building had to accord with a building which represents various chronological phases and associated material changes that echo the wider transformation moments experienced by the area as whole. The 'stratigraphical observatory' becomes then an additional information source that enables a deeper understanding of how an urban area materially evolves, unveiling known and unknown layers of history and material transformation as well as social values associated with these layers [45].

For the case study of Woolwich, we concluded that Beresford Gate fulfils the selection criteria for conducting light archaeology. Beresford Gate lies on the boundaries that physically, socially, and symbolically separate the 'gentrified' Royal Arsenal from Woolwich Town Centre. It is an integral component of Beresford Square and yet also feels disconnected from it. According to the cartographic and iconographic sources (old paintings, architectural sketches, historical photographs), the analysis of the south elevation of the front of the gate facing the square evidenced five main transformations phases of the building, dating from 1828 to the 1990s. Some of these detected phases clearly evidenced that the gate is a tangible witness of the material and social changes of Beresford Square, and the whole Woolwich area, further supporting its preservation (Figure 2). It should be

noted here that the other front elevations revealed additional phases of the gate's individual history which are still subject to analysis.
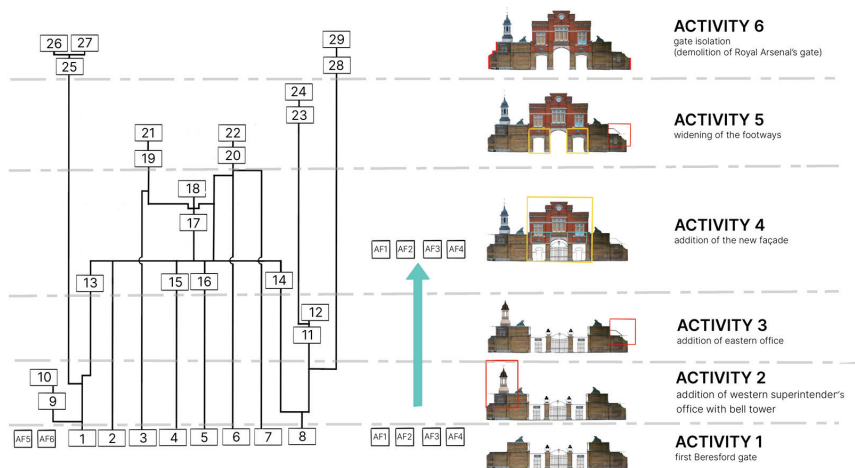
Figure 2. Beresford Gate—matrix and activities. This figure showcases the changes in uses over time with each material change outlined in boxes. (Designed by Elisa Broccoli and Michele Nucciotti).

Since this piece of research relies mainly on qualitative data, we performed a series of validation strategies including a thorough, historic review of the case study; regular discussions on biases that researchers from different disciplines bring to the study through critical self-reflection; use of peer debriefing; and independent coding before discussing together the various themes [46]. One of the main means of validation is to test and apply the model in a real-life context in order to inform decision-making processes. This is the next step of our research for which we are seeking funding. However, we did discuss the modelling process with stakeholders associated with the case study of Woolwich as well as the case studies of the entire project including Florence, Barcelona and Oslo. This enabled us to explore cross-cultural reflections of decision-makers towards the methodology and the key findings emerging from the analysis.

The key methodological steps followed are summarised in the diagram (Figure 3) below.
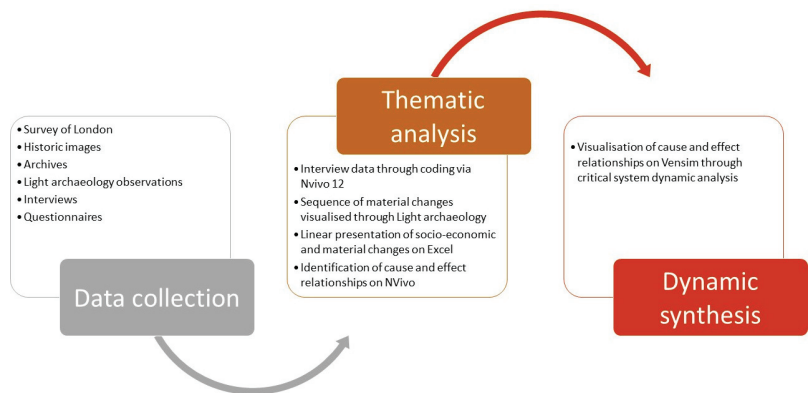
Figure 3. Methodological steps.

3. Results

3.1. Results from the Survey of London Analysis

Volume 48 of the *Survey of London* for Woolwich was originally published for English Heritage in 2012 by Yale University Press, New Haven and London, on behalf of the Paul Mellon Centre for Studies in British Art, London, and edited by Peter Guillery. The *Survey* details the changes of, mainly, the built environment across Woolwich since the 18th century. It is a dense document, the information of which we had to categorise in such a way so that the 'deep history' and 'heritage' of the area could be captured. The information associated with Beresford Square was organised into the following chronological phases:

(i)   Early construction phase and emergence of a grass-roots market (1720–1780);
(ii)   First attempts to organise the square and construction of Beresford Gate (1812–1865);
(iii)   Growth of market, square and transportation infrastructure initially with trams and then with buses (1867–1913);
(iv)   Closure of cinemas, and other buildings, including the closure of the Royal Arsenal but with the market thriving (1936–1984);
(v)   Gradual decline of the market kicked off by the re-routing of buses and trams through the opening of a new main road (Plumstead road) (1984 till today).

One of the key findings emerging from the analysis of the *Survey of London* is that any attempts to reverse the gradual decline of Beresford Square and its market through the 'canonisation' and relandscaping of the square, the pedestrianisation of the main High Street (Powis Street) or even the unsuccessful re-opening of the covered market failed. Our system dynamic analysis, as shown below, indicates that one of the main reasons for failing to reverse the decline is the failure to capture and revive the 'deep values' and 'deep sense of place' which, in this case, was associated with a vibrant, albeit chaotic, environment characterised by people passing by and through, connecting, socialising, hopping into trams and buses or stopping to buy diverse products from the market stalls. This vibrant atmosphere is succinctly encapsulated in the storytelling of a local resident who recalls his childhood in the market [47]:

> "Excitement, anticipation, of sights and sounds.
> Hurry to the bus stop; hop on the bus or the tram.
> The trip in; familiar sights.
> And in the distance. . ...
> The Market, all noise and smells, crowds,
> bustling, shuffling, smiling folk.
> People looking, and touching, and asking,
> meeting and talking,
> buying and selling,
> calling and shouting".

3.2. Light Archaeology

As aforementioned in the Section 2, the analysis of the south elevation front of the gate, facing the square, evidenced five main transformations phases of the building, dating from 1828 to the 1990s. Some of these detected phases clearly evidenced that the gate is a tangible witness of the material and social changes of Beresford Square, and the whole Woolwich area, further supporting its preservation.

In detail, Phase 1 represents the date the gate was built (i.e., 1828) following the clearances of cottages in town to open-up of the road to the Arsenal. This first gateway in plain yellow-stock brick is clearly recognisable today, the lower floor of the present building, even if some alterations were made to adapt the later additions (Figure 4).
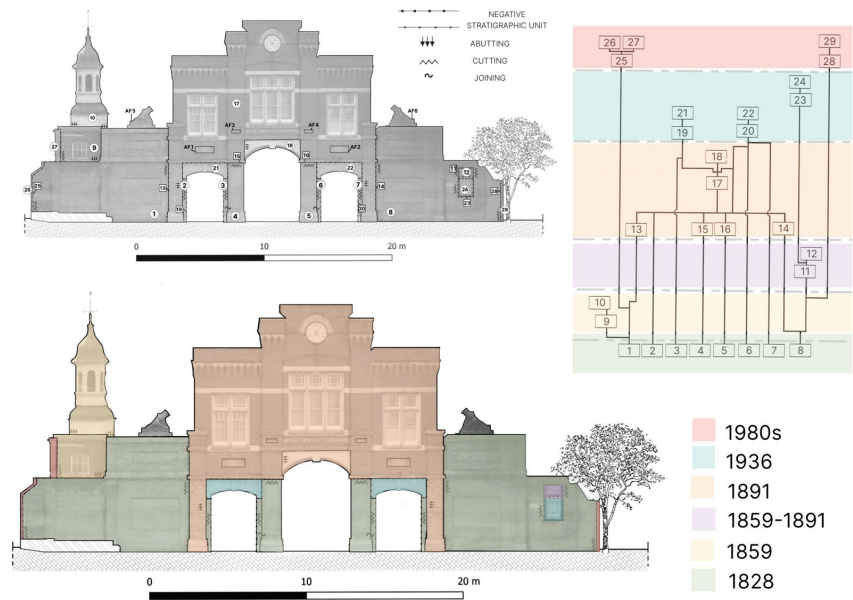
Figure 4. Beresford Gate-building archaeology analysis. This figure summarises in one diagram (unlike Figure 2 which shows the linear material changes) the changes through which the Beresford Gate went. The material changes are represented by different colours. (Designed by Elisa Broccoli and Michele Nucciotti).

The early phases of the gate can be observed in historical photographs of the end of the 19th century where Phase 2 is also visible; this phase relates to the addition of the western superintendent's office in 1859 and its bell tower as clearly illustrated in the "The procession leaving the Arsenal, Woolwich, United Kingdom, funeral of the prince Louis Napoleon" old illustration from the magazine *The Graphic* dated in 1879 [48]. Phase 3 is dated in 1891 and corresponds to the superstructure abutting the first gate. This addition in red brick, with dressed stone, machicolated cornices and a clock over the central of three openings, gave the gate a new monumental façade. As mentioned before, this phase altered the first structure. For instance, the buttresses flanking both the central and the sided footways appear more raised, and more protruding compared to the former ones. Subsequently, all the memorial plaques, the inserted ones in the buttresses inscribed '1829 B' and the Arsenal's coat of arms between the King's monogram 'G.R. IV', originally above the footways, were replaced higher in the new walls. The footways were widened in 1936 (Phase 4), and the iron gate was replaced with a spear-headed one [48]. The last alteration is the most severe: the demolition of the Arsenal's walls abutting the gate on both sides left the gate completely isolated in fact and at risk of demolition during the widening of Plumstead Road in the 1980s.

While Phase 2 and 4 concern Arsenal's internal use of the building more, Phase 1, 3 and 5 can also be connected to relevant socio-economic transformations of Beresford Square and Woolwich as a whole. Both Phase 1 and 3, even if at different scales, represent two crucial moments of the relationship between the 'inside' (the Arsenal) and the 'outside' (Woolwich). The gate named after and commissioned by Master General Beresford in 1829 was the only major work that took place in the Arsenal following the end of the Napoleonic Wars activities and changed the Woolwich townscape, replacing cottages and resulting in the creation of a road. This connected the Gate with Arsenal and the Square. In the end of the 19th century (Phase 3), the main entrance was monumentalised, possibly mirroring the Arsenal's dominant role in local economic growth, as well as the expansion of Woolwich and the growth of its market and square [48].

With the demolition of the walls in the 1980s (Phase 5), the 'inside-outside' irrevocably changed. However, even if these two spheres materially disappeared, the isolated gate, framed within other relevant urban transformations following the closure of the Arsenal and the rerouting through Plumstead Road, seems to still represent for some people a symbol of physical, social and symbolic disconnection [2].

3.3. Interview Findings

The rich interview data were thematically coded into 68 core categories classified into the following broader overarching categories: values and perceptions towards Beresford Square, Beresford Market, Beresford Gate, the Royal Arsenal and the factors that enhance or prohibit the attractiveness of Beresford Square, the Royal Arsenal and Town Centre. For instance, the overarching category of 'values' included sub-categories specifying the specific values attached to the area such as historic, aesthetic, social, economic. The idea of 'attractiveness' here refers to the extent to which those living or working in Woolwich are willing to keep living in the aforementioned places.

The socio-cultural data revealed great diversity, as expected, among residents' perceptions towards Beresford Square, its Gate and the Royal Arsenal. Beresford Gate was recognised by almost all respondents as a monument of iconic and symbolic value despite the loss of its original function, i.e., its function as the 'passing by' and connecting point between the Royal Arsenal and Woolwich Town Centre.

Similarly, official voices in the area highlighted the need to enhance the presence of Beresford Gate through its adaptive reuse, lighting during the night, and plantation of trees in the surroundings.

In contrast to Beresford Gate, Beresford Market was associated with both negative and positive perceptions. For most Royal Arsenal residents, the market was not viewed as holding a special heritage value while the products being sold at the market stalls were perceived of low quality. On the other hand, other respondents living outside the Royal Arsenal noted the 'friendly' atmosphere of the market as well as its distinct community identity and cultural diversity:

> *"I think most of the people [here], they have their own market, their things here, so they are important. For example, African communities, they have their own culture, own food, own shopping, but this doesn't stop us from going here".* (Interviewee 15, local resident of Woolwich living outside the Royal Arsenal and the Town Centre)

Interestingly, the values with which the market is attributed are further projected to the wider Beresford Square where the market is located. One of the interviewees, for instance, commented on how the square as a whole reflects the rich cultural diversity of Woolwich.

> *"And when you look at all different groups, and the nationalities. You know, there are not many squares we can get so many communities in one space. So it's very diversified in Woolwich".* (Interviewee 2, Local resident living outside Royal Arsenal)

Having identified some of the key values attributed to the key locations under study, the next step was to identify themes related to what factors the various communities believe enhance or prohibit the attractiveness and growth of each area. Although most local markets in Woolwich have been suffering from an overall decline, our system dynamic analysis demonstrated that the rerouting of the buses played a detrimental role in the decline of Beresford Market, a much more significant role than the closure of the Royal Arsenal. The rerouting led to the physical and social disconnection of the market from the rest of Woolwich. Recently, attempts by official authorities can be noted in boosting new and unique, international food stalls while reinforcing the nature of the market as a passing-through point. These attempts are noted by residents in the area:

"There is a Bulgarian shop and a lot of Bulgarian people go to that shop and also one specializes in Afro Caribbean". (Interviewee 10, local resident living outside the Royal Arsenal)

"If you just watch the different trucks here, each of them seems to show a different part of the world". (Interviewee 21, local resident living outside the Royal Arsenal)

"For example, there's a Nepalese community there's Nepalese food truck and you will see all these Nepalese and they'll sit together. Yes. They're very nice, yeah, so for them this is their community, they go there". (Interviewee 40, local resident living outside the Royal Arsenal)

In addition to international food stalls, performances and festivals taking place in Beresford Square are noted as a distinct feature of this 'side of the road' in contrast to the Royal Arsenal.

"Last week, there were a mini music festival, local school and communities. They built a stage and there were performing. Well, do they do these in the other side? I'm not sure". (Interviewee 2, local resident living outside the Royal Arsenal)

The festivals, in particular, seem to have acted as a 'contact zone' between the two sides as Royal Arsenal residents have been attending them.

"There was a festival there, one time. And you could see that everybody from this part (Royal Arsenal) went down there, it was like Jamaica, African festival in the Square. Everybody was there. So if there keep on doing that, people will start mixing". (Interviewee 3, Resident of the Royal Arsenal)

In addition to the festivals, the built heritage of the Royal Arsenal has the potential of bringing the two communities together. Residents living outside the Royal Arsenal highlighted that the built heritage is one of the key reasons why they would like to visit the area, despite the unaffordable prices of the local restaurants/pubs and of the Royal Arsenal's farmers' market.

"We lived in Woolwich and we saw the gates open. That's always been a wall. . .people never went behind that wall for years and years and years. And then one day, the gate was open and then we went in there. . .they were these incredible old universal original warehouses and you know, officers mess and all that. We just thought it was fabulous". (Interviewee 8, Local resident living outside the Royal Arsenal)

Overall, the physical disconnection of Beresford Square and Gate and the Royal Arsenal reinforces social disconnection between the communities living on both sides, the socio-economic profile of which is also different with affluent communities gradually inhabiting the Royal Arsenal. However, over time, there are signs indicating that built heritage or intangible heritage associated with the cultural diversity of the market have the power to act as catalysts of social cohesion.

3.4. Online Survey

The interview data were complemented with data collected via an online survey carried out by a team of MSc Sustainable Heritage postgraduate students supervised by the lead author during the COVID-19 pandemic. Not unexpectedly, the questionnaires also revealed distinctly different opinions between those living in the Royal Arsenal and those living in the Town Centre or elsewhere in Woolwich, with the latter groups tending to feel more dissatisfied with the rapid degree of change and transformation occurring on Beresford Square than the Royal Arsenal residents (Figure 5).
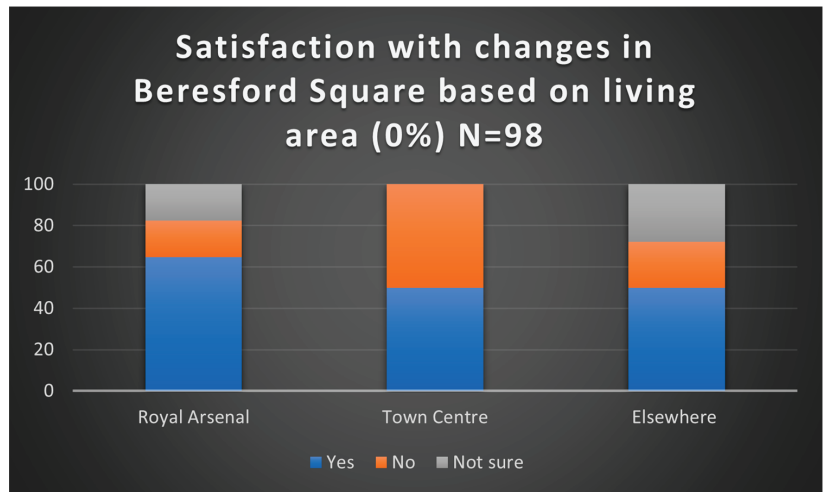
Figure 5. Comparison of views towards the transformation of Beresford Square based on living area.

Overall, the respondents tend to view changes occurring on Beresford Square positively while they seem uncertain about changes on Powis Street (Figure 6).
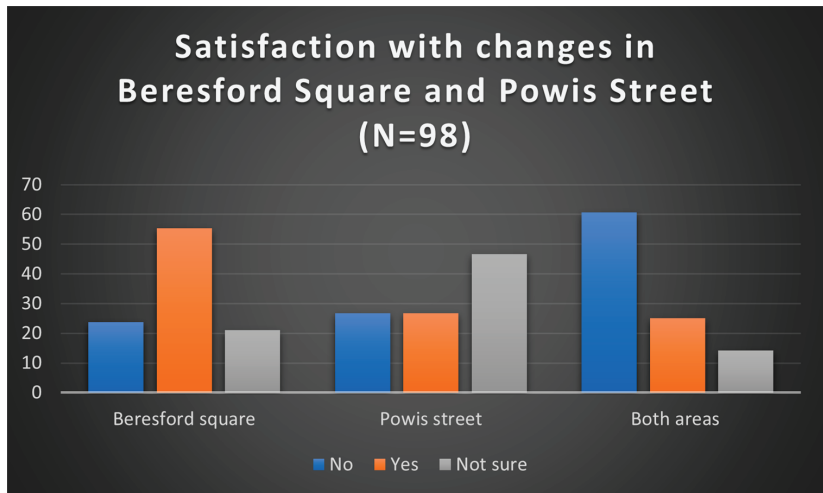
Figure 6. Perceptions of change and transformation at Beresford Square and Powis Street.

The diversity of responses seems to depend on the number of years each respondent has been living in Woolwich (Figure 7). For instance, residents who have been living in Woolwich for more than 10 years seem to favour the transformation of Beresford Square and less so the changes on Powis Street. On the other hand, recent incomers seem to be satisfied with recent changes on Powis Street.
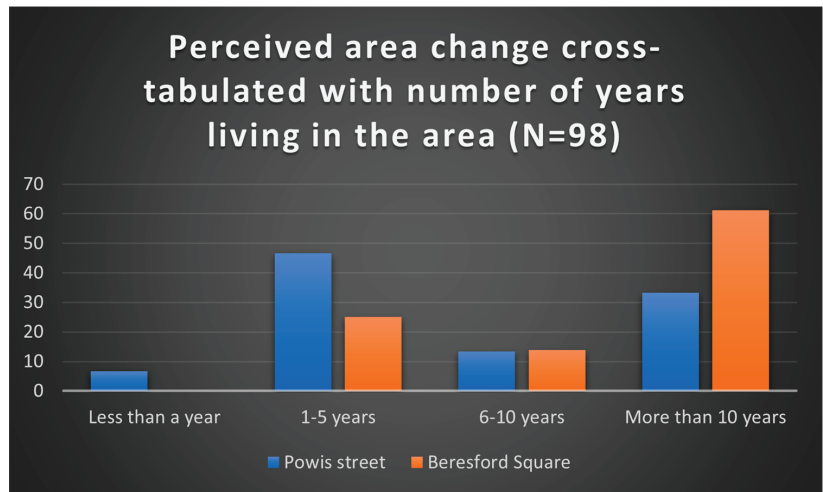
Figure 7. Perceptions of change based on number of years living the area.

The Royal Arsenal residents, more specifically, tend to be either satisfied with the transformation of Beresford Square or dissatisfied with all changes happening (mostly associated with townscape transformation). This may be explained by the fact that the majority of Royal Arsenal residents avoid spending time on Powis Street and hence, they may have not experienced the transformation processes in this area unlike in Beresford Square which provides a 'passing by' point for catching the DLR (Docklands Light Railway) train. Those living in the Town Centre are generally dissatisfied with all changes. However, those inhabiting other areas of Woolwich seem to be satisfied with the overall changes, especially with changes occurring at Beresford Square. Interestingly, despite its vibrance, the Town Centre has received the lowest number of positive responses. This may be explained by the fact that only recently the Town Centre has been going through a targeted regeneration programme, as part of Historic England's Heritage Action Zone scheme (Figure 8).
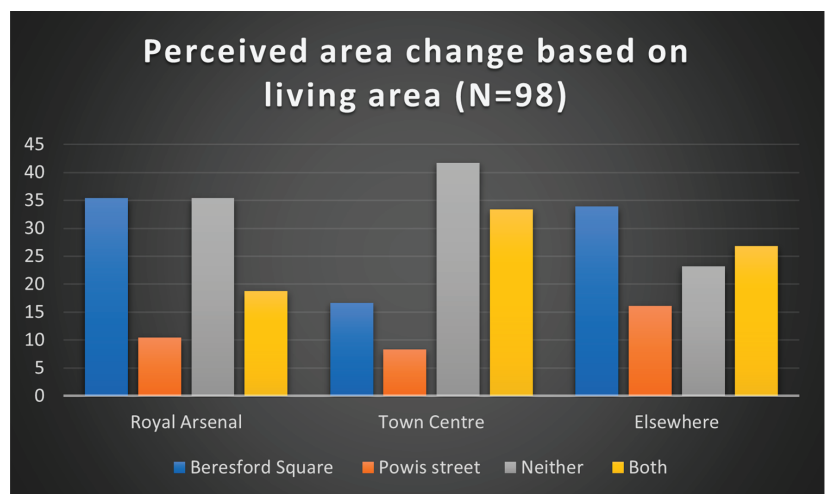
Figure 8. Perceived area change based on residents' area of living.

Hence, what the online survey findings illustrate, is that differences in perceptions among residents depend largely on the area in which respondents live as well as on the number of years they have been living in each area.

3.5. Synthesising Mixed Data by Mapping the Dynamic Transformation of Beresford Square through 'Critical System Dynamics'

As aforementioned in the introduction, we deployed 'critical system dynamics' for three main reasons. First, we aimed to capture the plurality and diversity of views of segments of the population instead of homogenising the population as one entity. Secondly, we opted for synthesising mixed data (qualitative and quantitative data). Thirdly, we focused on the critical role that issues related to social justice, equality and cultural diversity play in urban transformation policies. Having identified the critical non-linear cause and effect relationships in the thematic analysis of the interview data using the 'Relationships' functions on Nvivo (Figure 9) and the *Survey of London*, we developed a causal-loop diagram on the Vensim software.

Figure 9. Cause-and-effect relationships extrapolated by thematic analysis. (Created by Kalliopi Fouseki).

The causal-loop diagram we created represents the dynamic transformation of Beresford Square, its Gate and Market, although we acknowledge that Beresford Square occupies only a small section of the wider area. However, by zooming in, we are in the position to look more closely at how the area transformed over the years and what key values and attributes were missed during such transformation processes by planners, leading to the gradual decline of the square and its market.

In our 'causal-loop' diagram, we mapped six main 'stocks' (highlighted in blue) including the Royal Arsenal population (newcomers), the Woolwich local community residing outside the Royal Arsenal, the culturally diverse population, the number of market stalls, the transportation infrastructure, and the sense of connectivity/social cohesion. Unlike the traditional urban dynamics model which focuses on the dynamic interaction of housing, business and population dynamics [21], in the case of Beresford Square, the critical elements proved to be, in addition to the population, the transportation infrastructure, the market and the sense of social connectiveness. In order to better comprehend the evolution of the square and its market, it is important to look at how historically the market emerged as a social and cultural practice. The in-depth study of the morphological changes to Beresford Square, as recorded by the *Survey of London* and further complemented with information extrapolated from old images and testimonials and light archaeology analysis, unveiled how the 'open land' occupied by the square evolved organically, in a grassroots manner into a public space which hosted initially a grassroot market that was not subject to a particular legal framework since the beginning of the 19th century, before

the opening of the Royal Arsenal. The market gradually grew and eventually acquired a legal status in 1879. Attempts to 'regulate' the square and its markets have been continuous since then. Indeed, the square has been marked by a continuous 'tension' between the respective authorities in each period to 'regulate' and 'put an order' to the open space by endeavouring to attribute a 'rectangular shape' to the space through the demolition of the small number of houses and pubs that were built back in the early 19th century, and the communities that resisted this regularisation process (Figure 10).
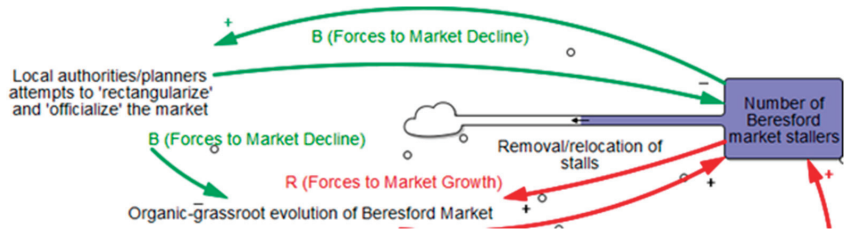
Figure 10. The forces leading to market growth and decline are illustrated. Reinforcing loops are marked in red; balancing loops are marked in green. (Designed on Vensim PLE ×64 by Kalliopi Fouseki and Lorika Hisari).

Thus, the square and its market have been historically characterised by a sense of 'randomness', 'irregularity', 'informality' and 'disorder', which was further exacerbated by the inclusion of trams and buses crossing the square amidst market stalls and thousands of Royal Arsenal workers or just residents doing their shopping (Figure 11).

Figure 11. This picture dates back to approx. 1900 and depicts Beresford Square and the Gatehouse through which individuals entered the Royal Arsenal complex. The gate fronted directly onto the old Plumstead Road, which in the past used to lead straight into Beresford Square, but which today passes behind the Gate (Wikimedia commons).

This is an additional 'deep feature' of the square. Beresford Square has been functioning for years as the 'passing-by' or 'connecting point' between the Town Centre, the Royal Arsenal and the rest of Woolwich. Trams and buses were cutting through the 'square' amidst hundreds of stalls and thousands of people (Figure 12).
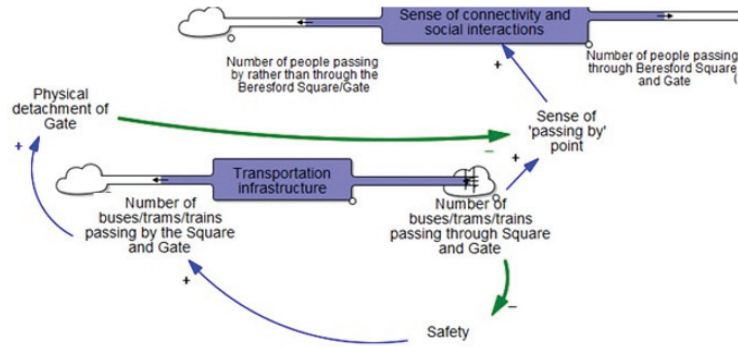
Figure 12. Sense of connectivity and interaction at Beresford Square as a critical dynamic factor is illustrated. (Designed on Vensim PLE ×64 by Kalliopi Fouseki and Lorika Hisari).

In a way, this very nature of the square and its market as a 'meeting point' is one of the 'deep values' of the place, a value that is not materially visible and one which can be traced through the unveiling of the 'deep layers' of the area. The 'disorder' and almost 'chaotic' nature of the square and its market were at the very heart of this space. The 'Beresford Gate' is possibly one of the few tangible reminders of this 'passing by', 'meeting point' function of Beresford Square. It could be argued that the square has not totally lost this 'passing by' feature given that the 'DLR' (Docklands Light Railway) station is located on the side of the square. However, the side location implies that most people move directly to the station without crossing through the square. In addition, the recent opening of an Elizabeth line tube station in the Royal Arsenal has further contributed to the loss of the 'passing by' nature of Beresford Square. In a way, despite the physical disconnection of the Gate from Royal Arsenal, the Gate became a reminder of the 'deep values' of the place. As such, the Gate has a huge potential role in reviving the 'deep spirit' of the place.

The widening of the Plumstead Road in 1984, intended, partially, to reroute the buses outside Beresford Square in order to provide a safer environment, seemed to constitute one of the key drivers—if not the main one—of the decline that the 'square' and its market have since been experiencing. The character of the place, which evolved organically in a grassroot manner, was rapidly transformed by the Plumstead Road project. As illustrated by memoires of former residents posted on blogs (see quote in the previous section), the 'square' stopped being the connecting or 'passing-by' point, numbers of market traders started declining and whole families of traders began disappearing. The bus re-routing was one of the many interventions to Beresford Square. Other interventions included the demolition of buildings around the square and the closure of Beresford Gate, which were opposite to the 'deep values' of the area (Figure 12).

Indeed, the area and its market started gradually declining. The number of market stalls decreased from 135 to 10 despite the growth of the population as a result of the Royal Arsenal development (Figure 13).
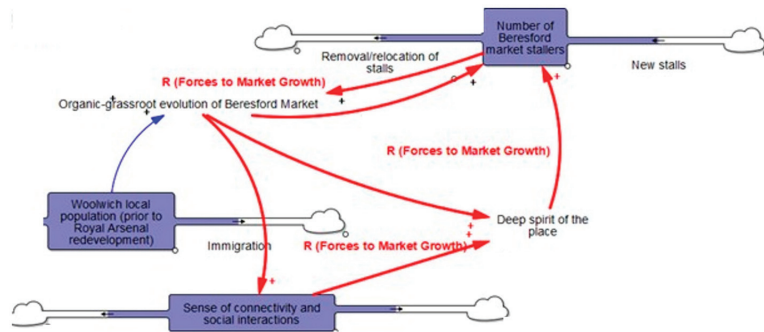
Figure 13. Market decline over time is depicted in the form of a causal loop. (Designed on Vensim PLE ×64 by Kalliopi Fouseki and Lorika Hisari).

As the existing market declined, the need for a new market emerged in the context of the Royal Arsenal area. A farmers' market was established in 2015 and currently takes place twice a month within the Royal Arsenal complex which stands in juxtaposition with the Beresford Market. A promising point of reversal is provided through the gradual increase in food stalls with diverse food offered by the traders at Beresford Square. Stories of local traders have been featured at the Museum of Docklands exhibit and on hoardings in the Royal Arsenal site prior to the launch of the Woolwich Works cultural centre at the Royal Arsenal.

4. Discussion

Our 'critical system dynamics' analysis enabled us to capture not just the 'deep urban layers' 'we can see' through material traces of the past but more importantly, what 'we can feel' and 'experience' [1]. In other words, we contend that through 'critical system dynamics' we can identify the often 'invisible', intangible, 'deep values' of a place. Although the resulting model merits application and validation on the ground, the process of mapping the 'deep transformation' of Beresford Square through historic and social research made the unfolding of the 'deep values' of the place feasible. By doing so, urban planning and urban conservation policies can build upon the deeply embedded features of a place alongside contemporary perceptions of this place to provide sustainable solutions for the present and future.

It could be argued that the 'deep values' and 'deep features' of a place we refer to echo, to some extent, the notion of 'genius loci' [49,50]. The concept of 'genius loci' has been defined as the 'intangible quality', the 'spirit' or soul' of a place, which can be perceived physically and/or spiritually [49] (p. 225). 'Genius loci' reveals itself 'through visible tangible and perceivable non-material features' and is 'made known by underlying processes' as it signifies a process that is happening which 'cannot intentionally be created' [49] (p. 225). Hence, the 'genius loci' or 'spirit of the place' is a temporal, dynamic concept as it encompasses all the temporal visible or invisible layers that have shaped the 'soul' of the place. However, as an urban space, and even more so a historic urban environment, is in constant flux, we should approach the notion of 'deep values' (or genius loci) as a 'complex' and 'systemic' concept, a dynamic 'assemblage' the analysis of which can benefit from systems thinking and respective methods.

The critical role that 'deep values' can play in urban transformation projects advances our 'urban heritage dynamics' perspective. We offered the 'urban heritage dynamics' perspective in the earlier sections of this article as an alternative approach to urban 'renewal', by which land occupied by 'obsolete structures' of heritage value is revived through adaptive reuse [2]. The focus was intentionally a material one in order to note the shift from traditional urban dynamics focusing on demolition to adaptive reuse. The in-depth analysis of the case study calls for an expansion of this approach by including the 'deep

values' of 'deep features' of a place. Hence, an 'urban heritage dynamics' approach refers to the sustainable transformation of historic urban areas through the 'adaptive reuse' of existing material traces of the past in ways that build upon the 'deep values' of a place. To do so, it is important to investigate how 'materials', 'competencies' and 'meanings' have interplayed over time [26] alongside 'senses and emotions', 'space/place/environment', 'time' and 'resources' [1,2]. In the case of Beresford Square, the materiality of the place shifted through the construction and demolition of residential or leisure buildings, the presence and re-routing of trams and buses, the increase and decrease in market stalls. By the appearance or disappearance of certain material manifestations of the area, certain competencies occurred or vanished such as driving trams, selling particular products in the market, cooking certain foods. This affected the ways in which the place was 'sensed' over time by the local inhabitants. The place was transformed from a place of connectivity, social transaction and a 'passing by' point into just a 'passing by' or 'through' area. Resources associated with investing in the revival of the area proved inadequate when failing to capture the 'deep values' of the place. Hence, among all the dynamic elements of urban heritage dynamics, the element of 'senses' and 'emotions', in this instance, proved to be amongst the most significant aspects of the dynamic transformation.

5. Conclusions

This article aimed to explore the dynamic transformation of Beresford Square in Woolwich, its historic Gatehouse and its market through the use of 'critical system dynamics'. By doing so, the article unveiled the visible and invisible 'deep layers' of the historic transformation of the area. A system dynamics diagram (causal-loop diagram) was created demonstrating the non-linear relationships between socio-cultural and economic factors that contributed to the sustainable growth or decline of Beresford Square, Beresford Gate, and its market. By 'zooming in' on a focal area, the area of Beresford Square, we were able to capture the micro-dynamics of this site which are often disregarded, but which are key for developing sustainable future conservation and transformation strategies. However, it is important to keep in mind that this area is also part of a wider urban environment that is going through rapid transformation and change. Indeed, as shown through the causal-loop diagram, wider socio-physical changes have directly impacted Beresford Square.

Why is tracing the 'deep values' of a historic area important for urban planning and conservation policies? In order to answer this question, we need to consider the unintended consequences of failing to do so in the case of Beresford Square, Gate and Market. Our 'critical system dynamics' analysis showed that the 'deep character' of Beresford Square lies in the ways the square functioned as a vibrant 'meeting' and 'passing by' point in space, occupied by trams, buses and market stalls. While this is an 'immaterial' quality, it could be argued that it is echoed materially in the presence of Beresford Gate. Hence, although Beresford Gate appears as a monument disconnected from its original site and function, in reality it functions as a 'material reminder' of the 'deep values' of the place. As shown in the previous sections, former attempts to revive the square and its market failed to build upon the 'deep features' of the place. Most endeavours of revitalisation focused on how to 'aesthetically' enhance the square by imposing an 'order', almost 'pristine' arrangement of space layout. However, these efforts were in a way against the very nature of the place, which evolved organically over the years, creating a space of 'disorder', 'fusion' and even 'chaos' at times, but one that accommodated the social practices and cultural heritage of the people using the space.

Recent strategies to revive the square and its market seem to be starting to address the 'deep values' of the place by exploring ways in which the Gate can be transformed into a 'passing by' point, allowing connectivity and social interactions between Woolwich Town Centre and the Royal Arsenal [51]. Although originally Beresford Gate was listed due to its historic significance during the widening plans of the Plumstead Road as a means to preserve it for demolition, it can now play a significant role in reviving the 'deep spirit' of the place. There are also efforts to increase the number of market stalls through the

introduction of new food stalls reflecting the cultural diversity of the area [51]. This may contribute to the revival of the character of the place as space of connectivity, gathering and interaction.

The in-depth, dynamic examination of the transformation of Beresford Square can showcase a series of implications for future urban planning policies. The complexity, for instance, of the layers of values attached over time to a heritage area requires the application of appropriate techniques and methods that move beyond tick-box consultation exercises. The 'Deep Cities' toolbox (www.deepcities-toolbox.unifi.it (accessed on 25 August 2023)) that has been designed by the research team aims to address this gap by offering a suite of participatory methods and dynamic tools that can be applied in tight timeframes. Recommendations emerging from the 'Deep Cities' project include the wider adoption of people-centred methods, to understand the complex social values associated with deep cities, and the need for a holistic approach to urban heritage management, ensuring involvement by a wide range of stakeholders throughout urban change processes and recognition of grassroots, community heritage practices. A detailed paper on recommendations for practitioners and policymakers emerging from the 'Deep Cities' project is currently in preparation.

We would like to conclude this article by stating that the causal-loop diagram developed in this case cannot represent the dynamics of every single urban heritage area. On the contrary, the dynamics for each area will be peculiar and distinct. However, the process of applying the method can be generalised and applied in similar case studies. We thus hope that we offered a new conceptual and methodological approach to the understanding of the dynamic transformation of historic urban areas, as well as a tool to communicate the results of such studies with planners and conservation officers.

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Transforming Urban Landscapes: Reuse of Heritage Sites through Multi-Value Interpretations in Xi'an, China

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Abstract: As a catalyst for urban landscape transformation, the reuse of heritage sites plays a pivotal role in shaping contemporary urban spaces and influencing socio-economic development. However, this phenomenon is not without controversy, particularly regarding the quality of preservation and the potential risks associated with over-commodification. Consequently, there has been an increasing research focus on reconciling these conflicting aspects. This study employs a multi-value interpretation framework to delve into the reuse of heritage sites in the urban area of Xi'an within the broader context of China's urbanization. Utilizing a comparative case study method, this research specifically examines the burgeoning phenomenon of heritage parks. This exploration sheds light on how the reuse of heritage intertwines with urbanization processes, by taking into account environmental, economic, social, and cultural values. The findings suggest that a multi-value interpretation framework is crucial to address the limitations of the current heritagization. Heritage sites in Xi'an have been integrated into the urban transformation process through heritage conservation and the production of new heritage spaces. However, the evolving multi-value evaluation of these heritage sites continues to influence the city's interpretation of its significant and fading past in planning. This study highlights the dynamic nature of heritage sites in the urban context and underscores the need for nuanced approaches to balance heritage preservation with the evolving demands of contemporary urban development.

Keywords: urban landscape transformation; heritage sites; heritagization; multi-value; Xi'an

1. Introduction

Over the past decades, global cities, particularly those with a rich heritage, have been grappling with a substantial building stock, with the aim of preserving historic buildings and historical monuments in their original form as much as possible [1]. However, beyond mere preservation considerations, the promotion of active social life and economic development are considered equally crucial aspects of urbanization processes. Instead of transforming into stagnant museums frozen in the past, heritage reuse emerges as a proper approach for urban landscape transformation, shaping contemporary urban space and influencing socio-economic development [2,3]. In this context, heritage has transformed from relying on government funding to being recognized as a resource with tourism, cultural, social, and economic values for society [4]. As a result, urban heritage is no longer perceived as an obstacle to development but embodies values for development [5].

According to the 1972 UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage, "sites" fall under the category of cultural heritage, embodying Outstanding Universal Value spanning history, esthetics, ethnology, and anthropology

values [6]. In exploring the effects of heritage in urban transformation, diverse forms of values tend to reshape people's actions and perspectives. However, these processes involve conflicts and contestations regarding the creation of heritage space [7]. The significance of heritage is characterized by an ever-changing multiplicity. Scholars contend that local service providers often misuse the values and meanings of heritage strategically for tourism development [8]. Consequently, the values associated with heritage sites undergo reinterpretation and are prone to shifting in specific cases and geographical contexts.

Post-reform China has become a focal point for urbanization and landscape transformation. The land reform and tax-sharing systems actively encourage local governments to engage in urban (re)development, utilizing market principles to pursue land value appreciation and infrastructure construction. In this process, heritage has evolved into a catalyst for urban (re)development, albeit with contentious issues related to social costs and preservation quality. Scholars have criticized the widespread demolition of areas surrounding heritage sites due to its role in gentrification, commodification, and the destruction of local life [2,9–11]. Since 2008, integrating heritage park construction with the redevelopment of surrounding areas has emerged as a reuse strategy for cities, aiming to achieve multiple goals including heritage preservation, infrastructure upgrading, city branding, and cultural tourism. Among various reuse modes, heritage parks can be referred to as 'museums without walls', with spaces designed to represent or reconstruct past environments or ways of life. This definition emphasizes the role of these parks in preserving, displaying, and interpreting historical and cultural heritage for the public [12]. Generally, heritage sites are valued for their role in contemporary urban life; for instance, redevelopment projects at these sites often incorporate elements of urban greening and sustainable design [13]. These interventions reinterpret the multi-value embedded with the reuse of heritage sites. Multi-value refers to the concept where a single heritage site, object, or phenomenon can simultaneously hold multiple meanings or significances to achieve the re-interpreting of heritage values [14]. Nevertheless, there remains a limited understanding of how heritage values are intricately woven into the urban transformation process via heritage park construction.

The reuse of heritage sites in China is a multifaceted process involving the reuse of historic buildings, the construction of heritage parks, and the comprehensive redevelopment of the surrounding area [2]. Central to successful reuse is the re-interpretation of heritage values and the integration of heritage places into modern life, focusing on balancing heritage preservation and contemporary socio-economic needs. While scholars have extensively investigated the multi-value of heritage sites, including controversies like gentrification, commodification, and challenges to the preservation quality of heritage sites [15], few have focused on specific heritage sites during the ever-changing stages of urban development [16]. Additionally, there exists a notable absence of research on value options when facing these challenges. We contend that when heritage sites are subjected to interests beyond culture, they require value-based foundations to support their own 'experiential' definition of heritage values. Therefore, this research will develop a framework for the multi-value reuse of heritage sites in China through changing stages of urban transformation. In particular, two steps help to explain the multi-value reuse of heritage sites. First, we explain the heritage features, reuse modes, and contradictions in the urbanization process. In addition, we further investigate the multi-value and coupled relationship between multi-values and heritagization. To achieve these goals, we employ a comparative case study approach to clarify two research questions: (1) How is the multi-value of heritage sites (re)interpreted through reuse as heritage parks in urban areas of Xi'an? (2) What are the value options available for the reuse of heritage sites when considering heritagization, and what are the associated positive and negative aspects of impact on the urban transformation? Here, we define 'heritagization' as a process where heritage sites, structures, and memorabilia from spontaneous memorials are claimed as heritage, implying a revaluation and reinvention of certain elements for present and future use, often within a context of cultural and touristic interest [17,18].

Xi'an, known as Chang'an in ancient times, was China's capital for 13 dynasties, and it is currently one of the nation's most significant historic cities spanning the Zhou, Qin, Han, and Tang Dynasties. It hosts numerous heritage sites that carry profound historical and cultural significance. Heritage sites in Xi'an not only represent historic relics but also significantly contribute to contemporary urban life [19]. Currently, Xi'an's extensive heritage sites enhance the city's esthetic appeal and cultural vitality. However, rapid urbanization poses a challenge to the preservation of these notable sites. One solution that has emerged is transforming these heritage sites into parks, integrating and preserving their value within the urban landscape. Drawing on case studies from heritage site areas in Xi'an, this research explains how the reuse of heritage sites is integrated with urban planning and construction processes through multi-value interpretation [19].

The structure of this paper unfolds as follows: initially, we review heritage and urban studies literature to offer a context of heritage preservation and utilization during urbanization, particularly focusing on the localized heritage values in the urban transformation process in China. The objective is to probe the evolving heritage values in urban transformation and recognize the current challenges faced when incorporating Western understandings into a local Chinese context. Following a brief introduction to Xi'an and the methodology adopted, we undertake an in-depth exploration of the urban and social studies on the heritage sites cases in Xi'an, including a comparative analysis of the multi-value in reusing urban heritage sites and an investigation into the coupled relationship between multi-value interpretation and heritagization. Lastly, we discuss the positive and negative aspects linked to the reuse of heritage sites in Xi'an and its long-term implications for sustainable urban development.

2. Heritagization in Urban Landscape Transformation and Heritage Reuse in China

2.1. Understanding Heritage, Heritagization, and the Context of Heritage Reuse

The perception of cultural heritage has undergone significant metamorphosis over time. UNESCO's definition of heritage stands as a worldwide reference and guideline [6]. The Venice Charter of 1964 used the term "monuments of antiquity" and emphasized its scope to include not just individual buildings but also the encompassing environment, thus underlining the need to consider the existence of physical remains in a specific context. Although heritage initially referred primarily to physical remains categorized as "monuments, groups of buildings, and sites", the 1972 UNESCO Convention's definition of a heritage site as an "area of Outstanding Universal Value (OUV) from a historical, esthetic, ethnological, or anthropological perspective" introduced the distinct concept of an area [6]. This interpretation suggests that these sites and their surroundings are not only physical structures for conservation but also hold unique abstract values. Consequently, OUV emerged as a crucial factor in the heritagization of historical remnants, a term that denotes a process wherein memories, patterns of use, and the meanings associated with a place shape people's understanding of that locale. This process embodies a byproduct of the present, historically contextualized and not necessarily grounded in the past [20]. Heritagization thus plays a role in redefining cultural and historical meanings and identities [21,22]. The visual manifestation of this heritagization process during urbanization typically involves screening (for preservation or demolition), grading (based on appropriate preservation measures), and use, often involving the adaptation of physical remains. However, the adaptation of physical remains is often examined for the authenticity of the heritage. The Nara Document on Authenticity, adopted in 1944 in Nara, Japan, is a response to the expanding scope of cultural heritage considerations around the world. It addresses the challenges and paradigms emerging regarding the concepts of authenticity and diversity as they pertain to cultural heritage. The Nara Document underscores the significance of preserving the authenticity of cultural relics and supports the variety in conservation methods. The document also brings attention to the pivotal role that cultural context plays in interpreting authenticity. This indirectly implies that the Western notions of authenticity and preservation strategies may not be entirely suitable for the heritage of the East.

Furthermore, heritagization is inextricably linked to expediting decision-making, especially in the context of China's accelerated urbanization in recent decades. This highlights the significance of heritagization in the intellectual and social life of the current generation, thus cultivating a context that incentivizes the reuse of heritage. Heritage sites occupy a dual role, contributing not just to the shaping of urban landscapes and the vitality of urban life but also to the forging of collective memory, "so that both holders and appreciators of heritage can confidently look forward to the future, instead of just being a sad watchman." [23].

Research on urban heritage reuse underscores its dual function in historical preservation and the promotion of socio-economic vitality. In Western contexts, urban restoration and heritage reuse highlight the diversity of needs and resources, as well as the importance of sustainable strategies at different stages of urban development [24]. Scholars have also highlighted the challenges to maintain the essence of historic areas while adapting to contemporary needs [25,26]. For instance, the reuse of heritage sites in Oberschöneweide, Berlin points out that communities participate in the reuse process in multiple ways, culminating in the phenomenon referred to as "vernacular adaptation" [25]. Similarly, the case of Cuenca, Ecuador has shown that the appropriation of urbanism by higher-income groups manifests a new kind of dispossession of heritage values [26]. Meanwhile, the complexity of heritage reuse projects is composed of diverse understandings and interests of different goals and stakeholders. Additionally, interdisciplinary comparative research emphasized the reuse of heritage sites across varying urban contexts, as well as the necessity of integrating environmental, economic, social, and cultural factors into implementation [27]. Chen et al.'s study on the impact of policy transfer on heritage reuse reveals that local circumstances have triggered shifts in heritage perspectives [28]. In conclusion, heritage reuse not only preserves the past but also forms a vital component of future sustainability strategies, necessitating a comprehensive approach.

2.2. Recognizing Heritage Values in China's Urban Landscapes Transformation

Originating in Europe, the idea of heritage preservation has deepened and broadened its concept and conservation practices since the 1990s [29]. However, the introduction of this idea to China involved a necessary and inevitable process of localization, motivating fresh explorations. In 1982, The Operational Guidelines for the Implementation of the World Heritage Convention underscored the rarity of OUV with the International Council on Monuments and Sites (ICOMOS) drafting the Charter for the Conservation of Historic Gardens as an annex to the Venice Charter, aiming to provide clear provisions for the conservation of historic gardens; yet, the research and preservation of the considerably broader scope of China's ancient heritage are reliant upon tangible practices that may fluctuate based on time, region, and policy.

The Convention Concerning the Protection of the World Cultural and Natural Heritage, established in 1972, identified Outstanding Universal Value (OUV) as the primary standard for evaluating heritage values [6]. Subsequently, in 1977, the Operational Guidelines for the Implementation of the World Heritage Convention emphasized the scarcity of OUV. The notion of "scarcity" underscores that only a few sites globally can meet these stringent criteria for designation as World Heritage Sites [30]. Meanwhile, in the actual situation of China's huge number of cultural relics, assessing OUV necessitates a profound grasp of contextualization and temporal progression. In 2011, UNESCO adopted the Historic Urban Landscape (HUL) recommendation, which addresses the city as a whole and provides a toolkit for implementing an integrated value-based landscape approach. However, the operationalization of value-based discourse remains broad and lacks complete contextualization in relation to local circumstances [31–33]. Therefore, adapting the value-based approach presents a significant challenge to localizing the HUL. The localized conservation practices adapted to China's national conditions over the past decades have provided rich experience and prompted considerable rethinking on how we perceive, value, and conserve heritage in the midst of fluctuating global and local forces. The understanding and use of

heritage values, aligned with relevant laws, provisions, regulations, and urban planning, especially in the context of significant changes and construction in Chinese cities over the past century, have distinct local characteristics, especially regarding the harmonious coexistence of historical tradition and modernism. Reassessing heritage value from the vantage of regeneration in contemporary China reveals a transformation in the comprehension of heritage value and the practices of heritagization and urbanization, forming the crux of this paper.

Since the 1990s, the introduction of the concept of cultural heritage into China via international conservation translations have laid the groundwork for the Chinese contextualization of cultural heritage in academic circles. This process has extended both the definition of heritage and the exploration of preservation theories. Heritage preservation practice in China began with the inception of the People's Republic of China, although the awareness of cultural heritage, different from the contemporary understanding of "heritage", has a lengthy history of transmission across dynasties through local communities. For instance, historical records of urban landscape, local chronicles, and classical poetry document historical buildings and sites such as city walls, temples, and local scenic vistas, which were characterized by their iconicity and often associated with significant people and events. A comparative analysis of chronicles from disparate regions unveils similarities in the nomenclature and content of these sites, indicating a form of regional uniformity documented in the historic records.

Since 1949, three crucial stages of heritagization have been recognized in the People's Republic of China, primarily partitioned according to the three national-level heritage census reports. The first phase took place during the country's establishment with the inaugural national heritage census, conducted from 1956 to 1959, encompassing over 36,000 sets of above-ground cultural relics. The second national census was carried out from 1981 to 1989 and registered over 400,000 immovable cultural relics but also counted a loss of around 700 sites of cultural relic recorded during in the first census [34]. Subsequently, the Protection of Cultural Relics Law of the People's Republic of China, introduced in 1982, underwent five revisions by 2017. This legal framework specified that immovable cultural relics include ancient cultural sites, tombs, buildings, grottoes, temples, stone carvings, mural paintings, historically significant sites, and modern representative buildings with historical, artistic, and scientific values. The third national cultural heritage census, extending from 2007 to 2011, covered immovable cultural relics on the ground, underground, and underwater. This extensive effort registered over 760,000 immovable cultural relics nationwide, indicative of the continuous expansion of the scope of cultural heritage conservation. Simultaneously, institutional advancements, such as the revised Guidelines for the Protection of Cultural Relics and Monuments in 2002, which quoted the Venice Charter, emphasized that the value of cultural relics encompasses historical, artistic, scientific, and social-cultural facets. The Xi'an Declaration of 2005 broadened the concept of heritage value even more, underlining its functional role in social, economic, and cultural spheres.

Immovable tangible cultural heritage sites, often characterized by partial destruction and incompleteness, require preservation and assessment that are not only based on remains but also take into account the surrounding environment. To cater to the cultural heritage preservation requirements amidst rapid urbanization, the State Administration of Cultural Heritage endorsed the concept of "large sites" in the late 1990s. The Overall Plan for the Protection of Large Sites—belonging to the 11th Five-Year Plan Period (2006)—specified that large sites encompass grand-scale spaces with considerable value and extensive influence, spanning diverse types and contexts. Scholars, such as Chen Tongbin, have categorized site preservation into overall and partial preservation associated with utilization forms [35,36]. The former includes site parks, tourist attractions, forest parks, and historical–cultural agricultural parks that integrate heritage site preservation with the creation of green landscape. The latter pertains to transforming partial sites into display spaces or museums. Though the heritagization process chiefly banks on the original authenticity of physical

remains, faced with the disappearance of numerous entities, conservation measures employ varied methods, such as document testimony, oral histories, photography, visual materials, and archeological discoveries, to revive the spiritual embodiment of heritage.

Nationally, the continual refinement of particular guidance on conservation and re-purposing, exemplified by the 2009 proposition for "national archeological sites parks", highlights the commitment to preserving significant archeological sites. The 2020 Guidelines for the Utilization of Large Archeological Sites (Trial) proposed two categories for reutilization: value-based and compatible utilization. The former involves cultural relics display, scientific research, education dissemination, and industrial transformation. While national-level guidance adheres to a top-down approach, the bottom-up reporting mechanism for the national cultural heritage census leads to variations among participants and different regions. This discrepancy stirs worries about inadequate evaluation, incorrect utilization, deviation from conservation strategies, and potential adverse impacts on safety, value promotion, and the sustainable use of heritage sites. The challenge of balancing heritage site preservation and urban development amidst rapid urbanization, aiming to strike a win–win scenario between safeguarding and growth, has emerged as a crucial conundrum in China's heritage preservation efforts [37].

3. Research Framework of Interpreting Multi-Values and Comparative Case Study Methods

3.1. Study Area

Xi'an, heralding a rich history of over 3100 years, served as the ancient capital of China for more than 1100 years. Specifically, it served as the capital for the Western Zhou Dynasty (1046–771 BC), the Qin Dynasty (221–206 BC), the Western Han Dynasty (206 BC–9 AD and 23–220 AD), the Sui Dynasty (581–618 AD), and the Tang Dynasty (618–907 AD). Claiming the prestigious title as the capital for 13 diverse dynasties, UNESCO has recognized Xi'an as a globally historical and cultural significant city. Xi'an was also listed as one of the first batch of China's historical and cultural cities by the State Council in 1982. As the origin of the Silk Road and custodian of the Terracotta Army, Xi'an boasts a significant position in both international realm and China's profound historical and cultural legacy. The urban archeological sites in Xi'an present unique features such as broad distribution, abundant quantity, extensive scale, varied types, and notable historical significance. Ranging from ancient human settlement sites dating back to the Stone Age to the ruins of capital cities, palaces, imperial gardens, tombs of emperors, religious structures, and ritual buildings from the prosperous periods of the Zhou, Qin, Han, and Tang Dynasties, Xi'an's archeological sites exhibit striking diversity. Large heritage sites encompass Fenghao from the Zhou Dynasty, the Afang Palace from the Qin Dynasty, Chang'an City from the Han Dynasty, and Chang'an City from the Sui and Tang Dynasties, collectively covering an area exceeding 190 km^2. Notably, the primary urban area of Xi'an extensively overlaps with these ancient heritage sites (Figure 1), with 37 percent of the urban development space characterized by the convergence of different historical periods. This conjures a distinctive urban landscape, mirroring the city's evolution over time and presenting a fusion of traditional and modern facets, along with a mix of influences from differing epochs. However, against the backdrop of rapid urbanization, the conflict between the preservation of historical sites in Xi'an and urban development is intensifying.
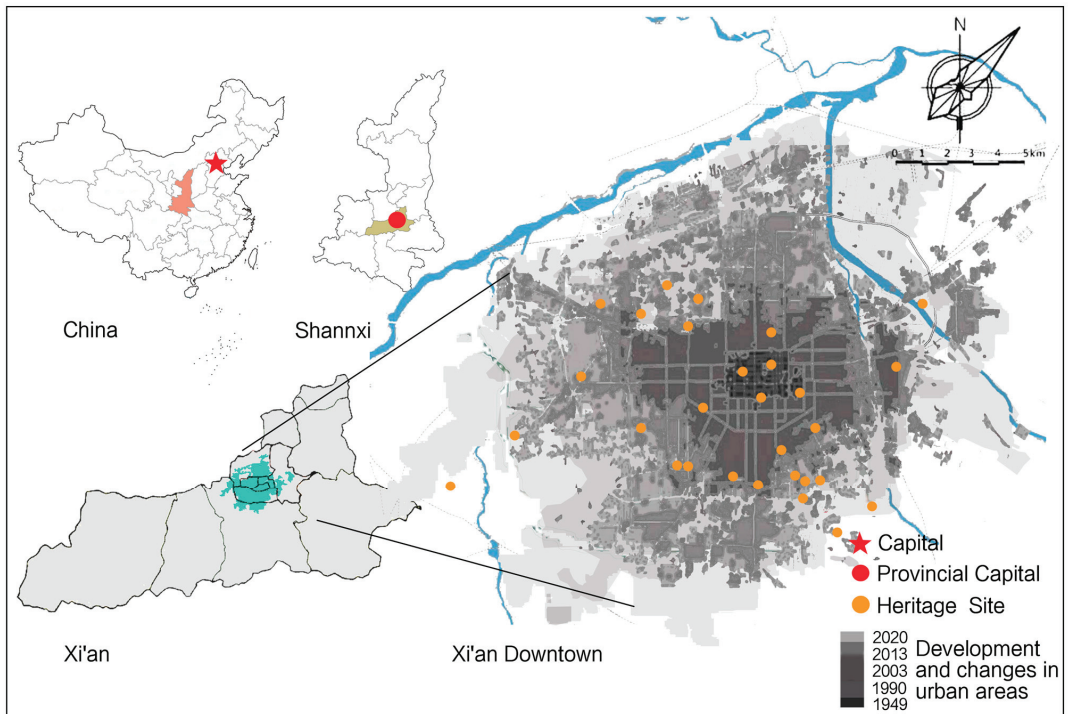
Figure 1. Location map of Xi'an city (Source: Authors).

The heritage sites in Xi'an were chosen as comparative cases, guided by a variety of criteria to ensure that they portray a blend of urban development stages, types of heritage sites, and heritage preservation methodologies. The selected areas include heritage sites that are being transformed from the old urban region into suburban areas, adorned with green spaces or residential areas, and eventually merging into heritage parks. Within the 28 national-, provincial-, and municipal-level officially protected heritage sites in Xi'an, representative sites were picked via comparative case studies with a focus on the level and scope of protection that each site receives. The authors have developed a set of standards to guarantee the distinctiveness and universality of these instances, considering the specific forms and locations of the heritage sites. Specific selection criteria encompass the historical and cultural significance of the site, the diversity of geographical location, and the comprehensiveness of practical implementations for site protection and reuse. During the research process, the data regarding transformations and site preservation are distinctly divided into urban evolution data and case evolution data concerning site preservation. By managing the website of the site's scenic area, in conjunction with historical atlases, satellite map extraction from Google Earth, and other links, data are separately extracted. An illustration includes the urban evolution literature that refers to authoritative government development reports, specialized provincial map extraction websites, and urban atlas monographs such as Xi'an Historical Atlas (1996) and the Atlas of Xi'an Urban Area Changes (2014). To guarantee accuracy and authority, representative instances of the site evolution process will be primarily sourced from nationally protected sites.

In Xi'an, the complex interplay of multi-value associated with heritage sites, including environmental, ecological, economic, social, and culture values, exerts an influence on both heritage preservation and landscape transformation. Consequently, we employ a multi-value interpretation framework (Figure 2) to delve into the intricacies of how the

construction of heritage parks integrates these diverse values, facilitating the reuse of heritage sites to achieve urban transformation goals.
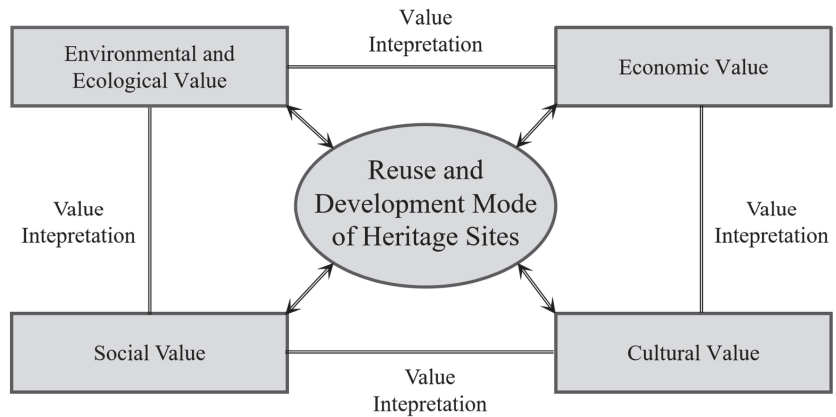
Figure 2. The conceptual framework of multi-value comparative analysis of heritage sites (Source: Authors).

3.2. Materials and Methods

This research uses a qualitative approach, employing a comparative case study method to conduct an in-depth investigation of the changes and integration of values in heritage-led urban transformation. The comparative case study method can provide a wealth of qualitative and quantitative data, offering broader themes, patterns and trends across different cases [38,39]. This approach could synthesize the overall reuse of heritage sites in Xi'an and investigate in-depth the multi-value interpretations and coupled relationships involved in urban landscape transformation. The process of transformation in Xi'an and the reuse of heritage sties over time are studied through the comparison of various sources, including a field survey of the built environment, online policy data, mapping exercises, and semi-structured interviews with various stakeholders. This comprehensive approach aims to provide a nuanced understanding of the heritage sites in Xi'an and how values are interpreted within the context of the new heritage space.

As Figure 3 shows, first, we reviewed literature, planning, and policy documents on urban development and heritage site reuse to identify whether they provided insights into heritage values and heritagization process in China and Xi'an, with particular attention to the change in urban area land use in Xi'an. A systematic historical tracing and mapping approach is used to track the transformation of heritage sites, which start from their original formation of the ancient urban area, transitioning to suburban spaces with green areas or residential zones in the 1990s, and eventually evolving into heritage parks integrated into the contemporary urban landscape. Furthermore, to scrutinize the process of value shifting, we conducted multiple visits to the selected sites spanning the period from 2016 to 2024. Second, an in-depth field survey of the long-term transformation was conducted based on official plans, urban maps, urban and heritage policies, and on-site surveys complemented by photographs. The objective is to clarify the modes and characteristics of heritage site preservation and reuse in Xi'an. The amalgamation of data and visual representations contributes to a comprehensive understanding of how multi-value gradually becomes embedded in the urban transformation process, particularly through the conversion of heritage sites into heritage parks. Socio-economic data on housing prices and the relocation of households were included, sourced from interviews.
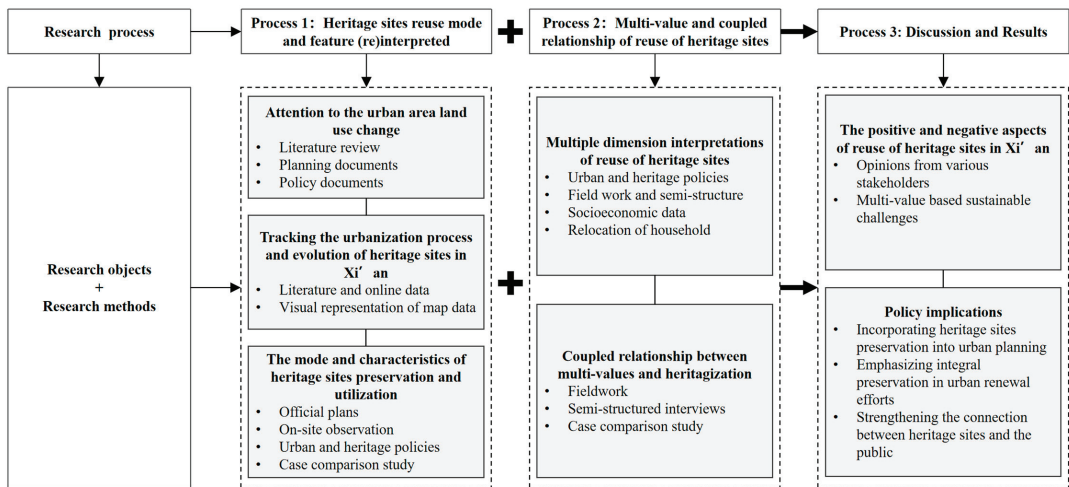
Figure 3. The methodological diagram (Sources: Authors).

Third, fieldwork and semi-structured interviews are important forms of data collection for this study. Field investigations utilized basic operational tools like photographic evidence and on-site analyses to identify the dynamics of landscape transformation. This process allowed us to directly observe and record the multi-faceted factors associated with the studied cases. We analyzed the coupled relationship between the multi-value of heritage sites and urban construction factors, updated and identified the current reuse situation informed by the existing literature, and highlighted their adaptability to complex urban construction conditions. In addition to fieldwork, we conducted a series of semi-structured interviews with 18 stakeholders, which included local government officials, architects, planners, scholars, and residents. During the interviews, we encouraged the interviewees to actively share their views, experiences, and feelings with a neutral and open attitude. We ensured that the interviewees fully understood the research purpose and we flexibly adjusted the interview questions according to different interviewees. During the interview process, the content was preserved in the form of recordings and notes, and privacy was maintained. After going through the content again, we confirmed and summarized it and extracted key information.

These interviews aimed to provide additional insights into how values are integrated into the process of urban transformation through the reuse of heritage sites. The interviews also contributed to data collection regarding the positive and negative aspects of heritage site reuse. Questions for local government officials, architects, and planners included how they consider heritage value presentation in the decision-making and planning process, how they integrate heritage sites reuse with urban landscape planning, and the current challenges in sustainable development in heritage parks. The questions for scholars focused on their attitudes toward the overall redevelopment of heritage site areas and on how to integrate multi-value into the current reuse mode and the critical aspects of heritage site preservation quality. The questions for local residents included their attitudes toward the heritage park, the impact on their lifestyle before and after redevelopment, and how they interact with other stakeholders and the new environment. This approach provides detailed insights to evaluate the positive and negative aspects of reused heritage sites in Xi'an, and it further clarifies the long-term implications and sustainability of the findings.

We acknowledge the potential biases and limitations inherent in the methodologies of this study. First, the long-term transformation field survey could be limited by the accuracy of reported data or the depth of data made available for public scrutiny. Limited or inaccurately reported data may compromise the integrity of conclusions drawn from these datasets. Second, the in-depth investigation into the shifts and value integration in heritage-

led urban transformation and heritage site reuse in Xi'an, despite its robustness, may be constrained by the unique socio-economic and cultural context of Xi'an, China. Lastly, the semi-structured interviews with stakeholders might have limitations regarding the depth and diversity of the collected data, potentially overlooking the perspectives of other stakeholders like tourists, historians, and conservationists. This could restrict the breadth of our understanding of how values are integrated into the urban transformation process. To mitigate these limitations, a number of measures could be considered. A larger participant pool for the semi-structured interviews can be utilized to incorporate a more diverse set of viewpoints. Additionally, it would be beneficial to undertake comparative studies in various other urban settings where heritage plays a significant role in urban development. This would add depth and provide a diversified perspective on the transformative shifts in the built environments of heritage sites. Also, to ensure the integrity of data, access to a more comprehensive dataset should be sought, which ensures the use of reliable and accurate statistics when analyzing heritage site preservation and urban development measures. These mitigation measures will provide a richer, more nuanced understanding of heritage-driven urban transformation, adding greater depth to future discussions.

4. Case Study: Multiple-Dimension Interpretations of the Reuse of Heritage Sites and the Coupled Relationship between Values and Heritagization

4.1. Multiple-Dimension Interpretations of the Reuse of Heritage Sites

As Figure 4 shows, the conflict between heritage preservation and urban expansion has manifested itself particularly in the use of land and space resources. Since the 1990s, heritage sites originally located in suburban or peri-urban areas have been integrated into urban development zones. Although these heritage sites have considerable potential for land value appreciation, their development has been hampered by the construction of essential urban infrastructure. As a result, as redevelopment projects progressed, some heritage sites found themselves surrounded by towering buildings that contrasted sharply with their historical ambiance. As a result, conservation areas became isolated patches, leading to a crisis in the isolation of urban heritage sites. Another dimension of conflict has emerged between traditional, static, and restrictive approaches to heritage preservation and the evolving urban living environment. The prolonged coexistence of large heritage areas with urban and rural development has posed a significant threat to these sites. For instance, within the Han Chang'an City site, the presence of 55 administrative villages and nearly 60,000 residents engaged in daily activities posed a significant threat to the site. The inadequate control of unauthorized businesses within the site exacerbated the situation. Inequalities in employment, income, facilities, and environment within and outside the heritage site led to a scenario of "preservation constraining development and development constraining preservation". Furthermore, profit-driven actions during the heritage site development process conflicted with preservation goals. Economic interests led to excessive tourism development and the irrational use of the sites, culminating in the commercialization and amusement park-like transformation of heritage spaces, causing damage to the sites and their surroundings. In conclusion, with rapid urbanization, there are significant complexities and contradictions in the relationships between heritage preservation and urban spatial expansion, financial investment and returns, as well as public services and improvements in people's livelihoods.
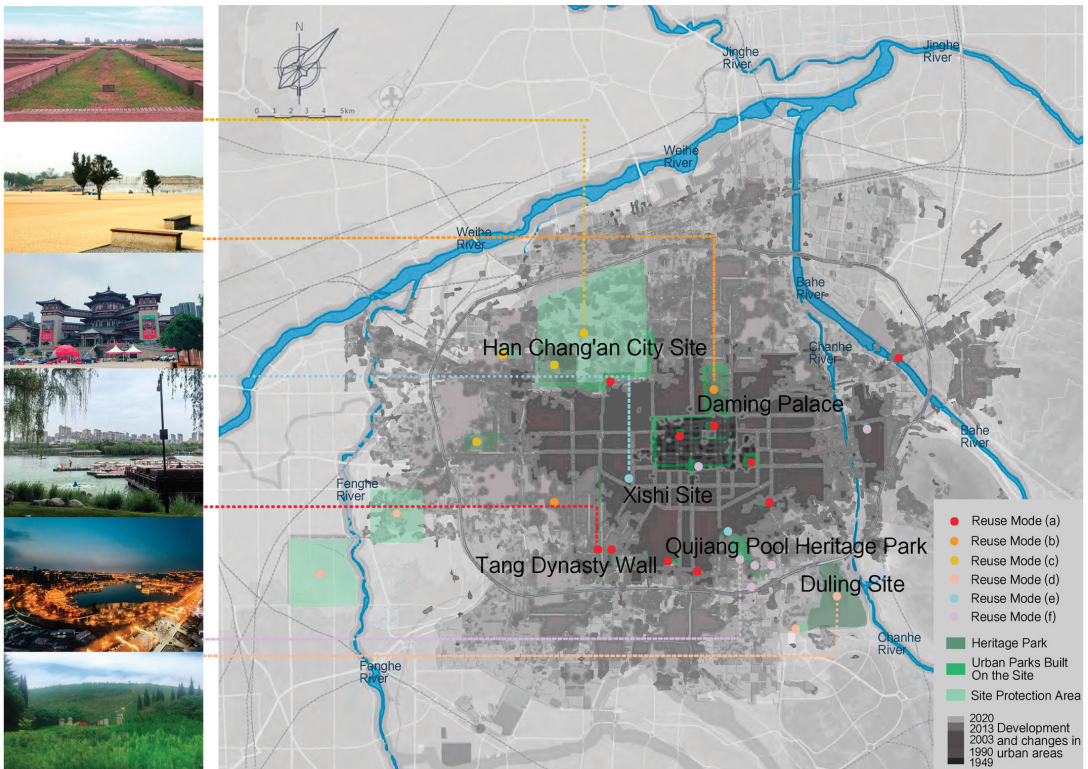
Figure 4. Changes in Xi'an urban area and distribution of historical sites (Source: Tang Dynasty Wall, Daming Palace, and Qujiang Pool Heritage Park were photographed by authors on 21 November 2019 and 10 and 15 January 2020. Han Chang' an City Site, Duling Site, and Xishi Site are reprinted with permission from Ref. [40]. 2022, Dingqing Zhang, Yiqing Zhao and Shanyao Zhu).

Given the diverse nature of heritage sites in Xi'an, which encompasses variations in scale, status, preservation conditions, preservation needs, and the developmental goals of their surrounding areas, the city has systematically explored a myriad of solutions for the preservation and utilization of its urban heritage sites. This exploration has yielded a spectrum of preservation and utilization models. When examining preservation objectives and implementation outcomes, the reuse of heritage sites in Xi'an includes various forms, such as museums with commercial development, heritage parks with ecological development, heritage parks with renovations of old district, heritage parks that cater to public daily needs, and heritage park clusters that cater to cultural tourism needs. Heritage parks have been a typical reuse mode to integrate various urban landscape transformation goals. Based on the relationship between the reuse of heritage sites and urban landscape transformation, the reuse of heritage sites in Xi'an can be broadly categorized into the following types (Figure 4, Table 1):

1. Integration with Public Parks (a)
2. Amalgamation with the Renovation of Old Districts (b)
3. Alignment with Suburban Rural Construction (c)
4. Harmonization with Ecological Development (d)
5. Incorporation into Commercial Development (e)
6. Preserving Heritage Clusters in Relation to the Agglomeration Effect of Cultural Tourism (f)

Table 1. Heritage site preservation and utilization in urban area (10,096.89 km²) of Xi'an (Source: Authors).

Preservation and Utilization Type	Typical Cases and Features of the Site	Principal Contradiction	Reuse and Development Mode
Integration with Public Parks	Tang City Wall Heritage Park The remains of the rammed earth wall foundation, city gate, inner road, and moat.	Contradiction between the construction plan of the new area and the ruins area.	Reuse as a cluster of public parks with museums, artificial lakes, gardens and new building structures with a historical look for both public and commercial use. Utilize the cultural elements of the ruins to construct urban green parks and improve the living environment.
Amalgamation with the Renovation of Old Districts	Daming Palace National Heritage Park The site area is overlapped by the city, leaving large, rammed earth platform ruins on the ground, while the rest remains deeply buried under farmland.	The contradiction between the occupation of the site area by urbanization and the preservation of the site.	Reuse as National Archaeological Heritage Park (3.2 km²) with 19.16 km² redevelopment area, including industrial heritage park construction, commercial center, real estate development, improve the living environment of the site area, promote cultural tourism, trade, and dissemination.
Alignment with Suburban Rural Construction	Han Chang'an City Site Existing ruins of city walls and large palace building bases. Rural construction activities have caused great damage to the site.	The single preservation mode of the site contradicts the improvement of people's living standards.	Reuse as heritage sites preservation demonstration area with coordinate cultural relics preservation and urban-rural construction, preserving historical agricultural landscapes, practices, and lifestyles. Integrating resident employment with the heritage preservation industry chain.
Harmonization with Ecological Development	Duling Heritage Park The ground remains of the emperor and empress tombs, and the excavation of the accompanying tombs sites have been found. The environment of the site area has been damaged by the living behavior of residents.	The preservation of suburban ruins faces the contradiction between financial difficulties and the rapid pace of urban construction.	Reuse as ecological heritage park, combined with the preservation of the cemetery, forms urban forest parks. Further develop the cultural tourism and leisure industry to stimulate regional economic development.
Incorporation into Commercial Development	Datang West Market Most of the ruins are completely overlaid under the city, and archeological investigations have shown that only some of the street and ditch ruins are partially preserved.	The archeological remains of the site contradict the new urban construction project.	Reuse as heritage museums with commercial development, including shopping mall, commercial district, investing funds in advance to implement the site preservation and exhibition projects, and then using commercial, cultural, and tourism development to obtain investment returns.
Preserving Heritage Clusters in Relation to the Agglomeration Effect of Cultural Tourism	Qujiang Heritage Park Group The heritage is rich with surrounding farmland villages near the Dayan Pagoda site. Renovation plans were implemented in the 1980s and 1990s.	Limited use of heritage, contradictions between urban development and construction requiring a large amount of land resources.	Reuse as heritage parks for cultural and tourist attractions, promoting tourism, commerce, and real estate development through policy driven and market-oriented investments.

These diverse approaches encompass various methods for the preservation and presentation of heritage sites and their environment. These methods are intricately woven into the tapestry of urban construction and development, resulting in a substantial enhancement of the local environment. The multiplicity of strategies reflects the city's commitment to addressing the unique needs and characteristics of each heritage site while contributing to the broader urban development goals of Xi'an.

(1)   Environmental Dimension

Heritage sites play a pivotal role in shaping the urban landscape through scale, spatial form, and land use. A notable illustration is the impact of heritage-led urban development projects led by the Qujiang New District, where the construction of clusters of heritage parks has contributed to the transformation of the new town in Xi'an. Within five years, a substantial green space area totaling 398.92 hectares has been established, achieving an impressive greening rate of 49.56%. As reported by the Xi'an Cultural Relics Bureau, more than 30 heritage sites are anticipated to be transformed into publicly accessible parks, urban landscapes, leisure squares, and city green spaces in the future. Throughout the heritage preservation implementation, a concerted effort is made towards environmental remediation, ecological construction, and landscape creation. These initiatives aim to optimize the urban spatial structure. Consequently, these heritage sites have evolved into "green lungs" dispersed throughout the urban area, thereby realizing the environmental and ecological value embedded in heritage preservation efforts.

(2)   Economic Dimension

Xi'an's heritage sites are emerging as major urban tourism destinations, playing a vital role in stimulating the local economy through the promotion of tourism and related services. As catalysts for economic growth, these heritage sites contribute significantly to the city's economic landscape. The strategic development of parks and attractions is a key approach that seamlessly integrates heritage preservation with the tourism and cultural sectors. This integration not only enhances the city's industrial fabric but also injects vitality into the city's economic framework. The enhanced environment surrounding these heritage sites creates peripheral economic benefits, with development projects centered around these sites effectively driving regional economic development. This strategic use of heritage sites realizes their economic potential, creating a symbiotic relationship between heritage preservation, tourism, and economic prosperity in Xi'an.

(3)   Social Dimension

The preservation of heritage sites in Xi'an has catalyzed the transformation of urban space and land use, leading to a significant improvement in the living conditions of the community. Notable sites such as Daming Palace and Han Chang'an City exemplify the dual progress of heritage preservation and urban development, with the common goal of improving the quality of life and overall well-being of the community. Through the strategic construction of infrastructure and the optimization of industrial structures, these initiatives have triggered a widespread improvement in residential living conditions. The resettlement of residents in the vicinity of these sites ensures that communities share in the benefits of development. In addition, local residents have seen their incomes increase as a result of their engagement in the preservation and maintenance of these heritage sites. This inclusive approach ensures that the benefits of heritage preservation are shared by the wider community, thereby fulfilling the social value of heritage preservation.

(4)   Cultural Dimension

The preservation of heritage sites in Xi'an highlights the significance of urban cultural resources, which are both scarce and unique. This process plays a pivotal role in preserving traditional culture and shaping a distinctive cultural image for the city. For example, the cultural industries that have developed around the Daming Palace Heritage Site include heritage exhibitions, cultural research, heritage tourism, and the creation of related cultural products and performances. By taking advantage of the Qujiang Heritage Park cluster,

a comprehensive "cultural experience" tourism industry system has been established. This developmental model integrates various elements, including dining, accommodation, travel, entertainment, and shopping, as well as a diverse range of cultural and tourism products. This integrated approach has become a key support system for the city's urban cultural industry structure. Through initiatives focused on public education and cultural dissemination, there has been a remarkable deepening of residents' emotional awareness and recognition of the city's history and traditional culture.

4.2. Coupled Relationship between Multi-Values and Heritagization

As shown in Figure 5, an analysis of the method of preservation and utilization of heritage sites in Xi'an, along with their multi-values, reveals a clearly coupled relationship. The intrinsic factors, representing the characteristics of the sites, are closely linked to the extrinsic factors related to urban development. This relationship guides the selection of different preservation and utilization approaches during the urban development process. These approaches may include preservation-oriented heritage parks, development-oriented commercial cultural tourism projects, or the cultural areas that emerge from clusters of archeological parks. At the same time, heritage museums can operate independently or in conjunction with broader preservation strategies such as urban parks, heritage parks, and suburban ecological forests. This coupled relationship highlights the dynamic interplay between the inherent qualities of heritage sites and the external factors that influence urban development decisions. It underlines the need for a nuanced and context-specific approach to heritage preservation and reuse that takes into account both the intrinsic and extrinsic elements shaping the urban landscape in China. These approaches interact to varying degrees with the environmental, economic, social, and cultural drivers of the city, ultimately realizing the diverse values of the site. Heritage sites with large scale, high rank, and rich heritage require significant construction efforts and financial investments, profoundly influencing the urban spatial and industrial restructuring and generating a diversified set of benefits.
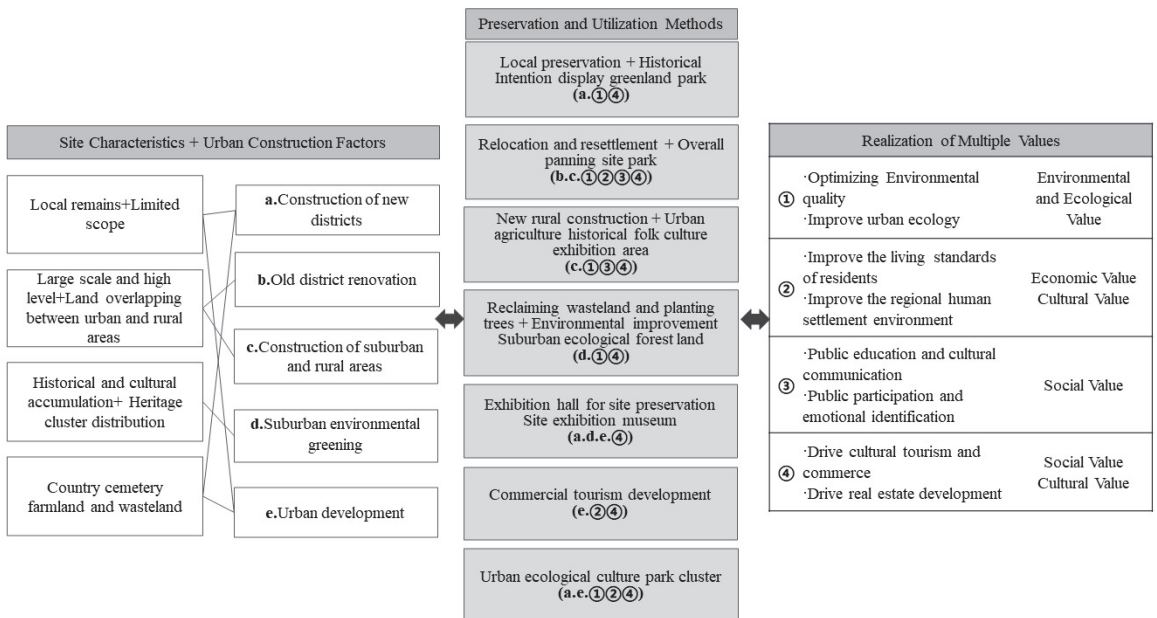
Figure 5. Integration of heritage site preservation and utilization with the realization of multi-value in Xi'an (Source: Authors).

The integration of heritage preservation with urban green spaces inherently achieves environmental and ecological goals. The social value of heritage preservation is closely linked to public participation and the enhancement of people's well-being. To fully realize its cultural value, heritage preservation must be seamlessly integrated into the urban cultural system. It is essential to recognize that different values may conflict with each other and that maximizing all values simultaneously is impractical. The recognition of the contemporary value of heritage sites should be based on core values such as historical significance, with economic considerations being secondary and contingent upon the preservation of these core values. Therefore, ensuring the safety of heritage sites and their environment becomes a critical prerequisite for their preservation and utilization.

The case that could illustrate the interweaving of multi-values in heritage sites is the re-development of the Daming Palace Site. Through reuse and integration with the renovation of old districts, the Daming Palace area has evolved from a Tang Dynasty Imperial Palace to a suburban green space with abandoned heritage sites, and then to an urban village with heritage elements, and finally to an archeological heritage park and the northern growth pole of Xi'an. The decision to build the heritage park has seamlessly integrated different values, demonstrating a conscious effort to reconcile historical and cultural preservation with urban development goals. It is a testament to the city's commitment to balancing modernization with the preservation of its rich historical heritage. The construction of the Daming Palace Heritage Park not only contributes to the preservation of a significant archeological site but also enhances the overall cultural landscape of the urban environment. Specifically, the museum within the heritage park showcases the Hanyuan Palace Heritage Site and aims to provide education, encourage public participation, and convey cultural meanings to highlight the cultural values of the heritage site. Covering an area of 3.2 km^2, the heritage park expands the green space and ecological environment in the northern area of Xi'an. With the relocation of over 100,000 residents and the demolition of 3.5 million square meters of urban village area in the Daming Palace area, the redevelopment uses heritage as a catalyst for social and economic development. As a result, multi-values are intricately embedded in the reuse of heritage sites and the redevelopment of the heritage site area.

5. Discussion

5.1. Reuse of Heritage Sites in Xi'an: Positive and Negative Aspects

After nearly three decades, Xi'an's multi-value approach to heritage preservation has gradually integrated various functions of urban development, including education, cultural tourism, ecological conservation, the creation of daily public parks for citizens, and economic development. Depending on the location, type, and preservation status of urban heritage sites, a variety of preservation modes have been adopted, such as heritage parks or landscape areas, including civic parks, ecological parks, and cultural theme parks. These modes are intricately combined with the renovation of the old urban district, suburban rural construction, cultural and tourism industries, and commercial development. Through various approaches, significant benefits have been achieved in terms of improving urban space and environmental quality, promoting economic development, enhancing residents' well-being, and promoting the education and dissemination of urban culture. In 2022, China's main urban park evaluation report ranked Xi'an as the 13th most park-friendly city, with 65.99 per cent coverage of integrated park services, 58.62 per cent coverage rate of community park services, and 24.80 per cent coverage of park services [41]. The forms of preservation and utilization of heritage parks in Xi'an have, to a certain extent, achieved a balance between heritage preservation and meeting people's living needs. By capitalizing on the scarcity of heritage resources, heritage parks have, to some extent, driven the development of surrounding real estate and tourism facilities. For example, the completion of the Tang Dynasty Wall Heritage Park has significantly increased land prices around the Qujiang Pool. As of 2024, residential prices in the Qujiang Pool area have surpassed the average level in Xi'an, reaching 40,000 RMB per square meter (compared with

the average price in Xi'an of around 15,000-20,000 RMB). In addition, the reuse of heritage sites by integrating heritage preservation with museums, green spaces, heritage parks, and other urban development goals in Xi'an has significant long-term implications. The integration of multi-value into heritage park areas can also contribute to the establishment of cultural brands and the fostering of a sense of cultural identity, providing the public with a satisfying and enriching cultural experience. By strengthening cultural self-awareness and self-confidence, these efforts have further enhanced the city's cultural influence and soft power, ultimately realizing the profound cultural value of heritage preservation. In addition, these heritage parks can serve as "living museums", providing immersive educational experiences for students and researchers interested in history and culture.

However, rapid redevelopment has also created challenges in terms of sustainability. First, the current focus of heritage preservation is primarily on physical remains, with planning measures limited to the preservation zone. The historic environment of heritage sites is challenged by the lack of control over the surrounding built-up areas. "If you go to visit heritage parks in Xi'an, sometimes it is difficult to find heritage sites, some people get lost, they experience the newly built modern buildings with historical look, breathe the fresh air by the park and lake, the surrounding areas are filled with many high-end residential and commercial facilities" (Interview 2019). There is an inherent contradiction between heritage preservation and its economic benefits. Overexploitation for short-term gain, coupled with the prioritization of real estate development, inevitably weakens or erases the deep historical sense of cultural heritage. For instance, the Tang Ci'en Temple Heritage Park is located near the Big Wild Goose Pagoda World Heritage Site, and the excessive commercialization and Disneyfication of the surrounding environment have posed persistent challenges to the historic environment of the heritage site, isolating the heritage site with noisy tourists. The Never Sleep Tang Dynasty Commercial District was a completely redesigned heritage space for tourism experience and cultural facilities; with the growing importance of economic and environmental values, the cultural values have been cut down. In addition, heritage sites, being relatively independent and scattered, lack synergy at the overall urban spatial level, resulting in uneven spatial development (Figure 1).

In addition, social issues arise when large-scale heritage preservation and utilization occurs, including fractured social networks, marginalized resettled communities, and the significant displacement of low-income communities by higher-income populations. Scholars have drawn attention to the issue of heritage gentrification. While escalating property prices and environmental renewal contribute to more affluent, high-end, and fashionable development, they also promote differentiation and conflict in cultural characteristics. For instance, when the Daming Palace Heritage Site was redeveloped into a heritage park, some of the residents were relocated to gated communities at the edge of the redevelopment area. Most residents tend to be satisfied with exchanging their dilapidated housing for a new location in a gated community. However, some of them still complain about the unequal relocation and the time it takes to receive their title deeds. During the interview with one community leader, she explained, "The commercial feedback around the new gated communities has been shared among the villagers, but I am still worried about the safety issue of the relocation communities due to the lack of a fire safety channel. "(Interview 2017). Moreover, the reuse of the Daming Palace Heritage Site as a heritage park also brought a new twist to the challenge of social inclusion. Although the villages near Daming Palace Heritage Site were relocated to a new gated community, the villagers could not adapt to the urban life, so the tradition of the marriage ceremony extended to a new gated community. In the Xianfeng community, the marriage ceremony inherited from the village started on 20 December 2017 (Figure 6). In addition, the cultural interpretation and exhibition aspects of current heritage preservation need improvement. Public participation and interaction are limited, and a sustainable propaganda and education mechanism has yet to be established. The current single reuse mode of heritage sites has not formed a complete cultural industry system, which affects the realization of social and cultural values in heritage preservation.

Although heritage parks provide sufficient green space and bring more cultural facilities to the city, the social sustainability of how local communities adapt to urban life and how to enhance social inclusion remains a key challenge.
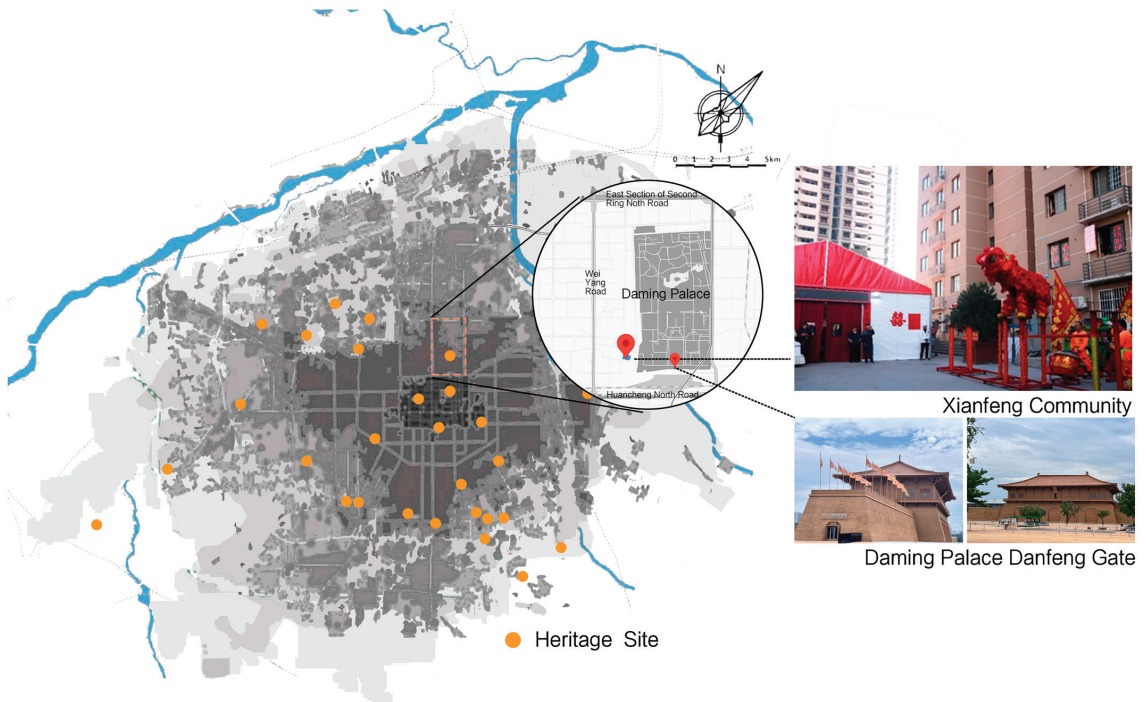
Figure 6. The relocation community near Daming Palace Heritage Park Area (Source: Photographed by Yiqing Zhao on 20 December 2017 and 26 May 2019).

5.2. Policy Implications of Heritage Site Preservation and Utilization

The multi-value approach has emerged as a new trend in the coordinated integration of heritage site preservation, utilization, and urban development. This approach establishes links between conservation goals and the broader desires and needs of society. In order to better integrate the multi-value framework of heritage preservation with urban development, several recommendations are proposed. First, it is suggested that heritage sites and their surroundings be actively included in spatial planning and that their coordination with overall urban development be prioritized. Scientific assessments of the intrinsic value of heritage sites, including a preliminary assessment of their multi-value, should be carried out during the planning phase. Attention should be paid to land use around heritage sites, understanding potential conflicts with the environment, and pre-studying possible solutions. Second, it is suggested to emphasize integral preservation in the urban renewal process and to recognize the vulnerability and non-renewability of heritage sites. Policies and project assessments should be used to mitigate the impact of tourism development on these sites, with continuous evaluation and monitoring of the impact of tourism activities on the lives of heritage site residents. Third, efforts should be made to strengthen the link between heritage sites and the public. This includes highlighting the importance of public participation in the presentation, interpretation, dissemination, and promotion of heritage sites. It is beneficial to use digital technology and new media to facilitate a multifaceted and diverse presentation of cultural content at heritage sites. Providing a range of tourism experiences, including heritage education, cultural activities, and vocational training, alongside other public cultural services, can enhance public awareness and

preservation consciousness. We advocate for the integration of heritage preservation and management with efforts to improve the quality of life of local communities. Finally, policy makers and urban planners should introduce policy or planning guidelines to monitor the long-term social sustainability of the heritage sites being redeveloped. Based on the multi-value interpretation of the reuse of heritage sites, social inclusion, local communities' living conditions, and local communities' participation in cultural events can help to balance economic growth with preservation and ensure that the local communities benefit from redevelopment.

6. Conclusions: Interweaving the Six Models of Multi-Value of Heritage Sites with Urban Development

The research makes a theoretical and practical contribution to the growing body of knowledge concerned with heritage preservation, the reuse of heritage sites, and urban redevelopment. This study provides new insights into the multi-value interpretation of heritage, empowering heritage as a catalyst for development rather than an obstacle. The study also explores the reuse of heritage with urbanization and critically examines the conflicts associated with shifting value interpretations in different heritage park construction cases. Through the reuse of the past in contemporary discourse, heritage sites have been integrated into the global tourism industry, transforming the past into a market commodity [42,43]. The evolutionary process and reuse of heritage sites in Xi'an serves as an example of Chinese efforts to weave the multi-value of heritage into the production of space to achieve urban development goals of real estate appreciation, sustainability communities, and cultural brand creation [40]. The theoretical exploration paves the way for understanding the delicate balance required to maintain the values of heritage sites while adapting to contemporary socio-economic needs. In this process, positive and negative aspects of heritage reuse often arise and interact in terms of pro-growth initiatives and considerations of social benefits. From a practical point of view, the research focuses on urban landscape transformation in post-reform China, implying a global application, especially in regions facing similar preservation and urbanization challenges. By considering these complex challenges, the research provides practical policy implications through the different cases of heritage park construction in Xi'an.

In conclusion, it is essential to include the development of the heritage environment in the evaluation criteria for heritage projects, if the rehabilitation of urban heritage areas aims to treat the heritage environment as a whole and consider long-term value realization. This can alleviate problems such as "heritage commodification", which can be explained as a process whereby objects, traditions, or places of cultural value are turned into heritage sites as products that can be sold or traded for cultural tourism [44], and the "unequal distribution of benefits" in the development of heritage areas. Finally, it is crucial to emphasize and strengthen the link between the multi-value of heritage sites and the public. This multi-target orientation has become a new trend in the coordination of heritage preservation and urban development. Therefore, it is crucial to involve different stakeholders, such as multidisciplinary experts, policy makers, residents of heritage sites, and the public, in a comprehensive preservation framework to work together to establish a link between preservation goals and the balance of social aspirations and needs. This includes highlighting the unique value and historical cultural information of heritage sites, maintaining a positive and healthy cultural orientation, and enhancing public esthetic awareness. This can be achieved through various means, such as digital communication platforms, the creation of a complete cultural industry chain that integrates creativity, product manufacturing, communication, service, and exchange, as well as the involvement of the public in heritage preservation, community management, and the integration of heritage sites into social life.

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Principles of Urbanscape Transformation in the Historical Perimeter of Split, Croatia

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Abstract: The genesis of the historical core of the city of Split, a UNESCO World Heritage Site, rests on the continuity of urban life. The city has been subject to constant change over the course of almost two millennia, transforming from an ancient imperial palace into today's city. The ever-changing urban landscape implies the need for a continual dialogue between old and new, especially considering the efforts made throughout history to develop a new image of the city. By analysing three examples—Milesi Palace from the Baroque period, Bajamonti Palace from the age of Classicism, and Nakić Palace from the Secession period, all national heritage listed buildings, the significance of the urban logic behind their construction, as well as the impact these buildings had on the image of the city, is established. All three buildings are located on the perimeter of the city's public zone, and in different periods, they established new sets of urban rules, which they hold to this day. By researching their influence on the formation of Split's urban tissue on their immediate and wider surroundings, their role in the city-building process is defined, thus revealing their impact on the formation of the urbanscape, as well as the relationships between architectural heritage and the city's transformation.

Keywords: heritage; urban transformation; urban landscape; imageability

1. Introduction

"The most important characteristic of a city is, perhaps, the continuous change inherent in an urban environment, which we experience as an everyday situation. The city is subject to constant change, . . . Therefore, each intervention in act brings about a change in the significance of the other built forms to a greater or lesser extent" *Herman Hertzberger* [1] (p. 149)

The genesis of the historical core of Split, a UNESCO World Heritage Site, rests on the continuity of urban life. Through a process of constant change over almost two millennia, Split transformed from the ancient palace of an emperor into today's city (Figures 1 and 2). When considering the specific urban context of protected historical zones, such as Split's historical core and the Palace of Diocletian, the question of urban planning, protection, and management arises. This paper aims to deepen the research on rethinking the role of heritage as an integral part of the urban landscape and land usage.

Figure 1. The wider area of the city of Split, Croatia. The thick dashed white line represents the border of the designated historical core, which is a World Heritage Site. The thin dashed white line represents the perimeter of Diocletian's Palace. The red dotted rectangles mark the positions of the buildings analysed here: "A" marks the position of Milesi Palace, "B" marks the position of Bajamonti Palace, and "C" marks the position of Nakić Palace.
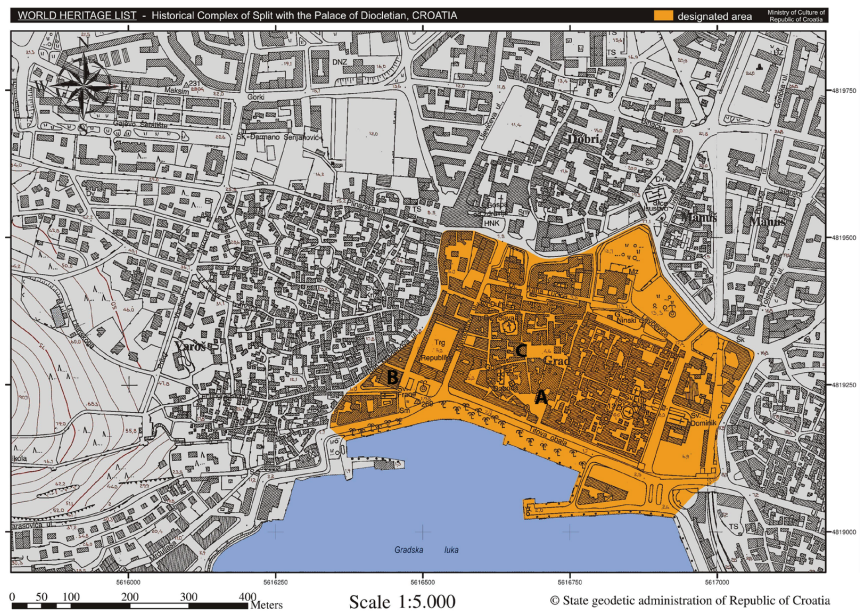
Figure 2. Historical complex of Split with the Palace of Diocletian, Croatia. The yellow area shows the UNESCO World Heritage Site. The letter "A" marks the position of Milesi Palace, "B" marks the position of Bajamonti Palace, and "C" marks the position of Nakić Palace.

The transformation of the historical complex of Split captures the entire spectrum of transformations, beginning with the construction of a heterogeneous medieval structure built within the clearly marked and monumental ancient building, within whose perimeter even the significant buildings of the Renaissance and Baroque periods adhere to a specific narrow context. The process of transformation can be traced continuously by following the expansion of the city to the west of Diocletian's Palace, first within the boundaries of the Renaissance fortifications and then within the imposing star-shaped Baroque fortifications. Later, following the disintegration of the fortifications, the city found itself in a new relationship with the ring of suburban settlements that surrounded it. The constantly changing urban landscape implied the need for a continuous dialogue between the old and the new, especially considering the efforts made throughout history to develop a new image of the city. This process aroused the research curiosity of numerous world-renowned experts throughout history—from Robert Adam, Georg Niemann, Ernest Hébrard, and Jacques Zeiller to Aldo Rossi, Jaap Bakema, Aldo Van Eyck, and Herman Hertzberger. Robert Adam wrote enthusiastically about the palace as early as 1764; Georg Niemann, Ernest Hébrard, and Jaques Zeiller at the beginning of the 20th century, at a time of avant-garde approaches to town planning and the birth of urbanism as a discipline (Adam, R. The Ruins of the Palace of the Emperor Diocletian at Spalatro in Dalmatia, Printed for the Author, Great Britain, 1764; Niemann, G. Der Palast Diokletians in Spalato, Wienna, Austria-Hungary, 1910; Hébrard, E., Zeiller, J. Le Palais de Diocletien, France, 1912). For the eminent protagonists of Team X—Herman Hertzberger, Aldo van Eyck, and Jaap Bakema, who were also the editors of the prominent magazine *Forum*—the palace was a reference point in the development of new architectural strategies: the social meaning of architecture, interpretation, and transformation, and the capacity for change. Using the palace as an example, Aldo Rossi developed theses on the transformation of use, adaptation, and meaning as key elements of urbanity. He did so by apostrophising the analogy of the city and the house (Bakema, J. An Emperor's House at Split became a town for 3000 People. Forum 1962, No. 2, pp. 45–78.; Rossi, A. L'architettura della città, Marsilio, Italy, 1966;

Van Eyck, A. Writings, Sun Publisher, The Netherlands, 2006; Hertzberger, H. Lessons for Students in Architecture, 010 Publishers, The Netherlands, 1991). The focus of this study is to determine the planning and architectural tools used to establish a new urban scale in different phases of transformation of Split's urban fabric. More specifically, it addresses the following question: Can urban landscape transformation generate, create, and develop new heritage? In particular, can the transformation of the urban landscape become a catalyst for the creation of new heritage values? The results of this research aim to contribute to planning, decision-making, and policy processes in accordance with the Operational Guidelines for the Implementation of the World Heritage Convention set forth by the UNESCO World Heritage Committee.

By analysing the principles of urbanscape transformation in the historical perimeter of Split through three examples—Milesi Palace from the Baroque period, Bajamonti Palace from the age of Classicism, and Nakić Palace from the Secession period, all national heritage listed buildings—the urban logic behind their construction, as well as the impact these buildings had on the image of the city, will be established. All three buildings form the perimeter of the city's public areas: Two are located on medieval squares, while one is located on the west end of the waterfront. Each structure established new sets of urban rules in the historical period in which they were constructed, and they all hold those rules to this day. By researching their influence on the formation of the urban tissue, with respect to both their immediate and their wider surroundings, their role in the city-building process is defined, thus revealing their impact on the formation of the urbanscape, as well as the relationships between architectural heritage and the transformation of the city.

2. Research Framework—Materials, Methods, and Theory

This paper aims to deepen the research on rethinking the role of heritage as an integral part of urban landscapes and land usage. Specifically, the hypothesis that urban landscape transformation can become a catalyst for the creation of new heritage was examined. In the examples studied, the tangible and intangible layers that have influenced the creation of new values within the cultural identity of the city were analysed [2].

Methodologically, this paper examines three types of indicators of urbanscape transformation: Firstly, it considers **the multi-layered nature of the palimpsest-like structure** of the historical city (historical frames—social and political circumstances in relation to urban change); secondly, **the emplacement of the buildings** (position—urban setting) and the consolidation of the newly created structure; and thirdly, **its influence in the context of the formation of the city's physical, as well as its intangible, identity**, which echoes future development (amalgam impact of development—*imageability*).

The first indicator is usually considered self-evident in almost any urban genesis that is not the product of a comprehensive, ad hoc planning act. Nevertheless, it represents a crucial starting point for insights into development. Through insight and analysis of the historical urban transformation of Split, its multi-layered genesis is constructed through a dialogue between solid structures and structures that slowly infiltrate or supplement the existing urban fabric and that can therefore be called "softer" structures. In the beginning, solid structures consisted of regular ancient buildings. They were followed by several layers of defensive structures that were constructed successively at different intervals throughout history. Due to changes in the geopolitical and technological environment, and due to the growth of the city, the perimeters of these structures were subject to decay: Larger-scale structures dissolved, transformed, or were replaced by smaller structures.

All three examples can be placed in the context of historical social changes and modernisation, along with the rise of the middle class, which brings with it the communal and infrastructural improvement of the city under the influence of contemporary European cultural aspirations, as well as new urban and architectural paradigms [3,4].

The focus of **the second indicator** is on setting up a new building in the existing urban tissue following a new urban logic. It implies reading the dictates of the found structures and how the new construction "obeys" them—that is, assimilates and uses them.

In terms of morphology, all three examples—Milesi Palace, Bajamonti Palace, and Nakić Palace—question the theme of the edge and whether this means defining a new edge, transforming an existing one, or apostrophising an existing conglomerate of built space, naturally mastering it in the context of spatial and functional contact with public space.

Certainly, the character of the changes conditioned by the wider historical and cultural context is obvious, but at the same time, the derivations of these processes are shaped by specific "local" elements, in which some authors see an interesting creative narrative. Ljubo Karaman interprets it in the context of the diversity of the periphery and the province, whereby the province only "copies stylistic elements from the dominant cultural centre," whereas the periphery reshapes them and leaves them to its influences [5] (pp. 30–31, 51–52). Ivan Rupnik later establishes this synthesis as the premise for a wide spectrum of architectural production in the contemporary context of Croatia as a geographical periphery, so we can apply it without hesitation to other historical periods as well [6]. Finally, Andrija Mohorovičić also attributes the specific creative intonation of the historical course of architectural creativity to this spatial boundary between continental Europe and the Mediterranean [7].

The analysis of archival materials and scientific papers that follow the development of the examples selected shows that the adopted urban sets were corrected depending on the specific urban context, and the architectural sets varied their archetypal stylistic forms, transforming them into expedient tools that operate in individual micro-situations. This specificity suggests an adaptability and the modernisation of design decisions, as well as the skill of local builders. At the turn of the 20th century, Camillo Sitte, a contemporary of Špiro Nakić, who designed one of the palaces discussed here, considered new theoretical principles for the relationship between the city and architecture. He recognised modifications to architectural language that can be found on the buildings discussed here. Marginalising the imperative of unequivocal design of the building itself, he subordinates it to a higher goal: the achievement of high-quality creative properties for urban space, which is precisely the focus of the second research indicator found in the examples from Split [8].

Newly created structures, if successfully developed, consolidate their urban "niches", creating new edges and the appearance of urban structures. This can be read through their role in the identification and representation of the image of the city, but also in their flexibility and change in use, which ultimately forms a layered amalgam because the creation of the meaning of built space is the result of a fusion of chronological narrative, collective consciousness, and a wide range of individual perceptions [9]. The decision to protect of these structures, however, is not merely based on an expert evaluation of their urban and architectural characteristics but is also a product of their so-called instrumental connection with space (a dynamic process that is only partly conscious and that includes the evaluation of various individual characteristics). Such a meaning is, after all, an emotional construction that is necessary for architectural heritage to become a vital phenomenon and essence of the urbanscape [10]. This is the focus of the analysis of **the third indicator**.

This study collected and analysed existing scientific, professional, and archival materials. It included plans, cartographic representations, and photo documentation. In addition to the aforementioned data sets, a large number of cartographic representations of the city of Split were collected and analysed. They show the state of the urban fabric in periods significant for the analysis of the development of the area under consideration. In further work, by systematising the collected data, analyses of each building were made, which included the developmental stages of the space in which the building is located; a review of plans, studies, and photo documentation of the historical condition; and a review of the constructed buildings.

According to sociologist Ivan Rogić, urban form, like any form in any other use, guarantees the necessary stability of a certain phenomenon, process, or event. As events become more complicated and less transparent, the search for their form becomes more important. The author concludes that the urban phenomenon is considered extremely complex pre-

cisely because of its multiple intricacies, which result from parallel and connected events on multiple event levels [11]. Therefore, this requires a research methodology that forms a system on which it is possible to experimentally carry out logical analysis in order to extend the data obtained in this way to the phenomenon being investigated and to gain reliable knowledge about it [12].

By applying the modelling methodology outlined above, we were able to meet the aim of this study, which was to determine the urban, architectural, and other aspects that ensured the success of the architectural solution; in this case, this referred to the city-forming features of the buildings in question. With the aforementioned methodological key, the required features were distinguished through detailed processing of the examples selected. The urban planning and architectural tools used were identified and their relationship determined. Elements that appear in all three examples were synthesised using the comparative method, which supports the study's thesis and forms the basis for valorisation and the development of a widely applicable method for researching the dynamic processes within the field of contemporary revitalisation of architectural heritage and its anthropogenic cultural and social emanation as an integrative part of the city landscape.

3. Case Study Analysis of Urban Transformations in the Historical Perimeter of Split

3.1. Historical Background

The history of urban culture in Croatia spans more than 25 centuries, from the first Greek towns dating back to the 5th century BC to the present day. The richness of Croatia's heritage sites has been recognised on a global level: Nine sites and one building from Croatia have a place on UNESCO's World Heritage List. In order to fully understand the process of land transformation in relation to three examples of historical buildings, which are themselves located within a larger protected historical structure that has a history of more than 2000 years of continued human impact on land transformation, a brief overview of the historical development of the city of Split is needed.

3.1.1. Roman Period

It can be claimed that the city of Split grew out of a single house. In the place where the historic centre of Split is today, the Roman emperor Diocletian built a large palace, which he moved into in 305 AD, following his abdication from the imperial throne (Figure 3). The layout of Diocletian's Palace, which combines features of a military camp (Lat. *castrum*) and a residential villa, has been recognised as a world-class example of a Roman building. The massive walls of the palace are fortified with 16 towers and organised into quadrants with two main cross streets (Lat. *cardo* and *decumanus*), which begin at the city gates. The walls enclose a structure that follows the layout of a Roman *castrum*, characteristic of many Roman colonies in Europe and North Africa. Examples of cities that developed from *castra* are Chester in England, Cologne in Germany, and Timgad on the north coast of Africa. Specific to Diocletian's Palace are the southern quadrants, which were intended for the imperial residence and a complex of religious buildings. This is especially evident in the southern façade of the palace, where, high above the sea, a covered arcaded porch (Lat. *cryptoportico*) stretched along its entire length in the manner of a summerhouse. Through the Northern Gate (Lat. *porta aurea*) via the *cardo*, one could proceed directly to the main square (Lat. *peristyle*), from which the main facilities could be accessed: the imperial chambers and the temples. Research has shown that the outstanding natural location, the favourable climatic conditions, and the existence of a source of curative sulphurous mineral water, which was used for rehabilitation treatments, played important roles in the selection of this particular site for the palace. Moreover, the site was also close to Salona, the capital of the Roman province of Dalmatia, which at that time represented an important harbour, as well as an administrative, economic, and military centre [13–15].
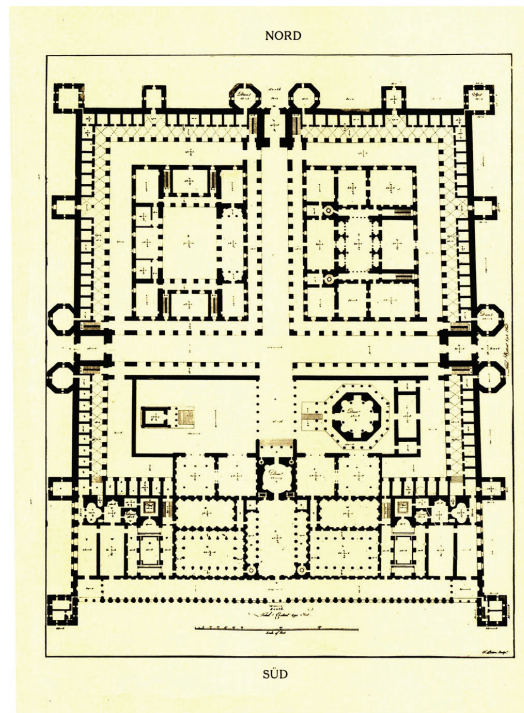
Figure 3. Plan of Diocletian's Palace by R. Adam from 1764.

3.1.2. Early Medieval Period

It was the destruction of Salona at the hands of the Avar and Slav tribes in the early seventh century that led to the first major transformation of the palace. Residents of Salona fleeing these attacks moved into the palace, using it as a shelter. Although the outer walls of the palace remained largely intact, still serving a defensive purpose, the interior was subjected to constant changes for centuries, caused by the needs of an increasing number of people in a limited space. Thus, for example, the main streets of the palace, the *cardo* and *decumanus*, which were once 12 m wide, were narrowed to only a few meters by the addition of new structures. The entire floor plan of the palace, previously geometrically clean, regular, and simple, became a labyrinth of semi-dark streets, small courtyards, and arched passages. Only one part of the palace remained wider and clear of buildings: the area in front of the mausoleum, which was converted into the city's cathedral. The peristyle, the central square of the former palace, became the centre of early medieval Split as well.

With the increase in the number of inhabitants over the course of the 10th and 11th centuries, the palace's framework became too narrow, so new settlements appeared on the slopes of the nearby hills of Marjan and Gripe. These settlements were unprotected and exposed to frequent attack, especially during the Tatar siege (1240–1242). In the 14th century, a new system of defensive walls was constructed to the west, thereby extending the city. Here, the city's inhabitants would seek shelter when under attack, and this structure gave Split a second urban frame within which to develop. This led to a change in the fabric of Split. The city went from being an extremely monocentric structure, with all its main facilities located on the peristyle, to being a bicentric structure. The religious facilities remained on the peristyle, while the city's municipal centre was transferred to today's Narodni trg (People's Square). At that time, the city had only one northern entrance, which was located in the new part of the defensive walls. This entrance marked the beginning of the shortest route to the municipal square, whereas the original northern gate of the palace was walled up.

3.1.3. Period of Venetian Rule

After 1420, Split was under the rule of Venice for almost four centuries. The city was included in the Venetian defensive system against the encroaching Ottomans, so the city's walls were reinforced on the northwest side and the ruling Venetians erected a defensive castle with towers around the southwest corner of the palace.

In the 16th century, the Turks conquered the fortress of Klis, which was located on a mountain pass near Split. This enabled free access to the coastal area from the hinterland, and consequently, Split once more faced the immediate threat of war. Despite this, the city continued to develop unhindered in every sense. Thanks to its geographical position on the Adriatic Sea and with good access via the mountain pass mentioned above to the neighbouring country of Bosnia, which was under Turkish occupation, in this period, Split became a lively port and a centre for economic exchange between Venice and the Ottoman Empire. Increasing maritime traffic led to further construction of the seashore in front of the palace. At the end of the 16th century, due to increased trade and defence against the plague, which was carried by caravans, the construction of a storage and quarantine facility began in the city's harbour, southeast of the palace [14].

The emergence of the third city framework, from the 17th century, was influenced by questions of defence rather than by the dynamics of growth. As a result, the city was developed to become a military stronghold: On the land side, it acquired a line of ramparts with bastions that were built around the old stone walls and separate fortifications located on a hill east of the bay, which defended the paths towards the city and the port from the seaward side [14]. These fortifications encircled the entire city, apart from the western and eastern suburbs (Figure 4).

Figure 4. Plan of the medieval city of Split from 1666, with fortifications surrounding the entire city, by Giuseppe Santini.

The war flared up in the 17th century, and the whole of Dalmatia was the stage for constant and exhausting clashes with the Ottoman invaders. However, when the Austrian army defeated the Turks near Belgrade in 1717 and the peace agreement in 1718 ended this age-old threat, the defensive wall system increasingly proved to be an obstacle to the further development of the city. The remainder of the 18th century saw people flee from

the surrounding areas, which remained under Turkish rule, and settle in the suburbs of Split. They thus enlarged the major settlements already forming around the defensive zone, which were cut off from the city's core.

3.1.4. Period of Austrian and French Rule

Split faced a series of changes caused by the Napoleonic Wars: the Austrian occupation in 1797, the French occupation in 1806 (which resulted in the end of the Republic of Venice as an independent state), the English occupation, and then the Austrian reoccupation in 1813. During a short administration (1806–1813), the French Marshal Auguste Marmont undertook a series of activities that were intended to improve the standard of living in the city. Part of the city's Baroque ramparts to the west and north, as well as part of the Venetian castle on the coast, were demolished. With the demolition of the ramparts, the process of merging the city with the surrounding suburbs had begun. On the site of the demolished ramparts, two city parks were built. A city hospital was constructed inside the northern bastion, and a new embankment was formed along the area in front of the southern façade of the palace [14].

The second Austro-Hungarian administration in Split lasted until the end of the First World War. With the arrival of the new administration, the gradual demolition of parts of the city's ramparts continued, and new buildings and gardens were erected in these locations. Thus, in the first few decades of the 19th century, Split lost its medieval form and the historical core increasingly began merging with the suburban settlements into a unique urban structure (Figure 5).

Figure 5. Plan of the city of Split from 1895, showing the disintegration of the fortifications and expansion of the city's tissue.

With this overview of the development of Split until the beginning of the 20th century, the processes and socio-political circumstances in which the city developed have been reviewed. Strong spatial frameworks, primarily defensive in nature, marked the city's historical development. Inside such clearly defined frameworks, despite numerous conquests and wars in this region, a continuity of construction was enabled so that consistent development and redevelopment of the urban fabric could take place. These processes continued in the 20th century, and the examples chosen for the following case studies illustrate them well. Through an analysis guided by methodological indicators, the case studies deal with three buildings—Milesi Palace, Bajamonti Palace, and Nakić Palace.

3.2. Milesi Palace

Milesi Palace has established itself as the most representative example of residential Baroque architecture in Split (Figure 6). The Milesi family emigrated from Bergamo at the end of the 16th century and earned the status of nobility by fighting in battles near the town of Herceg Novi. They also became prominent city officials. Although the exact date of construction of their palace was long uncertain, it ceased to be a point of contention following the discovery of information from a poem by Jerolim Kavanjin, a chronicler and poet from the beginning of the 18th century. As the construction of the palace is mentioned in Kavanjin's poem, the original assumption that it was built at the beginning of the 17th century was rejected. There appears to be no information in the archives about the construction, craftsmen, or works on Milesi Palace in Split [3,4].

(a)

(b)

(c)

Figure 6. Collage of images of Milesi Palace. (**a**) Cadastral plan from 1831. The dotted red line marks the position of Milesi Palace. (**b**) Site plan of Milesi Palace, marked in red, within today's urban tissue of the city of Split. (**c**) Photograph of the state of Milesi Palace today.

At the time the palace was constructed, the city was still confined within the ramparts, so its expansion to the west was not subject to the imperative of the existing structure to the same extent as the structures within the framework of Diocletian's Palace, the ramparts (the Venetian castle), and the urban tissue. The site of the palace features a conglomerate of three connected squares, which form a specific spatial context, a kind of edge to the city. In one part, fruits were sold—this was known in Italian as the *Piazza delle Legna*; in another it was vegetables—the Italian *Piazza dell'Erba*; and in the third, fish (the *Piazza del Pesce*). The structures that make up that edge belong, on the one hand, to the scale of defensive buildings (the Venetian tower), while on the other side, residential houses abut the western perimeter of Diocletian's Palace. Milesi Palace, with its striking and, for its spatial context, sizeable dimensions, is precisely on the border between these two urban scales. This is confirmed by Viki Jakaša Borić, who states that the new palace dominates the space in which it is located [3], while Cvito Fisković notes that, with its position and size, it surpasses the scale of Split at that time [16]. With this, the palace changed the interrelationships in the existing structure, bringing a new value to the public space. The wars with the Ottoman invaders slowly waned, and with the triumph of the Austrian army in 1717, they were finally extinguished. Over time, the ramparts increasingly proved to be an obstacle to the further development of the city. Spatial transformations of the Venetian tower and its demolition over time emphasised the size of Milesi Palace even more, strengthening its role in defining the character of the complex of three squares at the junction of which it is located. The original floor plan, which also includes a record of the neighbouring streets, squares, and buildings, can best be read in the hand-drawn plans of Petar Kurir—they date to 1751, which is the most authentic document in existence, given that the original design for the palace has not been preserved [17]. The palace's main façade faces the Piazza del Pesce, and the building overlooks the smaller square, Piazza delle Legna, to the west. The eastern side is narrow, overlooks the Piazza dell'Erba, and is the most modest of the palace's façades. The north side of the palace overlooks a courtyard (*Corte dei Signori Fuina*). On the site of the former Gothic church of St. James a new building was added, which, unlike the church, leaned against the western part of the northern façade of the palace. Its position was therefore largely free in space, except for the northeast corner, where it rests on the neighbouring complex [3].

However, the urbanistic characteristics of the palace largely depart from the baroque disposition in terms of the usual geometrically clear emplacement, which, with its symmetry and monumentality, often imposes itself as a spatial anchor. In this case, we are referring to the constricted and "closed" city, which, under the constant threat of war, expands beyond its original borders with extreme caution, and as might be expected, first "strains" within them, increasing its density. Existing, usually smaller, medieval plots are combined in order to construct larger houses. Their contours do not change; in fact, they remain written in the floor plans of future buildings. This was recorded in the cadastral report of the municipality of Split, which was created in 1831. This irregularity in the floor plan becomes a compromise that is de facto written into the topos of Split's Baroque residential architecture [3,16]. Moreover, the new Baroque conception of space implies a kind of freedom in dealing with architectural structures and moving away from the classic canon [4]. Milesi Palace was built according to the same key, uniting old plots of land on which smaller buildings had previously stood [3]. This specific spatial adaptation is characterised by another act that diminishes the purity of the Baroque expression: Elements of the found medieval structures were reused in the new building, thus embodying the paradigm of multi-layeredness. Milesi Palace is a true example of this; the main portal was actually built with late Gothic jambs, although it has Baroque trabeation, so scholars agree that it is a question of integrated parts of the houses that were previously located on the site of the palace [3]. It is assumed that the palace takes its stylistic models from Venice but that the craftsmen were probably local and brought their own interpretive touch to the Venetian prototype. Kruno Prijatelj describes the palace as having a more provincial, chaste, and massive form; a dearth of decorative effects; and a restrained ornamental repertoire.

However, the fine sense of rhythm and space and the variations of full and empty on the surface of the façade add a kind of sluggishness, tedium, and heaviness [4]. On the other hand, richer and better-quality architectural elements are present on the upper floors. The lack of decoration on the ground floor is due to the commercial function of that part of the building, thus elaborating on the adaptability of stylistic imperatives to a specific context [3].

At a time when the city was experiencing modest growth, the architecture of Milesi Palace nevertheless echoed social changes: A new social class wanted to display its position and wealth, and the visible façade became a training ground for this very intention; the less visible change, meanwhile, takes place inside the house. Namely, the courtyard of the palace, into which the main portal leads and which has been a common feature since the 14th century, is now becoming smaller. The space that served the nobility as a contemplative garden and from which the main access to the upper floors led is no longer the focus of the floor plan; instead, the staircase retreats into the interior of the house [3]. The design of Milesi Palace's façade can also be seen in Petar Kurir's drawing: When considering the stylistic backbone of the façade, it consists of five axes with openings that graduate in shape and size towards the mansard floor, and their verticality is softened by horizontal dividing cornices. The *piano nobile* on the first floor connects three centrally placed openings with a balcony. However, urbanistically speaking, it is more important that the position of the main entrance to the palace, which by nature should be on the axis of the main façade, has been moved to the west at the expense of a series of shops that are symmetrically placed and subordinated to the central axis, while the entrance doors open the ground floor towards the square. On the one hand, therefore, we have stylistic adaptations, interpreted as the creative impulse of local masters, while on the other hand, the unexpected treatment of the ground floor and attic shows a departure from the expected representativeness and consistency of the Baroque palace [4,16]. The side façades are somewhat more modest both in terms of material (rougher and smaller stonework) and architectural expression, while alterations and additions from later periods can be seen on the western façade [3].

The function of the palace changed over time; it began as a residential building and later became a public one, but the nature of housing at the time the palace was built implied a striking reflection on the public life of the city. There was a casino on the first floor and a ballroom, with a reading room and a lounge, and the entertainment, in addition to games, dances, and formal academies, included music, from Strauss' waltzes to Verdi's compositions. The original function of the ground floor, which contained shops, a warehouse, and an inn, remained stable and thus maintained the dynamic relationship between the house and the public city space. Moreover, they contributed more to the liveliness of the square than the conversion of the palace from residential to public. All traces of the Milesi family gradually disappeared over the course of history. However, it is known that, after the World War, the palace was owned by the lawyer Dr. Leonardo Pezzolio and his sister Matilda. Between the wars, it housed the Czechoslovakian consulate, and since conservators at the time had already valorised the façade of the palace, the consulate had to remove a plate with its coat of arms, which it had installed in 1932 [18].

The building underwent changes in function after this date: The interior was completely transformed on several occasions, first in the 19th and later in the 20th century, when the architect Budimir Pervan created an adaptation project, the execution of which was supervised by the Conservation Institute for Dalmatia, which allowed the Maritime Museum to move into the palace at the end of 1954 (Figure 7). In addition to the static reconstruction, the layout of the floor plan was also changed, whereas the external part of the building was preserved, with the reconstruction of the door of the shop on the ground floor. The atrium and staircase retained their original appearance [19]. The museum was in operation until 1985, when it was replaced by the Yugoslav Academy of Sciences and Arts (today the Croatian Academy of Sciences and Arts), which hosts numerous public events to this day.
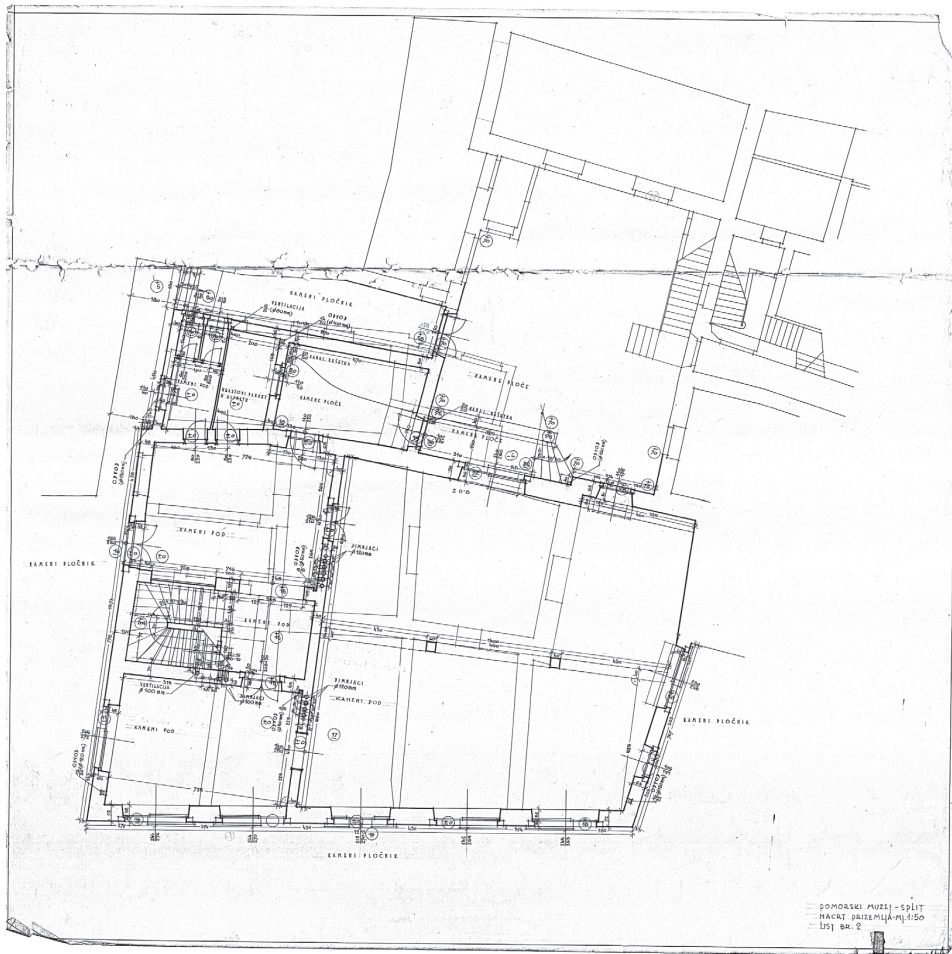
Figure 7. Ground-floor plan of Milesi Palace, from the design for its adaptation into a museum from 1954.

The specific context in which Milesi Palace was built greatly influenced its spatial position. Significant modifications to the city's fringes—the defensive castle—successively placed the palace in a different relationship with the built structure. In the immediate collision of the scale of various structures, defensive on one side and residential on the other, this Baroque palace did not impose itself by occupying and emphasising an already defined perimeter; on the contrary, its urban position is unusual—like a kind of "buckle" that brings together the existing medieval structure, which is irregular and heterogeneous—it manages to give the space a firm footing without thwarting the character of functional diversity and thus the compelling nature of this complex spatial conglomerate (Figure 8). The characteristics of the palace's urban form and spatial implementation demonstrate an adaptability that overcomes stylistic imperatives. By significantly changing the morphology of the associated spatial context, the palace forms a new layer, and with its facilities it "preserves" the urbanity of its squares, the uses of which have changed significantly. Therefore, it is not an exaggeration to conclude that it successfully consolidated the city space and formed a new urbanscape in the historical core of the city.

Figure 8. Collage of images illustrating the role of Milesi Palace in the urbanscape of the city of Split throughout history: (**a**) postcard c. 1910; (**b**) photograph c. 1960 following reconstruction; (**c**) photograph c. 1930; (**d**) hand-drawn plan by Petar Kurir, print from 1751; (**e**) measured building survey of the historical core block 20; (**f**) photograph from 1928.

3.3. Bajamonti Palace

Bajamonti Palace (Figure 9) was built between 1857 and 1858. It developed into a kind of apotheosis of a turbulent period in Split's history: On the one hand, it marked the beginning of a new political period of autonomist rule represented by Antonio Bajamonti's 20-year leadership, and on the other hand, in this private enterprise, Bajamonti symbolically compressed his ambition and the collectivist momentum of the city's progress in the context of modernisation. It is obvious, as Duško Kečkemet says, that Bajamonti was ideologically and politically stigmatised as an Irredentist—an opponent of the unification of what was then Dalmatia with northern Croatia—but it is undeniable that he put provincial Split on the map as a small but nevertheless European city [20]. In the mid-19th century, Split had a population of around 13,000. The majority of its inhabitants lived a semi-rural and difficult life. The middle class was built on the remains of the last noble families of medieval Split, as well as families of merchants and the families of officials who had immigrated during the Venetian administration. In addition, it also included Apennine and Austrian craftsmen who, over the course of several generations, completed the new bourgeois class. In addition, a touch of cultural modernisation was brought by sailors and captains, and

by wealthier citizens who took trips to Trieste, Venice, Vienna, and Paris [20]. Despite his political rigidity, Bajamonti, thanks to his family circle, in which his uncle Julije Bajamonti was a major influence, had libertarian and democratic beliefs, and he made his mark as a refined, progressive, and skilled speaker beloved by his fellow citizens. For him, Split was the city of the future (in Italian: "*citta del avvernire*") [20]. Moreover, Antonio Bajamonti did not merely speak of progress for the city: At the beginning of his mandate, a new regulatory plan was adopted by the municipal council in 1860 and was entrusted to the engineer Francesco Locati. In 1875, a new Construction Rulebook was adopted, and the so-called Official Commission was in charge of renovation, while the conservator of antiquities took care of Diocletian's Palace, a task initially assigned to Vicko Andrić [20].

Figure 9. Collage of images of Bajamonti Palace. (**a**) Cadastral plan from 1831. The dotted red line marks the position of Bajamonti Palace. (**b**) Site plan of Bajamonti Palace, marked in red, within today's urban tissue of the city of Split. (**c**) Photograph of the state of Bajamonti Palace today.

The spatial frame of Bajamonti Palace was generated by two factors. It finds itself at the convergence of the shoreline (known as the "Riva", the harbourside walkway), the ground plan "imprint" of the demolished Baroque rampart Šperun, and the existing spatial frame of the Church of St. Francis, with a monastery behind it. At this time, the church and monastery marked the end of the city and the beginning of the periphery. The periphery at this time radiated a different kind of modernisation and progress, playing host to symbols of the city's newfound prosperity: from the small harbour of St. Francis, which was given a shipyard in 1854; to the skerries further west along the coast; to the Giraldi and Bettiza

factory (from 1870 onwards), a soap and leather factory; to the Cukrov bell foundry [20]. The urban transformation of the coast began with the demolition of the Venetian tower [21], extending it by filling up the shoreline towards the west. The French general Marmont also intervened in the scale of the city: He aimed to make the new shoreline more attractive with a series of uniform houses by the architect Basili Mazzoli, with a striking urban park at the end, but the project was never built [20]. Bajamonti's house, meanwhile, developed as a result of interesting circumstances: through a symbiotic mix of his collective and private goals. The problems with the financing of Vicko Andrić's renovation of the city's water supply system were solved with an auction in 1855, during which the land on which the palace would one day stand was sold to raise funds. By purchasing the land, Antonio Bajamonti opportunely achieved his personal goal [20] (Figure 10).

The location of the palace is not accidental. With its position beside the church and monastery of St. Francis, Bajamonti Palace closes off the western perimeter of Split's Riva, thus making ideas originally proposed by Auguste Marmont a reality. With its imposing height and size, it obscures the smaller structures of the city's suburbs, which some scholars interpret as a deliberate act, attributing it to the desire to design an imposing façade for the city [22]. The palace took its architectural language from the classical Venetian palatial repertoire. This impulse is, of course, in the spirit of the European influences at that time, but it also has a direct connection with Antonio Bajamonti. This is because Bajamonti acquired the funds for its construction from the sale of a Venetian palace on the Grand Canal, which he had inherited from Elena Cippico, Julie Bajamonti's daughter. With a strong feeling for Venetian architecture, he leant towards the Neo-Renaissance style. What also takes over is the principle of emphasising the main façade, with the three side wings unadorned. However, there is one variation: On the south wing there were niches with sculptures (today they are no longer there), which positioned the house towards the street that separates it from the church. The palace, an imposing three-story building with a mansard, is also decorated with four large sculptures, which are stylistically associated with the Venetian sculptor Luigi Ceccone.

Antonio Bajamonti built his new family house, but he did not intend it to serve only a residential function. The building also housed the municipal administration of the autonomist party (1861–1880), the chamber of commerce, the municipal office, the court half a century later, and, from 1932, the post office and the headquarters of some societies (for instance, the Workers' Society) [18]. The first Split photographers (Pietro Zink and others) had spaces in the attic, and it was from their studios that the first photographs of Split were taken [20]. In the 1930s, the studio of the famous sculptor Branko Dešković [20] was located there, and later Dujmo Penić and the painters Frano Meneghello-Dinčić, Mate Meneghello, and Vinko Foretić also worked in the palace [18]. Thus, in the spirit of Bajamonti's life and work, the palace undoubtedly played a significant role in the public, civic, and political, as well as in the cultural, life of Split.

Bajamonti Palace framed the western façade of the city's main coastal promenade, suggestively uniting the series of heterogeneous layers that surround it. As the first prominent palace of the new bourgeois class, its stylistic and architectural superiority, as well as its imposing nature in relation to its urban surroundings, marked it as a kind of symbol of the new, advanced city. It was also a visually recognisable building; although in the beginning it was plastered with colourless plaster, the main façade was later painted an eye-catching red [20], and it thus became an integral part of the city's views and marinas. Even serious changes in the immediate surroundings (the construction of the Prokurative buildings and the square that connects them to the coast, controversial changes around the fountain, and oscillations in the horticultural arrangement) did not "shake" the strong and dominant role of Bajamonti Palace in the formation of a new, impressive urbanscape (Figure 11).
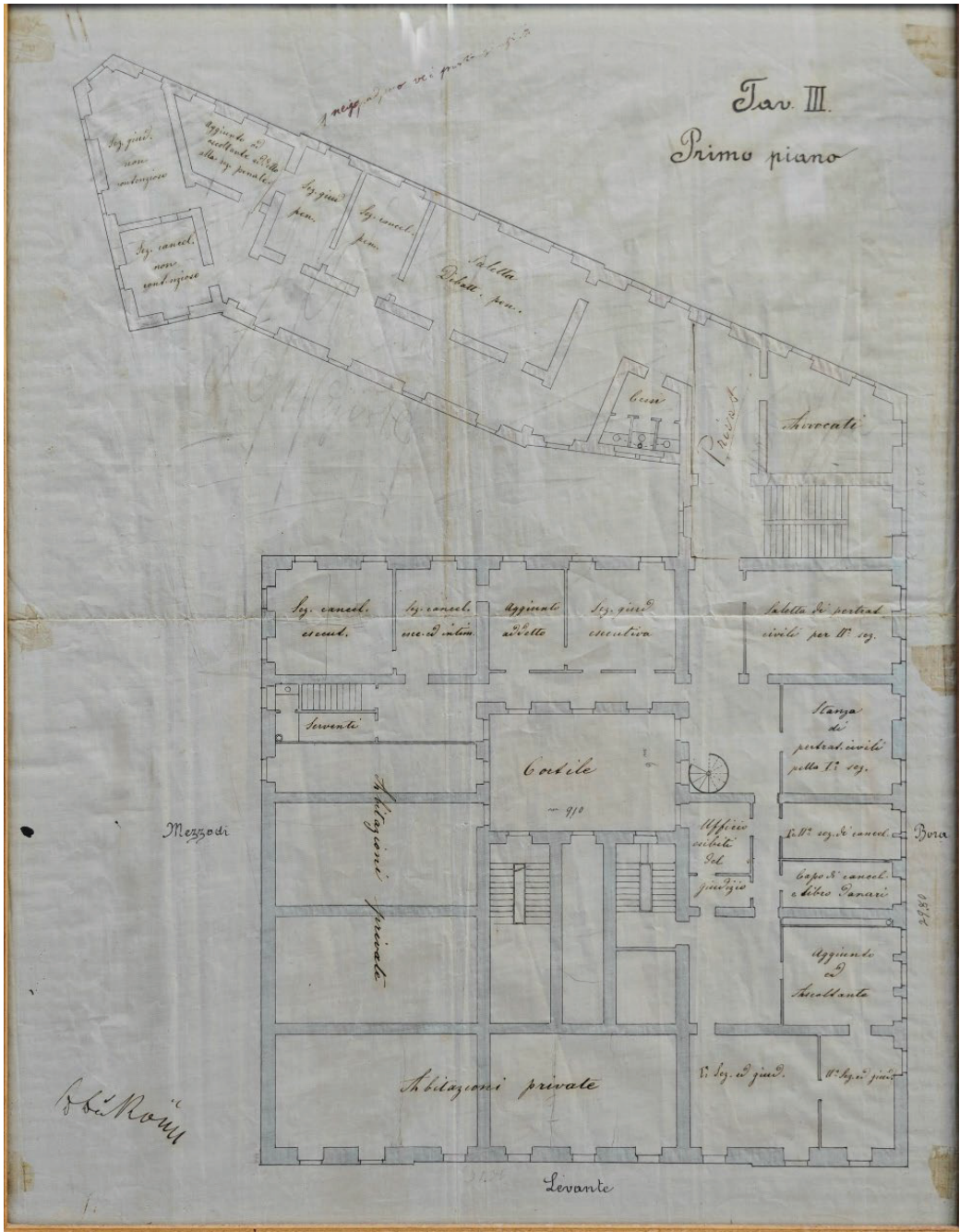
Figure 10. Plan of the first floor (*primo piano*) of Bajamonti Palace, with plans for the expansion of the new wing towards the west, which was never built.
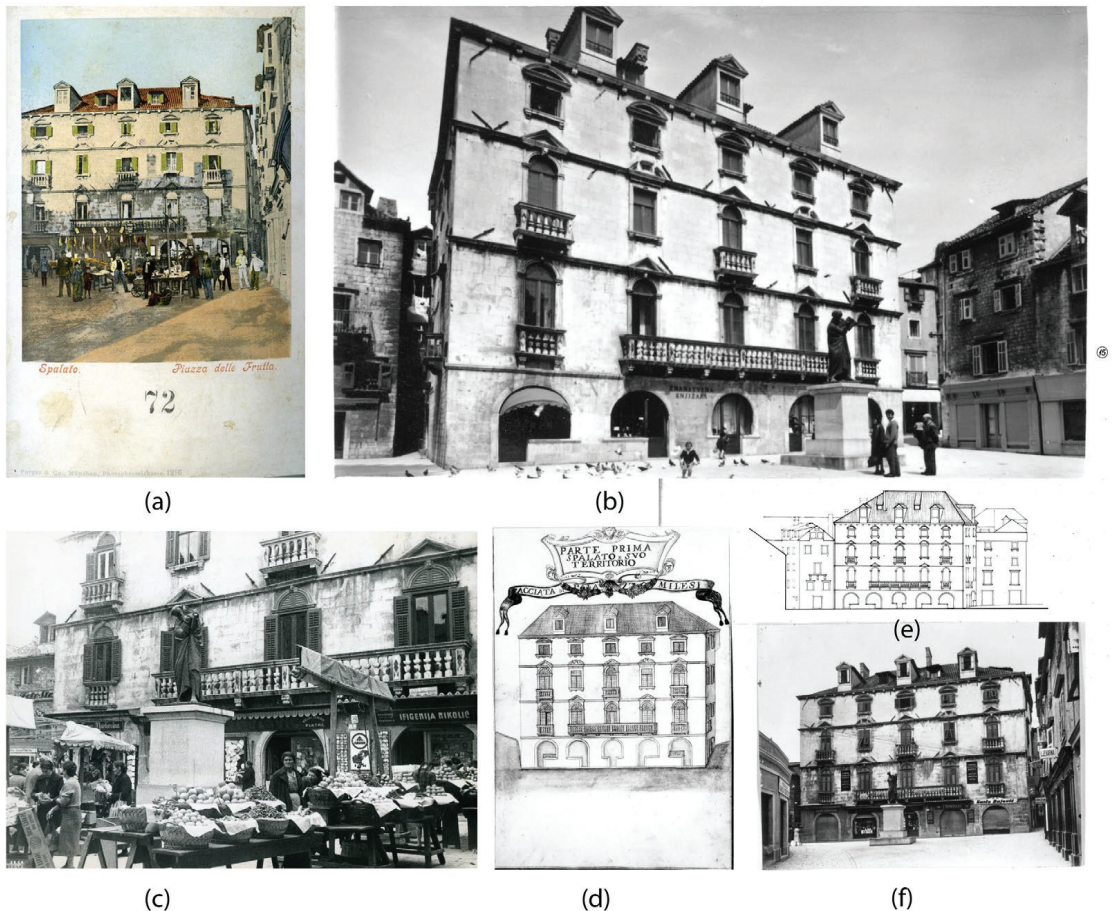
Figure 11. Collage of images illustrating the role of Bajamonti Palace in the urbanscape of the city of Split throughout history: (**a**) postcard from the turn of the 20th century, (**b**) photograph c. 1940, (**c**) postcard c. 1960, (**d**) postcard from 1960, (**e**) photograph from 1926.

3.4. Nakić Palace

The circumstances that preceded the construction of this palace on the western edge of the city's main medieval square resemble a palimpsest. The historical layers of construction have been repeatedly erased so that the space may be reused for new purposes that correspond to changes in socio-historical circumstances. The starting point of the development of this square is the Western (the so-called "Iron") Gate of Diocletian's Palace (Lat. *Porta Occidentalis*), from which the square has expanded to the west on several occasions throughout history.

Initially, a church was built at the eastern point of the square and then a cemetery around it, but over time the square lost its religious character and became the main secular centre of medieval Split. Trade began taking place on the square, and under Venetian rule, public buildings such as the duke's palace, dungeon, and theatre were placed on the square. Through each of these changes, the square changed its morphology and gradually

expanded towards the west. These changes are recorded in the historical maps of the city of Split [23].

In addition to the change in shape and new developments, the peripheral buildings were often upgraded in such a way that a floor or two was raised on top of the previous historical layer, or one block of buildings was completely demolished to build new, more impressive ones. The last major change in the square's morphology took place in the 1820s, when, due to deterioration, an entire complex of public buildings, which consisted of the duke's palace, dungeon, and theatre, was demolished. The square thus lost its articulated format and the city's facilities were relocated [23,24]. Consequently, the square expanded further west, and low and unremarkable houses, where the Špiro Nakić family's shop was located, became part of the perimeter of the square.

The end of the 19th century was marked by a change in the political leadership of the city (the People's Party won the elections in 1882 and replaced the government under the leadership of Antonio Bajamonti as mayor). The newly formed municipal administration strove to meet the city's living needs, and despite the lack of economic support from the state and underdeveloped industrial production, it contributed to the development of the city, which can be seen in active construction activity and increased cultural activities.

This was a period of economic prosperity in Split, which was mostly based on the wine trade. As a result of these activities, commercial traffic in the port of Split gradually but constantly grew, and at the end of the 19th and the beginning of the 20th century, the city of Split became the most important economic centre in Dalmatia and the second port in terms of traffic within the territories under Austrian rule. In addition to the wine industry, the drivers of development were local entrepreneurs, even though the economy was limited to craft production. The reasons for the absence of stronger industrial production were the lack of capital, lack of railway connections with the hinterland, and limited state investment.

These circumstances at the beginning of the 20th century had a positive effect on the cultural and artistic life of the city, and many cultural and artistic societies were founded, various newspapers and magazines were launched, and cultural establishments organised plays and exhibitions. Most of the young artists from Split went abroad to be educated, and on visits to their hometown, they would organise exhibitions, although they did not have adequate space for them. In the absence of an exhibition space, young sculptors and other artists from Split exhibited in shop windows and cafes [25].

In that period, Špiro Nakić, the son of a successful shop owner, finished his studies in architecture in Vienna and returned to live in Split. Schooled in a modern spirit, he successfully persuaded his father to invest in the construction of a new, modern palace within the historic core of the city of Split [26].

The store and warehouse of the Nakić family were located in a block of smaller and unremarkable buildings with shops on the ground floor, which gradually became the western edge of the main city square. This situation was recorded in the cadastral report of the municipality of Split, which was drawn up in 1831 [27].

The family recognised the potential and importance of the location and decided to sell off their warehoused goods in order to demolish the existing buildings and begin building a new palace. The architect Špiro Nakić designed a new building within the framework defined by the existing street network but different in expression and urban scale and thus successfully established a new image for the western perimeter of this city square (Figure 12).

The shape of the building was mostly defined by the existing cadastral parcels, which already had a clearly defined edge towards the public city area and the surrounding narrow alleys and their associated buildings. The parcel on the northeast corner already had a specific trapezoid shape, the breaking point of which was at the junction of the street and the square. The parcels on the southeast corner formed a kind of extension of the street in contact with the square. This defined three sides of the building—north, east, and south—while the west side was incorporated into the existing block of buildings.

Furthermore, some of the walls from the previous building were reused as part of the new floor plan.

The building is an irregular quadrangle in shape, with specific rounded corners facing the square, and it was conceived as a four-story building with clear differentiation in the design of the ground floor, first floor, two upper floors, and the attic beneath the pitched roof (Figure 13). Several different architectural tools were used. The ground floor is designed with large glass panels and wooden elements painted in dark green and decorated with a series of stylised mouldings. The first floor is "separated" from the ground floor and the floors above by horizontal cornices and has an additional pronounced horizontality in the form of mouldings imitating rustic masonry. The upper two floors form a unique main design composition of which the first floor forms a sort of base, and the ground floor is read as a pedestal. The wall fabric of the second and third floors is plastered flat with a series of shallow protrusions—pilasters that extend through both floors between the window axes. The pilasters are richly ornamented with stylised plant ornaments, motifs typical of Art Nouveau. Above this is a steeply sloped red roof with round dormer windows.

(a)

(b)

(c)

Figure 12. Collage of images of Nakić Palace. (**a**) Cadastral plan from 1831. The dotted red line marks the position of Nakić Palace. (**b**) Site plan of Nakić Palace, marked in red, within today's urban tissue of the city of Split. (**c**) Contemporary photograph of the palace.

Figure 13. Second floor plan of Nakić Palace, the 2018 design for the adaptation of the palace into a hotel.

The division in design corresponds to the logic of the construction, as well as the distribution of facilities within the building. The structural solution for the ground floor involved a specific type of steel beam and concrete floor construction supported on the perimeter walls, which enabled good organisation of the stores on the ground floor, and

on the upper floors, where the offices and apartments were located. The rest of the floors and the roof were built with wooden constructions supplemented by exterior and partition walls made of brick. The first floor, which is slightly lower than the other floors, is assumed to have been originally intended for business premises, while two apartments per floor were placed on the second and third floors. The apartments were quite large and most certainly represented luxury for the period in which they were built. The original floor plans of the apartments were typical for the period of construction, dominated by narrow and long corridors in the back leading to spacious rooms on the outer walls of the building.

This differentiation is further emphasised by the design of the windows. Despite the axial and symmetrical setting, five window axes are oriented towards the square, with two in the rounded part, and in each horizontal zone they change format or size, thereby contributing to the reading of the different design elements of the façade. The roof windows, with their specific round shape, are set aside in relation to the façade, thereby beautifying the appearance of the roof surface and only participating in the composition from a greater distance, as the end of the window axes.

The specifics of the architectural organisation can be recognised in the somewhat eccentric removal of the main entrance from the main axis of the building. The entrance to the house is on the north side. It leads to a long, narrow corridor via which you enter the stairwell. Placing the entrance in this way allowed flexibility in the organisation of the shops on the ground floor, which faced the square. Numerous adaptations and changes in the functions of this part of the structure, none of which had a major impact on the overall appearance of the building, indicate the quality of this solution.

This building is the first in Split to be built in the Secession style, and it is among the first, if not the first, such building in Dalmatia. The decision to build in the Art Nouveau style was questioned by the public, as evidenced by several records from local newspapers of that period [23]. Despite this, the very quality of the design and its elegance were indisputable, and soon the building itself became a symbol of Split.

The construction of the building can be connected to the long period in which this city square was an important part of the life of the city. The site of frequent events, the square itself has been an unavoidable point of spontaneous socialising for many years. There was, of course, a period of stagnation due to the two world wars, but it remained a meeting place until the end of the 20th century, more precisely the 1990s, when there was once again a period of stagnation due to the Croatian War of Independence.

In most periods, the ground floor of the building was occupied by a bookstore, and for a short period, it also housed an information office, thus actively engaging in the life of the city square. But interestingly, the building itself has, in addition to the active role played by the facilities on the ground floor, often served as a part of the scenery, a canvas on which changes in socio-historical circumstances have been displayed to the public. All this is evidenced by numerous photos that show the various inscriptions and signs that were placed on the façade of the building throughout its history.

Therefore, the change that took place in 2019, when several small hotels were placed on the upper floors, can be characterised as successful, in that it maintained the role that the building had throughout history. The hotel rooms were laid out in such a way that the existing organisation of the space was respected, thus maintaining a good relationship between all the hotel rooms and windows overlooking the town square. The attic has also been remodelled into individual rooms. Given that it is unusual to place more than one hotel in a single building, the receptions are located on the first and second floors, and they are accessed from the stairwell, through the northern entrance. This maintains the logic of placing commercial facilities on the ground floor, which, as independent units, are accessed directly from the square. By keeping this solution, the active role of the building in the life of the square has continued. In addition, during the construction work, the entire façade was refurbished.

With the construction of this building, the image and identity of this part of the city was established, and there were no further morphological changes in the shape of the

square and surrounding urban structure. All further interventions in the arrangement of the square were either interior remodelling or the refurbishment of the façade of an individual building, including the restoration of the façade of Nakić Palace.

It is fair to say that Nakić Palace contributed to the creation of a new urban identity for the cityscape. The building arose as a reflection of the socio-political circumstances of the time and successfully became the bearer of an established identity in the following period. The rounded corners greatly contribute to the contemporary appearance of the building in the heterogeneous system of peripheral buildings that now line the square but with clear historical layers. This is a gesture with which incredible fluidity of the urban landscape has been obtained and which invites further exploration of the urban fabric (Figure 14).

Figure 14. Collage of images illustrating the role of Nakić Palace in the urbanscape of the city of Split throughout history: (**a**) photograph c. 1905, (**b**) photograph c. 1910, (**c**) postcard c.1910, (**d**) photograph c. 1910, (**e**) photograph c. 1930, (**f**) photograph c. 1967, (**g**) photograph c. 1960 at Christmastime.

4. Discussion

The processes of development and the historical and spatial frameworks of the urban tissue within which the buildings discussed above were placed influenced all the essential characteristics of their urban and architectural solutions. The case study analysis resulted in a series of characteristics that belong to the selected methodological indicators—palimpsest, emplacement, and echoes. These characteristics were sorted in a table so that they can be read and compared (Table 1).

Table 1. Indicators of urbanscape transformation in the historical perimeter of Split.

Indicators	Milesi Palace	Bajamonti Palace	Nakić Palace
Palimpsest - Historical frame - Social and political circumstances	- Baroque style, one of the notable architectural projects of the 18th century in Split - Build by newly established nobility, prominent city officials of that period	- Neo-Renaissance style, representative example of residential architecture in Split from the 19th century - Build by the future mayor of the city	- First building in Split built in the Secession style, with large residential flats overlooking the city square - Built by a prominent merchant family from that period
Emplacement - Position - Urban setting	- Transforming the edge of the city block - Transformation and merging of smaller existing plots - Dominating with scale within existing urban structure (creating new urban scale) - Leaning on existing urban tissue structure - Reusing found building structures (jambs, walls, etc.) - Corresponding square shaped by the demolition of fortifications (successively from 1806) - Development of irregular floor plan following the medieval plot matrix - Adaptation of the architectural expression to the local micro-context - Lateral positioning of the main entrance, giving priority to placement of shops on the ground floor	- Closing and consolidating the western edge of the seaside promenade - Plot derived from the demolition of fortifications (around 1808) - Dominating with scale in relation to the nearby suburb of Varoš - Continuation of the building line of the façade of the neighbouring monastery - Adaptation of the architectural expression to the local micro-context - Placement of shops on the ground floor	- Redefining the new edge of the city square - Transformation and merging of smaller existing plots - Dominating with scale within existing urban structure (creating new urban scale) - Deviation from the construction line by means of rounded corners - Corresponding square transformed by the demolition of deteriorating complex of public buildings (1821) - Leaning on existing urban tissue structure - Reuse of found building structures - Adaptation of the architectural expression to the local micro-context - Lateral positioning of the main entrance, giving priority to placement of shops on the ground floor
Echoes - Role in shaping identity - Imageability - Amalgam impact of development	- Postcard motif: symbol of the city, frequently featured on postcards - Markets on the squares next to the building - Shops and warehouses on the ground floor, bookshop - Different public facilities on the first floor: reading room, ballroom, casino, lounge, consulate - Maritime Museum (1954–1985) - Yugoslav Academy of Science and Arts (since 1985) - Public events in front of the building, with advertising on the balcony of the first floor	- Postcard motif: symbol of the city, frequently featured on postcards - Shops on the ground floor - Public facilities on the upper floors and studios on the attic floor: photographers' studios, artists' ateliers, municipal and political party offices, chamber of commerce, court, post office, headquarters of various societies - Political and religious events on the corresponding square next to the building - Public events in front of the building	- Postcard motif: symbol of the city, frequently featured on postcards - Shops, information office, bookstore on the ground floor - Different facilities on the upper floors: administrative offices, small hotels - Political and religious events on the corresponding square next to the building - Public events in front of the building and on the balcony of the second floor

Although the indicators mark clear characteristics of the processes of development, they should not be understood unambiguously. These processes are complex, and their role in urban transformations should be viewed integrally. As a response to the socio-historical circumstances, modernity in the design approach gave these buildings additional value, which was proven by the dynamic processes of the life of these structures. Although the

very modernity of the design of these buildings was a topic of debate, time has confirmed this type of approach. Moreover, if we look at the heterogeneity of the architectural language used in the individual design of these structures, it could also be considered a confirmation of the "theory of dressing" (Germ. *Bekleidungstheorie*) established by the German architect Gottfried Semper in 1860. According to Semper, in addition to closing the established constructive framework and lateral protection of the interior entity, the vertical envelope of the building took on the key function of communication with the immediate social environment and the entire living framework of the city. It is stated by researcher Karin Šerman, apostrophising this "exterior–exterior" communication as the most suitable and logical for the outer envelope of the building, that the outer space is what the building's façade articulates and with which it imperatively—for the sake of accurate information and collective historical orientation—communicates coherently [28].

Consequently, we can read exactly these values in all three of the structures analysed above. The coherent communication between the façade and the spatial context, which was achieved precisely through active critical and creative expression resulting from adaptation and sensitivity towards the micro-context in all three examples, is proof of a rational balance between the architectural and stylistic patterns and the priorities derived from a concrete reading of the space. These interwoven city-building values ensured that these houses played an active role as bearers of cultural identity throughout the following centuries, despite a series of changes in their function and manner of use. It could be claimed that it was precisely because of these values that the structures retained and developed their significance. The relationship between open city spaces—squares and the main façades of the buildings analysed here—is the factor that sets them apart from other buildings from their period. Through this dialogue, they became a backdrop of city life. This is confirmed by the fact that their urban and architectural appearance has become instantly recognisable, a symbol of the city. They became a frequent and unavoidable motif on postcards, and with their various advertising and social inscriptions and messages, which were "glued" to their main façades, they were in constant communication with Split's citizens.

The façade's scenographic role can also be considered an important factor in the preservation of the buildings and their appearance to this day. Proof of this claim is the permanence of the buildings, despite the frequent changes that took place in the surrounding areas, where there was a constant search for consolidation. In the case of Milesi Palace, it was the changes in use or spatial dimensions, such as the removal of a series of buildings on an adjacent square. In the case of Bajamonti Palace, it was changes to the shoreline and the installation and subsequent demolition of the so-called "Bajamontuša" fountain and the extension of the Prokurative complex. In the case of Nakić Palace, it was disagreements over its role in defining the urban format of the People's Square, as well as a series of different ground-floor arrangements and the placement of various types of monuments in the square. Also, the shapes of the plots were almost completely predefined, and the different incoherent urban scales of the surrounding developments called for the establishment of a new urban standard to articulate and/or consolidate those parts of the city in which they were built. Moreover, such circumstances required a shift in the use of established architectural and urban planning tools—more precisely, a fine-tuning of particular tools modified according to the circumstances encountered. This is evident in the floor plans of the buildings analysed, which were aligned with those of existing structures. It can also be seen in the deviation from the standard positioning of the main entrance on the main façade in the case of the Milesi and Nakić palaces and by the treatment of the main façade, which differs from the other elevations.

5. Conclusions

All three of the buildings discussed above are part of a historical complex protected by UNESCO and are themselves protected on the national level [29]. They play an active role in understanding of the city's identity. They have become an integral part of the touristic landscape, which is consumed by an increasing number of visitors every year.

What is important is to recognise the key elements of the contributions made by individual structures to the image of the city. In the context of more than 1700 years of continued urban life on a single site, the multi-layered identities of the historical core, growing out of a process of constant change, have been recognised as having "outstanding universal value" by UNESCO. Therefore, it is imperative to preserve each layer of identity. When it comes to the three selected examples, the principles of transformation have been demonstrated: the multi-layered nature of the pre-existing structure, the consolidating effect of the specific urban emplacement, and the improvement to the *imageability* of the city—these represent the key elements that established city-building features, and they need to be actively considered for further protection and use. This confirms the approach that cultural heritage should not be seen as a static object but that it can and must be seen as an active participant in activities aimed at improving the quality of the landscape and the quality of life [2].

In light of UNESCO's protection of Outstanding Universal Values for listed sites, within the Operational Guidelines for the Implementation of the World Heritage Convention [30], it is important to add the dynamic function of community life to heritage to strengthen the credibility of its role in the life of the city. This should be implemented through formal and informal mechanisms, from traditional practices to different levels of planning instruments. The historic core of Split is one of numerous UNESCO World Heritage Sites that include historic city centres that are still inhabited today. Solving the problems of its contemporary protection, management, and planning requires a holistic approach and the integration of numerous indicators that serve for detailed valorisation. Since 2011, UNESCO has recognised such urban structures, which are referred to as Historical Urban Landscapes (HULs). This approach considers living, protected historical centres for more than just their monumental and visual value [31]. Therefore, this analytical model can be applied to other examples of architectural heritage within the protected historical core of Split, as well as to other examples of buildings located within heterogeneous historical layers of any city, which represents the original scientific contribution of this research.

This study of urbanscape transformation is a continuation of previous historical studies that have always been the bearers of theoretical thoughts for the further modern development of cities, as well as a record of a living model of the transformation of the built environment in accordance with the needs of the population. The approach to such environments, which is shaped and modified throughout history and today is nurtured through the adaptive reuse of cultural heritage policies [32], shows that transformation and adaptation are the key to learning and, consequently, acting in space. In Split, this can be seen throughout history, from Robert Adam to Herman Hertzberger, who absorbed the nature of these processes through the transformation of the ancient Diocletian's Palace to today, when we try to look at them as comprehensively as possible. Examples, such as the three selected for this study, which have been an integral part of city life for centuries, represent a valuable knowledge base from which the principles of urbanscape transformation can be recognised and improved in accordance with the needs of a living city while protecting architectural and urban heritage.

ravni odjel za urbanizam i izgradnju/the City of Split, Administrative Department for Urban Planning and Construction.

Conflicts of Interest: The authors declare no conflicts of interest.

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Article

Urban Transformation in Muslim Neighborhoods: From Shanghai's Women's Mosque into a Retirement Home

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Abstract: Since the mid-19th century, the migration of Hui Muslims to Shanghai has fostered the development of stable residential neighborhoods around the Small Peach Garden Mosque, turning the area into a hub for religious gatherings and a bustling economic center, especially for the beef, mutton, and catering sectors. However, the dawn of the 21st century brought with it swift economic expansion and urban redevelopment, gradually replacing the neighborhoods surrounding the mosque with high-end residential zones. Soaring land prices slashed the profits of Muslim food businesses in the area to the point of unsustainability, disrupting the traditional pattern of life around the mosque. This study offers insights from interviews with older Muslim women who stayed at the Small Peach Garden Women's Mosque after its demolition, slowly transforming it into a retirement home. Their stories underline that architectural conservation alone is not sufficient to preserve the character of historic and cultural sites. The study calls for a deeper understanding of urban transformations in historic urban landscapes for religious minorities.

Keywords: Muslim; historic urban landscape; minorities; adaptive reuse

1. Introduction

Recent geographical research on religion has increasingly focused on the dynamic relationship between sacred spaces and urban landscapes, highlighting how places of worship such as mosques contribute to society and the urban fabric [1,2]. In the contemporary era, many of these historic landscapes have seen the collapse of their traditional and social foundations [3]. The Hui community in China, with its Islamic faith and distinct culture, provides a unique case study in this regard. Known as Huizu and recognized as an ethnic minority, the Hui are noted for their Islamic heritage. Unlike other Islamic minorities in China, the Hui primarily speak Chinese, which linguistically aligns them with the Han majority while culturally distinguishing them from other minority groups. English-language scholarship frequently refers to the Hui community as Chinese Muslims or Sino-Muslims, emphasizing their integration into Chinese society [4].

The Small Peach Garden Mosque in Shanghai's Huangpu District, constructed in 1917, represents a focal point of the Hui's urban presence and has been an exemplar of West Asian Islamic and Chinese architectural influences. Adjacent to the main mosque building is the Small Peach Garden Mosque for women, established in 1933, which provides a dedicated space for Muslim women to engage in religious activities. This study used the approach of case study and qualitative methods to explore the profound transformations of the Small Peach Garden Mosque, particularly its transition into a retirement home for older Muslim women following urban redevelopment pressures.

Our case analysis draws upon archival and historical materials, census data, and recent fieldwork. We conducted interviews in the women's mosque as well as on-site surveys involving diagram drafting, photography, and observation; we also integrated archival blueprints and historical urban redevelopment data from the Shanghai Islamic Association

and other archives. By employing a multifaceted methodological approach, we aimed to capture the complex interplay between religious practice and urban planning in the context of China's rapid urbanization.

Our research focuses on the following objectives: The primary goal is to explore the impact of urban redevelopment projects on religious communities, especially in megacities like Shanghai, with an emphasis on the Hui Muslim community. A key component of our study is the examination of the Small Peach Garden Women's Mosque's transformation into a retirement home. This case acts as a prism to understand the wider effects of urban redevelopment on religious spaces, shedding light on the challenges and potential benefits of such transformations.

Building on this foundation, our research integrates methodologies and theoretical frameworks from urban sociology, the sociology of religion, and case analysis. We aim to enrich the ongoing discourse surrounding cultural preservation and the sustainability of communities within the dynamic context of urban transformation. By highlighting the experiences of the Hui Muslim community in Shanghai, we hope to inform policy and planning processes that respect and protect the cultural and religious heritage of urban communities.

2. Theoretical Framework

The theoretical framework of this study is grounded in the intersection of urban sociology and the sociology of religion, providing a lens through which we examine the impact of urban transformation on religious spaces. It draws upon theories of urban development that emphasize the transformation of cityscapes in response to economic, political, and social forces and integrates perspectives from the sociology of religion that highlight the role of sacred spaces in maintaining community cohesion and identity [5]. This dual approach informs our exploration of adaptive reuse of religious spaces and enables a comprehensive analysis of how the mosque-centered communities of Shanghai's Hui people have navigated the challenges posed by urban redevelopment.

Urban transformation in historically significant neighborhoods is a complex process that encompasses more than the physical redevelopment of spaces; it profoundly affects the socio-cultural and economic dynamics within these communities [6]. Drawing on Lefebvre's theory of the production of space [7], this study interprets urban spaces as both physical structures and manifestations of social relations, reflecting and shaping the lives of those who inhabit them. The transformation of the area around the Small Peach Garden Mosque in Shanghai illustrates this dynamic vividly. This mosque, central to the life of the local Hui Muslim community since the mid-19th century, has witnessed how economic expansion and urban redevelopment can reshape community structures and cultural identities.

As land values surged in the early 21st century, traditional businesses like those in the beef, mutton, and catering sectors, vital to the community's economy, faced declining sustainability. This economic pressure has not only altered the physical landscape but also disrupted the social fabric and cultural practices centered around the mosque. The case of the mosque's gradual transformation into a retirement home serves as a poignant example of adaptive reuse, where architectural conservation efforts alone have proved insufficient to maintain the community's historic and cultural character.

Critiques by thinkers such as Jane Jacobs [8] and Lewis Mumford [9], who emphasize the need for urban planning to respect the organic, lived experiences of community inhabitants, resonate deeply with this case. They advocate for a planning approach that values the community's social fabric over mere economic gains. This perspective is complemented by the concept of 'creative destruction', which captures the inherent tension in urban transformation efforts between generating economic opportunities and eroding established social networks and cultural landmarks [10]. This tension is particularly acute in religious and minority spaces, which are crucial for maintaining community identity and cohesion.

Moreover, this study underscores the necessity for urban policies that recognize and respect the cultural and religious dimensions of urban spaces. Policies should aim not only at economic rejuvenation but also at preserving the social and cultural heritage, enriching urban life in a comprehensive manner [11,12]. The concept of 'living heritage', which advocates for the preservation of both tangible and intangible cultural facets that define urban communities, further supports this approach [13–15]. By integrating living heritage into urban transformation efforts, cities can foster environments that preserve their architectural treasures while enriching the social and cultural fabric, thus ensuring that urban spaces retain their authentic essence and continue to foster a sense of belonging and continuity among their residents.

3. Materials and Methods

3.1. Research Background

3.1.1. Women's Mosques in Chinese Islam

The Small Peach Garden Women's Mosque (小桃園清真女寺), also known as the Shanghai Women's Mosque, is located at the intersection of South Henan Road and East Fuxing Road in Shanghai (see Figure 1). It holds the distinction of being the city's only mosque exclusively for women. The architectural design features a distinctive pink exterior complemented by a green, onion-shaped dome, indicative of its Islamic heritage (see Figure 2). Although the building's dimensions are compact, the meticulously organized interior accommodates prayer and scripture study areas alongside essential living amenities. The emergence of such mosques in the 19th century provided a dedicated space for worship, addressing the exclusion of women from traditionally male prayer spaces.

Figure 1. Small Peach Garden Mosque location. Map source: © Map World (https://map.tianditu.gov.cn/, accessed on 4 May 2024).
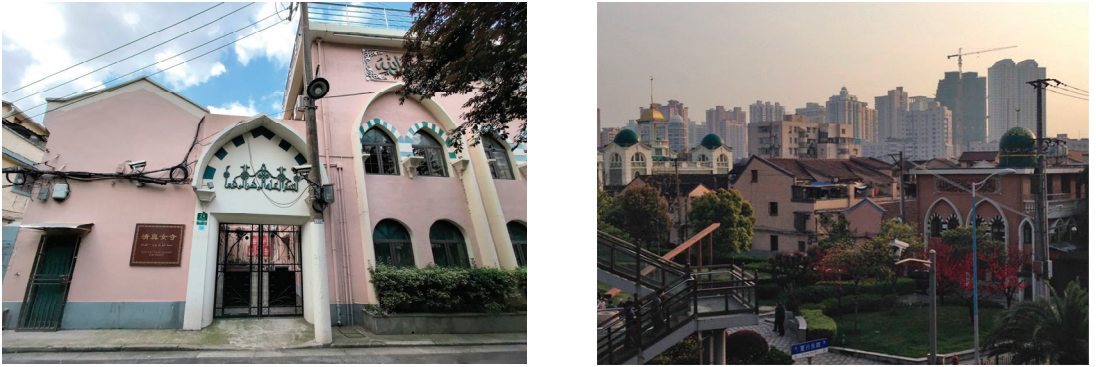
Figure 2. Small Peach Garden Women's Mosque, a mosque in China dedicated exclusively to female worshippers. [Photographed on 4 May 2024]. (Source: the authors).

This mosque, initially founded in 1917 on Xicang Bridge Street (西倉橋街), has navigated historical shifts, including a period of dormancy during the Sino-Japanese War. The school was revived in 1945, and in 1950, it was relocated to its current address due to the expansion of Henan South Road and became known as the Shanghai Women's Mosque. Today, the Shanghai Women's Mosque is an important venue for Shanghai's Muslim women to study, connect with each other and Muslims abroad, and conduct religious activities. It stands as a symbol of Islamic culture in Shanghai.

Figure 2 presents two buildings with green onion-shaped domes, emblematic of Islamic architecture. The white building on the left is the Small Peach Garden Mosque. Adjacent to it, on the right, is the Small Peach Garden Women's Mosque, distinguished by its pink exterior.

Female-oriented Islam in China represents a distinctive adaptation of Islamic traditions, shaped significantly by the nation's cultural and historical context. Globally, women's roles in Islam vary widely, but typically, direct religious leadership in mosques and religious education are male-dominated domains. In contrast, the rise of women's mosques and the pivotal role of female imams in China showcase a unique divergence from these more widespread Islamic practices [16,17].

The origins of this phenomenon are deeply rooted in the Ming Dynasty, an era that marked significant cultural and religious identity development within Chinese Muslim communities. It was during this period that the development of Jingtang education was extended to women, necessitating dedicated spaces for their religious learning. Initially, women's Quranic schools were adjunct to male mosques, comprising a few rooms or a small courtyard segregated from male Muslim activity areas. By the mid to late Qing Dynasty, these schools evolved into full-fledged women's mosques, establishing themselves as exclusive venues for female Muslims, mirroring their male counterparts [17].

Women's mosques serve as spiritual havens where female imams guide Hui minority women in worship and Quranic studies, adhering to the Sunni tradition. In the absence of such mosques, women's participation in religious practices might be confined to domestic spaces or designated areas within male-dominated mosques [18]. Beyond being mere places of worship, women's mosques play an indispensable role in fostering the spiritual well-being of Muslim women. They are instrumental in preserving cultural heritage and ensuring the intergenerational transfer of Islamic teachings, often amidst challenging conditions [16]. Distinct to the Muslim milieu of China, these mosques have become crucial hubs for education and cultural preservation, safeguarding the continuity of Islamic traditions and knowledge within the Hui minority [19,20].

3.1.2. Founding and Cultural Significance of the Small Peach Garden Mosque

Since the opening of Shanghai's port in 1843, the city has been characterized by its large immigrant society and fluid population. Hui Muslims from the areas surrounding Shanghai (Jiangsu Province) started to settle in the city due to the Taiping Rebellion in 1853, initially residing in the northern part of Shanghai's Old City (see Figure 3), which was the original urban core of Shanghai before its modern expansion. Known historically as the Shanghai Old Town, the Old City served as the political, economic, and cultural center for centuries, defined by the boundaries of the Old City walls, which were dismantled in the early 20th century [21]. This area became the earliest Hui Muslim enclave. As the northern part of the city's Hui populace swelled, the Fuyou Road Mosque (also called the North Mosque) built in 1870, struggled to accommodate the growing community [22]. In response, in 1917, a donor named Jin Zi Yun (金子雲, 1869–1937) allocated funds to procure a 2.4-acre garden property, leading to the inception of the Small Peach Garden Mosque, also known as the West Mosque [23].

(**a**)   (**b**)

Figure 3. (**a**) Downtown map of Shanghai County and concession areas (1884). (Source: Virtual Shanghai); (**b**) Locations of two historical mosques within Shanghai's Old City walls, marked by the red outline, which represents the city walls from the late Qing dynasty. Base map: © Map World.

The Small Peach Garden Mosque was a pivotal congregation hub for Chinese Muslims embarking on their Hajj pilgrimage to Mecca via Shanghai. According to a report, between 1923 and 1933, a total of 733 mainland Chinese Muslims departed from Shanghai for the pilgrimage [24]. To facilitate this sea journey for Muslims from inland regions, the mosque was equipped with over 30 rooms capable of housing more than 100 pilgrims. The mosque also provided specialized travel services, including arranging passports and visas, purchasing steamship tickets, and exchanging currency. The founder of the Small Peach Garden Mosque, Jin Zi Yun, negotiated with British shipping companies to charter annual voyages directly from Shanghai to Jeddah, Saudi Arabia, exclusively for Chinese Muslim pilgrims.

The Hui community, as an urban minority, preserved its unique identity and cultural mores through a distinctive urban layout termed the "mosque-block system". This ingenious configuration, with the mosque at its core, functioned as both a spiritual haven and a communal nexus, engendering a tightly knit social structure known as Jamāʿat. This Arabic-derived term, denoting unity and communal assembly, mirrored the Hui's predilection for concentrated, mosque-centered habitats. Hui culture is characterized by a firm social structure with four dimensions: a geographic–residential structure; an economic–occupation structure; a religious–educational structure; and a lineage–marriage (endogamous marriage) structure [25].

The relatively concentrated residential pattern provides favorable conditions for interaction and constitutes a basis for Hui society's significant degree of endogamy. Like many

Han Chinese, many Hui families have their own genealogies, recording their kinship and marital relationships. Endogamy has ensured the continuity of the Islamic faith and cultural inheritance in Hui society. Mutual marriage facilitates the formation of networks between Hui communities and individuals.

In terms of economic and professional structures, the Hui community around the Small Peach Garden Mosque developed thriving businesses such as halal catering and jade and jewelry trading [23]. The area became famous for its beef and mutton street, a culinary hub for authentic halal meat markets and diverse halal eateries.

Within the spheres of religious and educational infrastructure, the mosque stood as the cornerstone of Islamic instruction. Distinguished among the renowned quartet of Islamic scholars of the Republican era, two Imams—Da Pusheng (1874–1965) and Ha Decheng (1888–1943)—upon their return from an international study of Islamic culture in 1938, founded the Shanghai Islamic Normal School at the Small Peach Garden Mosque. They mentored eminent Hui scholars like Ma Jian, spearheading reforms in mosque-based education. This marked the beginning of a transition from traditional mosque-based learning to a contemporary educational framework, though the new system retained the mosque as the foundational setting.

Between 1949 and 1978, China underwent a series of social and political upheavals that profoundly affected religious practice, impacting the Hui Muslim community in Shanghai along with the rest of the country. Starting in the mid-1950s, various campaigns critically questioned religious beliefs, resulting in the shutdown of mosques and scrutiny of religious figures [23]. During the Cultural Revolution, the Small Peach Garden Mosque, including its women's section, was repurposed as residential housing. Additionally, schools for Hui children were established in the vicinity of the mosque, integrating mosque-centered education into the national education system and marking a significant shift from traditional religious teachings to state-regulated schooling.

With the implementation of "reform and opening" policies in 1978, the Small Peach Garden Mosque was reclaimed from residential use. In 1993, the Shanghai Islamic Association made a decisive investment to rebuild on the original site and revive the women's mosque. The construction of the Small Peach Garden Women's Mosque was completed in 1994 and the mosque opened to the public. In anticipation of the 2010 Shanghai World Expo, the Shanghai Islamic Association invested over 1.5 million yuan (approximately USD 219,750, based on the 2010 exchange rate) in a major renovation of the women's mosque. The mosque now features a three-story building with the main prayer hall on the second floor, adorned with exquisite decorations and numerous Arabian architectural elements. Beyond the prayer hall, the mosque houses a study room, reception room, offices, kitchen, and other well-equipped facilities.

In summary, the transformation of the Small Peach Garden Mosque can be categorized into four distinct phases. Figure 4 provides a historical overview of the mosque's 20th-century transformation.

Initial Establishment (1917–1949)	Political Turmoil and Repression (1949–1978)	Reform and Restoration (1978–2000)	Economic and Urban Growth (post–2000)
1917: Initially constructed. **1925**: Rebuilt into the current West Asian-Arabic style mosque.	**1950s**: Political campaigns questioning religious beliefs led to the shutdown of mosques. **1966–1976**: During the Cultural Revolution, repurposed as residential housing.	**1978**: The mosque was restored for religious use. **1990**: The Shanghai government allocated funds for restoration. **1994**: The Shanghai Islamic Association renovated the mosque, opening it to the public.	**2000**: Designated as a cultural heritage site. **2010**: Renovated in preparation for the Shanghai World Expo. **Post–2010**: Large-scale demolition projects began.

Figure 4. Historical overview of the 20th-century transformation of the Small Peach Garden Mosque.

3.2. Research Methods

3.2.1. Semi-Structured Interview for On-Site and Off-Site Groups

This study primarily employed ethnographic fieldwork methodologies, utilizing techniques such as in-depth interviews and participant observation. We conducted ten interviews with relevant governmental officials and engaged in discussions with thirty local residents, herein referred to as "Remaining Residents", which included six Hui Muslims working in the halal food industry in the neighborhood. Crucially, we secured interviews with eighteen Hui Muslim women at the Small Peach Garden Women's Mosque.

We opted for semi-structured interviews for both on-site and off-site groups, balancing flexibility in discussions with a thorough coverage of essential research topics (see Table A1). This approach enabled us to delve into personal experiences, perceptions, and the social dynamics within the Hui Muslim community, yielding rich and detailed data.

Field research was carried out at the Small Peach Garden Women's Mosque from March to June 2023, with a focus on Friday afternoons, a pivotal time for weekly Islamic prayers. Interviews, conducted post consent, typically ranged from 30 min to an hour. Some participants also engaged in follow-up interviews via WeChat video calls. Interviewees were selected randomly on-site, often starting with casual conversations. Additionally, visual data were captured through photography. The demographic information is summarized in Figure A1. The findings from these interviews are referenced as 'M' followed by a sequential number in subsequent sections.

Figure A1 presents the demographics of 18 interviewed women, all of whom are retired. The youngest among them was 50 years old, the retirement age in Shanghai, and the eldest was 79. All of them are Shanghai locals, with their grandfathers, as revealed in Section 3.1, having migrated from Jiangsu Province to Shanghai.

On-site interviews with local residents were conducted using a combination of convenience and snowball sampling methods. Initial participants were approached based on their availability and willingness to participate, after which they were asked to recommend other potential respondents. The interview guide for residents included questions about the neighborhood's appearance in the early 1990s, the impact of urban redevelopment on the Small Peach Garden Mosque's surrounding area, where residents relocated, and their stories during the relocation process. The demographic information for the 30 local resident participants is summarized in Figure A2. The results of these interviews are denoted as R followed by a number in the following sections.

For the off-site interviews with governmental officials, we targeted two specific offices known for their specialization in urban planning, community affairs, and ethnic minority policies. These offices collectively housed ten individuals who were directly involved in areas relevant to our research. We conducted interviews with all ten officials to ensure a comprehensive understanding of the governmental perspective on the issues at hand. These interviews were carried out over the phone to accommodate the officials' schedules while still allowing for in-depth discussions. The semi-structured interview guide for this group covered topics such as policies impacting the Hui community, the effects of urban redevelopment on minority communities, and the government's role in supporting religious and cultural preservation. Additionally, these discussions were designed to complement the narratives provided by residents regarding the changes around the mosque and their personal experiences. The results of these interviews are denoted as O followed by a number in the following sections.

We emphasized ethical considerations by obtaining informed consent from all participants, ensuring they were fully aware of the study's aims and their rights. Rapport building was prioritized by engaging in informal conversations before formal interviews, creating a foundation of trust. Respectful engagement was maintained by allowing participants to guide the conversation, ensuring they felt heard and valued. In anticipation of the diverse cultural backgrounds of our participants, particularly the Hui Muslims, our interview team underwent specialized training in cultural sensitivity and awareness. This training included understanding the cultural norms, religious practices, and language nuances

specific to the Hui Muslim community. Furthermore, to accommodate language preferences and ensure clear communication, we conducted interviews in both Mandarin and Shanghainese, the local dialect spoken by our participants. These measures were essential in creating a respectful and inclusive environment for our interviews, thereby enhancing the credibility and depth of our research approach.

3.2.2. Data Analysis

Interview transcripts were analyzed using thematic analysis, which involved coding the data and identifying recurring themes and patterns related to the study's objectives. The study involved the collation and thematic analysis of field notes, photographs, and transcribed interviews—in total, nearly 50,000 words of field and ethnographic data. Additionally, relevant historical documents and policy papers were reviewed to enrich the research context.

The structure of interviews with local residents and governmental officials is presented in Section 4.1 "Urban Transformation in Shanghai's Old City Area" and Section 4.2 "Urbanization and Its Impact on the Religious Landscape", while the findings from interviews with Muslim women are presented in Section 4.3 "Women's Mosque as a Retirement Home".

4. Results

4.1. Urban Transformation in Shanghai's Old City Area

Entering the 21st century, China experienced a profound urban metamorphosis driven by market-oriented reforms. Shanghai, in particular, saw its urban landscape rapidly transformed, fueled by economic growth that sped up the city's development [26,27]. The Small Peach Garden Mosque, nestled near the bustling Yuyuan area, found itself in a locale ripe for commercial exploitation due to soaring property values. The Old City, known for its historical and cultural landmarks, became a magnet for developers eager to capitalize on its scarce land and rich cultural backdrop, building a series of high-rise luxury developments that marketed the Old City's cultural depth and central location as prime features.

Originally, the neighborhood around the Small Peach Garden Mosque was dominated by lower-income households, with halal food businesses operating on slim margins. As property values and rents increased, many of these establishments could no longer sustain operations. The younger Hui Muslim population was compelled to relocate their businesses to areas with more affordable rent, often moving to the suburbs (R9, 6 March 2023). Locals recall numerous long-standing halal restaurants such as the "Qingzhen Yongfeng" on Jia'an Road, which, despite the popularity of its dishes such as curry beef noodles that catered to the tastes of Muslims and non-Muslims alike, succumbed to rising rents and closed around 2012 (R1, 6 March 2023). As of 2023, in the vicinity of the mosque, only two halal restaurants persist (Figure 5). These establishments have expanded into substantial catering operations, now part of state-owned enterprises.

As redevelopment intensified, many Hui Muslims residing in the traditional Shikumen houses[1] faced relocation. The area beside the Fuyou Road Mosque was one of the first plots in the Huangpu District earmarked for such development starting in 2004, and as of 2023, the mosque is entirely encircled by new commercial housing. Residents of the Small Peach Garden Mosque area were designated for relocation early in this process, but not all have moved yet. Cramped and outdated housing, surrounded by new, upscale residences and historic buildings, offers no employment opportunities, so younger adults have mostly moved away for work and other reasons, leaving mostly older adults behind (O4, 2 June 2023).

As depicted in Figure 6, the Small Peach Garden Mosque is centrally located in Shanghai's Old City, in close proximity to the Bund. It is ensconced within the city's elite residential districts and bustling commercial hubs. The area labeled as "site" on the map represents a residential zone that, in 2023, became another high-value property newly auctioned off.

Figure 5. The two remaining restaurants in the vicinity of the Small Peach Garden Mosque (a mosque located within a historically lower-income neighborhood in Shanghai, known for its Hui Muslim community). [Photographed on 4 May 2024]. (Source: the authors).

Figure 6. Schematic map of the Old City area in Shanghai, as published on the Shanghai government's website. (Source: Huangpu District Government website). Reproduced with permission.

As Figure 7 shows, the mosque is situated between two clusters of towering high-rise buildings, signifying just the beginning of a broader relocation and redevelopment process for the surrounding plots (Shanghai Huangpu District People's Government 2021).

While Hui Muslims harbor a deep nostalgia for their traditional neighborhoods, they generally accept the inevitability of urban development. Although they prefer to maintain their communal living, direct negotiations with developers typically focus on compensation rather than ethnic considerations (O5, 2 June 2023). The most pressing questions from the Hui residents concern the availability of relocation benefits. The once-vibrant mosque-

block social structure around the Small Peach Garden has largely disintegrated in the face of these changes.

Figure 7. Old City Quarter area planning map displayed on the Shanghai Government website, 2021. This expanded effect model map illustrates the government's redevelopment plans for Shanghai's Old City. Red area: high-rise buildings; yellow area: relocated/demolished traditional alleyways. (Source: Shanghai Municipal Planning and Natural Resources Bureau). Reproduced with permission.

4.2. Urbanization and Its Impact on the Religious Landscape

The diminishment of the Small Peach Garden Mosque's position as the center of a cultural and religious community reflects a significant shift. With the advancement of urbanization across China, the floating population of Hui Muslims coming to Shanghai for business, education, and marriage has been increasing. In 2019, approximately 10,000 individuals, including Hui, Salar, and Dongxiang Muslims, moved with their relatives from Qinghai Province to Shanghai to operate halal noodle restaurants offering Northwestern flavors [28]. Many of them have chosen to settle in the suburbs of Shanghai due to various factors such as location, affordable rent, and reliance on relatives and friends, opening or working for halal businesses in these areas (R11, 20, 6 March 2023). These migrants who settle in the suburbs generally prefer to perform their religious rites, primarily the Friday Jumu'ah prayer, at the Huxi Mosque or the Pudong Mosque because the Small Peach Garden and Fuyou Road Mosques outside of the city center are too far away. Our survey indicates that in recent years, the total number of worshippers at the Fuyou Road Mosque, Small Peach Garden Mosque, and the Mosque for Women in the city center combined is less than half of that at the Pudong Mosque.[2]

As discussed in Section 3, the Fuyou Road Mosque and Small Peach Garden Mosque were among the first mosques to be established in the Old City of Shanghai after the modern opening of the port and have long been considered the undisputed center of Shang-

hai's Muslim community. However, their status has now become more symbolic, largely attracting visits from foreign Muslims (O8, 11 June 2023).

4.3. Women's Mosque as a Retirement Home

The neighborhood surrounding the Small Peach Garden Mosque for Women is predominantly inhabited by retired older adults, including a portion of the Hui Muslim community. As urban redevelopment policies take effect, some Hui Muslims, particularly women accustomed to city center life, choose to return to the Small Peach Garden Mosque for Women post retirement to live amongst their fellow worshippers, treating it as a sanctuary for their twilight years. They commonly report that relocating to the suburbs makes attending mosque services challenging, as the round trip can take up to four hours—a daunting task for individuals of their age. Interviewee M18 (12 May 2023) expressed the sentiment shared by many in the community: "For us Muslims, being close to a mosque is ideal. Living near a mosque is not just a matter of convenience but a crucial aspect of our daily lives, enabling easy access to prayer and halal provisions. Regrettably, the rising costs of new apartments in this vicinity are prohibitive, pushing us to consider relocating further away from the mosque".

Living near the mosque allows them to better enjoy the sense of belonging central to their Islamic faith, and with the forced move of much of the local Muslim community to the suburbs, the mosque has gradually become not just a place of congregation but also their dwelling place. They take pride in this adaptation, seeing it as a continuation of the historical establishment of women's mosques, where community members would contribute household items, gradually enriching the mosque's resources. Within the mosque, they study the Quran and practice the five pillars of Islam, discuss upcoming religious events or daily news, and, like other older adults, talk about family and children. The challenge of accessing halal food makes the mosque's kitchen facilities especially appealing, influencing their decision to convert the mosque into a retirement home. Additionally, the Small Peach Garden Mosque, being a hallmark of Islamic culture in Shanghai, regularly receives attention, funding, and maintenance from city and district officials, offering a certain level of economic security to its residents.

The area surrounding Small Peach Garden Mosque is predominantly composed of residential buildings in the Shikumen style, constructed in the 1920s and 1930s (see Figure 8). As mentioned earlier, these buildings have been included in the urban redevelopment plans, and it is only a matter of time before the residents are relocated.

Figure 8. Shikumen buildings adjacent to women's mosque, awaiting demolition, with most residents already moved out [photographed on 4 May 2024]. (Source: the authors).

Over time, the congregation at the Small Peach Garden Mosque for Women has become predominantly local Shanghai women, many of whom previously resided near Small Peach Garden Street, with younger women less frequently seen. M8 (12 May 2023), whose father was an Imam, was immersed in Islamic teachings from a young age. M1 (12 May 2023), a Hajji who proudly completed her pilgrimage to Mecca in 2016 at her own expense, commands respect among her peers for achieving this significant religious milestone. When asked about their children's participation in religious life, M1 expressed a desire for her children to simply acknowledge their Islamic faith and adhere to basic practices, such as dietary habits. M1 mentioned that more than half of her children and their spouses are not Muslim. This reflects broader trends within the Hui community since 1949, characterized by a decline in Islamic practices, partly due to diminished religious education and changes in traditional lifestyles. As a result, intermarriages between Hui individuals and those from outside the Hui community have increased. Furthermore, it is not uncommon for the offspring of these intermarriages to continue this trend by also marrying individuals who are not from the Hui community [29]. M1 has chosen to reside in the women's mosque, valuing a community that upholds shared religious beliefs and provides opportunities for spiritual engagement.

As an increasing number of young Hui Muslims move away for work or education, the percentage of older adult Muslims living alone is on the rise, particularly among women, who generally outlive men. For these older widowed women, the primary challenge lies in enriching their spiritual lives. M11 (26 May 2023) shared her experience, noting that her husband had traditional views, believing that Islamic law discourages gatherings of women for conversation lest they lead to domestic discord. She understood his concerns. However, since her husband's passing, she has found solace in joining other female worshippers at the women's mosque to chat about daily life, without causing any disruption to family harmony. Another interviewee, M2 (12 May 2023), remarked that although many in the Hui community believe that gatherings of women could lead to gossip and trouble, for the older women, such gatherings offer comfort and camaraderie without these issues. All of the them were capable of living independently and thus focused on the need for spiritual and religious fulfillment in their lives. They frequently mentioned facing numerous challenges when considering moving into retirement homes, including issues related to Muslim culture and dietary habits.

The research findings presented in this section illuminate the profound transformations occurring in the neighborhood surrounding the Small Peach Garden Women's Mosque, primarily driven by urban transformation efforts. The escalation of property values, coupled with the consequent rise in rental costs, has compelled Muslim catering establishments in the vicinity to migrate to more financially viable locations in the suburbs. This exodus marks a pivotal shift in both the demographic composition and the cultural fabric of the area. Moreover, the ongoing urban redevelopment initiatives loom as a constant threat, portending additional demolitions in proximity to the mosque. Within the context of Shanghai's expansive urban landscape, elderly Muslim women face a particular quandary. The imperative of living close to the mosque for communal and religious reasons clashes with the financial impracticality of affording the escalating housing costs in the area. Faced with this dilemma, these women have made a decision to relocate to the Small Peach Garden Women's Mosque, effectively transforming it into a residence for their retirement years.

5. Discussion

5.1. Advocating for the Living Heritage of Urban Spaces

The economic reforms initiated in the late 1990s have spurred urban economic growth, leading to widespread urban transformation efforts [30,31], including the restoration of religious sites affected during the Cultural Revolution. However, the impact of the reforms, the market economy, and globalization has posed new challenges to religious and cultural traditions. The large-scale urban redevelopment of the old areas has reduced the size and

fragmented the historic spaces. In the process of urban reconstruction and demolition in Shanghai, geographical communities that have been the backbone of Hui ethnic traditions for a century have nearly vanished. The once-thriving mosque-block social structures have largely disintegrated in urban China. The crucial question remains: how can urban Hui communities build their social networks, preserve their culture, and maintain their identity under these new circumstances? This paper presents a rather somber view of the outcome.

As the Shanghai municipal government has emphasized the preservation of historical ambiance via projects such as the restoration of early Shikumen architecture alongside the construction of high-rise residences [32], the academic community has extensively studied the conservation of historic buildings in Shanghai's Old City [26,33,34]. The successful restoration of the Small Peach Garden Mosque stands out as a noteworthy case [35], symbolizing not just the preservation of an ethnic and cultural identity but also the embodiment of Shanghai's historical and cultural essence. However, the fragmentation of residential areas, following the disappearance of the overlapping centers of population, economy, and religion within the Hui enclaves, ultimately led to the erosion of the Hui community's historical and cultural heritage. The disconnection between physical conservation efforts and the vibrant community life that these structures once supported highlights a crucial aspect of cultural heritage that remains unaddressed. This scenario underscores the imperative of "living heritage", a concept that advocates for the holistic preservation of not just architectural forms but the intangible cultural aspects they represent, including social practices, traditional customs, religious observances, and communal vitality [13–15]. Hence, protecting urban heritage requires a comprehensive strategy that safeguards architectural landmarks while simultaneously nurturing the social and cultural tapestry that bestows these places with their true essence and vibrancy.

5.2. Adaptive Reuse of Religious Spaces

Religious heritage sites like monasteries and mosques are central to local communities, shaping the urban landscape. These sites are not only venues for religious practices but also emblematic of cultural identity and social unity. Nonetheless, secularization trends and demographic changes are leading many such sites, including churches and monasteries, to lose their original roles [36].

The adaptive reuse of these heritage sites is gaining recognition as a key component of sustainable urban development. This approach helps in preserving cultural and historical values while also driving local and regional economic growth. Repurposing these sites can bolster local traditions and culture, provide distinctive tourist experiences, and stimulate urban transformation and community engagement. Additionally, the renovation of old buildings is environmentally beneficial, as it reduces the need for new materials [37].

Globally, the creative repurposing of religious spaces is becoming a popular solution to meet the changing needs of urban communities, highlighting the importance of innovative urban planning and community development strategies that respect and integrate diverse religious and cultural traditions into the urban tapestry. For instance, in Europe, decommissioned churches have found new life as cultural centers, libraries, and even hotels, maintaining their historical and architectural essence while fulfilling new community roles [38]. Similarly, the transformation of a monastery into a university campus not only preserved a historical site but also rejuvenated a city area by attracting students [39]. However, studies on mosques' adaptive reuse are scarce, making this article's case study a novel contribution.

Previous research has pointed out financial hurdles in the adaptive reuse of cultural heritage [40]. In our example, the transformation of a mosque into a retirement home in one of Shanghai's upscale neighborhoods, where land values are high, benefits from substantial local government funding. This financial backing ensures steady support for the women's mosque, enabling the procurement of essential resources and upkeep of the facility.

5.3. Faith-Based Elderly Care in Megacities

Recent expansions in research on faith-based elderly services underscore the pivotal role of faith and religious communities in supporting the elderly. Investigations have delved into how faith-based principles intertwine with elderly care services, meeting the spiritual and emotional needs of aging populations [41]. Such studies highlight the holistic benefits of weaving faith into care practices, noting improvements in the mental, physical, and spiritual well-being of the elderly [42,43]. Additionally, research emphasizes the critical role of faith communities in offering social support, companionship, and a sense of belonging to older adults, vital for mitigating loneliness and isolation [44].

The redevelopment of urban ethnic enclaves can significantly impact older residents. Such changes can disrupt their social networks and cultural practices, potentially leading to feelings of isolation and a loss of identity. For Muslims, who view Islam not just as a religion but as a way of life, older adult care presents a multifaceted challenge. It is crucial for care plans and services to incorporate considerations of faith to ensure they effectively meet the needs of devout Muslims [45,46].

In large cities, elderly Muslim women commonly face health issues, the absence of nearby family, and widowhood, with neither family-based care nor community services meeting their spiritual needs. As traditional family structures evolve and the younger generation moves away, both geographically and in terms of lifestyle choices, older individuals, especially women, may find solace and companionship among their peers within religious communities. The women's mosque provides more than just caregiving; it offers diets and daily routines that align with the residents' religious and personal needs, enhancing their overall well-being. As a communal and spiritual refuge, the mosque is invaluable in later life, providing a space where daily rituals and shared cultural and religious identities foster a sense of belonging and purpose. This role of the mosque for Muslim women highlights broader issues related to urban development and the provision of adequate facilities for older adults, particularly among religious minorities. This case study underscores the necessity of providing essential emotional support to older adults, a crucial societal goal for ensuring a fulfilling retirement life. Specifically, older Muslim adults have unique needs that demand a specialized approach to their care.

In conclusion, the transformation of the Small Peach Garden Women's Mosque into a retirement space is a proactive response to urban development challenges, providing essential emotional, spiritual, and cultural support to meet the distinct needs of older Muslim women in Shanghai.

6. Conclusions

This study delves into the adaptive reuse of religious sites amidst urban change, spotlighting the transformation of the Small Peach Garden Women's Mosque into a retirement home as a testament to resilience in the face of change. It argues for policies that recognize and bolster the unique cultural and social weave of Muslim neighborhoods in Shanghai, underlining the vital importance of preserving communal life alongside architectural heritage. Our findings illuminate the complex interplay between urban development, religious sites, and demographic shifts, advocating for inclusive urban planning that respects diverse cultural and religious identities.

The paper contends that the Small Peach Garden Mosque's case study stands as a significant example, showcasing the distinctive structural features of Muslim communities, traditionally centered around mosques. This cohesive framework is rendered susceptible to urban development pressures, jeopardizing the community's spatial and social coherence. The mosque's metamorphosis not only holds emblematic value but also echoes a broader challenge that Muslim communities face in urban landscapes amid modernization and urban sprawl.

In summary, the urban transformation unfolding in Shanghai's Muslim quarters, particularly around the Small Peach Garden Mosque, epitomizes the intricate nexus of urban growth, religious observance, and community resilience. The initiative by elderly Muslim women to repurpose the mosque into a retirement facility highlights the pressing demand for culturally sensitive elder care solutions in fast-urbanizing environments. This case underlines the critical need to preserve community spaces that cater to both spiritual and social needs, offering insights into broader strategies for tackling the challenges that aging populations with religious ties encounter in urban contexts.

Author Contributions: Conceptualization, X.L. (Xunqian Liu); methodology, Y.Y.; data curation, X.L. (Xiaoqing Liu); writing—original draft preparation, Y.Y.; writing—review and editing, X.L. (Xunqian Liu). All authors have read and agreed to the published version of the manuscript.

Institutional Review Board Statement: This study adhered to the ethical guidelines of the Human Science and Technology Ethics Review Committee of SJTU, ensuring informed consent and confidentiality of all participants.

Data Availability Statement: The original contributions presented in the study are included in the article, and further inquiries can be directed to the corresponding authors.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A

Table A1. Key Interview Questions for Muslim Women.

Background and Personal Experience	Can you share a bit about your life before moving to the Small Peach Garden Women's Mosque?
	What prompted your decision to live at the mosque rather than relocating to the suburbs or a different area?
Community and Religious Practices	Can you describe a typical day at the Small Peach Garden Women's Mosque?
	How do you and the other women contribute to the mosque's community and its upkeep?
	In what ways do you engage with Islamic teachings and practices here at the mosque?
Challenges and Adaptations	How has your daily routine and lifestyle changed since moving into the mosque?
	What are some of the biggest challenges you've faced since moving into the mosque?
	How do your family members, especially your children, relate to your decision to live at the mosque?
Emotional and Spiritual Fulfillment	In what ways does the community here at the mosque provide support and companionship, especially for those who might be widowed or living alone?
	How does living at the mosque influence your emotional and spiritual well-being?
Perspectives on Women's Gatherings and Social Interaction	What is your opinion on the belief that gatherings of women might lead to gossip and potential discord, as mentioned by some in the Hui community?
	How do you perceive the role and significance of women's mosques in the context of the Hui Muslim community and broader Islamic practices?
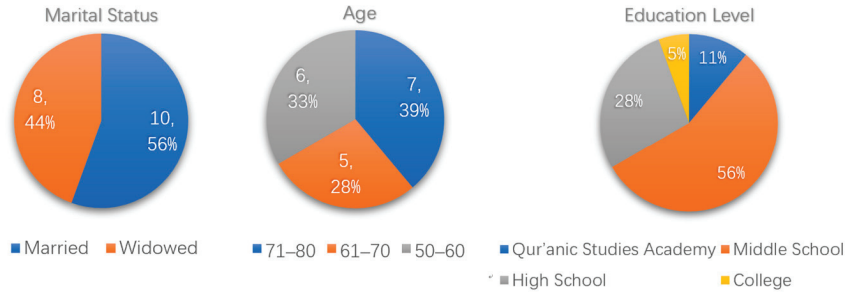
Figure A1. Demographics of Muslim women participants (N = 18).
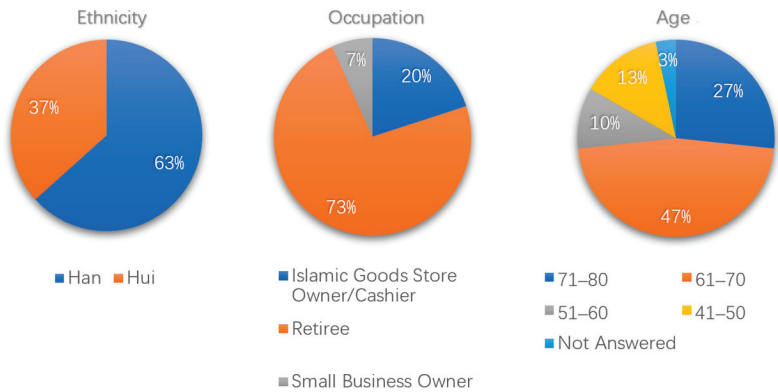
Figure A2. Demographics of local resident participants (N = 30).

Notes

1   Shikumen architecture is a traditional style of housing in Shanghai, characterized by its high brick walls and narrow alleys. Shikumen houses are typically two or three stories tall, with the front door leading to a small courtyard, then to the main living area. Originating in the late 19th century, this architectural style represents a cultural fusion that arose from the urban conditions of Shanghai during that period and has become an iconic symbol of the city's historical urban fabric.

2   In our study, we observed that temporary prayer spaces are often set up in the attics of suburban noodle shops, with banners inscribed with "Jamāʿat" hanging above, indicating a religious community centered around a mosque. Despite the rapid urban development that has disrupted the traditional mosque-centered living patterns, the concept of community life revolving around mosques remains deeply ingrained among Hui Muslims from the northwest. Even in the face of significant changes brought about by urban redevelopment, any space that can host the Jumu'ah prayer, no matter how modest, is regarded by the Muslim community as a spiritual sanctuary. This phenomenon undoubtedly presents a new topic for discussion.

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Article

Urban Transformation after a Scandal: Preserving Social Values in Late Medieval Dubrovnik

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Abstract: This research reveals the original medieval forms of the Convent of Poor Clares while contextualising the spatial interventions after the scandalous year 1433 that led to the urban transformation of the broader neighbourhood. The research methodology addressed historical visual sources analysed in the context of the information provided by archival documents, starting with the *Ordo* from 1433 and including all the City Councils' deliberations until 1450. Linking these two sets of information resulted in the schematic and hypothetical visualisation of the disposition of the convent's medieval buildings and the identification of all the changes in neighbouring public and private buildings and spaces implemented to achieve the perfect *clausura* inside the densely built urban fabric. Along with the prison sentence to be served inside this very convent, the nobility of the Republic of Dubrovnik ensured that the social values were preserved for the future.

Keywords: urban transformation; archival sources; visual sources; hypothetical reconstruction; medieval urban life; social values; Dubrovnik; Convent of Poor Clares

1. Introduction

In autumn 1433, a scandal broke in the city of Dubrovnik when it was discovered that a priest and a Clarissan nun had eloped. The reactions from the relevant authorities differed: the archbishop, as the foremost responsible instance, left it to the city government to deal with the problem, which resulted in dozens of recorded City Councils' deliberations and the issuing of orders regarding the scandalous event. The government was consternated not only because it involved two persons who had promised to consecrate their lives to spirituality but even more so because the two lovers belonged to different social classes; the priest was a commoner, while the nun was the daughter of a prominent noble family. To understand the extent of the scandal and the decisions implemented to prevent similar events in the future, it is necessary to comprehend the society of late medieval Dubrovnik and its values.

The aristocratic Republic of Dubrovnik, which included the city and its surroundings, was governed by its urban nobility. The formation and segregation process of this social class ended in 1332 with the closure of the Major Council that defined the list of noble kindreds for the following centuries [1–3]. The male members of these kindreds would automatically become members of the Major Council when they reached legal age. From the pool of the Major Council's members, the holders of other offices were elected, the most important being the Minor Council and the Senate members. The role of the Major Council was to pass laws; the Minor Council acted as an executive body, whereas the Senate had an advisory role and decided on the most sensitive issues. The structure of the governing bodies remained stable and unchanged until the end of the Republic in 1808 [4,5].

The members of the nobility were constricted to endogamy, with both parents needing to belong to noble kindreds for their offspring to be considered noble, that is, for their sons to be accepted to the Major Council [6,7]. It has to be underlined that other Dalmatian cities

also featured similar laws regarding inter-class marriages; however, Dubrovnik was stringent in enforcing territorial endogamy, which restricted the choice of a marital partner to families from the same city. Although it was theoretically allowed to marry a noblewoman or a nobleman from another Dalmatian city or Venice, it was not a common practice since it was in the public interest to keep family ties and wealth within the Republic. Unmarried daughters for whom the families could not provide a suitable dowry spent their lives as nuns in one of the eight city convents [8]. Some convents admitted only noblewomen and were so densely populated that the city authorities instructed the abbesses to stop admitting foreign nuns in 1379 and 1415 (for Poor Clares) and 1422 (for all nunneries) [6,9]. Gradually taking over the management of the admissions to the Clarissan convent, the noblemen sought to provide a secure and socially convenient life for their daughters while keeping the property intact. Therefore, the scandal of a young *noble* nun eloping with a *commoner* priest jolted the fundamental value of the Republic—its radically strict social order. This order supported the preservation of wealth and power within the nobility, which it used to secure the freedom of this small aristocratic Republic (that lasted until the time of Napoleon) and ensure the well-being of its citizens [3–5,10–15].

Following a series of discussions in the Senate on the incarceration of the protagonists of the elopement, the priest Antonius Vučićijević and the nun Pervula, daughter of *Ser* Nicola de Tudisio, on 22 October 1433, the Senate passed the deliberation on the Poor Clares' convent—*Ordo monasterii poncellarum Sancte Clare Ragusii* [16]. Unlike its usual deliberations, which are relatively short and consist of several lines, this one extends to three pages, listing in detail all the construction works that must be implemented to achieve the perfect *clausura*. Since the works regarded different spaces of the nunnery, this source allows a partial identification of the disposition of the medieval convent buildings. Scilicet, the medieval Clarissan complex, was severely damaged in the catastrophic 1667 earthquake. Afterwards, it was reconstructed and again radically rebuilt in the nineteenth century (when it was repurposed as military quarters). So far, no studies have been conducted on the original medieval forms lost during iterative rebuildings.

The convent was established in the late thirteenth century, adjacent to the city walls and close to its western gate, along the main street called Stradun (*Platea* in the archival sources) (Figure 1), and beside the first church of the civic patron, St Blaise [17,18]. After the construction of the new church dedicated to the holy patron in a more prominent location during the second half of the fourteenth century, the convent's church became known as St Clare [17–19]. The convent was abolished only at the end of the Republic [17–20], and the complex has been hosting various institutions since. The architecture of the conventual complex, as preserved after the consequent rebuildings, is typical of the Mendicant Orders (Figures 2–4). The church, which dates back to around 1300, from the earliest phase of the convent, is a sizeable single-nave space with a rectangular apse and open timberwork. A square cloister from the post-earthquake reconstruction is located south of the church, featuring arcades on the ground floor and single upper storeys pierced with windows. Instead of a closed upper storey, the north wing, which is adjacent to the church, has another arcaded porch on the first floor. The Late-Renaissance form of the Ionic capitals of the upper arcade suggests that this porch dates back to the period preceding the 1667 earthquake. The west wing protrudes between the church and the city walls, almost reaching the city gate. The east wing is joined by a city block comprising several tiny houses in a row.

Figure 1. The location of the Convent of Poor Clares in Dubrovnik (Google Earth).
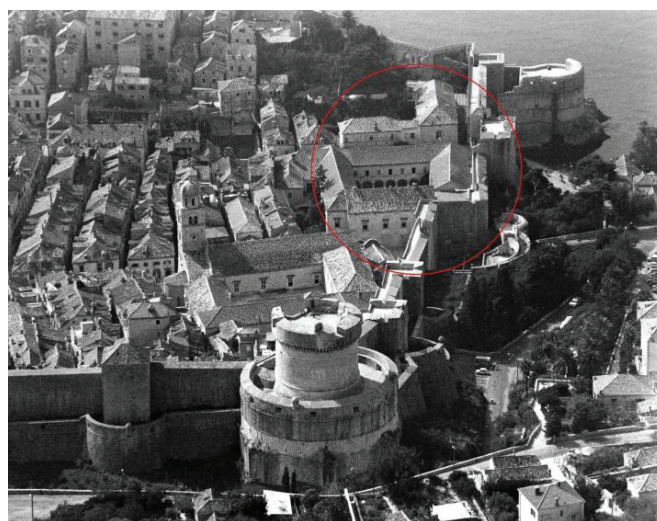
Figure 2. The complex of the former Convent of Poor Clares, view from the north (IPU-2N-08613).

Figure 3. Puncijela Tower, city walls, and barbicans, view from the west (IPU-2N-09795).
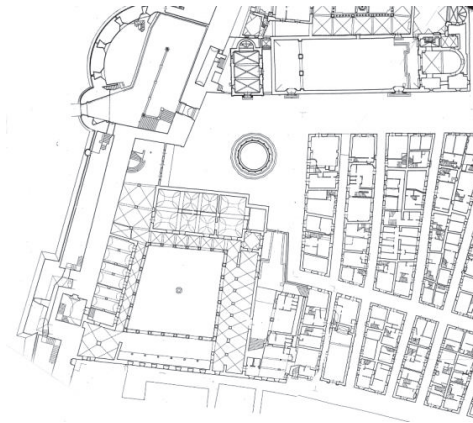
Figure 4. The complex of the former Convent of Saint Clares, details of the architectural drawing of the ground floor of Dubrovnik (IPU, 1970).

2. Sources and Methods

The present research aims to reveal the convent's original medieval forms and contextualise the spatial interventions after the scandalous year 1433 that led to the urban transformation of the broader neighbourhood. The research methodology first addressed historical visual sources: crucial information was gathered from two maps, the Habsburg Cadastral Map from 1837 (from the State Archives in Split, Croatia) [21] (Figure 5) and the map compiled at the beginning of the seventeenth century (from the State Archives in Turin, Italy) [22] (Figure 6), and then from a *veduta* (cityscape) depicting the city before the 1667 earthquake kept in the Society of Friends of Dubrovnik Antiquities (Figures 7 and 8) (its copy held in the Franciscan friary is better preserved but less accurate) [23,24]. Additionally, a design drawing from 1532/1533 depicting the eastern façade of the convent and its church was consulted [25]. Photographs dating from c. 1900 (published as postcards) are valuable sources for the spaces that connected the nunnery to the public space [26] (Figure 9). These visual sources were analysed in the context of the information provided by the archival documents, starting with the *Ordo* from 1433 and including all the City Councils' deliberations until 1450. The spaces recorded in these documents were linked to

those depicted in visual sources to define the form of the medieval convent and to discern the spatial transformation that took place in the decade following the scandal. The same methodology was applied to the surrounding public space and private residential buildings.

Figure 5. The complex of the former Convent of Saint Clares, details of the Habsburg Cadastral Map of Dubrovnik from 1837 (State Archives in Split). Its buildings were used for military purposes, and they are marked as "Arsenale" on the map.
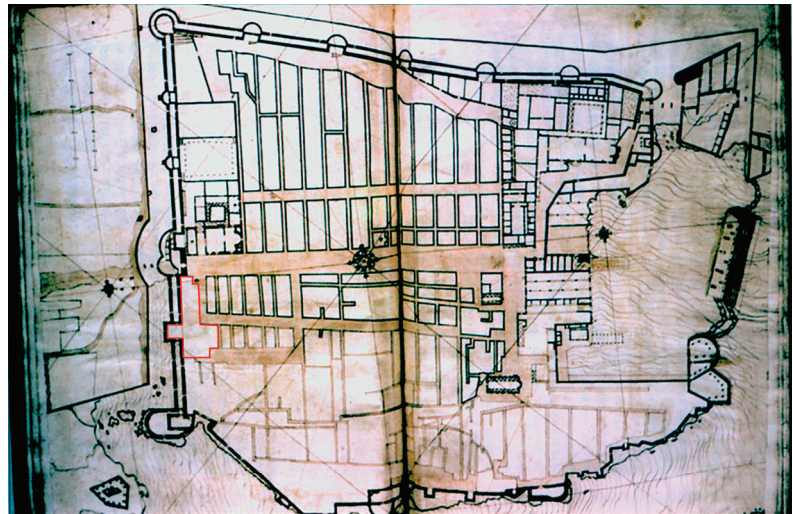
Figure 6. Dubrovnik at the beginning of the 16th century and the block with the Convent of Poor Clares [22], Principe 1991.

All other historical visual sources were also reviewed but not utilised because of their unreliability. Local historiographical texts, travelogues, and praises of the city also did not provide detailed descriptions of the convent, undoubtedly due to the authors' forbidden access to the *clausura*. The only known textual sources that reveal detailed information about the layout of the spaces inside the convent date to the first half of the fifteenth century: the City Councils' deliberations, beginning with the *Ordo*. No similar archival source has been found or published to reveal the other changes during the convent's long history.

Figure 7. The Convent of Poor Clares in the cityscape of Dubrovnik before the Great Earthquake in 1667, Society of Friends of Dubrovnik Antiquities (IPU-F-27843_PM).
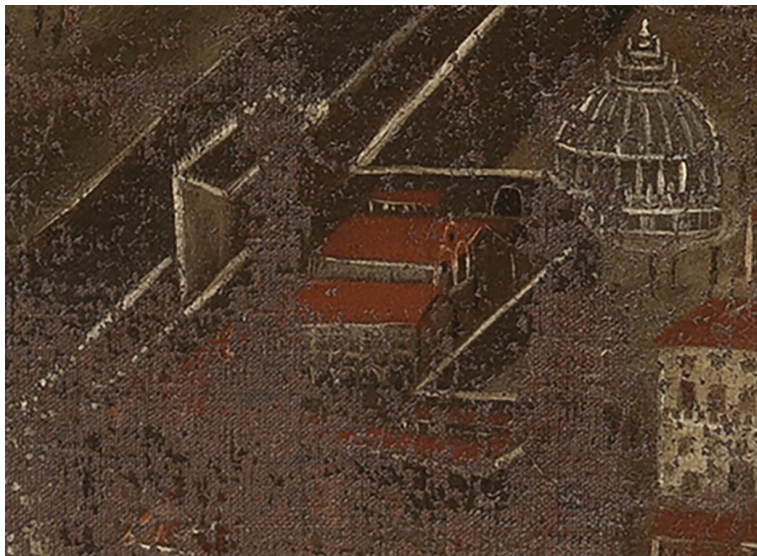
Figure 8. The Convent of Poor Clares in the cityscape of Dubrovnik before the Great Earthquake in 1667, Society of Friends of Dubrovnik Antiquities, detail (IPU-F-27843_PM).

The uniqueness of the *Ordo* and related deliberations is due to the scandal that the government had to deal with. Late medieval archival documents in Dubrovnik were always produced to record changes. In the given period, the Councils also demanded changes in other city convents. Those were, however, minor interventions in specific parts of the complexes, not providing enough detail to reconstruct these convents' layouts [9]. The immensity of the scandal in the Poor Clares' convent provoked numerous changes recorded in the *Ordo* in detail, providing crucial information for this article. So far, no similar research has been conducted on the convent's layout after the fifteenth century.

Figure 9. The Great Fountain and the wall with the entrance to the Convent of Poor Clares, postcard, around 1900s.

3. Results

This research resulted in a map that provides a schematic and hypothetical visualisation of the Convent of Poor Clares' layout around the mid-fifteenth century and the location of all the neighbouring buildings and spaces subjected to the transformation (Figure 10). The spatial interventions that included changes to the ecclesiastical, public, and private buildings and spaces are contextualised within the social values of the late medieval Republic of Dubrovnik, providing a comprehension of the governmental, i.e., City Councils', mechanisms used to preserve social order by regulating the urban fabric.
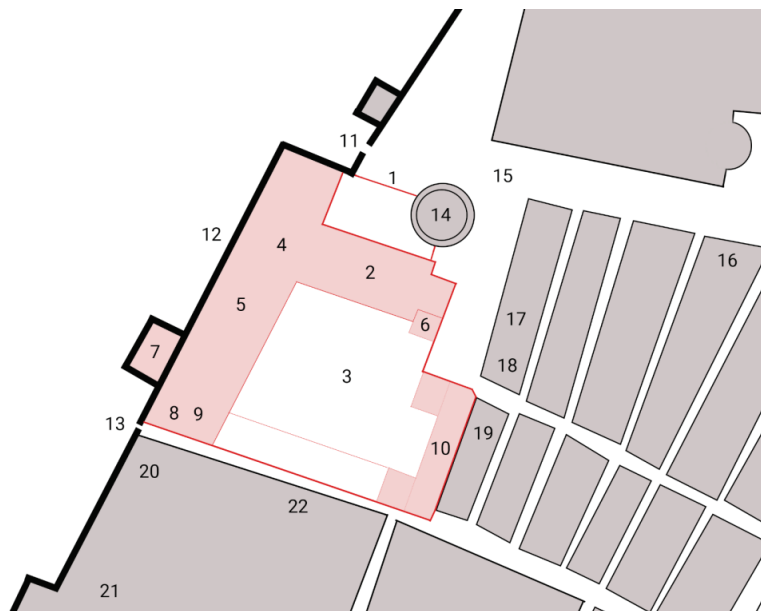
Figure 10. A schematic and hypothetical reconstruction of the Convent of Poor Clares around 1450, after the urban transformation, and the location of other buildings and spaces mentioned in the text

(the authors' drawing): 1, entrance; 2, church; 3, courtyard; 4, chapel (with a parlatory); 5, dormitory; 6, sacristy (with a parlatory); 7, Puncijela Tower (with the kitchen and toilet on the ground floor); 8, infirmary (upper floor); 9, cellar (ground floor); 10, side rooms (with servants' dwellings and the prison); 11, western city gate—Pile Gate; 12, city walls; 13, small city gate; 14, Great Fountain; 15, Stradun (the main street); 16, public orphanages (from 1432); 17, 18, 19, Houses of Radivoi Chatario and noble families de Sorgo and de Bona; 20, hospital; 21, Convent of Saint Andrew; 22, House of Radan Thollolovich.

4. Discussion

4.1. Visual Sources and the Convent in the First Half of the Seventeenth Century

The Cadastral map compiled in 1837 (Figure 5) illustrates the perimeter of the convent that resembles the contemporary one described above: the west wing protrudes almost to the city gate, and the east wing is joined to the city block by a tiny building, closing the street between them at its southern end.

In the scholarly literature, this unusual junction was ascribed to the intervention of the Austrian government in the early nineteenth century [27]. This opinion was based on the fact that, after the Great Earthquake, the city was rebuilt following its medieval layout, as had been defined by the Statute, i.e., the compilation of the municipal laws, composed in 1272, with novelties added in 1296 [27–31]. The Statute regulated the placement and width of existing and future streets and, accordingly, the perimeter and size of the blocks. The City Councils had protected open public spaces for centuries, thus protecting the urban layout. Therefore, it is plausible that the closure of the public street, followed by the construction of the building on the site, was possible only after the fall of the Republic. However, the "Turin map" [22] (Figure 6), discovered thirty-three years after Beritić published his study, attests that the convent and the block were already joined. Therefore, it can be concluded that the street was created after the Great Earthquake when the convent was rebuilt, and its size was reduced.

However, this raises the question of the interpretation of the map from Turin: What was the reason for such a junction of a city block with the convent, and when did it occur? The year 1296, when the regulations on the part of the city east of the convent were passed, should be considered a *terminus post quem non*. The regulations defined the urban raster, prescribing the number, placement, and width of streets and blocks, which remain unaltered today. The reason for joining the block must have been passed before 1296 and followed the decision from 1290 to trust the Poor Clarissan nuns with raising the orphans [6,32]. The nuns were entrusted with the duty until 1432, when the public orphanage (*domus misericordiae*) was established just a few blocks away [33–35]. Having rooms for the orphans in the east wing, separate from the rest of the convent, must have been a pragmatic decision. After the orphanage was relocated, the dwellings must have remained on the convent's property due to tradition, possession rights, and the need for space in the well-populated nunnery.

Unfortunately, while the "Turin map" offers details of significant public buildings, such as the cathedral and the patron's church, and the Mendicant friaries, the nunneries—including the Poor Clares'—are depicted only by their perimeters. It seems that the map remained un-finished since the blocks in the southern part of the city are bordered with pale lines, unlike the others, whose perimeters and details are depicted with black lines. However, even if the map had been finished, the question would remain as to what its purpose and sources were and whether the map makers were provided with information on the nunneries.

The drawing from 1532/1533 provides the outline design of the church of St Roch, which was planned to be built east of the convent [25]. Eventually, the church was erected elsewhere, but the drawing offers a street view of the eastern façade of the convent and its church. The rectangular apse had simple semicircular-arched windows secured with iron lattices—two on its eastern and one on its northern façade. The northern part of the east wing of the convent had two similar windows, close to the apse, that probably belonged

to the sacristy. The southern part of that wing occupied the city block, as depicted on the "Turin map". The visible part of its northern façade had no openings.

The visual source depicting the inside of the convent is the *veduta* (cityscape), kept in the Society of Friends of Dubrovnik Antiquities [23] (Figures 7 and 8). A critical study of this cityscape, through the analysis of several specific buildings, found it reliable in depicting important buildings and most of the city blocks, except a few that are utterly distorted due to the shortening of the inept perspective. The important buildings' details have been represented with diligence, whereas they are rendered schematically for other buildings. On the cityscape, the convent occupies the same area as it does on the "Turin map." Its major part is the central courtyard. The church is in the north wing, parallel to the main street. A building with a visible upper floor and roof is depicted north of the church, probably illustrating the northern part of the west wing, protruding almost to the city gate. South of the church and attached to it is a building with a porch, which must have served as an area for sheltered communication between the dormitory and the parlatory in the sacristy. The upper porch, whose Ionic capitals suggest that it was constructed in the late sixteenth or early seventeenth century, is not visible. The west wing is depicted as lower than the northern one, but it must have had an upper floor since its roof reaches the height of the city walls. On the outer side of the city walls, to the west, is the Puncijela Tower (Figure 3), which derived its name from the corrupted term *pulcelle* for the Poor Clares. The tower was constructed after the Major Council granted permission for the Poor Clares in 1305 to build it on the convent's land [36] (Figure 3). To the south and east, the courtyard is separated from the public space by a high wall. Since the cityscape is damaged, the south wing is not discernible. The southern part of the east wing, occupying the city block and enclosed by a high wall, is visible. It seems it consisted of certain law buildings leaning towards the wall, leaving some open space between them.

The *veduta* also provides important information on the buildings and spaces surrounding the convent. The painting is severely damaged in its lower-left portion, where it depicts the part of the city south of the Convent of Poor Clares (with the city hospital, some private houses, and Saint Mark's and Saint Andrew's convents), with only several roofs and façades discernible. It is better preserved in sections depicting the urban fabric east and north of the convent. East of the convent, there are city blocks with houses in rows, separated by narrow streets stretching from south to north and three wider, perpendicular ones. The Great Fountain is located north of the convent—a rounded building with a domed cistern erected from 1437 to 1447 [37]. The convent's outer courtyard wall stretches from the city walls to the Fountain, including the building (i.e., the northern part of the west wing) and the open space north of the church. It had a rounded arched opening leading to Stradun. A photo from the year 1900 shows its northern side, revealing a simple semicircular-arched portal [26] (Figure 9).

From this analysis, it can be concluded that in the first half of the seventeenth century, the convent consisted of several buildings around the central courtyard: the church to which the north wing with the porch was attached; the tower; the west wing that stretched north of the church; the east wing, occupying the city block and consisting of low houses with some open space between them; and the open space north of the church, separated from the main street by a high wall.

4.2. Archival Sources and the Convent in the First Half of the Fifteenth Century

The 1433 *Ordo* [16] was the first of forty-one deliberations passed until 1450 aiming at the convent's spatial isolation. *Ordo* prescribed all the work that was to be performed, while the deliberations that followed concerned its implementation.

Firstly, the west wing, where the dormitory was situated, had to be isolated from the city walls and their walkways. A wall had to be erected two and a half metres high between the dormitory's northern and southern gables [38,39]. Additionally, a two-metre-high stone wall had to be constructed above the hanging arches, where the wooden fence was used to protect the walkway on top of the city walls. These hanging semicircular arches, built

on the inner side of the wall, are preserved only in the portion of the northern stretch of the city walls [36]. The *Ordo* prescribed that the wall upon them had to stretch from the western city gate southwards up to the small gate at the end of the street that divided the convent from the hospital. These two walls aimed to prevent communication between the soldiers and the nuns.

Secondly, all the dormitory windows looking to the north, south, west, and east had to be closed with iron lattices and (opaque) glass, except those looking to the garden to the east. This indicates that the dormitory occupied the whole western wing, including the part north of the church and a room on the tower's first floor. The only windows allowed were those looking at the courtyard with the garden. The convent kitchen and toilet occupied the ground floor of the tower. Their windows also had to be closed with iron lattices and glass. The hole through which the kitchen water was drained had to be reduced so that no person could look through it, and it had to be secured with an iron lattice. The same had to be applied to the toilet hole since "it was large enough so that a man could easily enter the convent". The windows of the infirmary and the cellar, looking towards south and east, also had to be secured with iron lattices and glass on both the ground and upper floors. This proves that the west wing had two storeys, and the infirmary and the cellar were located in its southern part. Furthermore, the cellar had to be enlarged, occupying the room for servants, which had to be demolished and arranged elsewhere. It is not clear whether there was just a room for servants on the ground floor of the west wing or a separate house, probably wooden, that had to be demolished so that the extension of the cellar could be constructed towards the east. However, the cellar had to have two doors, one from the public space and another leading to the convent. The first had to be walled up for most of the year. Only during the grape harvest (from 15 August until 29 September) did the door leading to the convent have to be walled up, and the other door opened so that laymen could carry in grapes. Meanwhile, the nuns needed to store enough wine in the convent for a month and a half. Walling up the doors was the only secure way to prevent unwanted communication with the nuns and unsupervised entrance to the convent. A hole, seventeen to thirteen centimetres large, had to be opened next to the door leading to the convent so that firewood could be imported since it was forbidden to cut the wood in the convent. Whenever the hole was not in use, it had to be closed with a small door, whose keys would be guarded by the abbess. She also had to hold the keys to the three doors leading to the dormitory. The locks for these doors seem to have been introduced only after the scandal broke. Unfortunately, the source does not reveal their locations.

The only change required in the east wing was the destruction of a *solaro*. The term (Latin *solarium*) refers to a part of the building that is exposed to the sun [40]. These small terraces used to be constructed on the tops of roofs, usually, but not exclusively, of wood. It had to be dismantled to disable any communication outside of the *clausura*. The new house for the servants was to be constructed in the courtyard, on the site of the wood storage. These buildings may have been located in the east wing, which was perceived as suitable for the side rooms after the orphanage was transferred.

Furthermore, the source reveals that the convent had a chapel for nuns next to the church. This chapel might have been located along the western wall of the church, close to the dormitory. The chapel was connected to the church through an opening secured with a grid (parlatory), and the church organ had to be placed more than four metres away from that grid [38,39]. The sacristy, which has been preserved, is placed south of the apse. It also had a parlatory window, which had to be secured with an iron lattice. On the street side, the sacristy, even today, features two windows that were ordered to be closed with glass.

From this analysis, it can be concluded that in the first half of the fifteenth century, the convent consisted of the church and the west wing, which had two floors, with the cellar and infirmary in its southern part; the tower's ground floor housed the kitchen and the toilet, and its first floor served as the dormitory, while its upper parts were integrated into the defence system; the chapel, with a parlatory, was probably west of the church; the sacristy, also with a parlatory, was south of the apse. Side rooms were planned to be

arranged in the courtyard, probably in the east wing, which plausibly remained empty after the relocation of the orphanage (Figure 10).

The *Ordo* was concluded with the rules on men entering the convent: workers were allowed only after the procurators obtained a permit from the Minor Council, with instructions on entry and the way the workers would carry out their tasks; a chaplain was allowed to visit a sick or dying nun for confession and communion, but during the visit, he had to be accompanied at all times by the abbess and older sisters; in cases of death, two or three friars were allowed to enter to organise the burial. In cases of disobedience, the *Ordo* did not prescribe the punishment, which was usual in all other deliberations, but left the decision to the Rector and the Minor Council, meaning that the sentence was expected to be highly severe [41,42].

The twenty-seven deliberations that followed were passed to schedule the works listed in the *Ordo* [43], to decide on funding (since the city covered the costs of materials and workers' labour) [44], and to purchase building materials and tools from other public construction sites [45]. Another nine deliberations resulted from problems that emerged during the works: in 1435, a convent's building, or a part of it, collapsed [46]. The new situation required the appointment of a skilled supervisor of the workers [47] and the election of officials, who were all trusted noblemen, to manage the work [48]. The sources do not reveal which building collapsed but only order that another stone wall be dismantled due to its constructive instability [49]. The new problems prolonged the works and demanded extra caution to prevent unwanted and unauthorised visitors to the convent: every day, two noblemen from the Major Council were elected to guard the entrance to the convent from the morning to the end of the second hour of the night, which was around 10 p.m. [8,50]. They were allowed a break for lunch and dinner under the condition that one of them always remained on guard. After 10 p.m., during the night, they were replaced by night guards who regularly walked the main street, but now four of them had to stay by the convent's entrance. It is not known how long this deliberation remained in force. Only in 1449 was a new one passed, not listed in the *Ordo*, regarding access to the convent from outside the city walls: the entrance to the space between the walls and the barbicans had to be walled up from both sides of the Puncijela Tower to isolate it from any laymen, especially soldiers [51].

4.3. Urban Transformation as the Result of the Changes in Surrounding Spaces and Buildings

In 1437, the most ambitious project in Dubrovnik in the first half of the fifteenth century was completed: the aqueduct was constructed after the plan and under the supervision of the Engineer Onofrio della Cava from Naples [37,52–54]. It was followed by the construction of two fountains: the Great Fountain on the western end of the main street (Figure 11) and the Small Fountain on its eastern end. Their construction was again entrusted to Onofrio and his collaborator, Pietro di Martino from Milan. The verses of the Humanist Ciryacus of Ancona praising this achievement, engraved on the Great Fountain, marked its completion [55–57]. The citizens received free running water, flowing abundantly. The affluence enabled a direct water supply to the buildings that the Republic found of particular importance—the Rector's Palace and the Franciscan and Dominican friaries—for which purpose additional pipes were laid. In 1447, the Senate decided that water should be likewise given to the Poor Clares for their well-being [58]. This water was supposed to flow from the pipes on the outer side of the city walls, being added to those supplying the horses' trough. However, two years later, the Minor Council passed the deliberation that the water flowing from one of the sixteen Great Fountain's pipes, placed on the back side of the Fountain, had to be assigned to the nuns [59]. The implementation of this deliberation, as discernible from all the visual sources (each revealing some details), shows that it was not just one section of the Great Fountain dispensed to the convent. Indeed, a quarter of the Fountain and its water was dispensed to the nuns. The reason for such a decision was not based on the amount of water required but on how access to it was arranged. As described above, a high wall was built stretching from the city walls eastwards, reaching the Fountain.

South of the Fountain, another wall was constructed, leaving a quarter of the Fountain's sixteen sections inside the front courtyard of the convent [26] (Figures 8–10).

Figure 11. The Great Fountain, the former Convent of Poor Clares buildings, and the Pile City Gate at the end of the twentieth century (IPU-2N-08693).

In this way, the city reserved a part of the public space in favour of the convent, which was an exceptional decision in medieval Dubrovnik. It was precisely the public space that the Councils vigorously protected. In the case of any construction in the city, the Rector and all the members of the Minor Council attended the site to approve the perimeter of the future building and to ensure that no public space was going to be occupied [27,60]. With this decision, the convent gained access to the water, and the nuns acquired extra space: an additional courtyard north of the church. This city donation reflects the awareness of all the Councils' members that the enclosure and the isolation of the nuns had to be levelled by providing them extra space to ease life in seclusion, which was rarely a consequence of their choice. After all, the nuns were their daughters or sisters.

Although the nuns were now away from the sight of citizens on the other side of the convent's walls, as well as that of soldiers on the fortification's walkway and of all those passing by the kitchen and toilet outside of the city walls, still the members of the Councils did not think that the nuns were completely protected. Indeed, they were genuinely concerned about the outcome of any communication between a nun and any man, whether he was a cleric or a layman. Therefore, they ordered the windows of surrounding houses overlooking the convent to be closed with iron lattices and glass or walled up. The *Ordo* prescribed it, pointing to a house belonging to the Benedictine convent of St Andrew, located nearby on the slope of the hill and overlooking the Poor Clares' convent (Figure 10). Four additional deliberations also demanded that the owners of three neighbouring houses close their windows [61]. The request made no distinction regarding the social groups the owners belonged to. One of them was a commoner, living there with his wife, and others were noblemen from respected kindreds of Sorgo and Bona. The Sorgo family even had to close windows belonging to their *sala domus*, the most representative room in the house. This practice was not new since, already in 1414, before the scandal, an owner of the house south of the convent was demanded to close all the third- and fourth-floor windows looking to the north and to put iron lattices on those looking eastwards so that no person

could protrude their head through the window to look towards the north, that is, to the convent [62]. However, after the scandal, the implementation of that practice was taken more seriously.

The consequence of all the above deliberations was that this part of the city transformed. Dubrovnik, like all the eastern Adriatic cities in the late Middle Ages, had three distinctive characteristics: firstly, the urban area was limited inside the ramparts; secondly, the urban layout was defined and protected by municipal laws; and thirdly, edifices were built of stone and, consequently, highly durable. Therefore, after the initial regulation of 1272, the urban transformation rarely included tearing down an existing building or disrupting the defined city layout. It merely comprised functional adjustments within the existing urban fabric. However, in the case of changes in Dubrovnik after the Clarissan scandal, the scale of the adjustments was such that it was possible to define them as urban transformation. It included interventions in ecclesiastical, public, and private buildings and, even more, in public spaces. Out of love for their daughters and sisters and a desire to provide them with the most comfortable life possible, noblemen decided to sacrifice a significant part of open public space that was extremely valuable and always insufficient in the densely built urban fabric inside the ramparts. It encompassed a large part of the representative space at the very entrance to the city, featuring the Fountain that was praised as a grand achievement of the small Republic, symbolising all the other attainments as well. It also encompassed the streets east and south of the convent, turning them into "blind" streets by closing the windows, depriving the tenants of the houses of communication with the outer world, and forcing them to renounce their living comfort significantly. The city walls (as already mentioned) were fitted with a two-metre-high wall for preventing the soldiers from communicating with the nuns.

The final result of these changes was the urban transformation that granted the nuns free and undisrupted use of their courtyard, the only open space in their strict enclosure.

4.4. Preserving Social Values in Late Medieval Dubrovnik

Dubrovnik Councils' deliberations were always written down in the shortest possible form, never revealing any more detail than necessary for their implementation and never recording the discussion. Therefore, not much is known about the scandal itself.

The nun in question was Pervula, daughter of *Ser* Nicola de Tudisio, whose two brothers decided on her destiny after their father's death [8,63,64]. In that way, the brothers did not have to share the inheritance with their sister. The priest was Antonius Vučičijević from Ston, a small town in the Republic of Dubrovnik. The relationship probably developed during secret conversations at night, of which there is no firm evidence, but the deliberation *Contra presbiteros* from 1427 indicates it was a common practice [65]. It is one of several deliberations that regulated order and safety in the city during the night, forbidding walking without a candle. The light stated a person's presence and illuminated their face to identify them. However, keeping discipline in the city required passing the same deliberation repeatedly: this one was recorded in 1424, 1439, 1445, and 1447 [66,67]. A special one was passed in 1427, addressing only priests. It states that if the night guards discovered a priest, or a few of them, walking the city streets after midnight without a candle and honourable company, they should be treated as laymen and imprisoned. In the morning, they were to appear in front of the Rector, who would take their statement, and then they would be sent to the archbishop to decide on the penalty. Both the city and ecclesiastic authorities agreed on the procedure. It seems that the priests, probably the young ones, used to wander the city at night looking for fun, and perhaps, conversations with a nun who lived in a rather loose enclosure led to a love affair. What is known from the sources is that Antonius was accused of the abduction of Pervula [8]. The Senate, however, decided to punish them both. It raises doubts about whether Pervula willingly ran away or was abducted and whether the official records were altered to downplay the shame that fell on the whole Republic and especially on its nobility.

The Senate decided on Pervula's punishment in May 1434 [68]. The most severe punishment—public humiliation [41,69]—was not imposed in this case because that would further emphasise the shame the scandal caused in the society. Instead, the second most severe, i.e., the prison sentence, was chosen. Although there were women's prisons alongside the men's, in the Rector's Palace, Pervula did not serve her sentence there. For this purpose, a particular room was ordered to be built in the convent courtyard, with only one small window looking into the servants' dwellings. The window served as a means of delivering Pervula food, wine, and communion and exchanging other necessities as well. Most of the time, it had to be closed with a shutter, whose keys were kept by the abbess. In this way, serving a prison sentence in the convent provided an example and a warning to all other nuns not to dare to break their vows.

5. Conclusions

Between 1433 and 1450, a total of forty-one deliberations were passed, whose implementation resulted in the transformation of the urban landscape and the isolation of the Convent of Poor Clares in the densely built urban fabric. It encompassed changes to the convent's buildings, which resulted in spatial seclusion, making any unsupervised communication impossible; changes to private buildings, which caused discomfort to tenants by depriving them of the use of their windows; changes to public buildings, which left soldiers in walkways on top of the city walls and barbican passages unable to see the convent's spaces; and, finally, changes to public spaces, donating a significant part of open public space to the convent. These deliberations ensured the spatial isolation of the nuns but also contributed to easing their lives in the *clausura*. The deliberation on the prison sentence to be served inside this very convent was the final one by which the nobility of the Republic of Dubrovnik tried to ensure that social values and order were preserved for the future.

Philippus de Diversis from Lucca, the Rector of the Dubrovnik school, clearly expressed what the Convent of Poor Clares meant to the citizens and how they perceived it. In his book *Situs aedificiorum, politiae et laudabilium consuetudinum inclitae civitatis Ragusii*, written in 1440, he praised the city, its governance, its laws, and its buildings [70,71]. In his writing, he describes the Poor Clares' convent as the city's most beautiful and largest one, where noble virgins from Dubrovnik were entirely devoted to God: *et unum aliorum omnium pulcherrimum et amplissimum devotissime virginis sanctae Clarae, discipula quae fuit sancti Francisci ubi solum nobiles Ragusinae virgines Deo dedicantur ut plurimum*.

photographs and the architectural drawing of Dubrovnik, and to the State Archives of Split for copyrights for publishing Habsburg Cadastral Map of Dubrovnik from 1837.

Conflicts of Interest: The authors declare no conflicts of interest.

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Investigating Spatial Criteria for the Urban Landscape Assessment of Mass Housing Heritage: The Case of the Central Zone of New Belgrade

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Abstract: This study addressed problems related to the protection, reconstruction, and revitalisation of modern heritage, particularly the regeneration of mass housing estates built after WWII and facing the contemporary perils of urban decay and deterioration. It presented interdisciplinary research investigating the possibility of extending and complementing the heritage assessment methodology and broadening the scope of the criteria by including mass housing landscape values. Starting with a close reading of the key theoretical positions embedded in the conceptualisation and construction of New Belgrade, we investigated a set of holistic and time-based criteria, followed by contemporary methodologies for landscape quality assessment. The investigation was based on an urban landscape approach to heritage assessment and focuses on the Central Zone of New Belgrade, declared a heritage site in 2021. The interaction of the theoretical underpinnings of modern architecture and urban planning with urban landscape discourse, coupled with historically and theoretically relevant knowledge and data, resulted in an investigation of landscape-based criteria for further mass housing assessment. Finally, we presented the findings of the landscape quality assessment of the transformations of the Central Zone. This perspective could be used to extend the possibilities of this approach in order to (1) tackle the "thickness" of temporality related to (urban) landscapes; (2) rethink and redefine the applied heritage assessment approach; (3) open the assessment procedure to a wider range of stakeholders, particularly nonexperts and the local community; and (4) re-actualise the position and role of experts in the sense of communicating knowledge in a completely new context.

Keywords: urban landscape transformations; Central Zone of New Belgrade; mass housing estates; landscape quality assessment; heritage assessment criteria

1. Introduction

This study focuses on mass housing urban landscapes and a critical investigation of the evaluation methods employed in the process of modern heritage assessments. The research is an outcome of collaborative participation in the interdisciplinary research network funded by COST (European Cooperation in Science and Technology), entitled "European Middle-Class Mass Housing" (COST Action 18137, MCMH-EU, 2018–2023). This transnational and multidisciplinary network aims to bring together diverse knowledge and expertise regarding extensive modern mass housing production and to develop new scientific approaches to the study of MCMH [1]. Still, observing mass housing heritage within the theoretical framework of urban landscapes (ULs) may open up new possibilities for examining and assessing this type of modern urban heritage by offering an integrative

and time-based approach. As a response to the complexity of the research object, in this study, we observe this topic through the lens of landscapes, combining the transdisciplinary perspectives of architecture, urban planning and landscape architecture.

The immediate subject of this work is the recently declared heritage site of the Central Zone of New Belgrade (CZNBg) (Belgrade, Serbia) [2] (Figure 1). It is singled out as an outstanding case of modern mass housing heritage, as well as an insightful testing ground for rethinking contemporary strategies of modern heritage protection. Enhanced methodologies for heritage evaluation were applied in the process of its nomination for the status of cultural heritage [3], yet the approach lacked an assessment designed to identify the specific qualities of its open spaces and the relationship between its physical and biophysical structures, thus raising questions regarding the development of new approaches, methods, and techniques for mass housing heritage assessment, which forms the main focus of the following investigation. In addition, CZNBg is distinguished by its capacity to reflect and resist dominant socio-political and economic paradigms, effectively accommodating the ever-changing needs of its inhabitants [4,5].

Figure 1. The plan of the Central Zone of New Belgrade, 1960. Graphical illustration prepared by Dezire Tilinger, 2024. Source of map: [6] (p. 182).

Representing a widespread and significant legacy of twentieth-century architecture and urban planning, modern mass housing estates have become the subject of academic and professional attention worldwide in the new millennium. This has resulted in significant research projects [1,7] and publications [8–11], spanning mass housing-related topics, from their origin and historical development to issues of their ongoing renovation.

Mass housing estates mainly arose because of the dire need for housing after WWII and the baby boom that followed it, along with the rise of social policies, government support, and necessary technological advancements within the building sector that made construction on such a large scale possible [12]. These estates were mostly built on city

peripheries and typically consisted of prefabricated tower and slab residential buildings. Usually, these neighbourhoods were accompanied by collective spaces for communal use, ranging from open public spaces and green areas to educational, health, and other communal facilities for the everyday needs of the inhabitants. Since WWII, millions of modern mass housing apartments have been built across Europe [13], making this type of housing the leading pattern of urbanisation in the twentieth century. Currently, housing from the postwar period (1946–1980) accounts for up to 50% of all residential buildings within certain EU member states [14].

However, some mass housing estates face various problems, ranging from severe urban decay to social issues. Many of them have encountered problems from the start, such as unsatisfactory construction quality, underdevelopment, or nonexistence of planned amenities and communal spaces, and, often, dislike of the monotonous ambience of the neighbourhoods by the residents [15]. The shift from state management to private ownership and the lack of public management pose challenges to renovations, which are usually carried out by the tenants themselves [13] and at the expense of the original appearance and performance of the buildings. The public spaces and amenities, once finally built, were often not maintained in a manner similar to the residential buildings and are thus in need of urban renewal. In post-socialist Eastern Europe, those neighbourhoods were subjected to an influx of new residential, commercial, or office buildings, and parking lots, usually built on spaces previously designated as public green space [16]. Thus, like many of the heritage places and sites of twentieth-century modernism, these types of residential neighbourhoods remain at risk due to a lack of general awareness, as "too often they are pressured by redevelopment, unsympathetic change, or simply by neglect" [17] (p. 1). Such changes and problems within mass housing neighbourhoods generally coincide with or stem from the collapse of socialism in Eastern Europe and the decline in social policies across Western Europe. This process is also related to the global shift towards a neoliberal market economy, which has altered the way these neighbourhoods are further planned, managed, and lived in.

Rising interest in mass housing research was prompted not only by the ageing and deterioration of the bulk of the building stock but also by recognition of its multiple values and significance as modern built heritage. Only recently have some of the more prominent mass housing complexes begun to be considered heritage sites, and strategies for their protection, conservation, and renovation are still in the early stages of development [18]. Although an extensive body of knowledge and experience addresses issues concerning the regeneration and protection of this type of built heritage, it often proves to be ineffective in the face of the dramatic challenges of the contemporary world [17,19–22]. In this context, the necessity of reevaluating and rethinking the future of modern mass housing estates, in general, and outstanding heritage sites, in particular, requires a holistic approach and interdisciplinary research methodologies, which are still underrepresented. As asserted in the *Manifesto on the New European Bauhaus* (January 2024) by the Architects' Council of Europe, the desired change towards a holistic approach to the way we commission, design, build, renovate, manage, and regulate our built environment is marked by calling for greater synergies: "[a]n essential ingredient of such a change must be sought in an inter-professional cooperation which could overcome fragmented and overly-specialised interests" [23] (p. 3). Simultaneously, the European Landscape Convention heralds a new holistic and all-encompassing approach to landscape conceptualisation, marking it as a pivotal aspect of contemporary landscape discourse [24].

The current methodologies for modern heritage valuation and assessment are also marked by calls for a multidisciplinary approach and the inclusion of all relevant stakeholders. Traditionally, methods of assessing heritage significance rely on the expertise of professionals, mostly historians, art historians, architects, and archaeologists, being applied through disciplinary methods. Over the last two decades, the role of nonexperts in the process of valuation has been recognised, prompting democratisation in the field of heritage protection [22,25–27]. In this extended field of competing interests, articula-

tion, and understanding of values have acquired greater importance, and consequently, new types of assessment typologies pertinent to mass housing neighbourhoods have been developed [28]. Still, there is a lack of methodologically oriented research conducted on mass housing heritage assessment [29]. In this work, we aim to address the problem of the expanded scope of values and include still underrepresented disciplinary knowledge of landscape architecture in assessments of this type of heritage [30,31].

The aim of this research is to look for qualities and specific criteria for the assessment of MH spatial/landscape values through analysis and interpretation of relevant historical/theoretical discourse and landscape quality assessments. The major approach to contemporary strategies for the protection and revitalisation of modern mass housing estates should be derived from present concerns and expertise, coupled with accurate knowledge of historical currents and spatial corollaries of its continual transformations. In this work, we investigated the following: How can MH assessment methods be transformed beyond current heritage assessment practices in relation to the complexity of its subject? How can the value framework present within the discourse of urban landscape assessment be included in assessment methodologies for modern mass housing heritage? Accordingly, the question is to what extent and how can existing approaches and methods for MH heritage assessment be extended, correlated, and complemented with urban landscape theory? Finally, how can the identified assessment criteria be operationalised to address the specific context of MH estates?

2. Theoretical Framework: Notions of Importance

This research is grounded in a complex contemporary theoretical concept of the urban landscape [32–36]. In its essentiality and terminological richness, the term allows for the various interpretations and multiple approaches necessary for MH studies. It encompasses the entire space of a city within its environment, and its transformations over time due to evolving socio-economic circumstances. In the physical sense, urban landscape refers to the different spatial levels of a city, which together belong to the global relations of techno-structures that permeate the entire space [37]. This notion also functions on a symbolic level as a physical reflection of what was a social priority for a certain group, community, city, and country at a certain moment in history [38]. Because it comprises the built, physical, natural, and social spaces of a city, the concept of urban landscape enables mastering the problem of the exquisite complexity of the MH phenomenon as a part of the contemporary urban environment. Furthermore, UL's socio-economic and cultural patterns, transformed throughout history, are expressed in changes in the urban morphology of the landscape, as well as in the perception of those changes. Starting from these basic hypothetical positions, urban landscape operates in this investigation as a methodological framework for the overall study of diverse impacts on the CZNBg but also as a key tool for the identification, evaluation, and assessment of landscape values.

The contemporary theory of urban landscape considers transformation to be its immanent feature, which occurs in accordance with various changing factors in the environment, as well as with the history of the physical structure of the existing space [39]. Urban and suburban landscape transformations thus occur with the "qualitative destructuring of the whole, a process in which the weave (reality) formulates new patterns" [40] (p. 7). As a complex dynamic system, a city manages to absorb the insignificant changes that occur constantly. In relation to the degree of intensity and scope, we distinguish radical changes in space, that is, ULT. Socio-spatial transformations through history lay at the foundation of different approaches and all procedures in heritage assessment. Hence, this study employed the ULT theoretical approach to incorporate historicity and temporality as integral and comprehensive parts of landscape value assessment [41]. Historical analysis based on ULT is distinguished here because it enables the perception of broader processes and establishes a starting point in the identification of the basic (and generally missing) criteria in landscape assessment.

Complementing the ULT approach is the broad-based and holistic perspective of the historical urban landscape, which has been incorporated into various studies on heritage issues. As an interdisciplinary approach that considers the complexity of the human milieu, HUL establishes relationships between the fields of cultural heritage protection and urban planning [25,26]. As UNESCO indicates, a certain value of urban areas is best defined by extending its significance "beyond the notion of 'historic centre' or 'ensemble' to include the broader urban context and its geographical setting" [27] (n.p.).

The current practice in mass housing landscape heritage assessment mostly stems from a values-based approach to heritage conservation, initially formalised in the Burra Charter (ICOMOS Australia, 1979/2013) and broadly used over the last two decades [41,42]. At the same time, the contemporary conceptualisation of landscape resulted from a different perception of space: abandonment of reductionism and transition to holism. The value of the landscape lies in its cohesive amalgamation of both natural and cultural components, which are interwoven and should be considered jointly rather than separately (i.e., individually). The analysis of landscape is founded upon the scientific principles of landscape ecology and aesthetics, considering them as an integrated whole [43–46]. Although the endeavour to achieve a comprehensive assessment of the landscape value continues, notable scholars suggest indicators such as *stewardship*, *coherence*, *complexity*, *naturalness*, *openness*, and *historicity* as promising for future research [43–45].

The CZNBg and its layers of transformation were explored in this study as the continuum of the modern urban landscape but also as an historical urban landscape with its specific urban heritage values [25,26]. For the case of the CZNBg, as a modern MH estate recognised as cultural heritage, the comprehensive theoretical and methodological backgrounds that are introduced hereby serve to identify the systems of values through UL criteria, and derive corresponding indicators as a basis for landscape quality assessment.

3. Materials and Methods

3.1. Study Area

The subject of this research is clearly distinguished both in spatial terms and in its historical formation. The Central Zone of New Belgrade occupies an area of 1600 × 1600 m (around 250 ha) located on a plain at the confluence of the Sava and Danube. Its planning and construction were realised from 1958 to 1979, and it has undergone moderate transformation ever since. It was conceived and structured as the core of New Belgrade, a new and modern part of the city intended to house around 40,000 inhabitants [47,48]. The authors of the first plan were Milutin Glavički, an architect and a prolific urban planner, and Uroš Martinović, an architect, professor, and political protagonist [49], a key figure in the formation of the so-called "Belgrade School of Architecture" [49,50]. The initial plan was developed according to a competition-winning entry in 1958, with the proposal submitted in collaboration with planners from the Urban Planning Institute of Belgrade (Leonid Lenarčić, Milosav Mitić and Dušan Milenković), and made effective through the Conceptual Plan in 1960 and Regulation Plan in 1962 (Figure 2). The distinctive spatial concept was based on an orthogonal urban matrix, with a system of three large central squares (Blocks 24–26), six large residential blocks on the outside (Blocks 21–23 and 28–30), and the monumental central axis stretching from the Presidency of the Government (under construction at that time) to the Railway Station (unexecuted).

The first residential community in Block 21 was planned and built as one neighbourhood unit for 10,000 inhabitants (1958, 1962–1966) and placed in the northeastern corner, measuring 400 × 600 m. This included a cluster of six 16-storey high skyscrapers, a 24-storey-high tower with single persons' apartments (that was never built), and two 10-storey-high buildings, 286 m long each, along the major boulevards. Inside the block, two primary schools, two kindergartens, a community centre, and an electric substation were built, together with a lower residential structure, forming the meander at 4 storeys high and 980 m long. The initial model for Block 21 was consequently reprogrammed, responding to ongoing social transformations and future expectations through a series of

competitions that were conducted for each of the other five residential blocks, as follows: 22, 23, 28, 29, and 30 (Table S1). The dynamics of the planning and building of the four corner blocks (21, 23, 28, and 30), which have the same size of approximately 20 hectares, plainly reveal the change in housing standards in socialist Yugoslavia over time. Thus, following unprecedented economic growth and the rising standard of living, the estimated number of inhabitants steadily decreased, from 10,000, which was initially planned for each corner block, to 6000, as proposed in 1967 for Block 30.

(**a**)

(**b**)
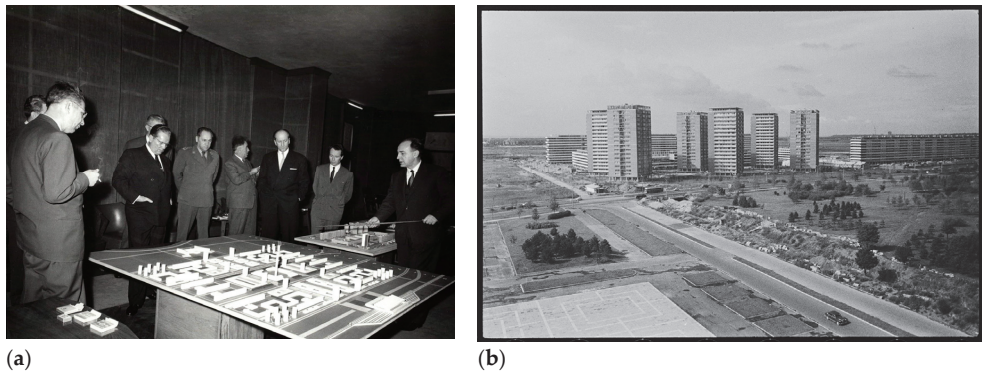
Figure 2. (**a**) Director of the Urban Planning Institute, Aleksandar Đorđević, shows a model of the CZNBg to President Josip Broz Tito and his collaborators (around 1960); (**b**) residential towers and buildings in Block 21 located towards the back of an undeveloped central axis of the CZNBg (circa 1965). Source of photographs: Museum of Yugoslavia, Belgrade; photo-archive of Josip Broz Tito, Legacy of Radovan Cukić, 1960_129_048 (**a**) and Stevan Kragujević, SK_32_A_266 (**b**).

Since its inception, scholars have aptly studied the architecture and urban planning of CZNBg. A postmodern critique of socialist modernist urban planning was formulated by Miloš R. Perović in the proposal of an alternative model for CZNBg [51]. A comprehensive study on conceptions and planning strategies for New Belgrade by Ljiljana Blagojević, was an outstanding contribution to the discourse [6]. Most later studies focused on the residential blocks [52] and their common spaces [53], the building technologies applied [3], and the political and societal conditions that facilitated housing construction and directed its future changes [54,55]. Some scholars emphasise the role of individual architects in CZNBg development alongside the impact of planning and architectural doctrines [56]. A common ground within the literature is a positive assessment of buildings and their relationship with the environment in bordering blocks. In contrast, the development of blocks along central axes is frequently criticised in various aspects. Vesković and Jovanović provided a comprehensive overview of the planning and construction process for individual blocks and the entire area as part of the documentation to secure protection for CZNBg as a heritage site [57].

The first claims for protection and reconstruction of the CZNBg had already appeared in the mid-1980s. In the words of Vladimir Macura, an architect and urban planner, the CZNBg is a valuable city tissue and one of the greatest achievements in Yugoslav urban planning, and it should be protected from further reshaping [58]. A decade and a half later, the General Plan of Belgrade 2021, adopted in 2003, and led by Macura, considered the CZNBg a cultural heritage asset [59]. This plan emphasised the CZNBg as a symbol of its time and an urban area with exceptional conceptual, spatial, and architectural features. The General Plan also recommended preserving and improving the authentic values of modernist urbanism and architecture in Blocks 21–26 and 28–30 and proposed an open competition for ideas on the future development of CZNBg [59]. This led to the tentative protection of CZNBg by the city authorities.

During this period of tentative protection, the Cultural Heritage Preservation Institute of Belgrade carried out inventorisation and valorisation of the six residential Blocks 21, 22, 23, 28, 29, and 30. Methods for an initial assessment and evaluation included architectural, urban, and historical analyses, extended by evaluation formulas and a catalogue of the objects [60]. The evaluation was carried out at the block level (excluding structures built after 1990) according to the methodology developed by authorities for heritage protection in Brno and Vienna, specifically for the evaluation of architecture from 1945 to 1979. This methodology provides useful guidelines and protocols directed towards decision making regarding renovation or conversion of significant architectural objects or complexes [61]. The complex data analysis related to mass housing was complemented with strategies developed in museology and DOCOMOMO protocols. The main difficulties in the process of valorisation were recognised in discrepancies between the original projects, realised housing stock, and present condition, as well as in the lack of data on illegal interventions. As a result of these procedures and joint efforts by experts, the general public, and policymakers, in 2021 the Serbian Government declared the CZNBg as a spatial cultural–historical unit.

According to the Decision on Declaring the Central Zone of New Belgrade as the Spatial Cultural-Historical Unit, the CZNBg represents an "anthological and original example of postwar Yugoslav architecture" [2] (p. 40). This document recognises the values of the CZNBg and describes the overall measures of protection to be applied to the entire space, as well as the particular measures for each block based on the period in which it was built and its relationship to the original plan. Protection measures are divided into general and special protection measures and further divided into categories of special value, of value, and of no value (Figure 3). General protection measures provide instructions for an integral approach to heritage protection, including the application of different conservation methods and the preservation of the original spatial layout of streets, blocks, buildings, and public spaces. Special protection measures vary relative to the value of particular blocks and objects within them.
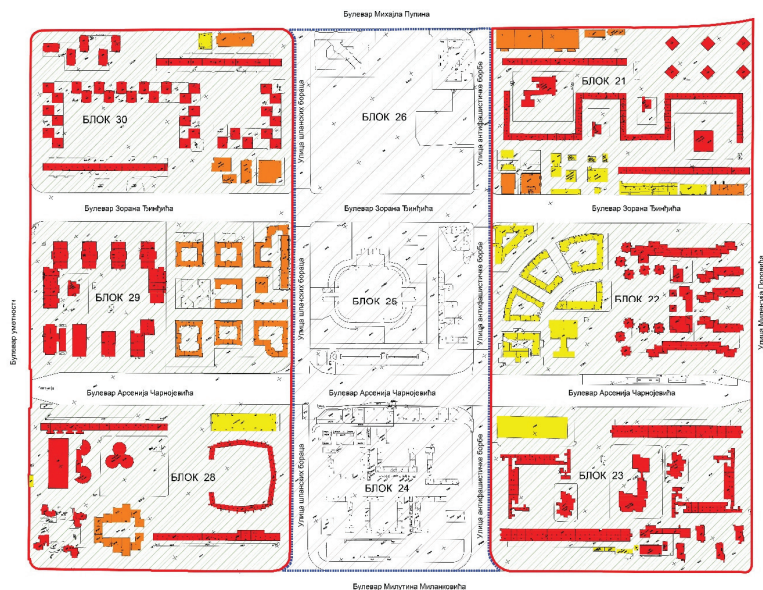
Figure 3. Document issued by the Cultural Heritage Preservation Institute of Belgrade showing the valorisation of buildings of the CZNBg: (1) red—buildings of special value; (2) orange—buildings of value; and (3) yellow—buildings of no value. Source of map: The Cultural Heritage Preservation Institute of Belgrade.

The Decision also highlights the need for "preserving the landscape values of the spatial cultural-historical unit, its perception as a part of the urban landscape and image of the city", underlying "preservation of significant vistas towards valuable objects and the ambiance of the spatial cultural-historical unit" [2] (p. 40). These concise recommendations importantly introduce the notion of landscape value into the process of modern mass housing valorisation and, consequently, recognise the role of perception in its formations and transformations, yet the proper inclusion of the landscape perspective is still missing. The three main "criteria/qualities" for evaluation adopted from the Brno/Vienna methodology—historical/cultural (*Geschichte: Konnotation/Aura*), architectural/artistic (*Architektur: Ingenium*), and performance/use (*Phisik: Leistungsfähigkeit*)—provide detailed information on building stock in its spatial and cultural contexts [3,61]; however, landscape qualities mostly remain excluded from the equation. In this regard, beyond the inventory data on greenery and the mere consideration of the quality of the landscape architecture, we were curious as to the potentials and shortcomings in the holistic evaluation of mass housing heritage from the landscape perspective.

3.2. Methodological Framework

Following the main objective of the study, we applied a hybrid methodology that consisted of conducting qualitative and quantitative analytical procedures and seeking to integrate historical/theoretical and analytical/empirical materials. With the aim of enhancing the extended methodology for the assessment of mass housing heritage values, the complex notion of urban landscape and its theoretical and methodological features should be introduced as relevant thematic criteria/qualities and investigated from their historical, theoretical, environmental, and visual aspects.

To propose guidelines for a novel value typology for mass housing assessment, the research combines current methodologies for architecture assessment with methodologies for landscape quality assessment. From the Brno/Vienna methodology prepared for the heritage assessment of post-WWII architecture in Brno and Vienna (2010–2012) [61] and selectively employed in the valorisation/assessment of the CZNBg, the main structure for the MH urban landscape assessment protocol was derived. The investigation presented in this study does not aim to provide a comprehensive value typology—that would be beyond the scope of this research—but to investigate the main criteria for valorisation and provide guidelines that can serve as the analytical probe of the methodology in conducting this type of assessment.

A standard procedure in all assessment protocols is the process of inventorisation, that is, collecting facts/data, which is distinguished from value analysis. Historical inventory delivers unchangeable, universally valid results, whereas value analysis provides time-determined (estimated or defined) parameters [61]. The protocols for inventorisation are not considered here because this topic has been well covered in earlier publications [3,22].

Consequently, the landscape value analysis in this study is designed to be conducted along three main lines related to quality/criteria, accommodated to specificities of the landscape phenomenon. These three lines include (1) landscape historical analysis, (2) landscape theoretical analysis, and (3) landscape quality assessment. They are explained in the text below.

(1) The first line for the thematic area of investigation is *landscape historical analysis*. This analysis is an analytical probe for CZNBg's urban landscape assessment. It is based on the HUL theoretical approach and is conducted using the theoretical concept of the ULT by employing a set of relational analytical procedures.

The keyword for this area of investigation is *connotation*, which refers to the significance and spirit of a comprehensive milieu of a human settlement or place resulting from its spatial transformations over time. According to Cosgrove [62], every new layer in the urban landscape is created through the interactions of all of the generally valid and accepted ways in which a certain community demonstrates its culture or its cultural practices, led by its external and internal logic. The characteristics of the HUL theoretical base of the research indicate a wide range of research materials, methods, and techniques. Their

application in our research on CZNBg urban landscape assessment resulted in the design of a spatiotemporal comparative diagram showing the cycles of ULTs from the nineteenth to the twenty-first century, in addition to explanations of these radical changes that have left their material or immaterial traces (see Section 4.1).

The documentation base used for the content and comparative content analysis and the conceptualisation of the spatiotemporal comparative diagram stems from previous profound research founded on archives materials and scientific literature, including sources relevant to the historical interpretation of the relationship between socio-economic and spatial transformations [35,63–66]. In particular, the diagram was also realised according to relevant historical cartographic documentation [35] (pp. 9, 429), [63] (pp. 182, 233, 244, 247), [65] (p. 254), [66].

Considering the steps in the proposed methodology of MH assessment, the first level of analysis refers to profound research in the domain of spatiotemporal flows of landscape and urban landscape transformations and their meaning in the context of a wider spatial level. This analysis examines the values that each landscape emanates, according to the HUL approach. The results of this analysis cannot be expressed numerically but qualitatively as a contribution to the knowledge of an MH urban landscape. Furthermore, it is hoped that it informs the other phases of research and assists in determining how MH urban landscape protection and revitalisation can proceed.

(2) The second line of investigation was conducted using *landscape theoretical analysis*. This covers the criteria concerning the unique quality of the space, which is difficult to measure yet comprehensible by coupling qualitative and quantitative analyses.

The umbrella criterion in this investigation is marked by the term *spatiality*. It was utilised to operationalise the theoretical base, denoting the network of spatial and social features whose connectedness and relationships define the quality of the space. In search of the key landscape qualities necessary for conducting an MH urban landscape evaluation, a focused theoretical analysis was implemented, considering fundamental ideas and concepts from the referent discourse of CZNBg's formative period (see Section 4.2). In this case, it was centred on the theoretical work of prominent experts in the domain of space production whose practice, in the broadest sense of the term, serves as a catalyst for exploring urban landscape qualities [56]. They are distinguished for their comprehensive approach uniting different spatial categories, not only the individual spatial qualities and their complex relationships but also the broader scope of socio-spatial interactions, which includes the corpus of invisible characteristics of the urban landscape.

Regarding the steps in the proposed methodology for MH assessment, the investigation focused on the theoretical underpinnings of modern architecture and urban planning that support and provide a theoretical basis for urban landscape discourse [35,65,66], allowing for the employment of an interpretive historical research methodology coupled with architectural analysis. The knowledge base also encompassed archival sources on New Belgrade and broad insight into relevant secondary literature, applied particularly through analytical comparative drawing, which compares two critical moments in the planning history of New Belgrade and its central zone.

(3) The third line in the thematic domain of research is the *landscape quality assessment*, which analyses, on this level, landscape performance using advanced analytical tools that can comprise multiple site-specific criteria and carry out big data analyses. On the basis of the selected/assigned spatial values of the CZNBg, previously discussed through theoretical and empirical research, the set of indicators that determine the urban landscape mass housing heritage values are established and verified.

As a means of providing deeper and site-specific insights into the research topic, *landscape quality assessment* is employed here to further investigate and offer criteria for the assessment of MH spatial values from the perspective of the contemporary landscape architecture approach. It embraces measurable indicators of landscape values as a whole [43–46] with contemporary analytical tools. The basic foundation used to determine the landscape

structure of CZNBg is rooted in the Urban Atlas of Land Cover created under the framework of the Copernicus programme of the European Union. The Urban Atlas database offered only partial information about the CZNBg landscape structure, prompting the need for the enhancement of land use/land cover (LU/LC) classes through integration with data sourced from OpenStreetMap (OSM). Using modern GIS technologies and remote sensing, the mapping of LU/LC classes provides important outputs for measuring urban landscape structures and applying landscape metrics to assess modifications at the landscape and class levels over different periods [67–69]. The detailed methodological review is closely related to the research results presented in Section 4.3.

All three lines of investigation are accompanied by graphical material, comparative analytical drawings, diagrams, and photography. All three levels of analysis are connected and arise from each other. They represent experts' contribution to the formation of a basis for broadening and adjusting the MH urban landscape assessment.

4. Results: Setting Urban Landscape Criteria for MH Spatial Values Assessment

4.1. Tracing the Urban Landscape Criteria: A Historical Enquiry

An exploration of New Belgrade's urban landscape transformations is conducted here to understand the process by recognising and deriving its main stages, from the marshland to the post-socialist city. Four different cycles of ULTs are distinguished by their main features, which correspond to different social and economic systems and their historical turning points. The comparative diagram (Figure 4) shows an analytical overview of the ULTs' phases that include not only facts about historical flows but also belonging to spatial specificities, as follows: (1) the generative stage—*borderlands*—a marshland, a gap between the two historical centres, and the two empires; (2) the initial stage—*fairground*—the first signs of urbanisation in "*no man's land*"; (3) the formative stage—*socialist city*—origination of the modern urban landscape under the socialist economic and social systems; (4) the transitional stage—*post-socialist city*—a series of ULTs coinciding with the post-socialist transition towards parliamentary democracy and neoliberal market economy.
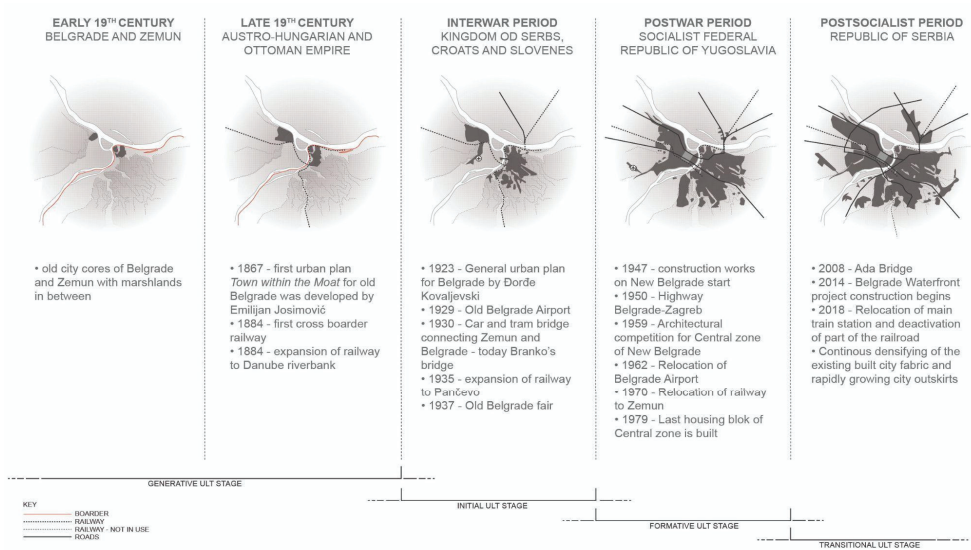
Figure 4. Transformation of the urban landscape of (New) Belgrade. Diagram: A comparative overview of the formation and transformation of the urban landscape of Belgrade and New Belgrade, XIX–XXI centuries. Conceptualisation of map interpretations and diagram: Dragana Ćorović and Dezire Tilinger, 2015, 2024. Graphical illustration prepared by Dezire Tilinger, 2024. Source of maps: [35,63,65,66].

The first generative ULT stage was determined by the borderline dividing the Habsburg and Ottoman Empires, established along the Sava and Danube rivers in Belgrade in 1739. The waterline, as the natural boundary line and the state border for almost two centuries, until the end of WWI, also separated two old city cores of Belgrade and Zemun with marshland in between. Starting with gradual liberation from Ottoman rule, Belgrade's old historic core underwent the most transformation in the period 1867–1914, executed according to Emilijan Josimović's modern regulation plan (1867). The overall transformation of Belgrade at the time was caused by a wide range of issues in the context of the city's modernisation, which was influenced by European cultural paradigms [35,36].

During the second, initial ULT stage, between the two World Wars, the territory of present-day New Belgrade became part of the newly founded state (Kingdom of Serbs, Croats, and Slovenes, 1918–1929/Kingdom of Yugoslavia, 1929–1941). This change also brought the first ideas about transforming the marshland between the left bank of the Sava and the right bank of the Danube, which appeared in the entries for the international competition organised within the process of creating and implementing the 1923 General Plan of Belgrade [64]. The territory of Belgrade increased significantly when the nearby town Zemun, with marshland in between, legally became part of the whole in 1935. The Bridge of King Alexander Karađorđević was constructed in 1934, crossing to the left bank of the Sava River, where the First International Belgrade Fair was held in September of 1937. The complex, visually striking against the background of its surroundings, arranged in a formal spatial order, nestled on the edge of "no man's land" in the centuries-old war landscape between the empires. In terms of both form and meaning, Belgrade Fairground represents a missed opportunity to promote the essential emancipatory tendencies of spatial transformations at the time. In the further course of history and WWII, the Kingdom of Yugoslavia was invaded and occupied by Nazi Germany, and the Fairground became a concentration camp, *Jugendlager Semlin*, founded by secret police, the Gestapo [70].

The third ULT stage is of particular importance, considering that it covers a formative stage. The significance lies not only in the fact that it was a period of extensive housing construction but also in many other aspects. The guiding principles of planning a modern city in *sun*, *air*, and *greenery* can be traced throughout the whole formative period of New Belgrade. Theoretical insights into an unbroken progression of spatial units that perpetually entwine and unite in a dynamic entirety of a socialist city, as Nikola Dobrović phrased it, are the essences upon which the concept of the new city was based. The discourse of the socialist New Belgrade urban landscape (up to 1991) consisted of the practice of town planners, architects, engineers, and landscape architects planning, designing, building, and constructing spaces. It was part of a larger picture of established collaboration in building practice; experts cooperated and influenced each other, and the majority of significant projects across Yugoslavia were arranged through country-wide architecture competitions at the time. The Yugoslav housing experiment included the appropriation, innovation, and even invention of different industrial building technologies that were further enhanced by excellent standards in urban planning and architectural design [71].

The fourth ULT transitional stage was characterised by political and social turmoil. During the disintegration of Yugoslavia from 1991 to 2003, the Republic of Serbia passed through a process of turbulent social transition and turned towards a neoliberal democracy. Following the new law on housing relations (1990), almost the entire socially owned housing stock was initially nationalised and turned over to state ownership. Then, with the 1992 housing law, flats were offered to their tenants for purchase at bargain rates in the process of privatisation. Except for remnants of the very limited social housing sector, housing provision in Serbia was left to the free market over the following 30 years, and it is still based on the same paradigm [72]. Because of ageing, lack of maintenance, and the impoverishment of its inhabitants, the present state of large housing estates is often poor. However, they are still significant due to the size of the housing stock and the lessons on housing provision to be learned.

A series of unsuitable outcomes of the transition to a neoliberal market economy can be traced throughout CZNBg. New developments, marked by the authorities of heritage protection as buildings of no value (Figure 3), are new residential buildings and rooftop extensions, as well as systemic appropriation and usurpation of the common and public spaces [4,71]. In addition, new planning for the massive construction of business and residential complexes that belong to the area of speculative undertakings continues, even after the proclamation of the CZNBg as a heritage asset.

The two post-WWII cycles of ULTs analysed in this study correspond to two fundamentally different socio-political and economic systems, clearly distinguished through their different modes of urban development. Conceived and built as an epitome of socialist growth, the CZNBg reflects the virtuosity of spatial production in late socialism and contains traces of its crisis and subsequent collapse. Namely, it illustrates all of the different phases of socialist urban planning practice, which stemmed from shifts in the economy and politics of the country, starting from the late-1940s break from the Soviet Union and turn towards self-management during the 1950s and 1960s, to the further decentralisation of the country during the 1970s and 1980s, and, finally, its dissolution during the 1990s.

4.2. Tracing the Urban Landscape Criteria: A Theoretical Enquiry

Searching for the core landscape values integrated into the very genesis of the urban landscape transformation from marshland to the socialist modern city of New Belgrade, curious insights can be found in the work of architects Nikola Dobrović and Branko Petričić, especially in their theoretical discourse from the period. Both of them were prominent figures in Yugoslav architectural modernism, outstanding urban planners, educators, and theorists, and deeply engaged in the post-WWII construction of (New) Belgrade.

4.2.1. Concept of "City Landscape" by Nikola Dobrović

The urban development of New Belgrade as the new city centre located and built between two completely formed historical entities became a distinctive implementation of the principles of the Athens Charter (CIAM, 1933) [51] through a series of urban plans in 1946–1962. Nikola Dobrović was the author of the initial draft for the regulation of Belgrade on the left bank of the Sava (1946), which was followed by the Conceptual Plan of New Belgrade. The plan was completed in 1948 at the Institute of Urban Planning, under Dobrović's leadership and after all-Yugoslav competitions (1947) for two key buildings of the new city and urban planning proposals. The plans corresponded to Dobrović's theoretical practice, which considered thinking about nature, space, and landscape in the broadest sense [65].

Throughout his complex professional career, Dobrović extensively studied the transformation of the built environment in a given social and economic context with its particular technological and cultural expression. Accordingly, in his writings landscape was understood as a significant critical factor in forming culture. This insight led him, together with other theoretical studies and his planning praxis, to formulate the concept of "city landscape" [73]. The concept was in accordance with the then-current tendencies in modern urban planning, such as Hans Henry Scharoun's plan for Berlin and Le Corbusier's (Charles Edouard Janneret) "discourse of the urban landscape—*le paysage urbain*" [6] (p. 112). It relied on the cohesive potential of greenery but also went far beyond. The wholeness of the city could be achieved, claims Dobrović, through knowledgeable and sensitive connection of "built forms and their plasticity, hollow space in between, terrain architecture, greenery and vistas into an organic, premeditated, compositional whole" [73] (p. 1). Dobrović advocated for a new, integral approach and insisted on organic qualities of space, continuity, and movement; in his words, importantly, he sought "a new kind of spatiality". He appealed for the unified, continual tissue of the (socialist) city to be perceived as a motion picture, produced by the cohesive forces of the collective will; it should provide an unbroken progression of spatial units that perpetually entwine and unite [74].

Dobrović's theoretical approach to planning was implicitly present in the Conceptual Plan of New Belgrade (1948), through which the main features of CZNBg were adopted. The street matrix was regularly gridded, and the plan related closely to the propositions of the Athens Charter (CIAM, 1933). The longitudinal axis formed by the city highway intersected the main transversal axis of New Belgrade, which stretched between the Presidency of the Government and the Railway Station. Along the transversal axes, a festive avenue was planned to be lined with administrative buildings and organised on the principles of baroque garden art. The plan suggested the construction of a navigable channel between the two rivers with a tripartite artificial lake in the middle zone, which was justified by the savings it would have brought in earthworks. The residential districts were organised along the middle avenue as a system of parallel freestanding slabs, surrounded by greenery [56] (Figure 5 (1), Cf. Figure 1).

1
1948
Conceptual plan for New Belgrade
Nikola Dobrović

KEY
ROADS AND PATHWAYS
RAILWAY
CENTRAL ZONE

2
1957
Proposal for the Master Plan of New Belgrade
Branko Petričić
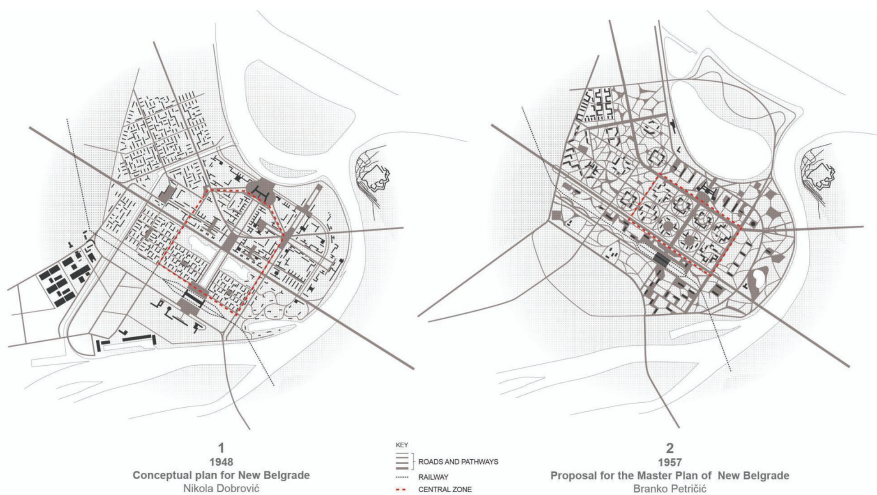
Figure 5. Comparative drawing of two urban plans for New Belgrade. Graphical illustration prepared by Dezire Tilinger, 2024. Source of maps: [6] (pp. 107–154).

In furthering Dobrović's elaboration of these ideas/concepts, particularly useful material for the assessment and evaluation of the existing urban matrix in New Belgrade, and modern mass housing heritage in general is found. Foreshadowing the future/contemporary theoretical discourse and realising that the critical breaking point between nature and humanity has already been reached, Dobrović suggests the implementation of the concept of "universal urban planning" and "potential spatial planning", which he defined, in the widest sense, as a comprehensive view of the world and nature, a synthesis of science and art, explained in exceptional detail in his publication *Fundamentals of Potential Town Planning* (1957) [75]. In recent decades, in "a world of endless complexity" [76] (n.p.), the concept of space requires fundamentally different approaches. In the field of human geography, a significant shift in thinking was characterised by a careful examination of the meaning of the notions "space" and "spatiality", resulting in the conceptual transit from one to the other. Likewise, Audrey Kobayashi emphasises the difference between *relative* space and *relational* spatiality, where spatiality is not a particular space; it is a dialectical process that recognises space and "its sticky context" as a whole [77] (n.p.). Dobrović's writing places his theoretical notions of "landscape", "city landscape", and, particularly, "spatiality" in the context of their contemporary reinterpretations and re-actualisations.

4.2.2. Environmental Perspective in the Theory and Practice of Branko Petričić

In the 1950s, the initial idea of New Belgrade as a "governing city" was abandoned, and the focus shifted to the fundamental problems of housing. During this period, Branko Petričić authored the Proposal for the Master Plan of New Belgrade (1957), which, as pointed out by Ljiljana Blagojević, was well informed by his practice as an apprentice in the office of Le Corbusier in the 1930s. Furthermore, the turn in the planning of New Belgrade through Petričić's plan, can be read in its approximation of the basic postulates of the Radiant City, *La Ville Radieuse*, by Le Corbusier [6] (Figure 5 (2)). The Proposal was eventually abandoned, but his urban plans for housing settlements, experimental blocks 1 and 2, were the first to be realised in New Belgrade. Petričić attempted to synthesise and eventually managed to implement his idea on the "unity of organic and inorganic elements, fused in a functional structure" [78] (p. 228). In his architectural practice, as well as in his theoretical work, Petričić demonstrated deep knowledge and understanding of various aspects of the geographical, economic, and historical positions of Belgrade, as well as great sensitivity to the city's specific urban problems.

"The city itself already is complicated, so it should not be complicated furthermore. Its basic unit—a man—enters life with already complicated relationships. His existence depends on an untold number of cases and coincidences, to which he needs to react correctly—otherwise, he is a nuisance to himself and the environment" [78] (p. 219). Introductory sentences to Petričić's article on the planning and building of New Belgrade (1955–1975) reveal his attitude towards the multiple questions that arise during the procedure. The key element in Petričić's comprehensive and integrated approach to the theory and practice of urbanism, architecture, and landscape architecture is the profound knowledge collected to make an analytical basis for planning and design.

The relationship between the built and natural environments, the relationship between Belgrade and Zemun, two historic entities, and especially the position of the CZNBg in this complex context, were also subjects of Petričić's thorough explorations and thoughts on the diverse characteristics of the environment. According to Petričić, the general values at the core of a new city concept rely on the precise and detailed analysis of the complexity of the relationships among urban elements, but above all, their unity is seen as the feature of the main importance. In his vision of the modern city in the landscape, Petričić notes that "buildings [...] are not shapes in space for themselves, but entities in landscape assembly and part of the big panorama" [78] (p. 228). Maintaining the perspective of the big picture [79,80] and undertaking minute work in the fields of architecture, urbanism, and landscape architecture, both in theory and in practice, Petričić emanated the guiding idea that by denying nature, freedom is denied to a man [78].

4.3. Measuring Urban Landscape Transformations by Landscape Quality Assessment
4.3.1. Landscape Quality: Setting the Indicators and Assessment Framework

Landscape quality is the inherent value of the landscape as a whole [24]. Contemporary landscape conceptualisation shows the complexity of the phenomena in assessing and measuring it. Existing research, from sectorial points of view, provides vast spectra of landscape quality indicators [81,82]. For the purpose of assessing landscape quality within the spatial and urban planning contexts of the Republic of Serbia and founded on analogous approaches observed in countries that have ratified the ELC, our focus was on the integration of ecological and visual categories of indicators, such as openness, complexity, coherence, naturalness, and historicity [46,83]. The implementation of landscape quality indicators marks a significant milestone within landscape assessment on national (The Spatial Plan of Republic of Serbia indicates 15 landscape types) and regional scales (The Atlas of Belgrade's Landscape Character Types indicates 22 landscape types) [81,83–85].

Assessing the spatiality of the CZNBg required a new interpretation of urban landscape structures from the perspective of original modern architectural value that is legible as a built form and hollow space—roads, paths, paved, and high and low green spaces, as determined by the authors, Dobrović and Petričić [73,78]. (Figure 6). The creation of a

framework to assess landscape quality was based on already implemented indicators, such as openness, complexity, coherence, and naturalness, while historicity was omitted because of its complexity, which involves assessing both the historical continuity and richness of the urban landscape structure [86], which are not easily measured at this level by landscape metrics and need to be compensated with qualitative research.

MEASURABLE SPACE	MEASURABLE DATA OF LANDSCAPE ELEMENTS	LANDSCAPE QUALITY INDICATORS	DEFINITION		LANDSCAPE METRICS	DEFINITION
BUILT FORM		OPENNESS /ecological/	The ability of the land / specific area to absorb atmosferic water / the level of porosity...	patch density and size metrics	CA	Quantitative measure of the transformation process of structural changes in the landscape.
					CA%	Quantitative measure of the transformation process of structural changes in the landscape.
	buildings	OPENNESS /visual/	Visual openness refers to the extent to which a space or environment allows open views and vistas. Area that is open to the sky.		NumP	Quantitative measure of the transformation process of structural changes in the landscape.
	roads				PSSD	A measure of absolute variation, it is a function of the mean patch size and the difference in patch size among patches.
	paths	COMPLEXITY	It expresses the structural complexity of a landscape pattern which determines the functional and aesthetic categories of a particular type of landscape.	edge metrics	ED	The edge density equals all edges in the landscape in relation to the landscape area.
	paved area			shape metrics	MSI	Geometric parameter used to characterize the shape of objects or areas in landscape. Provides quantitative information about the curvature of a contour or boundary at each point on the object's surface.
	high greenery	COHERENCE	Coherence represents the unity of the landscape image through a consistent continuum of structural and textural characteristics of the landscape pattern of a certain type of landscape.		MPAR	Perimeter-area ratio is an indicator of polygon shape complexity. It provides quanyitative iformation about mean perimeter area ratio in hectares.
	low greenery			diversity metrics	SDI	It measures the diversity of patches within a landscape structure and is a way of measuring the uniformity of different land use patches within a landscape structure.
HOLLOW SPACE		NATURALNESS	Percentage of green infrastructural elements within the landscape structure.		SEI	Provides information on area composition and richness. It covers the number of different land cover types.

Figure 6. Landscape quality assessment: approach and methodological framework. Conceptualisation of the LQA presentation by Nevena Vasiljević and Sandra Mitrović, 2024. Source of data (Measurable Space): [73,75,78], Source of data (Landscape Quality Indicators, Definition, Landscape Metrics and Definition: [68].

Openness as an indicator of the landscape quality of CZNBg is recognised within both Dobrović's and Petričić's works [73,78], and it is observed as open urban blocks within naturally occurring clusters of lush vegetation, with adaptable compositions that prioritise artistic expression over rigid geometric designs. The *naturalness* of CZNBg emphasises an organic approach to shaping nature, combining organic and inorganic elements into a functional structure. The role of greenery (high and low) plays a crucial role in maintaining a natural feel amid urbanisation, providing environmental protection (wind and sun protection, noise reduction, and enhancement of the microclimate). Furthermore, aesthetic factors, such as the colour, structure, and arrangement of vegetation, play pivotal roles. The *complexity* of landscape structure is noticeable within a diverse range of artistic compositions in both inner block greenery and larger inner block/park panoramas that emphasise vistas and offer diverse views, experiences, and uses for residents (roads, parking, pedestrian walkways, and waste collection points, as well as expansive green areas featuring playgrounds and sports grounds). Although dimensions and distances may change over time, the structure of the CZNBg ensures that human measurements remain consistent to maintain a comfortable and harmonious living environment. In contrast, the outer block design adopts a mixed composition along roads, incorporating diverse vegetation types. The design balance between functionality, aesthetics, and ecological benefits, such as noise and pollution reduction, whereas during the socialist period, urban green open spaces primarily served recreational purposes and represented a space for social gatherings. The *coherence* of the block structure strives for spatial harmony in composition, preserving the integrity of open areas in continuous spaces and ensuring that all building layouts contribute to a cohesive landscape.

An assessment of the landscape quality of the CZNBg has to provide quantified data regarding spatiotemporal changes in the urban landscape's structure. Over the last two decades, landscape metrics have been used extensively as quantitative expressions of

changes in the urban landscape's structure using specific indicators at the landscape and class levels [67–69,87]. Landscape metrics are algorithms that quantify the spatial characteristics of landscape elements, supporting landscape analysis by means of objective indices. In these terms, carefully chosen metrics and parameters belonging to different groups, such as patch density and size metrics (AREA_ha, CA%, NumP, PSSD), edge metrics (ED), shape (MSI and MPAR), and diversity metrics (SDI and SEI), provide valuable information for improving assessments of landscape modifications in different time periods [67–69] (Figure 6).

By means of the multistage framework of landscape quality assessment explained above, our research aimed to analyse changes in landscape quality indicators within the urban landscape structure of CZNBg by quantifying it via landscape metrics over the following three time periods: the years 1985 (end of construction), 2005 (beginning of the twenty-first century) and 2024 (current state) (Figure 7).
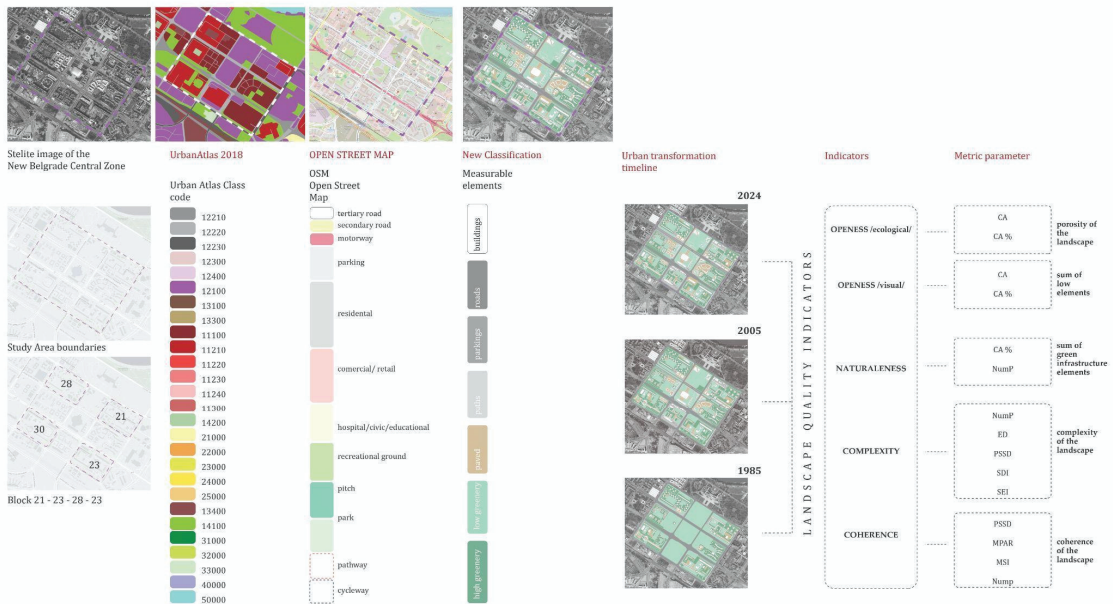
Figure 7. Generation of a new database for the landscape quality assessment. Visual conceptualisation of the database by Sandra Mitrović and Nevena Vasiljević, 2024. Source of database: [68].

Specifically for this research, we created a database linking UrbanAtlas (2018), as official metadata of official urban land use, with OSM (accessed: 22 February 2024) as user-contributed geospatial data. The created database was classified, in relation to the theoretical investigation of landscape spatiality, its built form, and hollow space (Figures 6 and 7), into five urban land use classes (ULUCs): buildings, roads, paths, paved areas, high greenery, and low greenery.

The landscape metrics were applied in the analysis of the patches of all urban land use classes (ULUCs). Class-level metrics were used in the analysis of the indicators of openness (visual and ecological) and naturalness. The openness indicators were observed from visual and ecological perspectives. They were measured using the AREA_ha and AREA% parameters, representing the porosity of the landscape/ability to absorb atmospheric water and visual openness or openness to the sky. Naturalness indicates the number of green infrastructure elements, which were measured by the parameters CA% (class area%) and NumP (number of patches). The landscape-level metrics parameters were used in the analysis of the complexity and coherence. The structural complexity was measured by

NumP (number of patches), ED (edge density), PSSD (patch size standard deviation), SDI (Shannon diversity index), and SEI (Shannon evenness index). The coherence of the landscape was quantified with metric parameters: PSSD (patch size standard deviation), MPAR (mean parameter–area ratio), MSI (mean shape index), and NumP (number of patches). The metrics were calculated using ArcGIS and Spatial Analyst, which is a tool of ArcMap, at the landscape level (analysis of all patches for each ULUC) and the class level (analysis of patches within the same ULUC) (Figure 7).

4.3.2. Focusing on the Case of the Central Zone of New Belgrade: Findings

The interpretation of the landscape quality of the CZNBg using the indicators of openness, naturalness, complexity, and coherence provides a spatiotemporal understanding of urban landscape modifications.

For the period from the end of the construction of the CZNBg (1985) to the beginning of the twenty-first century, quantitative analysis reveals a decline in metric parameters representing ecological and visual openness, naturalness, and coherence, while it shows increased values in the metric parameters of complexity. However, for the same time period between 2005 and 2024, these values decreased only minimally (Figure 8).
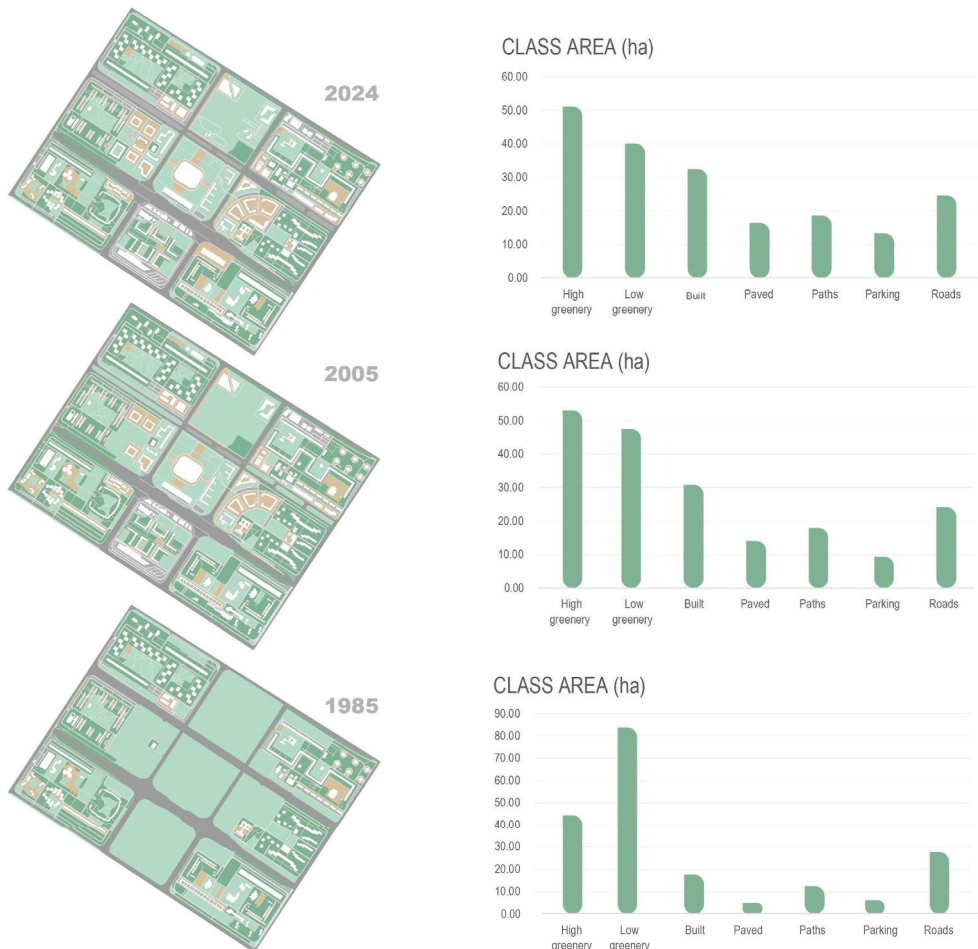

Figure 8. Spatiotemporal ULUC changes. Source of database: [68].

From the aspect of spatiality, the modification of the hollow space is most effectively accomplished by assessing indicators, such as ecological and visual openness, as well as naturalness (Table 1). The results show that from the period of 1985 to 2024, ecological openness decreased by 18.72% and visual openness decreased by 11.11%. Even if naturalness decreases the same as ecological openness, 18.72% the number of patches increases from 296 to 342, which directly influences the level of complexity. From the analysis of the class level of the CZNBg, the class of "high greenery", as a part of green infrastructure, showed minimal change, which represents one of the main characteristics of the urban landscape quality (Table S1). Conversely, the component of "low greenery" witnessed a substantial decrease in size due to the construction of central Blocks 22, 24, 25, 26, and 29.

Table 1. Landscape quality indicators for the assessment of the Central Zone of New Belgrade: parameter quantification. Source: Authors, 2024.

INDICATOR	YEAR	AREA_ha	%				
OPENNESS (ECOLOGICAL)	2024	91.21	46.33	SUM of ULUCs—high and low greenery			
	2005	96.37	48.95				
	1985	128.08	65.05				
	YEAR	**AREA_ha**	**%**				**CLASS LEVEL**
OPENNESS (VISUAL)	2024	113.12	57.45	SUM of ULUCs—low greenery, paths, paved area and roads			
	2005	113.12	57.45				
	1985	134.99	68.56				
	YEAR	**CA%**	**NumP**				
NATURALNESS	2024	46.33	342	SUM of ULUCs—high and low greenery			
	2005	51.05	354				
	1985	65.05	296				
	YEAR	**NumP**	**ED**	**PSSD**	**SDI**	**SEI**	
COMPLEXITY	2024	784	1943.8	1.15	1.85	0.95	
	2005	761	1889.0	1.16	1.79	0.92	
	1985	554	1326.5	1.68	1.57	0.81	**LANDSCAPE LEVEL**
	YEAR	**PSSD**	**SEI**	**MPAR**	**MSI**	**NumP**	
COHERENCE	2024	1.15	0.95	2640.43	2.12	784	
	2005	1.16	0.92	3291.52	2.15	761	
	1985	1.68	0.81	76785.1	2.41	554	

Landscape Quality Indicators

The ecological and visual openness metrics exhibited significant changes over time (Table 1). Ecological openness showed changes in the class values of high and low greenery between 1985 and 2005, with a decrease in porosity. However, from 2005 to 2024, this decrease slowed over the same period. Visual openness also showed notable variation in class values, such as low greenery, paths, paved areas, and roads, with a decrease between 1985 and 2005, whereas in the remaining period it stayed relatively stable, from 2005 to 2024.

Naturalness, indicated by the total percentage of the class area of high greenery and low greenery, or CA%, decreased from 1985 to 2024, but it showed an increase in the number of patches. This indicates that the elements of green infrastructure have become fragmented, with an increase in paved areas, parking plots, and construction of new buildings.

Unlike previous landscape indicators, the metrics at the landscape level for complexity displayed different trends compared to previous landscape indicators. From 1985 to 2024, the results showed an increase in several metric parameters, such as the number of patches (NumP), edge density ED, SDI, and SEI. However, PSSD showed a decrease, indicating a reduction in the variation in patch size.

Coherence emerged as the most critical indicator for assessing the landscape quality of CZNBg. It was measured at the landscape level using the Mean Shape Index as a shape metric parameter, which displayed a decrease in the shape regularity over time. The

number of patches increased from 1985 to 2024. Shannon's Evenness Index (SEI) exhibited an increase, indicating a shift towards more even distributions among patch types.

Landscape Quality Indicators for the Corner Residential Blocks of the Central Zone of New Belgrade

The corner residential blocks of the CZNBg present the inherent quality of modern architecture (construction was finished in 1985) and became the focus of our interest concerning a deeper understanding of landscape quality indicators.

Analysing the transformation of Block 21 in the CZNBg through a comprehensive examination of the gathered data, the following changes in metric parameters were observed (Tables S2 and S3, Figure 9 (1–2)). Both ecological openness (sum of ULUCs—high and low greenery) and visual openness (sum of ULUCs—low greenery, paths, paved areas, and roads) experienced a decline from 1985 to 2024. This reduction indicates a new construction within the boundaries of the block. Despite the overall transformation, the percentage of naturalness (sum of ULUCs—high and low greenery) remained relatively stable over time, with CA% staying at around 44% from 1985 to 2024. The analysis of the complexity metrics indicated that the number of patches (NumP) increased over time, from 1985 to 2024, while the edge density (ED) increased steadily over the years, indicating an increase in complexity, with a constant trend. However, the coherence shows that the patch size standard deviation (PSSD) decreased from 1985 to 2024, indicating a reduction in the variation in patch size, and the Mean Shape Index (MSI) also decreased from 1985 to 2024, indicating a decrease in shape regularity.

Both the ecological openness of Block 23 (sum of ULUCs—high and low greenery), and visual openness (sum of ULUCs—low greenery, paths, paved areas, and roads) exhibited a decline from 1985 to 2024, indicating new construction within the block's boundary. The percentage of naturalness (sum of ULUCs—high and low greenery) experienced a significant decrease from 2005 to 2024, indicating an 8.91% loss of green infrastructure elements over time. The number of patches (NumP) remained relatively stable, indicating the consistent fragmentation of green spaces. The complexity analysis showed a slight increase in the landscape complexity, with the number of patches (NumP) increasing from 1985 to 2024, while the edge density (ED) and Shannon's Diversity Index (SDI) show fluctuating values over time. The coherence metric remained relatively stable over time. The analysis shows that patch size standard deviation (PSSD) and Mean Shape Index (MSI) show minor changes over time, indicating relatively stable patch size distribution and shape regularity (Tables S2 and S4, Figure 9 (3–4)).

The evolution of Block 28 in New Belgrade offers significant insights into the changes in the landscape quality indicators (Tables S2 and S5, Figure 9 (5–6)). The ecological openness (sum of ULUCs—high and low greenery) remained stable over time, while visual openness (sum of ULUCs—low greenery, paths, paved areas, and roads) showed slight fluctuations, decreasing from 1985 to 2024. The percentage of naturalness (sum of ULUCs—high and low greenery) decreased significantly from 2005 to 2024, indicating an increase in construction. The complexity analysis suggests a slight increase in the number of patches from 1985 to 2024, suggesting a slight increase in landscape complexity, while the edge density (ED) and Shannon's diversity index (SDI) showed minor fluctuations over time. The coherence metric of Block 28 showed a patch size standard deviation (PSSD) and Mean Shape Index (MSI) that remained relatively stable over time, indicating consistent patch size distribution and shape regularity.

Following the change landscape quality indicators of Block 30 in New Belgrade (Tables S2 and S6, Figure 9 (7–8)), ecological openness (sum of ULUCs—high and low greenery) and visual openness (sum of ULUCs—low greenery, paths, paved areas, and roads) showed a decrease from 1985 to 2024. The percentage of naturalness (sum of ULUCs—high and low greenery) remained relatively stable over time, with the CA% staying at around 61–66%. The complexity of Block 30 showed that the number of patches (NumP) remained consistent over the years, suggesting a stable landscape complexity. The edge

density (ED) and Shannon's diversity index (SDI) remained relatively stable over time, with no significant changes. The coherence metrics for patch size standard deviation (PSSD) for Block 30 remained consistent over the years, indicating a stable patch size distribution. The Mean Shape Index (MSI) also remained consistent, indicating stable shape regularity.
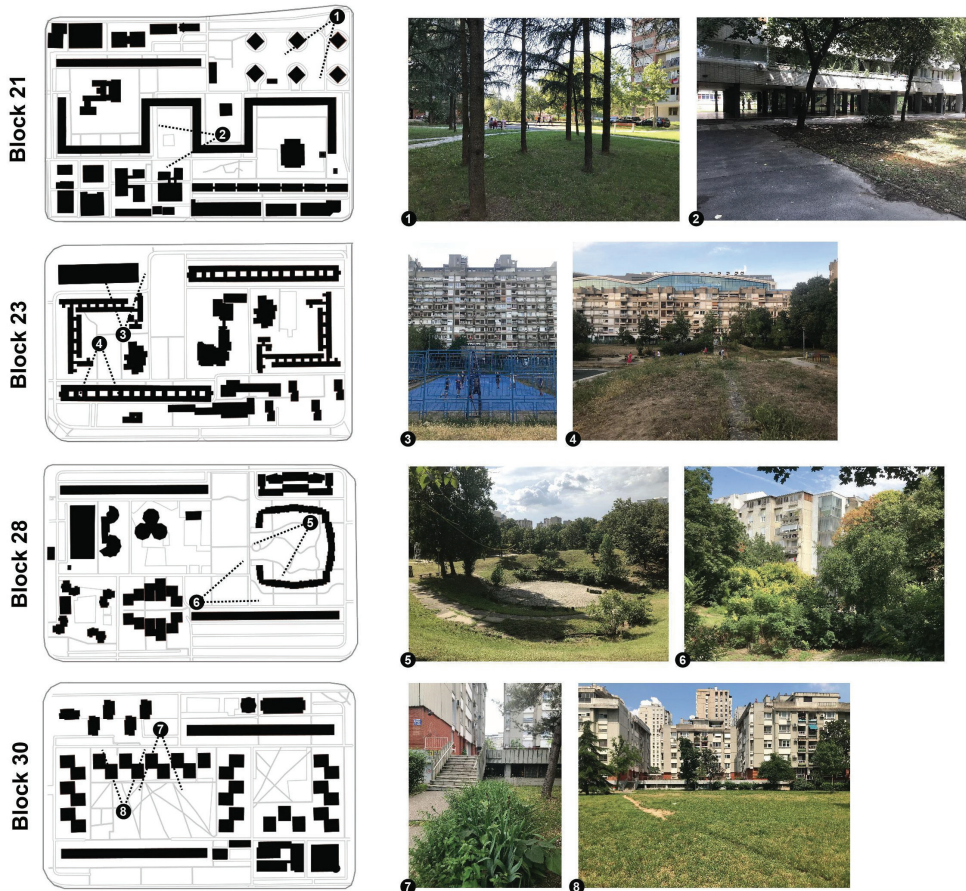
Figure 9. Spatial relationships documented in the vistas of the corner residential blocks of the Central Zone of New Belgrade. The plans for each analysed block, with the positions marked 1–8, and the orientation of the photographer's view, are coupled with the corresponding images: 1—playgrounds and green space between residential towers; 2—vista at the ground level passage of the slab building; 3—basketball playground and residential slab behind; 4—greenery and residential slab with the roof of a newly developed office building peeking behind; 5—landscaping in the block's inner courtyard; 6—view of a residential building through the greenery; 7—vehicle and pedestrian separation in the block; 8—grass patch and mass housing in the background. Graphical illustration prepared by Dezire Tilinger, 2024. Photographs: Marija Milinković, July 2020 (1,2,5,6) and September 2023 (3,4,7,8).

Analysing specific blocks within the CZNBg reveals similar trends in ecological and visual openness, naturalness, complexity, and coherence. However, the degree and timing of the changes vary among the blocks, suggesting unique patterns of landscape evolution within each block (cf. Figure 9). Despite facing reductions in openness and shape regularity, Block 21 demonstrated an increase in complexity over time. This indicates a dynamic process of urban modification, with the landscape evolving in response to changing urban demands and development pressures. The landscape quality of Block 23 showed a mixed

pattern of change, with decreases in openness and naturalness alongside slight increases in complexity. This suggests a complex interplay of factors influencing the landscape dynamics within this block (Figure S2). Block 28 exhibited relatively stable openness and coherence over time, with notable decreases in naturalness. This indicates a consistent landscape structure with ongoing urban development activities, leading to the loss of natural elements within the block. In Block 30, openness exhibited a decrease over time, while naturalness, complexity, coherence, and historicity remained relatively stable. These changes reflect a balance between ongoing urban development and the preservation of certain urban land use classes within the area, emphasising a distinctive approach to landscape management and planning.

Overall, these observations highlight the diverse and dynamic nature of landscape quality within different blocks of the CZNBg, influenced by a combination of urban development, preservation efforts, and evolving environmental factors.

5. Discussion

In conducting an investigation into postwar mass housing heritage, a set of criteria and indicators for the valorisation and assessment of large housing estates was developed. Using a multiperspective analytical probe, the methodological assumptions were tested, and the results point to specific recommendations for setting a novel value typology. The suggested methodology provides the possibility of expanding heritage assessment methods, that is, to complement traditional and current methods and enable a more encompassing assessment of significance.

The CZNBg is used here as an exploratory case study to showcase what insights landscape architecture can provide in the assessment process that have not yet been grasped by other disciplines. The case was selected as relevant from a cultural heritage perspective because it is one of the largest and most exemplary mass housing neighbourhoods built in Yugoslavia and one of the rarest to be declared a heritage site (Figure 10).

Starting from the element used in the process of the institutional protection of the CZNBg, we entangled the ULT approach to propose a new assessment methodology that could also serve as a base for assessing and declaring other mass housing neighbourhoods as heritage sites in the ex-Yugoslav and broader post-socialist European context. In this endeavour, it was necessary to change the traditional perspective of historical enquiry usually applied in the assessment process and to broaden the scope of the criteria by including urban landscape values [66]. An urban landscape approach to heritage assessment opened the possibility of holistic insight into all levels that compose the complex structure of the relational context [25,26]. Seeking to integrate criteria from the urban landscape perspective, we applied the following three lines of investigation: landscape historical enquiry, landscape theoretical analysis, and landscape quality assessment.

The criteria obtained using an historical perspective and the principle of *connotation* refer to comprehending the urban landscape as a phenomenon in a spatiotemporal context, such as including the broader spatial and temporal context; being aware of nonmaterial heritage values; being aware of past transformations of landscape and integrating the previous historical layers into the new superimposed landscape; and observing the heritage site in relation to the neighbouring urban structures, specific urban tissues and the existing urban landscape as a whole.

The criteria from the theoretical framework and the notion of *spatiality* refer to a comprehensive approach to the assessment of spatial values of the urban landscape and imply an intention to acknowledge the ratio between built forms and hollow space in between; inside–outside continuity, interstitial and transitional spaces, as well as all kinds of spatial relationships in between; terrain architecture—qualities of constructed topography and spatial connectedness; the green infrastructure elements as a ratio between ecological and visual openness; and movement.

The framework of landscape quality assessment considers various measurable indicators, such as openness, complexity, coherence, and naturalness. Through the application

of landscape metrics, which are algorithms that quantify the spatial characteristics of landscape elements, landscape analysis is supported by means of objective indices. This approach helps to ensure that assessments are objective and based on specific criteria rather than subjective opinions.

In Europe, mass housing estates present a relatively new heritage and, therefore, many of them are not yet protected. The results from the COST project, presented in the MCMH Atlas, provide curious statistics regarding the scope of protection. In fact, out of the 27 countries and 97 mass housing estates analysed as case studies, only studies from 8 countries (Belgium, France, Israel, Lithuania, Portugal, Serbia, Slovenia, and the Netherlands) clearly stated that some of the studied estates were under some form of protection, ranging from local or national to UNESCO patrimonial heritage. Moreover, there is a sort of initiative to declare exemplary mass housing estates as heritage in several countries, such as Hungary and Montenegro [1]. On the basis of these broad but still limited insights, it can be concluded that countries in Europe recognise the importance of collecting, documenting, and evaluating relevant data on mass housing estates and are slowly starting to view these estates as heritage sites.

The valuation of mass housing heritage is generally based on the well-established significance assessment procedures used in the areas of history, architecture, and urbanism. The analysis of landscape values is mostly limited to the recognition of significant achievements in the domain of landscape architectural design or description of the main features of open spaces [1]. The Lazdznai (Lithuania) mass housing estate represents an exemplary case in this sense. It was listed as a heritage site of local significance on the Lithuanian SSR list already in 1984, only a few years after its construction began (1967), because it was awarded the Lenin Prize. It was the first top-level state award for an urban project, and the estate became an example for the entire Eastern Block. It was later transferred to the Lithuanian List of Cultural Heritage in 1993 as a heritage site [88,89]. The estate is valued as important due to its architectural, historical, landscape, and urbanistic significance. The information available from the Register of Cultural Heritage in Lithuania provides a detailed description of both its built and natural values and specifically highlights important features and parts of the estate by name. Natural elements, like the terrain, the nearby pine forest, and the specific arrangement of the perimeter plantings along pedestrian paths near certain streets with deciduous trees, are highlighted as important and as an evaluation category of its own. A more complex and comprehensive assessment methodology is implemented in the case of Western Garden Cities, Amsterdam, the Netherlands, where all building ensembles in the neighbourhood are assessed at the following four levels: "(A) typology or internal organisation of the building; (B) architectural quality, relating to design, style, construction, material used, and technical detailing; (C) ensemble or urban layout, which refers to the connection to the urban space and positioning or grouping of buildings within an ensemble; and (D) relation to the garden city character, that is, the quality of the relationship between the object or ensemble and the garden city character" [29] (p. 5). At this point, it can be comprehended that the Dutch assessment procedure employs the well-known garden city concept as a quality criterion and extends the traditional methodology.

Having this relatively low number of mass housing estates declared as heritage sites in mind, it can be assumed that methods for assessing them as heritage sites are still in development and vary between countries, as can be seen from the differences between Lithuania and the Netherlands. As already explained, these housing estates have similar origins, comparable development paths, and face similar issues today; future research should aim to develop universal methods for mass housing heritage assessment with a holistic–interdisciplinary yet flexible approach in mind. Still, this is quite a challenge due to the fact that there is a lack of methodologically oriented research conducted on mass housing heritage assessment and still very limited literature on the topic, as such research studies mostly focus on describing a case study rather than explaining the evaluation

process [29–31,90]. The lack of transparency in heritage significance considerations has also been noted by other authors [42,91].

Figure 10. Illustration of the urban landscape transformation of the Central Zone, which is placed on a hydrological map of Belgrade. Graphical illustration prepared by Dezire Tilinger, 2024; source of the hydro-geology map of Belgrade: [92]. Source of the drawing of the plan of the CZNBg: [6] (p. 182).

In terms of the CZNBg and the related investigation presented here, similar or identical conditions prevailed in the mentioned European examples, such as in Lithuania and the Netherlands. Moreover, the obstacles and limitations in establishing a context for assessing the value of mass housing settlements were quite similar. We believe that a proposal for a new, expanded methodology for the assessment and protection of modernist mass housing settlements based on a complex theoretical and methodological approach, including the multiperspective approach of landscape studies, can contribute to overcoming the current situation and its complexity. The main problem with cultural heritage assessments of mass housing estates is the lack of time to conduct detailed research, because this process is always caught between calls for the recognition of their value as cultural heritage and actual socio-economic opportunities and challenges that represent, in many ways, the danger that settlements will either be demolished or transformed [93]. We argue that only careful consideration of the socio-spatial context, coupled with decisions that stem from this approach, can provide the conditions for mass housing protection and revitalisation.

6. Concluding Remarks

The selected approach revealed diverse knowledge and various insights, apparently inconsistent but interrelated and complementary. Historical enquiry offered broader insights into relevant ULTs, highlighting unique social and spatial contexts. The theoretical survey unlocked a set of the main qualities of urban landscapes subsumed through the main/umbrella criterion of *spatiality*. Following the results of previous phases of investigation, landscape quality assessment adapted the standard methodological procedures and verified the set of selected criteria and indicators through a detailed analysis of the

real space transformations. Further investigations might allow for the development of a detailed value typology by further identifying and testing landscape criteria/qualities and indicators. One outcome of this research was the evidence of experts' involvement in the preparatory phase of the MH landscape assessment. By providing a body of knowledge and expertise, this kind of methodology can inform the broad-based participation process, following the contemporary tendencies for the democratisation of the cultural heritage assessment procedure [41]. The approach to mass housing urban landscape heritage assessment proposed herein, further elaborated through a site-specific assay, was supported by a comparison with other referent assessment procedures.

This perspective can be used to extend the potential for 1. tackling the "thickness" of temporality related to (urban) landscapes; 2. rethinking and redefining the applied heritage assessment approach; 3. opening the assessment procedure to a wider range of stakeholders, particularly nonexperts and the local community; and 4. re-actualising the positions and roles of experts in terms of communicating knowledge in a completely new context.

The correlations between the disciplines of architecture and urban planning and landscape architecture and planning were explored here to allow for multiple perspectives on the same issue and to help bridge the research gap between standalone disciplines. This inquiry employed the different methodologies and terminologies used by each discipline to contribute to a better, nuanced, and more precise understanding of complex concepts. Consequently, it should help to establish a more delicate and multifaceted approach to the assessment and, consequently, the protection of endangered urban cultural heritage.

With this in mind, future research can advance critical spatial assessments by proceeding along the three directions used in this study. It can focus on the operationalisation of the theoretical discourse for further development of the assessment methodology, including adjustments and specifications for the proposed criteria and indicators. The three lines of research are intertwined, inform each other, verify insights, and, most importantly, enable the formulation of new questions and fields of research in the domain of spatial assessment.

Conflicts of Interest: The authors declare no conflicts of interest.

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Article

The Welfare Landscape and Densification—Residents' Relations to Local Outdoor Environments Affected by Infill Development

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Abstract: Densification through infill developments is a common planning strategy where both advantages and problems have been brought forward. However, the knowledge on how such developments affect residents and their relations to local outdoor environments is limited. Also, modernist areas have been highlighted as planning heritage with specific values. We studied the case of a multi-family housing area in Uppsala, Sweden, originally planned in the 1960s as part of the Swedish modernist welfare era and later affected by densification through infill development. The mixed-methods approach included document analysis and observations followed by an online survey focused on the use of, perceived qualities of and satisfaction with outdoor environments among residents. The results revealed the heritage of careful planning during the 1960s concerning green space availability and solutions limiting car traffic, with recent densification affecting different sub-areas to various degrees. Respondents living in non-densified sub-areas reported higher levels of satisfaction, more qualities and a more varied use of the outdoor environment compared to in densified sub-areas. However, the management level was considered too low in mainly one of the non-densified sub-areas. Many respondents brought up the loss of qualities in their local outdoor environment through the infill development, both during the construction work and in the result, with less green spaces and increased car traffic. This study revealed large negative effects for residents of densification that focuses on density without securing sufficient qualities in the outdoor environment but also of neglected open space management.

Keywords: car traffic; compact cities; green space; infill development; neighborhood satisfaction; open space management; perceived qualities; planning; Uppsala

1. Introduction

Urban spatial planning in Europe and beyond has been strongly focused on densification processes during the last decades, mainly in the form of infill in existing built areas [1]. Densification is often based upon an aim for sustainable development, claiming to achieve multiple goals, including land protection (from urban sprawl), carbon emission reduction (through short distances for transport and commuting leading to, e.g., less car dependence) and stimulation of other socio-economic effects [2]. However, there are also several arguments against densification, and challenges concerning transport and energy consumption have been revealed [3]. A review of the research literature on the effects of densification showed positive correlations for transport and economics but negative correlations for ecology, social impact and health [4], indicating that the ecological, social and health effects have not been sufficiently taken into account. Reviews on the effects of cities growing more compact are thus bringing up both positive and negative effects [5]. This duality can result from different aspects being studied and from the many different ways in which density can take physical form, showing the need for contextual, place-based understanding [1].

A major challenge is that cities undergoing densification have problems providing green space without loss in quality, quantity and social equality [6]. Having access to large green spaces close to home has specific values for residents as it affects their overall quality of life and health positively [7], as for example, mental health is supported by the frequency of visits to green and blue spaces [8], and the amount of neighborhood greenness is associated with slower ageing [9]. With increasing numbers of people sharing often diminishing green spaces, crowding can negatively influence their wellbeing in terms of mood and affective experience, affecting women in particular [10]. Other groups with specific needs for green space access include the elderly and children [11], as well as different ethnic groups [12].

A well-functioning green space provision for all users does require good planning, design and management [13], where these processes are well connected to provide quality over time [14]. However, urban green structures are increasingly conceptualized in order to fit within policies of compact cities, threatening the coherence of green space, as densification has become the priority rather than the shared goal of sustainability [15]. In planning documents, densification is therefore claimed to provide several positive qualities simultaneously, including green spaces and their functions, even when this is not actually spatially possible [16]. The current development with increased densification can thus be putting urban green space and its functions at risk, which is affecting its various users.

For people living in built environments, satisfaction, use and perceived qualities related to local outdoor environments are three highly interlinked aspects, all affected by multiple factors, connected to green spaces [17]. Neighborhood satisfaction is strongly affected by the perceived qualities of local green spaces [18]. The many aspects affecting the use of local green space [19] include positive perceived qualities relating to pleasantness and safety [20] but also qualities such as distance from home [21]. Perceived qualities are related to individual uses and user preferences but mainly describe these through conditions of existing local outdoor spaces [17]. Compared to urban sprawl, neighborhood satisfaction and wellbeing can be higher in compact built environments if certain qualities are fulfilled, including "mixed land uses, public transport, limited car traffic, access to green spaces, and social equity" as well as measures to limit noise, litter and fear of crime [22] (p. 270).

Despite the common densification trend in planning, little is known about how denser areas and infill projects are affecting the views and lives of urban residents. Infill developments are rarely considered positive among local residents [2], experiencing loss of open and green spaces and neighborhood character and increased traffic [23,24], while in some contexts, they are found rather attractive [1]. The fact that they are more commonly accepted in general than in one's own neighborhood is something that Wicki and Kaufmann [2] describe as being caused by either NIMBYism or anti-growth sentiments, while Ruming [25] finds such labeling problematic against local engagement in protecting open spaces and vegetation. Concerning the use of private cars, denser built environments have shown not to guarantee reduced personal vehicular mobility neither in large cities [26] nor in smaller towns [27]. Car traffic and green space provision are also closely connected. For example, Qviström et al. [27] showed that retired persons living in newly built, dense areas with limited access to green spaces had chosen to compensate for the lack of outdoor areas by having second homes to which they drive by car.

There is an increasing interest in the heritage of modernist areas in many parts of the world, being highlighted as planning resulting in specific values for people, previously often not recognized and therefore under pressure to change [28,29]. The lingering structures of modernist-style planning in Sweden and neighboring countries might be described as a welfare landscape. It is the materialization of a complex welfare discourse [30], often found in multi-family housing areas part of the Swedish so-called million homes program [31]. Particularly during the 1960s and 1970s, much attention was given to the provision of, e.g., large surfaces for outdoor recreation and traffic solutions separating cars from pedestrians in those areas [30]. Today, many local residents appreciate the modernist

outdoor areas and express affection towards them but also experience too low maintenance levels [32]. However, a shift in the attitudes in planning has led to green spaces aimed for recreation being used for development, arguing for quality rather than quantity in outdoor space [33]. In the last decades, a patchwork of planning styles has appeared as densification is introduced in or next to older areas. As the materializations and assets of welfare planning are today being heavily transformed, Qviström [34] has called for a better understanding of the heritage and values in its topology, before it is too late. It is therefore of high interest to study the effects of this development through the views of urban residents. As local green space is a quality for residents that has been emphasized in planning both during the welfare era and in current densification, there is a need to learn more about residents' relation to green space in areas that are shaped according to these different ideals.

The aim of this study is to deepen the knowledge on how densification of urban residential areas from the welfare era is affecting satisfaction with, use and perceived qualities of outdoor environments among residents. A central research question guiding this study is as follows: How do the satisfaction with, use and perceived qualities of outdoor environments from the Swedish welfare era differ between where densification has been realized and where it has not?

2. Methods

This study is based on a single case study using mixed methods, including initial document analysis and observations of the planning and development (part 1), followed by an online survey on residents' satisfaction, usage and qualities sent out to residents of a selected case study area (part 2) (see Table 1 for an overview). The case is an area consisting of the two city districts Kvarngärdet and Kapellgärdet, which is part of central Uppsala, Sweden. The area was selected for the study as it contains elements which are materializations of both a welfare landscape and of later dense planning ideals, being characterized both by housing areas planned in the 1960s and 1970s, as well as more recent infill from the 2000s.

Table 1. Overview of the methods used in the case study.

Part 1—Planning and Development	Part 2—Residents' Satisfaction, Usage and Perceived Qualities
Document analysis	Online survey test
On-site observations	Online survey
Virtual observations	

A combination of document analysis and observations was carried out during the spring of 2021 to conduct an initial analysis of the area. Relevant planning documents from the 1960s and 1970s were collected from city archives at Uppsala local government during two visits. One detailed development plan was excluded, as it had been renewed in the last couple of years in connection with the densification process. On-site observations were conducted on three occasions at varying times and days. Streets, parks, playgrounds and available courtyards were observed and documented with written notes and photographs to confirm which parts of the area had been densified. Virtual observations, using Google Street View, were used throughout this study to further understand information obtained through the survey.

The online survey was created in the program Netigate and consisted of three blocks, containing in total 13 questions (see Appendix A) connected to the outdoor environment: satisfaction, usage and qualities. Additionally, four questions were asked about the respondents' socio-demographic profile to obtain an overview of the respondents as a group. The survey contained multiple choice questions, rating questions and open-ended questions.

The options for the multiple choice questions regarding usage types were based on a categorization of uses by Fongar et al. [35], meant to capture the users' motivation to be outdoors: extrinsic (e.g., walk the dog, collect food, play with children), social interaction (e.g., visit/take part in events, meet friends, picnic), active (e.g., running, other sports, cycling, ball games, other activities), intrinsic (e.g., quietness, get fresh air, relax, get sun, experience nature) and non-users (e.g., passing through, do not visit green space). The last option was separated into two and lightly adjusted: (1) passing through and (2) do not use the outdoor environment.

The options for the multiple choice questions regarding which qualities could be found and appreciated in the outdoor environment were based on cultural ecosystem services as well as a categorization of qualities found to motivate people to visit green areas developed in previous surveys [36]. The options "changes and constructions" as well as "I do not value the area" were added.

To be able to compare parts of the case area that are densified and those that are not, the area was divided into six sub-areas, three of which contained densification through infill development and three that were not (yet) directly affected by infill (Figure 1). This division provides a simplified view of the area and its two qualities—either welfare landscape or densified—while there are also differences between the sub-areas as well as different parts of them. The sub-areas are Western Kapellgärdet (1), Northern Kapellgärdet (3) and Eastern Kapellgärdet (4), all densified, and Central Kapellgärdet (2), Northern Kvarngärdet (5) and Southern Kvarngärdet (6), which are not densified but largely consist of kept welfare landscape characters. Of the densified sub-areas, Northern Kapellgärdet (3) consists of housing from the 1960s, where open spaces have been densified both outside of and within existing courtyards, whereas infills in Western Kapellgärdet (1) have been built as a larger new infill area on former industrial space. In Eastern Kapellgärdet (4), infills have been built on open green or gray spaces in close connection to existing housing areas and a main road. Also, the sub-areas that are considered not densified are affected by infill to various extents, as for example, parts of Central Kapellgärdet (2) and Northern Kvarngärdet (5) are very close to the new buildings in Eastern Kapellgärdet (4), in an area where the division between the sub-areas is not evident.
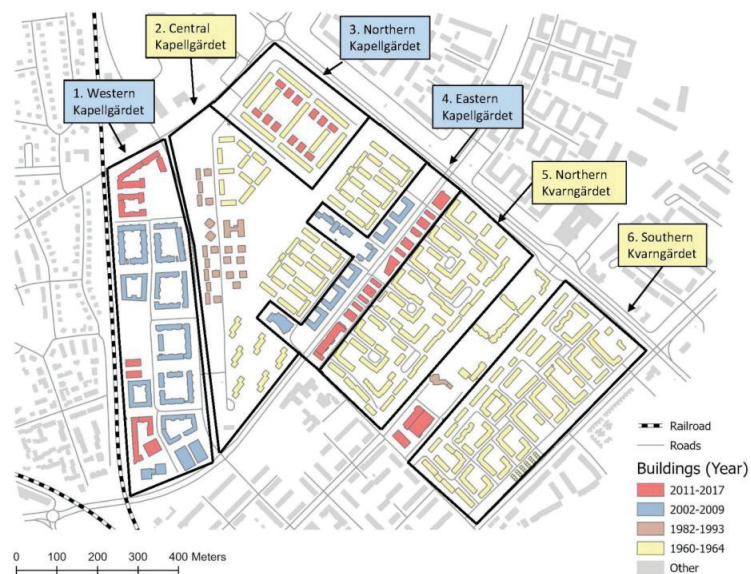

Figure 1. The six sub-areas defined in this study. The colors of the buildings show the years the detail plans were formally accepted. Non-densified sub-areas mainly consist of buildings from the 1960s (yellow), while densified sub-areas include buildings from the 2000s (red and blue).

Questions regarding satisfaction, usage and qualities were posed on two scales, once about the outdoor environments in the immediate area (within 50 m from the home) and once about the area as a whole. This was performed to identify differences between the outdoor environment in the immediate area and in the area as a whole, as well as between residents in densified and non-densified sub-areas.

Before the questionnaire was sent out, it was tested on a limited number of people with connections to Kvarngärdet and Kapellgärdet, resulting in two answers. The feedback was used to adjust the questions. The questionnaire was then sent out to all residents residing in the area, after ordering addresses from Statens personadressregister, SPAR, ("the Swedish state personal address register"), identifying 5913 relevant and unique addresses. A QR code and a link were printed on physical postcards distributed to the addresses in May 2022. Both the postcard and the survey had text in Swedish only. After 3.5 months, the survey was closed to further answers. According to Swedish law, no ethical approval for the research was needed, as no personal or sensitive information was collected from the respondents, whose answers were given anonymously.

Analysis

The survey results were analyzed in the program IBM SPSS Statistics 26, where one-way analysis of variance followed by Tukey's test was used to determine statistically significant results between answers from the different sub-areas (on a 5% significance level). In the analysis of the question of usage frequency, a seven-step scale was grouped into seldom (a few times a month, more seldom and never) and often (several times a day, once a day, several times a week and once a week) to simplify the analysis. For usage frequency, usage types and perceived qualities, Crosstabs with Pearson's chi-squared test were used, first for each sub-area, then grouped into densified and non-densified sub-areas. Answers to open-ended questions were analyzed qualitatively by coding and sorting them based on their similarities in content, forming larger themes. This process was performed manually using a digital spread sheet. The results were arranged in line with the three main blocks of the survey, with sub-categories under the two blocks satisfaction and qualities, where results from open-ended questions were included. Planning documents were scanned through, and parts relevant to the research questions were synthesized.

3. Results

3.1. Planning and Development

Plans for Kvarngärdet started during the 1950s, in a modernist style with parks, housing, public buildings and limited access for car traffic [37]. Parking spaces were placed along the main road in the city district, purposefully to limit car traffic as much as possible in the smaller streets, both for children's safety and general well-being in the area. The housing consisted mainly of two-story buildings around common courtyards. Schools, preschools and open spaces for sports were built north of this area.

In 1964, Kapellgärdet was planned on the other side of a main road from Kvarngärdet, tied together by pedestrian and bicycle paths and a tunnel (Figure 2). Housing in the form of six-story buildings as well as lower two-story buildings was constructed, with some of them being designated as student housing, around a generous park and with open courtyards attached to other adjacent green spaces. Additional space in the north of Kapellgärdet was also planned as parkland, to compensate for the lack of green space in the surrounding housing areas [38]. Preschools and social spaces such as squares, common buildings and shops were also constructed. Traffic was planned in the same way as in Kvarngärdet, limiting car traffic and connecting the different parts of the city district with pedestrian and bicycle paths. In the west of Kapellgärdet, an area for small industries was built.
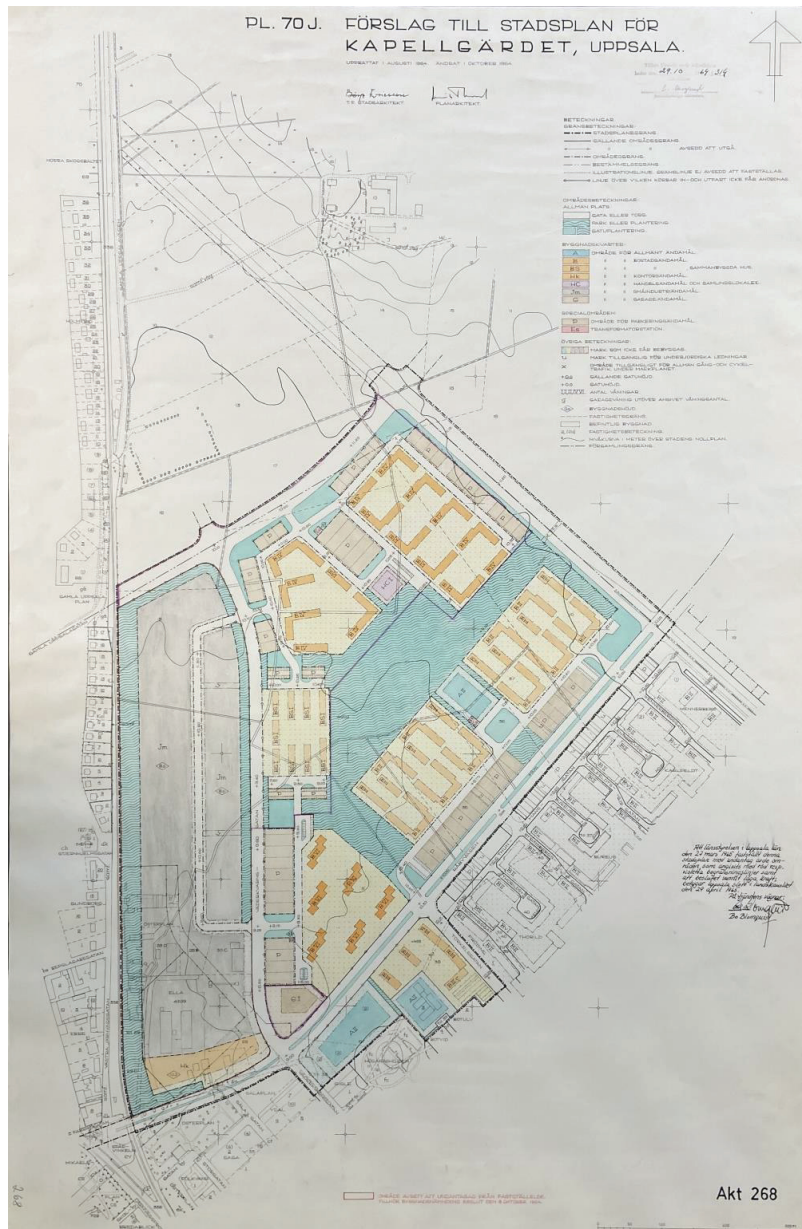
Figure 2. The plan for the city distric**y** Kapellgärdet from 1964 [38] with the large park surrounded by various housing areas and services. Areas for parks, plantings and public usages are in light blue while housing areas are in yellow.

Infill development of mainly more housing was planned and built in the area, mostly from the beginning of the 2000s and onwards. Among other changes, the main road leading through the area (east–west) was widened and adapted with a bus lane. There are currently plans to build additional housing in Kapellgärdet on green and gray spaces around existing buildings and courtyards [39]. The plot ratio in 2015 in Kvarngärdet was 0.71, which is

considerably higher than the average of 0.42 reported for all of Uppsala but also much lower than that of the city's most central parts [40].

3.2. Survey Response Rate and Socio-Demographic Profile

A total of 595 answers were collected, giving a response rate of 10%, of which 523 answers were complete (8.8%). The gender and age distributions of the respondents were fairly even, along with some very few non-binary people and people who did not wish to specify their gender. Nearly half of the respondents had lived in the area for 1–5 years, while only a few (2%) had lived there their whole life. A large share of the respondents (40%) lived in the densified sub-area Western Kapellgärdet (1), where many reside and the response rate was highest (13%).

3.3. Satisfaction

The level of satisfaction with the outdoor environments varied greatly between sub-areas, with answers ranging from not at all to very satisfied. A statistically significant difference was found between densified and non-densified sub-areas regarding the immediate area (within 50 m of the home), see Table 2, where respondents from non-densified sub-areas indicated higher levels of satisfaction. While respondents in two of the three non-densified sub-areas were the most satisfied with their outdoor environments, Southern Kvarngärdet (6) was the exception, see Figure 3. For satisfaction in the area at large, no statistically significant difference was found between densified and non-densified sub-areas, and the lowest level of satisfaction was reported in Southern Kvarngärdet (6).

Table 2. Tukey's test for satisfaction in regard to the outdoor environment in the immediate area, where sub-areas without a common letter (a, b, c) are separated on the level of significance of 5%.

In Which Part of Kvarngärdet or Kapellgärdet Do You Live?	N	Mean Value
Eastern Kapellgärdet	59	2.66 a
Southern Kvarngärdet	63	2.70 a
Northern Kapellgärdet	55	3.11 ab
Western Kapellgärdet	229	3.15 b
Northern Kvarngärdet	49	3.27 bc
Central Kapellgärdet	102	3.79 c
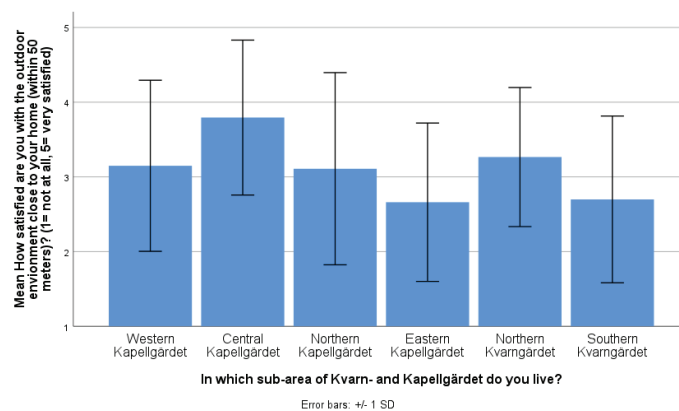
Figure 3. Mean level of satisfaction in regard to the outdoor environment in the immediate area, found to be higher in non-densified sub-areas (Central Kapellgärdet (2), Northern Kvarngärdet (5) and Southern Kvarngärdet (6)) in the statistical analysis.

3.3.1. Density

Respondents from all sub-areas mentioned that the area as a whole is or is becoming very dense, with buildings close to each other. They drew attention to some buildings in the densified sub-areas having small courtyards or having none at all. There were accounts of physical crowding in the outdoor environments, the sun rays not reaching the ground of the courtyards and noise echoing between the crowded buildings causing stress and sleep deprivation. An example of the sense of crowdedness is the fact that several respondents referred to a small hill in one of the parks as their favorite place because "(...) there you mostly get left alone and get to have a view". Other accounts included the following: "There is way too much construction! Everything green is being replaced by buildings. It makes me consider moving" and "This place was beautiful before but now it's so cramped".

3.3.2. Maintenance and Perceived Safety

Respondents from all sub-areas expressed problems with littering and insufficient maintenance of the outdoor environment, connected to open space management and its operational maintenance. This issue had worsened during the last few years, particularly mentioned by residents in non-densified Southern Kvarngärdet (6). The maintenance in this sub-area was described as "a total catastrophe", and someone expressed that "the area was good in the past, but now it is practically decaying". The poor maintenance might explain the low level of satisfaction in Southern Kvarngärdet (6). In other sub-areas, respondents considered the immediate area or the area at large to be well maintained, e.g., more than half of the respondents in non-densified Central Kapellgärdet (2) and nearly half in densified Western Kapellgärdet (1) (see Figure 4).
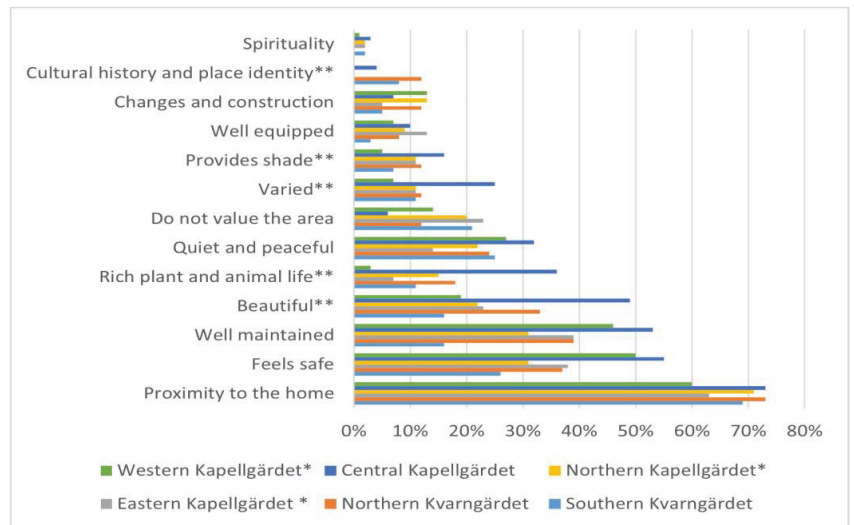
Figure 4. Qualities that respondents from each sub-area found and appreciated in the immediate outdoor environment (50 m from the home). * Densified sub-areas. ** Statistically significant difference, where the quality was found to a higher extent in non-densified sub-areas.

Some lack of perceived safety was experienced in all sub-areas, but mainly in Southern Kvarngärdet (6). This feeling was connected to a lack of maintenance, with untrimmed shrubs or broken streetlights as a result, or to known or suspected crimes, drug-use or "shady people" gathering in the area. However, respondents from most sub-areas described the outdoor environment in the area as calm or safe, for example, around half of the respondents in both densified Western (1) and non-densified Central Kapellgärdet (2), respectively (see Figure 4).

3.4. Usage

Of the six categories of usages available in the survey (extrinsic, social interaction, active, intrinsic, passing by and non-users), most respondents reported passing by, both in the immediate area and the area at large. Some types of usage rendered statistically significant differences between densified and non-densified sub-areas. Social interaction (e.g., visit/take part in events, meet friends, picnic) and intrinsic usage (e.g., quietness, get fresh air, relax, get sun, experience nature) were both higher in non-densified sub-areas than in densified sub-areas in the outdoor environments in the immediate area. The same applied to intrinsic usage in the area at large, which was also significantly higher among respondents from non-densified sub-areas. However, no statistically significant difference was found between densified and non-densified sub-areas concerning the frequency with which the residents use the outdoor environment.

3.5. Qualities

The most commonly found and appreciated qualities of the outdoor environments in the immediate area and the area as a whole were their proximity to the home, perceived safety and good maintenance. A statistically significant difference was found between densified and non-densified sub-areas, both in the immediate area and in Kvarngärdet and Kapellgärdet at large, regarding the qualities beauty, rich plant and animal life and variation. For the immediate area, a statistically significant difference could also be found between densified and non-densified sub-areas regarding the qualities shade and place identity and cultural history. All of these qualities were found and appreciated to a higher extent by respondents in non-densified sub-areas (see Figure 4).

3.5.1. Green Spaces and Traffic

Green, open spaces or greenery were highlighted as particularly good qualities in Kvarngärdet and Kapellgärdet, especially the park and green spaces around Central Kapellgärdet (2). This park in Kapellgärdet was many respondents' favorite place, mainly because of its spacious, green and social qualities. The many pedestrian and bicycle paths and large and open spaces as well as the restriction of car traffic were highly appreciated in the non-densified sub-areas. The limited access for car traffic in the housing areas was also considered good for children. Some accounts of this included the following: "I moved away a few months ago, but what I valued the most was the fact that there was only a pedestrian and bicycle path going past my home. So no car traffic" and "that there are large and beautiful green areas for both children and adults [is particularly good]".

Many green areas and elements such as trees and shrubs have been removed as Kvarngärdet and Kapellgärdet are being densified: "They have cut down almost all the trees in the area (50 m) where I live. It was much greener and more beautiful before. Now there is hardly anything left, which I think is a great pity". This includes a loss of especially valued places: "[My favorite place] doesn't exist anymore because all the trees and the grove are gone". Several respondents also expressed a concern regarding further loss of green areas: "The ongoing densification means that the green character is deteriorating in a worrying way. Smaller green areas, fewer large trees (less shade)" and "There are still parks and greenery, but I am worried that more will be built". There is also a perceived lack of green spaces in the densified areas, expressed by several respondents: "Too few green areas. Absolutely crazy how the municipality builds without taking into account that the people who live here need green areas". In particular, respondents in densified Eastern Kapellgärdet (4) report a lack of greenery: "I miss green places! It feels very "confined" here, I miss green and leafy areas (...). This area feels surrounded by concrete and asphalt".

Car traffic in or around Kapellgärdet was considered problematic in places where it was not restricted, considering both safety and noise. Mainly respondents in densified Western (1) and Eastern Kapellgärdet (4) raised this issue but also to some extent those in non-densified Central Kapellgärdet (2) and Southern Kvarngärdet (6). The excessive amount and speed of the traffic on roads in or around the area at large was often mentioned

by respondents as a poor quality of the outdoor environments. Respondents in densified Eastern Kapellgärdet (4) reported issues with noise and stress, mainly from the main road leading through the area. However, a few respondents considered the traffic on the same road well organized, with clear rules and sections.

3.5.2. Social Qualities

The responses show a general lack of places with social qualities in Kvarngärdet and Kapellgärdet. This is referred to as a lack of physical places for socializing in the area, like restaurants, bars, shops, parks or squares, a poor social environment or insufficient green space maintenance (see Figure 5 for a comparison of characters). In the densified Western Kapellgärdet (1), the former is expressed: "I miss a park or a square, it would make the area feel more alive. Now it's just houses" or "There is also a lack of a living street environment. There is no neighborhood restaurant, no cafe and very few businesses. There is nowhere to gather outside on summer evenings to have a glass of beer in the evening sun". In all sub-areas but densified Northern Kapellgärdet (3), respondents expressed that there were not any, or enough, places for older children to use, particularly places considered safe. Still, many pointed out the park in the non-densified Central Kapellgärdet (2) as a "well visited area with all age groups represented, lots of laughter and activity" where "people socialize or pass through which brings life to the area".

(**a**)

(**b**)

(**c**)

(**d**)

Figure 5. *Cont.*

(**e**)   (**f**)

Figure 5. Photos of rather typical settings in each of the sub-areas. (**a**) One of the smaller courtyards in a densified infill area of Eastern Kapellgärdet (4); (**b**) one of the larger courtyards in non-densified Central Kapellgärdet (2). (**c**) Entrance to courtyard in densified Western Kapellgärdet (1) and (**d**) courtyard in non-densified Northern Kvarngärdet (5). (**e**) Courtyard in densified Northern Kapellgärdet (3) with infill in the right half of the photo and (**f**) courtyard in non-densified Southern Kvarngärdet (6), where lack of management was seen as an issue.

Elder respondents pointed out the loss of shading trees, which together with a lack of public bathrooms and insufficient numbers of seats in the outdoor environments constituted a problem for them. Densified Eastern Kapellgärdet (4) in particular was expressed as ill-suited for elders: "Poor adaptation to the specific needs of the elderly, e.g., seating and opportunities to take a coffee break (. . .). The ongoing densification means that the green character is deteriorating in a worrying way. Smaller green areas, fewer large trees (less shade)".

The social qualities in non-densified Southern Kvarngärdet (6) are affected by the insufficient management: "Very neglected outdoor environment, the landlord does not maintain it. Mostly weeds and gives an abandoned, impersonal impression. The outdoor environment is perceived as unsafe instead of inviting, inspiring and welcoming." However, the structure of the physical environment in the sub-area with its outdoor spaces has a recognized potential: "Has the potential to be a green oasis. Many low-rise buildings with large courtyards. With proper care, it would promote outdoor socializing with neighbors and friends. Unfortunately, it does not feel that way at the moment".

3.5.3. Densification Process

The densification of the area has affected respondents in many ways, one of which is inconvenience due to prolonged construction in the area, particularly voiced by respondents in Northern Kapellgärdet (3): "there is always construction somewhere here. Ever since we moved here in 2013, there has been construction in the area in various places with noise, construction traffic, dust etc. as a result". Others expressed that building sites were being left unfinished for a long time, looking unpleasant, and that information and services from the municipality in the process were not sufficient, creating irritation: "(. . .) obstructions in the form of concrete sows that are not removed [once buildings are finished] are not so fun. Nor big signs that claim that something will happen 'soon', but that 'soon' never happens".

4. Discussion

This study had the aim of deepening the knowledge on how the densification of urban residential areas from the welfare era is affecting satisfaction with, use and perceived qualities of outdoor environments among residents. The results show that there are differences in all these three aspects—satisfaction, use and perceived qualities of outdoor environments—between sub-areas that have been densified with infill and those that have

not. Moreover, the descriptions provided by the respondents give a picture of an area undergoing major change and where valuable green space quality and quantity as well as car traffic limitations are being lost.

The many negative comments on the experiences of living in an infill development project, both concerning the process and the result, can be described as rather expected. Previous studies have found that these areas can be considered rather attractive for living [1] but also that residents rarely look positively on infill development in their own neighborhood, connecting to NIMBYism or anti-growth sentiments [2]. However, the results of this study not only show how densification affects feelings and opinions but also demonstrate statistically significantly higher satisfaction with local outdoor environments with more different uses and qualities in sub-areas that are non-densified. This points to the actual experiences of densification in the case of Kvarngärdet and Kapellgärdet resulting in a less useful outdoor environment than found in the non-densified sub-areas. Interestingly, the negative effects for residents of the densification not only affect those who lived there before the new constructions but also to a large extent those who have moved into new buildings, inside the developments in Western (1) and Eastern Kapellgärdet (4), who are now lacking green spaces and safe traffic solutions. This points at an actual lack of qualities in the outdoor environment, which is partly different to a view of the residents as NIMBYs or anti-growth [2].

When studying the effects of densification, it is important to place awareness on the context of various cases, as density can take physical form in many ways [1]. Previous studies have highlighted the possibilities of having higher neighborhood satisfaction and wellbeing among residents in compact environments [22]. However, that is in comparison to urban sprawl and in cases when the compact areas include qualities such as "mixed land uses, public transport, limited car traffic, access to green spaces, and social equity" and furthermore with measures to limit litter, noise and fear of crime [22] (p. 270). In the context of Kvarngärdet and Kapellgärdet, the built environment from the welfare era was not urban sprawl but a multi-family housing area already containing the required qualities, in particular, many green spaces and limited car traffic. In line with Qviström [34], this study has shown specific assets in the materializations of welfare planning, a heritage that is now being highly threatened. In addition, the infill development has to some extent meant limited fear of crime and better maintenance as compared to some of the non-densified sub-areas, which is positive, but also problems such as increased noise [22]. Densification that in this way has led to mainly negative aspects being introduced for the residents, including loss of green spaces and increased noise and fear caused by traffic, appears more focused on the densification per se rather than social sustainability goals [15]. In the plans from the 1960s and 1970s, social places such as shops, restaurants and squares and green spaces such as parkland were given priority, something that evidently is not as prioritized in the densified areas today. This affects the social qualities and uses of the outdoor environments, particularly for elderly people and older children who are more dependent on e.g. shade and facilities. It further supports that the effects of densification can be negative in some aspects [5], including for social impact and health [4]. However, there may be contexts where densification can be realized with more priority given to social values, such as with a focus on saving and developing green spaces and social places and limiting car traffic.

The importance of well-functioning management of outdoor environments for residents was also shown in this study. Wear and tear as well as lack of maintenance and open space development were clear in mainly the older and non-densified sub-areas and lowered the satisfaction with outdoor environments among residents in those environments, as found also in other studies of similar areas [32]. Outdoor environments not being well managed over time is not directly a problem caused by planning but is still related to it [14], as the qualities of the welfare heritage are partly lost with insufficient management. A better co-play between planning and management is needed to reach environments of high quality [13].

This study has provided interesting insights through the use of mixed methods but also has limitations, including a low response rate for the survey and a simplified division into densified and non-densified sub-areas. A more detailed analysis of responses from different parts of the area might have provided more insight into the various experiences of living there. Also, despite including a rather large area, this study only considers a single case. The new development of a questionnaire was based on previous research as well as a small test of the questionnaire in order to support its validity and reliability, but it might be further improved in the future. The open questions in the questionnaire both provided rich qualitative data material and showed that respondents had understood the questions, which supports the validity. Future studies might deepen the insights into the context and provide more place-based and detailed results of densification projects and also how these are perceived by different user groups.

5. Conclusions

Based on this study, the importance of planning approaches that give residents access to varied and well-functioning green spaces as well as limit car traffic can be elevated. The study has mainly showed negative effects for residents in their relation to local outdoor environments, including limited satisfaction, use and perceived qualities, after densification through infill development, in a case where the densification has led to loss of green spaces and an increase in car traffic in a multi-family housing area from the welfare era in the 1960s. While there may be other more positive examples of densification processes to find, this study shows the need for more context-based planning approaches and also to question the current densification trend as a solution in all cases. There is a need to consider more diversified qualities in cities in order to fulfill all sustainability goals, including the social ones. This study also points to the values of the welfare planning and its heritage providing useful assets such as large green spaces, now threatened by both limited management as well as by densification projects that appear more focused on density per se than on providing qualities for residents.

Appendix A

Survey—questions and options

1.   Background

    (a) How old are you?
    1. 18–25 years
    2. 26–35 years
    3. 36–50 years
    4. 50–65 years
    5. >65 years
    (b) What is your gender?
    1. Woman

2. Man

3. Non-binary

4. I prefer not to specify

(c) How long have you been living in Kvarngärdet or Kapellgärdet?

1. <1 year

2. 1–5 years

3. 5–10 years

4. 10–15 years

5. >15 years

(d) In which part of Kvarngärdet or Kapellgärdet do you live?

1. Western Kapellgärdet

2. Central Kapellgärdet

3. Northern Kapellgärdet

4. Eastern Kapellgärdet

5. Northern Kvarngärdet

6. Southern Kvarngärdet

2.   Experience and usage

(a) How satisfied are you with the outdoor environments close to your home (within 50 m)?

1. Not at all 2. 3. 4. 5. Very satisfied

(b) How satisfied are you with the outdoor environments in Kvarngärdet and Kapellgärdet at large?

1. Not at all 2. 3. 4. 5. Very satisfied

(c) How do you use the outdoor environments close to your home (within 50 m)?

1. Active (e.g., running, other sports, cycling, ball games, other activities)

2. Intrinsic (e.g., quietness, get fresh air, relax, get sun, experience nature)

3. Extrinsic (e.g., walk the dog, collect food, play with children)

4. Social interaction (e.g., visit/take part in events, meet friends, picnic)

5. Non-user (e.g., passing through, do not visit green space)

(d) How do you use the outdoor environments in Kvarngärdet and Kapellgärdet at large?

1. Active (e.g., running, other sports, cycling, ball games, other activities)

2. Intrinsic (e.g., quietness, get fresh air, relax, get sun, experience nature)

3. Extrinsic (e.g., walk the dog, collect food, play with children)

4. Social interaction (e.g., visit/take part in events, meet friends, picnic)

5. Non-user (e.g., passing through, do not visit green space)

(e) Which qualities do you find and appreciate in the outdoor environments close to your home (within 50 m)?

1. They are beautiful

2. The cultural history and place identity

3. Their spirituality

4. They have a rich plant- and animal life

5. They feel safe

6. Their proximity to the home

7. They are well maintained

8. They are varied

9. They are well equipped

10. They are quiet and peaceful

11. They provide shade

12. The changes and construction in the area

13. I do not value the area

(f) Which qualities do you find and appreciate in the outdoor environments in Kvarngärdet and Kapellgärdet at large?

1. They are beautiful

2. The cultural history and place identity
3. Their spirituality
4. They have a rich plant- and animal life
5. They feel safe
6. Their proximity to the home
7. They are well maintained
8. They are varied
9. They are well equipped
10. They are quiet and peaceful
11. They provide shade
12. The changes and construction in the area
13. I do not value the area

(g) Do you have anything to add in regards to qualities in the outdoor environments in Kvarngärdet and Kapellgärdet? (Open-ended question)

(h) How often do you use the outdoor environments close to your home (within 50 m)?
1. Several times a day
2. Once a day
3. Several times a week
4. Once a week
5. A few times a month
6. More seldom
7. Never

(i) How often do you use the outdoor environments in Kvarngärdet and Kapellgärdet at large?
1. Several times a day
2. Once a day
3. Several times a week
4. Once a week
5. A few times a month
6. More seldom
7. Never

(j) What is particularly good with the outdoor environments in Kvarngärdet and Kapellgärdet? (Open-ended question)

(k) What is not so good with the outdoor environments in Kvarngärdet and Kapellgärdet? (Open-ended question)

(l) Do you have a favorite place in Kvarngärdet and Kapellgärdet? Describe where and why! (Open-ended question)

(m) Do you have anything else to add regarding in the outdoor environments in Kvarngärdet and Kapellgärdet? (Open-ended question)

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Article

Contextualizing UNESCO's Historic Urban Landscape Approach: A Framework for Identifying Modern Heritage in Post-Blast Beirut

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Abstract: This paper reflects on the application and adaptation of the Historic Urban Landscape (HUL) approach in Beirut, Lebanon, in post-disaster conditions. Adopted by UNESCO in 2005, the HUL approach marked a shift in addressing urban heritage, echoing an evolution in theory. However, contextualizing the HUL approach to address distinct local, geographic, and cultural conditions and reframing its scale and scope of operation remains a challenge. This paper uses a case-study-based methodology as it reflects on the application of the Historic Urban Landscape approach in the post-blast context of Beirut. Commissioned by UNESCO, an interdisciplinary team at the Beirut Urban Lab used the HUL approach to identify modern heritage in Beirut after adapting it to the post-colonial and Mediterranean context of the city. This study contextualized modern heritage definitions, proposed a periodization of modern built and landscape heritage, and designated modern heritage based on its formal/spatial, urban/landscape, socio-cultural, and environmental values. This paper argues that the study contributes to the advancement of the Historic Urban Landscape approach by operationalizing it into an applicable heritage framework, employing a transdisciplinary model that involves local people at the institutional and community levels, and serving as a basis for generating conservation strategies responsive to place and culture. This study also pioneered a comprehensive, integrative, and transdisciplinary reading of modern heritage in Beirut, breaking the professional silos between disciplines and bringing landscape into the identification of heritage in Lebanon.

1. Introduction

A century-long effort to redefine the scope of urban heritage has culminated in the development of the Historic Urban Landscape approach. A comprehensive survey of UNESCO's charters, conventions, and recommendations reflects a changing perspective on heritage, echoing an evolution in theory. Influential figures in heritage conservation throughout history shifted focus from the tangible, object-oriented, and monument-centered approach to giving value to the intangible and holistic meanings of heritage [1]. It started with Ruskin [2] in the mid-nineteenth century when he first attributed value to elements beyond the 'isolated richness of palaces' [1]. The turn of the twentieth century witnessed a shift toward an urban approach [3] after Sitte [4] advocated for integrating monuments within the urban fabric. Around the early twentieth century, Geddes [5] brought heritage to the discourse of urban development while advocating for a comprehensive surveying of the city with broad participation from a variety of relevant stakeholders [6]. At the time, Giovannoni and Ventura [7] also introduced the term 'urban heritage' while recognizing the interconnectedness of monuments and vernacular architecture within cities [1]. Also

in the twentieth century, Sauer [8] expanded our understanding of the notion of 'cultural landscapes,' which was first introduced by Otto Schlüter in 1899 and which, at later stages, became foundational to the core of the Historic Urban Landscape approach [9].

The notion of cultural landscapes offers a framework important to the historical urban setting, particularly because it focuses on vernacular culture and reinforces the idea that landscapes are 'cultural constructs' [9]. As Makhzoumi [10] puts it, cultural landscapes encompass nearly all of our surroundings, from 'untouched nature' to the highly humanized environments of cities. Within these framing of landscape, Sauer [8] attributes significance to temporal and social continuity in identifying heritage values [11], translated into a practical framework during the late 1980s and 1990s [12]. Heavily influenced by the pioneering works of cultural geographers, this period was marked by a critical discourse and a deeper understanding of cultural heritage [12]. Eventually, this theoretical progress led to what is known as the landscape approach to heritage, a holistic and integrative understanding of heritage that encompasses the tangible, physical/spatial, and intangible cultural values and practices. It also engages with the social and economic roles of historic cities [1].

The core ideas behind the landscape approach shaped the concept of the Historic Urban Landscape, as is evident in its definition:

> "*The historic urban landscape is the urban area understood as the result of a historic layering of cultural and natural values and attributes, extending beyond the notion of "historic centre" or "ensemble" to include the broader urban context and its geographical setting.*" [13] (p. 3)

UNESCO first announced the concept of the Historic Urban Landscape in 2005 at the Vienna Memorandum on World Heritage and Contemporary Architecture [14], and its application was later recommended in 2011 [13]. The uniqueness of the latest recommendation lies in its consolidation of complementary principles, concepts, approaches, and scopes previously addressed and adopted independently in earlier European and international documents [15].

Since its inception, the Historic Urban Landscape (HUL) approach has been subject to discussion and criticism. Although it was widely adopted in various case studies worldwide [16], the concept still raises many inquiries [17]. It has been questioned for its ambiguity and the absence of practical tools for its suitability and application in diverse contexts [1,15,17–21]. An extensive body of literature suggests the need to adapt the approach to the context of application while considering its local, geographic, and cultural specificity. An example of this adaptation is the project "Identifying Cultural Heritage Attributes in Beirut Blast Damaged Areas." In this project, the Beirut Urban Lab at the American University of Beirut collaborated with an interdisciplinary team of experts in the fields of built and landscape heritage, planning and legal frameworks, and participatory models and tools. The team worked to adapt the HUL approach to the post-colonial and Mediterranean context of Beirut in Lebanon. The project targeted an area extending over 2.2 square kilometers (see Figure 1) and was heavily impacted by the Beirut Port Blast on 4 August 2020. The interdisciplinary team proposed an urban and landscape framework that is substantially grounded in a historical reading of Beirut and based on a contextualized framing of modern heritage. In the absence of a comprehensive legal framework for protecting modern heritage in Lebanon, and given the post-port disaster setting, the project produced a milestone framework necessary for identifying and valorizing heritage.

Figure 1. Aerial Photograph showing the 2.2 km² Study Area Boundary. Source: Google Imagery (2020), edited by Beirut Urban Lab.

This paper critically reflects on the outcomes of the project and argues that the produced urban and landscape framework contributes to advancing the HUL approach in three ways. Firstly, it operationalizes HUL to respond to local contexts, moving HUL from a broad and abstract concept into a robust and applicable heritage framework. Secondly, it counters the universalization approach to heritage identification by employing a transdisciplinary model that involves local people at the institutional and community levels. Finally, by introducing clusters and ensembles, it introduces the intermediate scale of the historic urban landscape that goes midway between the urban fabric as a whole and individual buildings. This scale serves as a basis for generating conservation strategies that are responsive to place and culture. Additionally, this study also pioneered the first comprehensive, integrative, and transdisciplinary reading of modern heritage in Beirut, breaking the professional silos between disciplines and bringing landscape into the identification of heritage in Lebanon. The paper has three main sections. The first section sheds light on the critical discourse surrounding the HUL approach in the literature. The second section introduces the case study, highlighting historical and geographical transformations in Beirut and the existing legal framework for heritage. The third section presents the urban and landscape framework for identifying and valuing modern heritage in Beirut. The paper concludes with a discussion and reflections on the project.

2. The Historic Urban Landscape Through a Critical Lens

HUL emerged in response to the increasingly complex challenges posed by global processes and projected urbanization patterns [22]. Its core idea is centered on reshaping the role of urban heritage within society and redefining the criteria for its conservation, adaptation, and inclusion in urban decision-making processes [22]. From the lens of

its advocates, the approach embodies a shift from the conventional notion of a 'historic area/center/city' into a prioritization of 'urban heritage' in preservation policies, thus enabling a shift towards a more adaptable, inclusive, and community-driven approach to conservation [22]. In addition, this shift brought discussions about natural heritage to the table, putting forth landscape and ecological urbanism as an important dimension in urban conservation, as well as intangible heritage [22]. Its uniqueness lies in its ability to 'reconnect' the 'historic' and the 'modern,' allowing for a holistic understanding of urban heritage and influencing urban development and rehabilitation [22]. The HUL concept transcends the historic city and instead looks at the urban ensemble as a whole [20], while its most crucial concept is layering [23]. It considers the entire urban area as an accumulation of human interaction across time, focusing on the lively continuity in time and space while studying the urban fabric [23].

According to its founders, HUL is perceived as a 'mindset' or an 'understanding of the city' [24], which hints at a broad, theoretical, and abstract concept. Its ideas are flexible; the all-encompassing definition allows for numerous interpretations, making its implementation not binding but indulgent [25]. Ideally, it is envisioned as a tool to be incorporated into existing policies and principles but not replacing them, encompassing the legacy of a century-long accumulation of ideas [26]. It brings to the table the challenge of a new approach that is genuinely global and can cover a variety of historic urban contexts [27]. As it provides an all-embracing framework, it can aid in structuring and improving policies in urban heritage management [1]. It also offers a versatile methodology to tackle a range of issues by encouraging collaboration and connections among urban areas of different scales and their surrounding rural and peri-urban environments [28]. Thus, the broadness of the HUL approach is intentional, and it is rooted in the need for flexible guidelines that can be adapted to different contexts and cultures [29].

To facilitate the adaptation and implementation of HUL, involved stakeholders on the operational levels must initially be open to comprehending its underlying rationale and assessing its applicability within unique contexts [19]. However, adapting these international standards to local contexts has been a challenge. This contextualization requires practical tools that are rarely present in an approach that is more theoretical than practical [17]. The broadness of the HUL approach did not help in clarifying matters but rather caused further complications [29]. The approach has been criticized for including so many items yet remaining at the general level and avoiding detailed explanations. According to Azpeitia Santander et al. [17], HUL "acts as a whirlpool that engulfs everything without providing effective tools capable of managing the huge number of items it covers" [17] (p. 8). Moreover, at the practical level, implementing the HUL recommendations within a local context depends largely on the effectiveness of existing legislative and institutional frameworks for heritage preservation [1,18]. In that regard, translating theoretical concepts into actionable strategies becomes more complex in the context of global south cities [15], more so in Arab cities where it is challenging to interpret and translate the word 'landscape' locally [11,19]. The absence of a proper translation of the word poses a problem in the Arab region, as the outdated translation of the word, like *hada'ik* (gardens), *fadha'at kharijia* (outdoor spaces), and *bi'a* (environment), do not grasp its complexity in English [11].

The first step towards the practical application of the HUL approach was outlining six steps for Member States to assist local authorities in the implementation, collectively known as the Historic Urban Landscape Action Plan. The initial three steps of this action plan entail a comprehensive identification and mapping of natural, cultural, and human assets, followed by a valuation phase using participatory planning and a stakeholder analysis alongside a vulnerability assessment [30]. Once completed, the fourth step involves formulating a City Development Strategy (CDS) to embed urban heritage values and vulnerability assessments within a broader city development framework. The final two steps require prioritizing policies and actions for conservation and development, in addition to establishing local partnerships. Also, executing the Historic Urban Landscape Action Plan requires consultations with higher government levels [30].

Therefore, a prerequisite for successfully implementing the HUL approach is narrowing the gap between international standards and local contexts. This phase requires translating these broad theoretical concepts into a practical framework consistent with the HUL approach. One of the mainstream tools employed to assess the use of the HUL approach in different contexts is the SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis, as seen in Alsalloum [31] in Aleppo, Syria, Ginzarly and Teller [18] in Tripoli, Lebanon, Rey-Pérez and Avellán [32] in Ecuador, and El-Bastawissi et al. [33] in Beirut, Lebanon. However, each context's local, cultural, and geographical specificity requires more thorough, tailored approaches. This contextualization is especially crucial in contexts of post-disaster recovery. As heritage is perceived as a critical catalyst of post-conflict recovery [34], a tailored HUL approach can be utilized in identifying and valuing heritage, thus becoming a recovery agent. This was seen in the project "Identifying Cultural Heritage Attributes in Beirut Blast Damaged Areas" following the Beirut Port Blast on 4 August 2020.

3. Case Profile

3.1. The Context

On 4 August 2020, a massive blast hit the Beirut Port, shattering entire neighborhoods and causing severe damage to the urban fabric. Most of the damage was concentrated in the historical neighborhoods surrounding the port. Many of these neighborhoods have built heritage, open spaces, and natural landscapes with significant historical and cultural value to the rest of Beirut. They also host a diversity of social groups and unique socio-economic practices. According to a report on the Order of Engineers and Architects in Beirut published shortly after the blast, around 25% of the heritage buildings were at mid to high risk of collapse [35].

Besides the damages caused by the blast affecting heritage buildings, these neighborhoods were threatened by ongoing urban trends of gentrification. A significant transformation in the urban fabric was already taking place before the blast, and the Municipality of Beirut granted many demolition permits, especially along the main roads, according to data from the Beirut Urban Lab. According to a source at the Directorate General of Antiquities in Lebanon (DGA), a considerable number of property owners also filed for demolition permits, seizing an opportunity after the blast, further threatening the built fabric in the area.

Shortly after the Beirut Port Blast, UNESCO commissioned the Beirut Urban Lab to conduct a study entitled "Identifying Cultural Heritage Attributes in Beirut Blast Damaged Areas." The Beirut Urban Lab, formed in 2018, is a collaborative and interdisciplinary research space with a long-term collective experience and research trajectory formulated in response to disasters and urban traumas in different contexts, including historic cities and landscapes in the Arab region. Their work advocates for culture as a catalyst for more people-centered, place-specific, and heritage-led strategies of recovery. Focused on sites of recovery, members of the lab engaged with works in the Beirut Central District after the civil war (1975–1990), the historic core of Bint Jbeil in South Lebanon after the 2006 war, Aleppo in Syria during the Syrian conflict, and back to Beirut after the port blast in 2020. These works resulted in theorization and critical reflections through different publications.

The study area, designated by UNESCO, included the neighborhoods closest to the blast epi-center and mostly affected by it, in addition to being some of the richest neighborhoods in heritage buildings and landscapes in Beirut, like Gemmayzeh, Mar Mikhael, Mar Nkoula, and others. It is bordered by the Beirut River to the east, Karantina to the north, Georges Haddad Street to the west, and Charles Malek Street to the south (see Figure 1). In response, the Beirut Urban Lab formed an interdisciplinary team of experts led by Howayda Al-Harithy and including Hana Alamudin, Habib Debs, Jala Makhzoumi, Robert Saliba, and Serge Yazigi to conduct the study. They utilized their expertise and scholarship in the fields of built and landscape heritage, planning and legal frameworks, and participatory models and tools. As per a requirement by UNESCO, the team adopted

the Historic Urban Landscape approach to identify modern urban landscape heritage in the study area. This study was grounded in a thorough reading of the historical layers of the city at large and in the understanding of the existing legal framework for heritage protection in Lebanon.

3.2. A Historical Synopsis

Beirut exemplifies a Mediterranean city that is rich in natural and cultural heritage shaped by geographical complexity and a colonial legacy. With a history dating back to the fourteenth century B.C., its evolution intertwined with the presence of empires (such as the Ottoman Empire) controlling parts of the Middle East [36]. Unfolding these historical layers shows a radical transformation of a natural landscape into a cultural one, especially during the late Ottoman rule and the French mandate periods. This transformation contributed to changes in the built and social fabrics of the city, thus shaping modern Beirut.

3.2.1. The Geographical Complexity

Beirut sits on a peninsula protruding into the Mediterranean Sea and forming a triangular shape, with the sea delimiting two of its sides [37]. The foothills of Mount Lebanon border the city from the third side, thus adding to its geographical complexity. The topography is equally complex, with hills, coastal cliffs, and spurs that render the city a "remarkably defensible site" [37] (p. 146). The two hills of Achrafiyeh and Ras Beirut are the main contributors to the defense line of Beirut, the latter also protecting the city against prevailing winds [38]. Another spur to the west and a cliff to the eastern edge constitute a second line of defense. Beirut emerged at the lowest point in this complex wedge.

3.2.2. Transformation of the Historic Urban Landscape

By the end of the eighteenth century, Beirut was a small coastal Ottoman village with a population of 4000 inhabitants. At the time, inscribed inside its medieval walls, the city was of minor political and economic significance [37]. The city walls separated two contrasting areas: the inner space, which was a dense built-up area known as *dâkhil al madînat* (inner city), and the outer space, *zâhir al madînat* (back of the city) [37], which included watchtowers, caravan stops, livestock markets, gardens, public spaces, and cemeteries [37] surrounded by orchards and productive landscapes. Many place names referred to features of the rural landscape that dominated the hinterland; for example, *ayn* (spring), *mazra'at* (farm), and *joubbat* (mound) [37]. The productive landscapes included olive and carob trees, mulberry for silk production, figs, pomegranates, and date palms, with prickly pears demarcating the dirt roads [39]. The Beirut fertile plain that was open to the Mediterranean Sea, abundant springs, and proximity to the Beirut River secured food and water from land and sea [38] (See Figure 2).

Much of Beirut's modern history was shaped by global changes around the mid-nineteenth century [40]. The global development of capitalist systems and the shift in major trade movements from inland caravan cities to coastal cities contributed to the rise of Beirut as a commercial port city [37,40]. With the declaration of Beirut as a regional administrative center in 1832, the city witnessed economic and urban growth. As a result, it acquired an administrative role and attracted diplomatic representation [41]. Additionally, the construction of the Beirut-Damascus Road in 1863 played a crucial role in this economic revitalization as it established a strong connection between Beirut and other Arab cities and made it a hub for regional trade [42].

This period also witnessed an influx of migrants into Beirut, escaping the sectarian conflicts in Mount Lebanon, triggering the first urban expansion, and leading to the formation of the first garden suburbs in the peripheries [37,40]. As more migrants came, the city expanded in concentric circles following roads leading out of the city [37,43] (see Figure 3). Between 1860 and 1918, the urban peripheries expanded and became denser, some developed with distinctive spatial organizations that differed fundatmentally from the traditional urban fabric of the walled city [37]. The migrants transformed the rural

orchard/garden into an urban domestic gardens, a reminder of the valued landscape from where they came [44]. By the end of World War I, the city peripheries grew further, changing the character of Beirut from an Arab city to a Mediterranean bourgeois city [37].

Figure 2. Beirut City in 1876, with the study area marked by the authors. Source: Plan de Beyrouth by Julius Löytved, Danish Vice-Consul in 1876, Reprinted with permission from American University of Beirut, 2024, American University of Beirut, University Libraries.

Figure 3. Beirut's Concentric Growth. Source: De Vaumas, Etienne. Le Relief de Beyrouth et son Influence sur le Développement de la Ville, Beirut. Publications Techniques et Scientifiques de L'Ecole Française d'Ingenieurs de Beyrouth, N. 11, 1946, reproduced by Beirut Urban Lab (2024).

Under the French mandate, Beirut was declared the capital of the newly established Lebanese State. This period constituted the enactment of new property laws, the devel-

opment of transportation networks, and the expansion of the port [45]. Furthermore, the development of residential neighborhoods in the periphery required the establishment of public institutions. A tramway was constructed on Gouraud Street, which transformed it into a commercial street. Construction technologies introduced between the 1920s and 1940s facilitated construction on steep slopes and the erection of multi-story buildings [45]. As land in the city became scarce and its value increased, residential gardens started to disappear, and the urban fabric progressively densified.

As a result, the late Ottoman rule and French mandate periods marked a transition in the history of Beirut, witnessing a radical urban expansion and a shift in the socio-cultural composition from a Muslim urban culture into a Christian middle-class society. What remains of these periods today is a palette of urban and landscape fabrics with an eclectic mix of typologies and styles that reflect the hybrid nature of the modern period in Beirut. However, many of these fabrics remain unprotected due to the absence of a comprehensive heritage protection law in Lebanon.

3.3. The Legal Framework for Heritage Protection in Lebanon

Heritage buildings in Beirut, especially those in the oldest neighborhoods, face considerable pressure from building laws and zoning regulations [46]. These regulations are problematic because they allow for significantly high floor-to-area and exploitation ratios with no restrictions on building heights, thereby compromising the integrity of low-volume, low-density urban fabrics [46]. This regulatory setup paves the way for the unrestricted spread of towers in heritage-rich neighborhoods and incentivizes heritage building owners to opt for demolition [46]. With these threats to heritage in Beirut, the current legal framework for heritage protection in Lebanon falls short of providing adequate protection. The current framework is outdated, incomprehensive, and object-oriented, with landscape heritage completely overlooked.

3.3.1. Built Heritage Protection Law

The protection of built heritage in Lebanon continues to be regulated by a law originating from the French mandate period. The Antiquities Law number 166, dated 7/11/1933 of the Lebanese Law, is limited, object-oriented, and insufficient on several grounds. First, the law does not mention the word 'heritage'; instead, it addresses man-made 'antiquities' that reflect a focus on objects, artifacts, and monuments. By definition, objects are deemed antiquities if they predate 1700. Other immovable objects from 1700 are also treated as 'antiquities' if their conservation is deemed of public interest from historical or artistic points of view and are, thus, listed on the "General Inventory of Historic Monuments." Currently, around 500 buildings, 75 of them in Beirut, are listed on this inventory [47]. As per the antiquities law, they are protected by the Directorate General of Antiquities, and their demolition is prohibited. However, the limited time frame of this law excludes a rich layer of modern heritage integral to the heritage of Beirut, whereby their protection requires an administrative decision to be listed on the inventory list.

Awaiting a more contemporary heritage protection law, the Ministry of Culture resorted to other provisional measures through administrative decisions to protect unregistered heritage buildings. In this regard, the list of 'buildings whose demolition is suspended' was created by virtue of the Governmental Act No. 57 dated 10/03/2010. The list is a result of different surveys that took place between 1995 and 1998 by several consultants, namely APSAD (1995), DGU (1997), and Khatib and Alami (1998). Due to political pressure, the number of buildings on this list was reduced from 1016 to 458 buildings [46]. Another administrative decision by the Minister of Culture in 2010 required the owner of every building, regardless of its heritage value, to request a demolition permit from the Directorate General of Antiquities [46]. Therefore, heritage building protection is not based on an effective and robust law but rather on *ad hoc* administrative decisions that can be subject to legal appeals.

3.3.2. Landscape Protection Laws

There are no current precedents for a legal setup in Lebanon that recognizes landscape as 'heritage' comprehensively. Laws on the protection of landscapes do not attribute value to landscapes beyond their natural and environmental value, with little regard to the cultural aspects of the landscape. The latter follows from Landscape Protection Law No. 0/1939 of the Lebanese Law, issued during the French Mandate, that recognizes the importance of protecting natural landscapes but disregard cultural landscape heritage. A more contemporary law called the Protected Areas Law No. 130/2019 of the Lebanese Law recognizes the importance of the ecological biodiversity and cultural value of a 'Hima', community protected landscape, but similarly does not acknowledge the heritage value of designed landscapes, such as parks, gardens, and other open spaces. Like heritage buildings, some landscapes are protected through administrative decisions by the Minister of Culture to list them on the "General Inventory of Historic Monuments". Examples are Tobagi Garden and Massaad Stairs in Beirut by virtue of Decision No. 194 in 2018 and Decision No. 104 in 2014, respectively.

In conclusion, laws on the protection of heritage are deficient, focusing on monuments and buildings, disregard the surrounding fabric, and similarly disregards landscape heritage. These laws fail to address built heritage holistically and comprehensively, with a limited timeframe that excludes rich layers of modern heritage from the nineteenth and twentieth centuries. Above all, current protection measures operate through compartmentalized and uncoordinated administrative decision making.

Due to the adverse effects stemming from this outdated framework, including the distortion of the built environment and gentrification in certain areas, preparations are underway for the issuing of a more modernized legal framework. The new draft law recognized an urban approach to heritage that was absent in the antiquities law. The following is Article 1 of the new draft law issued through Decree No. 1936 dated 29/11/2017, translated from Arabic.

> "*The law aims to protect, revive, and showcase archaeological or historical sites, structures, landmarks, buildings, and components thereof with heritage or historical value, including built and unbuilt properties, that individually or collectively form an urban or heritage fabric in cities, villages, and towns. These properties have artistic, historical, architectural, scientific, heritage, natural, environmental, or cultural value due to their architectural character, coherence, or integration into their natural or urban surroundings.*"

However, the Lebanese Parliament has not yet adopted this law. And amid the current state of political instability, modern heritage in Beirut continues to be is still threatened.

4. An Adaptation of the Historic Urban Landscape Approach to Post-Blast Beirut

4.1. The Historic Urban Landscape Approach as a Premise

The initial step carried out by the team of experts included establishing an overarching framing of urban heritage with the Historic Urban Landscape approach as the main premise. As such, this framing departed from the notion of the Historic Urban Landscape being the outcome of a historical layering of cultural and natural values and attributes, as defined by the Recommendation on the Historic Urban Landscape [13]. This definition broadens the idea of the Historic Urban Landscape to extend beyond the notion of the historic center or ensemble and includes the wider urban context and geographical setting [13]. Within this framing, the team also acknowledged an extended definition of urban heritage that was framed in the European Union research report Nº 16 (2004), Sustainable Development of Urban Historical Areas through an Active Integration Within Towns—SUIT, and referenced in the Recommendation on the Historic Urban Landscape Approach (2011). The report identifies three main categories: (a) monumental heritage of exceptional cultural value, (b) non-exceptional heritage elements but elements that are present in a coherent way with a relative abundance, and (c) new urban elements to be considered, such as urban built form, open space, and urban infrastructure [48]. In addition to this, the framing

acknowledges that urban heritage should not be treated as large, isolated monuments or groups of buildings but as living historic cities, precincts, and/or groups of buildings intricately engaged with the urban fabrics of living cities. This general recommendation was mentioned in the final outcomes of the conference entitled "Heritage in Urban Contexts: Impacts of Development Projects on World Heritage Properties in Cities," held at Kyushu University, Fukuoka, Japan (2020).

4.2. Modern Heritage in Universal Contexts

In the process of framing the definition of modern heritage, the team gave special consideration to the notion of cultural landscapes, as the focus shifted away from the visual landscapes, like an individual building or groups of buildings, styles, and building technologies. Rather, the focus was on the impact of modernity and modernization as forces for shaping the built environment. In the team's framing, the definition of modern heritage relied on the outcomes outlined by the Modern Heritage Program, which was established by UNESCO, ICOMOS, and DOCOMOMO, and the Twentieth-Century Historic Thematic Framework published by the Getty Conservation Institute. On the one hand, this program understood modern heritage as a product of the design professions. It concluded that the World Heritage Convention applies to the architecture, town planning, and landscape designs of the twentieth century, with that of the nineteenth century after industrialization and colonialism as equally important [49]. Individual monuments of these periods were considered as important as other built forms, such as urban ensembles and city patterns, infrastructure and works of engineering, or landscape designs [49].

The Getty Conservation Institute, on the other hand, adopted a more comprehensive view as they correlated modern heritage with "key social, technological, political, environmental, and economic drivers of change that shaped the world from 1900 to 2000" [50] (p.8). Although universally designed, Marsden and Spearritt [50] provided a tool that can be employed to identify heritage places, contextualize them locally within the twentieth-century timeframe, and carry out a comparative evaluation between them. The ten themes discussed in this framework evolved swiftly in the twentieth century, though many trends were rooted in the nineteenth century [50].

It was also important to differentiate between the following three terms: modernization, modernity, and modernism. Modernization, as described by Berman [51], refers to "the processes of scientific, technological, industrial, economic, and political innovation triggered by these revolutions and that also become urban, social, and artistic in their impact" [51] (pp. 16–17). Modernity refers to the ways in which modernization infiltrates everyday life and permeates its sensibilities. Baudelaire [52] describes it as "the ephemeral, the fugitive, the contingent" and characterizes urban life under modernity by speed, mobility, novelty, and mutability. Modernism, however, refers to an avant-garde movement that, from the early twentieth century onwards, has responded in various ways to these changes in sensibility and experience [53].

4.3. A Contextualized Definition of Modern Heritage

After formulating a thorough understanding of modern heritage in international contexts, the team developed a contextualized definition of modern heritage for the city of Beirut. The first step was to evaluate the ten themes provided by Marsden and Spearritt [50] in the local context of Beirut (see Figure 4). This step is crucial as each region in the world responded differently to the wave of modernity that started in Europe and was reflected in regional expressions and nuances [49]. Subsequently, it was possible to formulate a synthetic definition of modern urban heritage. The three main categories from Dupagne et al. [48] were also redefined to align with the project. The monumental heritage with exceptional cultural value was defined as architecture, town planning, and landscape design of the nineteenth and twentieth centuries. A new dimension for the non-exceptional heritage elements was then added, which is the intangible social data. Finally, landscape heritage was assigned under new urban elements.

Theme: Drivers of change	Local significance
1. Rapid Urbanization and the Growth of Large Cities	Evolution of residential typologies in response to rapid urbanization and expansion
2. Accelerated Scientific and Technological Development	Limited relevance
3. Mechanized and Industrialized Agriculture	Limited relevance
4. World Trade and Global Corporations	Beirut as port city
5. Transportation Systems and Mass Communications	Inner city transportation networks
6. Internationalization, New Nation-States, and Human Rights	Beirut as cultural outpost and capital city
7. Conserving the Natural Environment, Buildings, and Landscapes	Landscape typologies, topographic landscapes
8. Popular Culture and Tourism	New Cultural and Tourist attractions
9. Religious, Educational, and Cultural Institutions	Beirut as hybrid multicultural city, institutions as catalysts of growth.
10. War and Its Aftermath (Traumas)	Urban Trauma in Beirut: post-war 1975-1990, post-blast 2020 (out of the scope of this study)

Figure 4. Evaluation of the 10 themes provided by Marsden and Spearritt (2021) [50] on the Local Context. Source: Beirut Urban Lab (2020).

It was also important for the team to understand the terms modernity and modernism in the context of Beirut and to differentiate between Western and post-colonial contexts. Ascher [54] subdivides Western modernity into three phases: early modernity extending from the Middle Ages to the Industrial Revolution, high modernity extending from the eighteenth century to the mid-twentieth century, and late modernity starting from the 1970s till now. In post-colonial contexts, modernity corresponds to the second phase with the European transfer of its manufactured products, its lifestyles, and its economic system through colonialism [55]. As such, Saliba [55] defined three stages of modernity that shaped Beirut's central and peripheral districts. The three stages are early modernity (1840–1943), high modernity (1943–1975), and late modernity (1980–now) (see Figure 5).

Figure 5. The Three Stages of Modernity in the Ex-Colonial Context of Beirut. Source: Beirut Urban Lab (2021).

Accordingly, modernity and modernism were redefined in the context of Beirut. Modernity was defined as the modernization that started in the second half of the nineteenth century as a twin phenomenon of colonialism, particularly in the late Ottoman rule and French mandate periods. Modernism refers to the architectural movement that was adopted and appropriated in the 1930s by local architects to produce their brand of 'Beiruti modernism.' Spatially, both modernity and modernism are related to the drivers of change introduced by Marsden and Spearritt [50].

In conclusion, the primary periodization of Beirut's modern heritage was classified as such: (1) the mid-Ottoman period (before 1830) and the Egyptian rule (1830s), (2) late Ottoman Beirut (1840–1919), (3) French mandate Beirut (1920–1943), and (4) Independence Beirut (1944–1975) (see Figure 6).
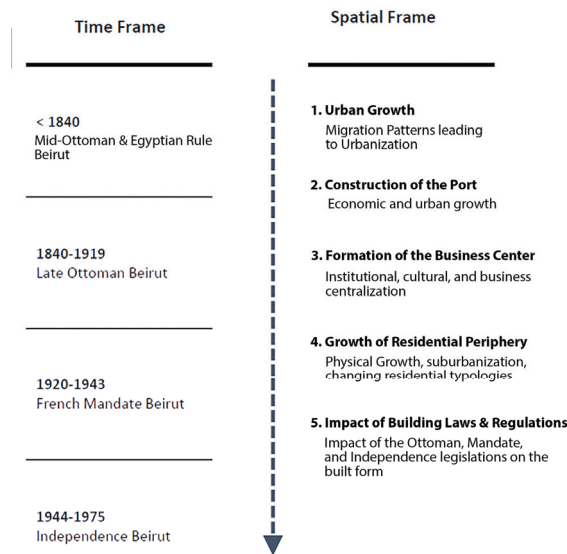
Figure 6. The Primary Periodization of Beirut's Modern Heritage. Source: Beirut Urban Lab (2021).

4.4. A Framework for Identifying Attributes of Modern-Built Heritage

The next step carried out by the team was to articulate an analytical framework for the periodization of modern built heritage. The team relied heavily on the set of variables proposed by Saliba [41], which relate to the formal, functional, and contextual attributes of buildings. Those variables were subdivided into three sets: external, internal, and status indicators. External indicators are visual clues observable from outside buildings, and they yield reliable information on the chronological dating and typological classification of structures. While these indicators depend on outside observations, internal indicators require accessibility to the interiors of buildings for spatial investigation. Status indicators describe differences in terms of size and quality of design and construction, as well as the level of ornamentation, between buildings sharing the same stylistic and typological features. The high diversity of façade treatment and the relative continuity in internal planning led to the emphasis on façade typologies for dating (i.e., visual dating) and assessing. Accordingly, the team conducted a comparative analysis of inventoried buildings to outline several façade typologies related to each modernization phase. In the process, the team resorted to secondary resources, such as Arbid [56], Ragette [57], and Kassab [58].

The proposed periodization distinguishes between four built heritage classifications: (1) late Ottoman heritage (1850–1919), (2) colonial eclectic heritage (1920–1935), (3) early modernist heritage (1936–1955), and (4) high modernist heritage (1956–1971).

4.4.1. Late Ottoman Heritage (1850–1919) as 1st Phase of Modernization

This phase was characterized at the urban level with increasing suburbanization. In less than a century, the adjoining agricultural hinterland changed into a sprawling suburb, then into a series of well-defined urban districts exhibiting a high diversity of socio-economic characteristics and lifestyles. This was reflected in an array of domestic building typologies that are relevant to this study, especially the central hall suburban house (commonly known as 'the Beiruti House') and the early rental walk-up apartment building, which became common from the 1900s onwards. While most of the buildings from this period shared the central bay and triple-arched façade typology, a diversity in façade treatment and building typologies responded to varying socio-economic conditions (mansion, mainstream house, and basic/farmhouse) (see Figure 7), as well as geographic/landscape conditions (hillside, flat, foothill). Moreover, these buildings were highly influenced by the introduction and increasing use of red-tiled roofs over both existing and new structures.
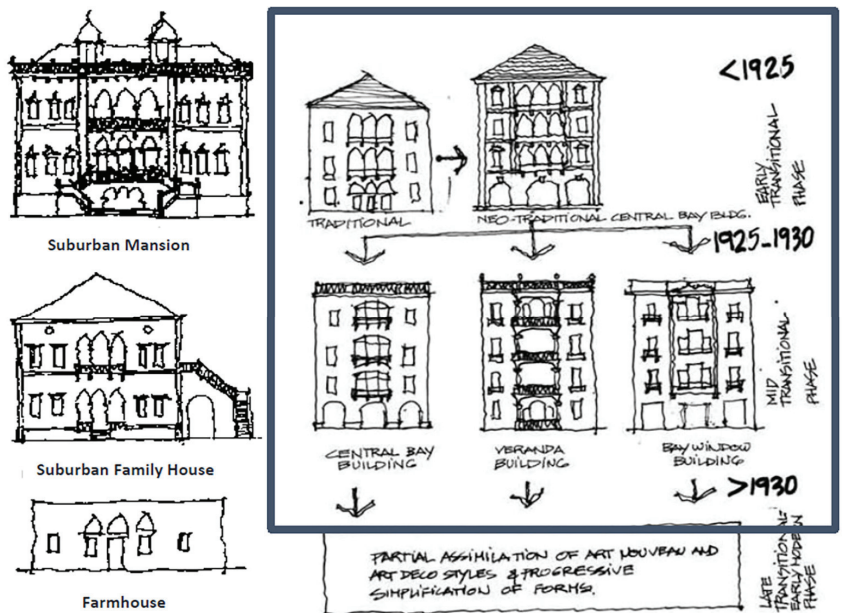
Figure 7. Building Typologies of Late Ottoman Heritage. Source: Saliba (1998) [41], reproduced by Beirut Urban Lab (2021).

4.4.2. Colonial Eclectic Heritage (1920–1935) as the 2nd Phase of Modernization

This phase was characterized by land speculation and an increasing rural-to-urban migration. Additionally, there was a gradual adoption of concrete as a building material. The superimposition of eclectic styles was also particular to this period, from neo-Classical to neo-Islamic to Art Nouveau and Art Deco, over a traditional spatial scheme: the central hall plan. Besides stylistic variations (see Figure 8), the central bay morphed into two additional façade types: the veranda type and the bay window type in the walk-up apartment buildings. The first type was created by the addition of a concrete veranda, while the second was a European import.
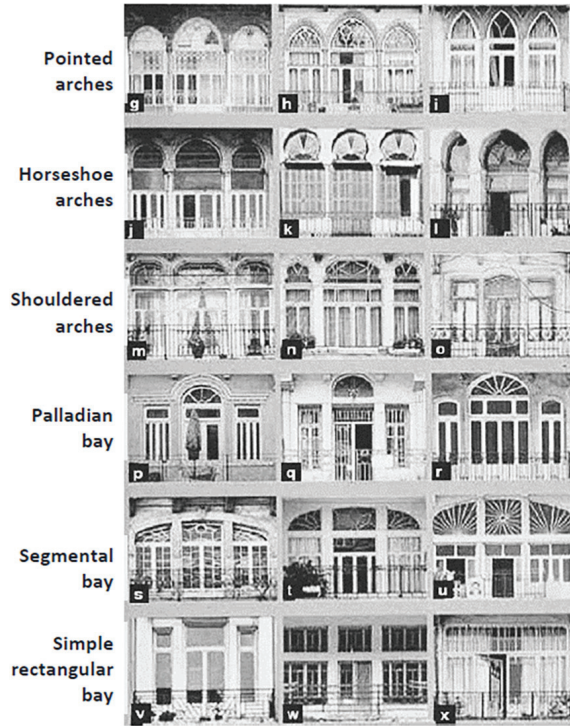
Figure 8. Variations on the Central Bay Openings, like pointed arches (**g,h,i**), horseshoe arches (**j,k,l**), shouldered arches (**m,n,o**), palladian bay (**p,q,r**), segmental bay (**s,t,u**), simple rectangular bay (**v,w,x**). Source: Saliba (1998) [41].

4.4.3. Early Modernist Phase (1936–1955) as the 3rd Phase of Modernization

In this phase, the main drivers of change are stylistic influences, especially of the Paquebot Style, where horizontality and rounded edges are prominent (see Figure 9). Technological changes involved the gradual assimilation of the elevator and the dissociative local carpentry style expressed in openings and shutters. This was reflected in the partial assimilation of Art Nouveau and Art Deco styles and the progressive simplification of forms under the impact of early modernism. The main building typologies from this phase are mid-rise elevator apartment buildings as well as low-rise apartment buildings. Notable façade features are protrusions, elongated linear balconies, elongated curvilinear balconies, and bays, such as the central bay and the recessed central bay.

4.4.4. High Modernist Phase (1955–1971) as the 4th Phase of Modernization

In the early 1950s, a shortage of residential units led to the drafting of a new building and zoning law in 1954. The main changes included increasing height limits, the introduction of the 'gabarit' (equivalent to the building envelope), incentivizing 'pilotis,' and the introduction of locally produced aluminum. The high modernist phase was characterized by the full assimilation of the modernist style, thus producing local modernisms and the leading role of key architects and engineers, both locals and foreigners, in shaping Beirut's urban architecture. Main façade typologies were classified according to the modular grid (integral through balconies, structure, glazing, etc., or detached as a second skin) and horizontal/vertical compositions (through balconies, bands, and other elements) (see Figure 9). The main typological features included the 'pilotis' on the ground floor, walled balconies, and blank walls. Distinctive elements included concrete pergolas, aluminum/steel frames, and concrete awnings.
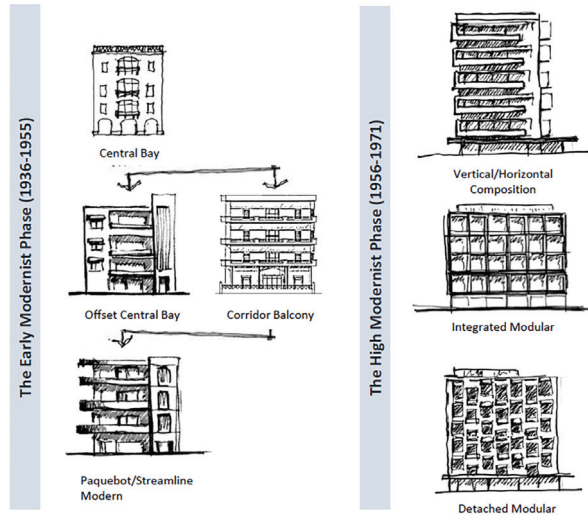
Figure 9. Façade Typologies of Modernist Heritage. Source: Beirut Urban Lab (2021).

The end of this phase marked the beginning of the late modernist phase. The main changes were driven by the amendment of the Building Law in 1971, which canceled the height restriction and modified the building's 'gabarit.' The law also specified regulations for the 'pilotis' floor that remained unchanged to date. This period saw the emergence of regionalism after the publication of "L'habitation au Liban" by Kalayan and Liger-Belair [59] and "Architecture In Lebanon: The Lebanese House During the 18th and 19th Centuries" [57]. It also saw the influence of brutalist architecture on local practitioners. The matrix in Figure 10 synthesizes the phases of modernization (periodization) with the main 'drivers of change' and the resulting building and façade typologies.

Figure 10. Periodization of Modern Built Heritage. Source: Beirut Urban Lab (2021).

4.4.5. Framing Natural and Landscape Heritage

The team distinguished between two categories of urban natural heritage. The first category embraces the geomorphology, landform, coastline, and river features that justified locating the city historically and shaped the character of Beirut in the centuries that followed. These natural features were covered by successive layers of habitation and are, for the most part, hidden. The second category of natural heritage embraces green and open spaces, gardens and parks, streets, and public stairs. Seeing how natural and cultural heritage is intertwined in this second category, the term 'landscape heritage' was used to distinguish them from architectural and built heritage.

For landscape heritage, three categories were identified. The first category included residential gardens, which are privately defined on cadastral maps and associated with traditional houses, villa houses, and apartment buildings. The second category included enclosed green/open spaces, which are semi-publicly defined on cadastral maps and associated with institutional sites, including religious, educational, health, and governmental buildings. The third category included open and public spaces, like streets and public stairs. Together, the natural landscape and built landscape form Beirut's unique historic urban landscape heritage.

Residential garden typologies closely follow the typologies and periodization of the modern architectural heritage of residential buildings. They were the focus of this study as they constitute the largest portion of the site area. Changes in garden landscapes are few and at a much slower rate than the development of architectural typologies. These typologies are as follows: (a) the productive garden, which constitutes the remainder of a 'bustan' containing mostly fruit trees; (b) the traditional house garden, which constitutes extensive trees planted around a suburban late Ottoman house; (c) the villa garden which surrounds mansions with a westernized character and large plot area; (d) the apartment building garden which occupies one side of an apartment building plot; (e) the modern apartment building garden which constitutes the garden of a modernist apartment building with a minimal green cover; and the (f) modern residual garden which is limited to the planted areas of the residential plots, generally within building setbacks (See Figure 11). In defining these typologies, the team relied heavily on the outcomes of the research conducted on the 'hakura' garden style [60] and the Beiruti house garden [44]. The matrix in Figure 12 synthesizes the phases of modernization (periodization) with the main 'drivers of change' and the resulting residential garden typologies. For institutional green/open spaces, four typo morphologies were delineated and surveyed, associated with religious, educational, health, and governmental buildings.

| (a) | (b) | (c) | (d) | (e) | (f) |

Figure 11. Gardens of the different residential garden typologies listed above (**a**–**f**). Photos by Mariam Bazzi (2021).

Era	Colonial			Post-colonial
Phase	1st phase of modernization	2nd phase of modernization	3rd phase of modernization	
Drivers of change	Rapid sub-urbanization (Garden suburbs) Trade & transportation systems (e.g.; railway, port) Religious, Educational, and Cultural institutions	Urbanization and the growth of large cities Accelerated scientific and technological development: introduction of concrete Migrations and refugees (camps)	Urbanization and the growth of large cities Accelerated scientific and technological development (e.g., Elevator)	Urbanization and the growth of large cities Trade and corporations Popular culture and tourism Bus stations and networks
Built Heritage	Late Ottoman Heritage (1850-1919)	Colonial Eclectic Heritage (1920-1935)	Early Modernist Heritage (1936-1955)	High Modernist Heritage (1956-1971)
Residential Garden typologies	Remnant Bustan	N.A.		
	Traditional House Garden		N.A.	
	Villa Garden			N.A.
	N.A.	Apartment Building Garden	Modern Apartment Building Garden	
			Modern Residual Gardens/Space	

Figure 12. Proposed Periodization of Modern Landscape Heritage. Source: Beirut Urban Lab (2021).

4.5. Defining Values and Attributes of Modern Heritage

The following step carried out by the team entailed defining values and attributes for modern built and landscape heritage. To do so, the team formulated a set of questions that guided the assessment of buildings and landscapes. For modern built heritage, three sets of values were identified: formal/spatial value, urban/landscape value, and socio-cultural value. Formally, a building is assessed on how it represents a historical period, including its style, typological elements, and its stylistic integrity. The urban value focuses on aspects of the building's relationship with its immediate environment, such as its interaction with streets and other buildings, its position on the plot, its visual prominence, and its overall contributions to the urban fabric. As for the socio-cultural value, it considers the importance of the building to the social history, cultural practices, and urban narrative, reflecting its impact on the collective memory and heritage.

A similar set of values was used to assess modern landscape heritage but with additional consideration for environmental value. Like buildings, a garden or green space is assessed spatially based on its reflection of a historical period and embodiment of societal values through its design, layout, and adaptation to local geographic and cultural contexts. The urban value assesses the contribution of the garden or green space to the urban landscape character or identity. The socio-cultural value pertains to the garden's significance to the shared memories of a place and contributions to its social history. As for the environmental value, it assesses the impact on urban microclimate and biodiversity. The matrix in Figure 13 summarizes the values and attributes of the modern built and landscape heritage.

Formal / Spatial Value	Urban / Landscape Value	Socio-cultural Value	Environmental Value
How buildings represent a historic period?	*How buildings contribute to urban and landscape identity?*	*How buildings are significant in relation to the socio-cultural memory of the place?*	
▪ Typology ▪ Distinctive architectural features ▪ Facade/stylistic integrity ▪ Period of construction ▪ Building condition	▪ Physical survey • Building setting • Topographic condition ▪ Urban experience • Prominence • Contribution to urban fabric • Harmony	▪ Architecture as practice ▪ Collective memory and practices ▪ Cultural practices ▪ Historical narrative	
How gardens represent a historic period?	*How gardens/green space contribute to urban landscape character/identity?*	*How gardens/green space are significant as urban nature & the memory of the place?*	*How gardens/green spaces contribute to urban microclimate and urban biodiversity?*
▪ Typology ▪ Distinctive features ▪ Hardscape ▪ Softscape ▪ Condition ▪ Integrity	▪ Garden/space ▪ Position in site ▪ Urban position ▪ Accessibility	▪ Collective memory ▪ Cultural practices ▪ Social significance	▪ Ratio built/open ▪ Vegetation type ▪ Vegetation density ▪ Vegetation maturity

Figure 13. Values and Attributes of Modern Built and Landscape Heritage. Source: Beirut Urban Lab (2021).

4.6. Validating the Framework

Building on the participatory approach advocated by the Historic Urban Landscape approach in items no. 22 and 23, the team operated through a collaborative model to validate the proposed framework. This model included public agencies, local and international non-governmental organizations, local experts and researchers in the field of heritage, and members of local communities. The aim was to include a wide range of stakeholders involved in the identification and protection of heritage in Beirut.

In this process, the team held three thorough meetings and discussions with UNESCO and the Directorate General of Antiquities in Lebanon (see Figure 14a). The purpose of the meetings was to reflect on the values and identification criteria for heritage selection in the context of the Historic Urban Landscape approach. Additionally, the team held two expert workshops on the identification of modern heritage in Beirut. The purpose of these workshops was to present and discuss the proposed definition and criteria for the identification of modern urban heritage within a framework of identified values and attributes. The workshops engaged local and international experts and academics to reach a shared definition and periodization of modern heritage in Lebanon and to identify its constituent elements and related attributes and values (see Figure 14b).

To advocate for UNESCO's Historical Urban Landscape approach and its application in Beirut, the team organized two public information sessions entitled 'The HUL Approach in the Context of Beirut-Blast Damaged Areas.' These sessions aimed to present the Historic Urban Landscape approach and how it applies to Beirut within a framework of identified layers, values, and attributes. A diverse audience attended both sessions, including scholars, architects, restoration specialists, students, and civil society actors.

| (**a**) | (**b**) | (**c**) |
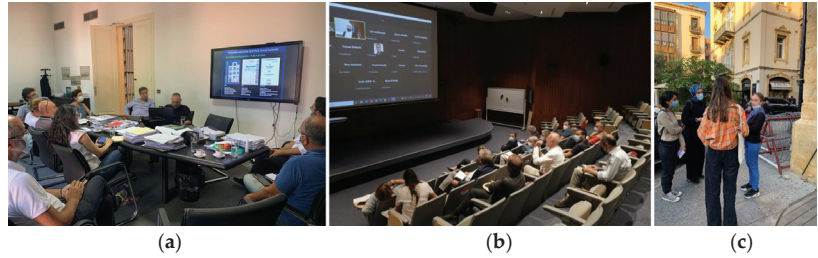
Figure 14. Validating the Framework. (**a**) Team meeting with UNESCO and DGA representatives at DGA premises, (**b**) workshop with local and international experts at the American University of Beirut, (**c**) team members with citizen scientists on an urban walk in Gemmayzeh. Source: Beirut Urban Lab (2021).

Furthermore, to solidify the participatory approach, the team engaged local citizen scientists, who are residents and members of the local communities trained by the Beirut Urban Lab on research methods and ethics (also called local researchers), in three urban walks (see Figure 14c). These urban walks aimed to identify sites of shared memories and significant places that hold urban and socio-cultural importance to the residents and local communities. These walks were recorded by photographing, audio-recording, and mapping the main places identified by the participants as significant landmarks, places, and practices.

4.7. Designation of Modern Built and Landscape Heritage

After extensive fieldwork resulting in 2464 surveys on built and landscape heritage, the team evaluated the results and proposed a scheme to designate modern built and landscape heritage. The designation was based on the assessment of the values of each building and the relationship it possesses with a given cluster or ensemble. It consists of four categories: A, B, C, and D. For built heritage, category A corresponds to individual monuments. They are buildings that demonstrate high architectural, urban, and socio-cultural value. Buildings falling under this category are envisioned to be protected even if they are not part of a cluster or ensemble. Category B corresponds to buildings that constitute elements of the Historic Urban Landscape. They demonstrate low to high standing across the three values, as follows: B1 buildings have high to low standing across all values, B2 buildings have low to high standing across two values, and B3 buildings have high standing architectural value. Buildings that fall under category B are envisioned to be protected as part of a cluster or ensemble. As for Category C buildings, they possess a high-standing urban value and are considered elements of the Historic Urban Landscape. It is recommended that they are assessed further within a detailed study of a given cluster or ensemble. Finally, designation D corresponds to buildings that have no value across any of the categories, and they are envisioned to be released (see Figure 15). A similar designation scheme was formulated for landscape heritage covering residential gardens, green/open spaces, and main streets and stairs.
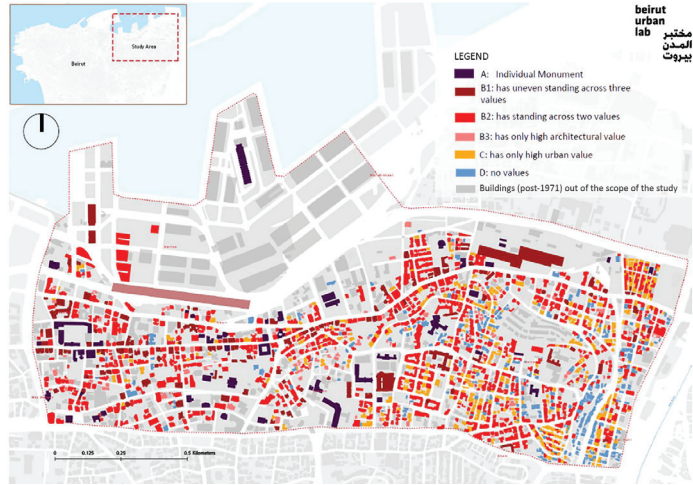
Figure 15. Designation of Modern Built Heritage based on the team assessment. Source: Beirut Urban Lab (2021).

4.8. Defining Clusters, Ensembles, and Garden Concentrations

In the process of reading the site as a Historic Urban Landscape, the team formulated a definition of a cluster, an ensemble, and a garden concentration. A cluster is distinguished as a group of modern heritage buildings sharing common architectural and urban attributes, thus forming the smallest ordered homogeneous group and constituting a recognizable urban form, like alignments, blocks, and squares. Each cluster is understood in context and in relation to how it contributes to the formation of space and the definition of urban identity (see Figure 16). An ensemble is identified as a sequence of clusters, or a group of modern heritage buildings, that are diverse in terms of their age, typologies, and other attributes. Accordingly, they form a comparable group of buildings. As for a garden concentration, it is defined as a group of gardens constituting a conglomeration of mature tree canopies that are of significance in shaping the Historic Urban Landscape character.

Figure 16. Mapping of Building Clusters in solid colors and Garden Concentrations in green, outlined in black. Source: Beirut Urban Lab (2021).

5. Discussion and Conclusions

Applying the Historic Urban Landscape (HUL), a broad, theoretical, and abstract international concept, to local contexts requires tailored approaches. The framework for identifying modern built and landscape heritage developed for the project "Identifying Cultural Heritage Attributes in Beirut Blast Damaged Areas" serves as an example of an adaptation of the Historic Urban Landscape approach to the post-colonial and Mediterranean city of Beirut, within and beyond post-disaster conditions. While most applications of this approach are centered in Europe and, most recently, in China [20], there were previous attempts to apply this approach in contexts similar to that of the case study. However, such attempts were limited to assessing the strengths and weaknesses of the HUL approach, in addition to identifying its role in the conservation of heritage [18,33]. El-Bastawissi et al. [33], for example, investigated the application of the four tools identified in the Recommendation and assessed the possibility of their application in the context of Beirut using a SWOT analysis [33]. Some applications were limited in scale, applying HUL to one street in Beirut, namely Armenia Street. While their research provides a valuable contribution to the study of heritage in Beirut, a more thorough and detailed reading of heritage is needed in this context, given the cultural and geographical complexity that requires a holistic reading of heritage. This is especially important for modern heritage, given the very limited research in that field and the absence of this layer from the legal framework in Lebanon. Therefore, a thorough identification of this layer is needed prior to any intervention in this context, especially given the post-blast condition. Countering this challenge required a major effort from the Beirut Urban Lab, embodied in the employment of six local experts who undertook a thorough investigation of modern heritage in Beirut. Therefore, we argue that the framework proposed by the BUL Team contributes to advancing the Historic Urban Landscape approach in addition to its contribution to the study of modern heritage in Beirut.

First, with HUL as an overarching premise, this study constitutes a holistic and integrated approach to urban heritage that is spatially expansive, embracing buildings and streets, open spaces and gardens, just as it is inclusive of socio-cultural practices and local cultural values. The HUL integrative framework engendered a layered reading that captured the complexity of the living heritage of cities. This aided the study in expanding the identification of modern heritage beyond individual monuments and buildings to incorporate both built and landscape heritage as integral and integrated components of the Historic Urban Landscape. By introducing and articulating the term landscape heritage in local contexts, this study pioneered the coupling of landscape and heritage within in-depth interpretations of heritage in the regional context. Through a thematic reading of the urban context, this study aligned the formation of modern heritage with its underlying 'drivers of change' [50], identifying key components, including infrastructure, open spaces, and the intangible heritage of social practices and collective memories. While providing a systematic valuation method for urban and landscape heritage with a detailed list of attributes specific to each category, the study can also serve as a cornerstone in heritage recognition, providing a reading of heritage that is inclusive of the urban fabric as a whole, thus moving beyond a historicized reading. HUL also became a tool for identifying and valuing heritage, moving it from a broad and abstract concept into a robust, integrative, and applicable heritage framework. Tangibly, this documentation of modern heritage in Beirut paved the way for a series of workshops that took place between public agencies, UNESCO, heritage experts, economists, policy experts, and academics in order to propose an amendment to the heritage protection law in Lebanon.

The participatory model through which the team validated the framework highlighted the importance of agency in the process of identifying and valuing heritage. Based on the recommendation, the team engaged a wide range of stakeholders, including public entities, the private sector, research and academic institutions, local non-governmental organizations, and international agencies, in addition to local community engagement through urban walks. As a result, HUL nurtured a true collaboration with local communities

and across disciplines, potentially described as 'transdisciplinary' in its collective framing and the proposed collective reading. Scholarly work across disciplines accounts for the layered reading of urban heritage and the innovative concepts of urban heritage attributes in post-colonial, global south cities. It has been argued that since HUL was introduced by UNESCO, it can often be considered enforced by international bodies, thus disregarding the specificities of local contexts [15]. This model, however, countered the universalization of heritage and brought back the agency by identifying heritage with local institutions and local communities. In this sense, the framework kept heritage, as Al-Harithy [61] argues, associated with the cultural context to which it belongs and engrained in the identities of local communities.

The recognition of 'landscape' as heritage is another key contribution of the project discussed in this article, demonstrating the potential of a holistic landscape reading of the site. For the first time in Beirut, the project recognized 'nature in the city', those fragments of living landscapes that include gardens and abandoned sites, street trees, and cemeteries, as opposed to the 'nature of the city', morphological features of the virgin site of Beirut that include landform and the coastline, transformed and/or incorporated into the urban fabric (See Figure 17). The reading of nature in/of Beirut was the basis for identifying the 'garden concentrations', exemplifying a holistic reading that incorporates open landscapes and buildings, gardens, and public stairs. By introducing urban clusters and ensembles, the framework also studied the relationships between buildings and their surrounding urban and landscape fabrics. The cluster analysis recognized the value of urban components and layers, not necessarily within themselves but also in their contributions to the memories and socio-cultural identity of the city. These elements provided an intermediate scale for the Historic Urban Landscape that was crucial for studying the urban morphology of the study area. Equally significant are the identified garden clusters that served as milestones in the next phase of developing strategies and guidelines for the conservation of heritage. They also contributed to innovative approaches to identifying urban heritage attributes and heritage conservation guidelines. As such, this study can serve as a pilot for the application of the Historic Urban Landscape approach in a regional context that shares a common colonial legacy and cultural characteristics. The authors encourage further research that investigates the applicability of the proposed framework in similar contexts.
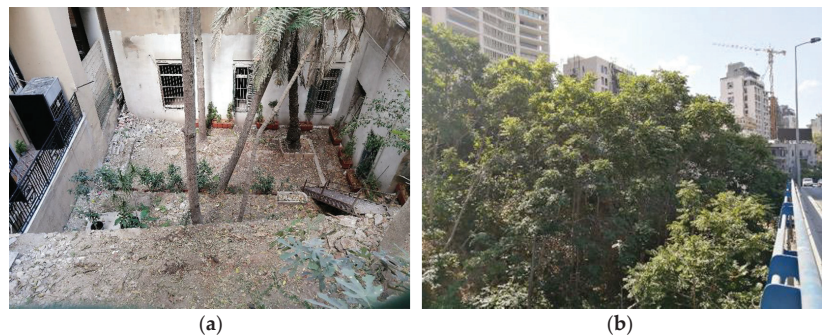

| (a) | (b) |

Figure 17. (**a**) Landform reshaped by terraces, (**b**) trees taking over an abandoned site. Photos by Mariam Bazzi (2021).

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The Formation and Preservation of Urban Heritage Through Urban Landscape Transformation: A Case Study of Pittsburgh

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Abstract: This study examines the potential of urban landscape transformation to generate and develop new heritage and the role of heritage urbanism in an industrial city. It explores whether the changeover of urban heritage districts in Pittsburgh (PA, USA) can give rise to a novel type of urban heritage. Pittsburgh experienced urban development primarily driven by the presence and accessibility of natural resources, rather than favorable geographical conditions: topography characterized by rugged hills, rock formations, rivers, and stream valleys. The integration of the American-style grid within this unique natural environment resulted in intriguing juxtapositions. Consequently, elements such as bridges, viaducts, stairs, tunnels, and historical inclines gained paramount importance in shaping the urban fabric. The city's remaining preserved or transformed urban heritage is protected through historic districts designated by the Department of City Planning, which enforces specific planning and design guidelines. The study employs a multi-faceted approach combining the concepts of historic stratification (urban palimpsest), integrated urban morphology, space syntax (integration analysis), and heritage urbanism. During the personally conducted long-term fieldwork, the selected case studies described herein (historic districts, university campus, and traditional neighborhood) proved to be the most suitable for demonstrating urban heritage formation through urban landscape transformation.

Keywords: urban heritage; Pittsburgh; integrated urban morphology method; urban palimpsest; space syntax; heritage urbanism approach; historic districts

1. Introduction

This research investigates the potential of urban landscape transformation to generate, create, and develop new heritage. The analyses cover the specific urban elements that make up each area and their combinations (urban morphology), as well as spatial syntax studies. Specifically, it explores whether the transformation of urban heritage districts can give rise to a novel type of urban heritage. Urban landscape transformation is a dynamic process characterized by alterations in the physical, social, and functional dimensions of urban environments. This often involves the redevelopment or reconfiguration of urban spaces, such as changes in or the demolition of the built environment, the construction of new infrastructure, or shifts in land-use patterns. In the current article, development is sporadically used when we are referring to the progressive changes of a city and district through the reuse of previous forms and the addition of new elements—development has a forward-looking undertone. The term urban heritage district is, in US legal terminology, equal to a historic district, which is defined by § 1101.02. The urban heritage district as a notion is an area of significant interconnected urban elements that represent urban heritage as a whole, e.g., urban structures, or built and natural environments. Furthermore, this study examines the role of heritage urbanism in the transformation of an industrial city, focusing on Pittsburgh (PA, USA) as a case study.

Urban heritage is a complex notion composed of interconnected historical, cultural, and architectural elements that define the distinctive character of a town. It includes tangible assets such as buildings, streetscapes, and public spaces, reflecting the historical and cultural legacy of a community. Although it might include intangible elements, in our case, tangible assets are the focus of our study.

"Heritage urbanism considers the revitalization and enhancement of cultural heritage in spatial, urban, and landscape contexts, and it explores models for its inclusion in contemporary life. In search of revitalization and enhancement models, heritage is not viewed as isolated buildings/objects, but rather as part of the immediate and wider environment" [1] (p. 4).

Pittsburgh experienced urban development primarily driven by the presence and accessibility of natural resources, rather than favorable geographical conditions. The city's topography is characterized by rugged hills, rock formations, and the presence of rivers and stream valleys. The synthesis of the American-style grid within this unique natural environment resulted in intriguing juxtapositions. Consequently, elements such as bridges, viaducts, stairs, tunnels, and historical inclines gained paramount importance, shaping the urban fabric of the city and contributing to the creation of distinctive neighborhoods.

Urban fabric (or urban tissue) is the physical framework of a city, encompassing the arrangement and interconnections of its urban elements, buildings, plots, systems of plots, streets (street network), public spaces, and green spaces. The spatial relationships between urban elements influence the identity of a neighborhood (urban fabric) and a town itself. Urban fabric is the ensemble of urban forms, and its typology is a taxonomic classification of urban form characteristics and their internal relations found in urban places. Character is the concept of physical identity, built up by urban elements that create the town's patterns through their combination.

A town's identity is intrinsically linked to its physical structure, including its built and natural environment, as well as its historical and social context. Urban heritage, a product of the past, remains an integral component of contemporary cities. As such, it serves as a defining element of a city's identity, connecting its inhabitants to the past and the forces that shaped its present. Urban heritage is more than a mere collection of buildings and monuments; it is a dynamic and evolving fabric that contributes significantly to a city's character and identity.

Spatial syntax studies deal with the current and simulated state of case study areas, and simulated states show a more harmonious spatial integration with less spatial isolation by restoring former historical inclines, as well as closed and transformed areas. Spatial integration refers to the interconnectedness and harmonious relationship between the various urban elements (especially the network of streets, as well as open and green spaces) within a town—in this case, Pittsburgh. Spatial isolation and limited accessibility characterize some of the case study areas, such as the historic neighborhood of Troy Hill.

As aptly stated by Franklin Toker, "(...) Pittsburgh neighborhoods and its topography give the city's eighty-eight neighborhoods the hills, gullies, rivers, bridges, train tracks, and expressway traffic that create borders of striking prominence. (...) The architectural glory of Pittsburgh may ultimately rest not in its buildings, but in its neighborhoods" [2] (p. 123).

The city's remaining urban heritage, both preserved and transformed, is safeguarded through historic districts designated by the Department of City Planning, which enforces specific planning and design guidelines. "The guidelines are designed to help individual property owners formulate plans for the preservation, rehabilitation and continued use of historic buildings (...). The guidelines pertain to buildings of all occupancy and construction types. They apply to permanent and temporary construction on the exterior of historic buildings as well as to new construction in the district" [3].

The definitions of historic structure and historic district under current legislation are as follows: "§ 1101.02 (a) HISTORIC STRUCTURE. Anything constructed or erected, the use of which requires directly or indirectly, a permanent location of land, including walks, fences, signs, steps and sidewalks, which meets one (1) or more of the criteria

for designation as listed in § 1101.04. (b) HISTORIC DISTRICT. A defined territorial division of land which shall include more than one (1) contiguous or related parcel of property, specifically identified by separate resolution, which meets one (1) or more of the criteria for designation as listed in § 1101.04." § 1101.04 states the following criteria: "(b) Designation of Historic Structures, Historic Districts, Historic Sites, and Historic Objects. The Commission shall limit its consideration to the following criteria in making a determination on a nomination of an area, property, site, structure, or object for designation by ordinance as a Historic Structure, Historic District, Historic Site, or Historic Object. (1) Its location as a site of a significant historic or prehistoric event or activity; (2) Its identification with a person or persons who significantly contributed to the cultural, historic, architectural, archaeological, or related aspect of the development of the City of Pittsburgh, State of Pennsylvania, Mid-Atlantic region, or the United States; (3) Its exemplification of an architectural type, style or design distinguished by innovation, rarity, uniqueness, or overall quality of design, detail, materials, or craftsmanship; (4) Its identification as the work of an architect, designer, engineer, or builder whose individual work is significant in the history or development of the City of Pittsburgh, the State of Pennsylvania, the Mid-Atlantic region, or the United States; (5) Its exemplification of important planning and urban design techniques distinguished by innovation, rarity, uniqueness or overall quality of design or detail; (6) Its location as a site of an important archaeological resource; (7) Its association with important cultural or social aspects or events in the history of the City of Pittsburgh, the State of Pennsylvania, the Mid-Atlantic region, or the United States; (8) Its exemplification of a pattern of neighborhood development or settlement significant to the cultural history or traditions of the City, whose components may lack individual distinction. (9) Its representation of a cultural, historic, architectural, archaeological or related theme expressed through distinctive areas, properties, sites, structures or objects that may or may not be contiguous; or (10) Its unique location or distinctive physical appearance or presence representing an established and familiar visual feature of a neighborhood, community, or the City of Pittsburgh" [4].

The urban heritage of Pittsburgh formed and transformed through three distinct eras of the city's industrial transformation.

The prosperous era was characterized by thriving industries, large-scale industrial estates, and emerging elite districts from the Iron City era to the Steel City period of the 1920s and 1930s (with significant influence of the great flood in 1936 on the urban and economic structure).

The phase of industrial decline and economic struggles resulted in segregated and deteriorating neighborhoods. The era overlaps with the war period and the redefinition phase, from the industrial decline of the 1950s in particular until the late 1980s (1981–1982 recession), and even the beginning of the new century.

The city's redefinition phase was marked by initiatives such as the development of river trails, the revitalization of the Strip District, and the growing importance of universities, with noteworthy examples like the campus of Chatham University. The phase from the post-war period (1946) to 1973 was marked as Renaissance I. From 1973 (the year of the 1973 oil crisis) to today, the foundation and acts of the Pittsburgh History and Landmarks Foundation (1964) and the efforts in the 1980s have shifted Pittsburgh's economy from heavy industry to the tertiary industry.

The current study employs a multi-faceted approach to address the research questions, combining the concepts of historical stratification (urban palimpsest), to identify changes in the urban fabric over time; integrated urban morphology and micro-urbanism, to understand the patterns of language and connection between urban structure and the built environment; space syntax (integration analysis), to measure the distance of spaces from the space of origin and to understand the impact of urban landscape transformation on the case study areas; and heritage urbanism, to understand whether the changes could lead to a new heritage revival model. Each of the approaches are explained in Section 2, from Sections 2.1–2.4.

We examine specific areas of interest, including historic districts such as Allegheny West, Allegheny Commons Park, Deutschtown, Manchester, Mexican War Streets, a university campus of Chatham University, and traditional neighborhoods, like Troy Hill.

Each case study area is a specific area of Pittsburgh that provides an urban context from the perspective of urban landscape, urban heritage, geographic segregation, gated communities, urban renewal, urban heritage evaluation, or emerging urban heritage.

Allegheny West, Allegheny Commons Park, Deutschtown, Manchester, and Mexican War Streets are located in the former independent Allegheny City, now Pittsburgh's North Side, in close proximity to each other. Manchester was among the first historic districts (1979), and Allegheny West, along with Allegheny Commons Park, has witnessed an intensive urban renewal program, which caused the revaluation of urban heritage sites. Deutschtown and Mexican War Streets, along with Manchester, contain the city's largest collections of Victorian architecture, with Italianate, Romanesque, Classical, and Colonial Revival styles, and notable architectural pieces. Troy Hill is geographically segregated. A report on the built environment of Troy Hill was completed in 2014 [5], which intended to "Identify and Designate Additional Historic Structures, Districts, Sites, and Objects (City of Pittsburgh Cultural Heritage Plan, 2012)" [5] (p. 3).

"In terms of significance, the potential Troy Hill district is likely to have significance under Criterion A, meaning it is important in association with events that made a significant contribution to the broad patterns of our [Pittsburgh's] history. The neighborhood was developed primarily by immigrants from German-speaking countries of Europe whose ethnic influences were significant in the development of Pittsburgh's North Side" [5] (p. 25).

The present study takes into account the 1962 Urban Renewal Impact Study [6], which, among other related issues, responds to the Allegheny West urban renewal program that changed the neighborhood's structure and urban fabric, and increased social changes. The maps and georeferenced aerial photographs (Pittsburgh Historic Maps 1957 and 1967) [7] show that, over a period of about ten years, beginning in the mid-1950s, the area was completely transformed. The book *Allegheny Center: A History of Pittsburgh's North Side* [8], published in 2014, states that during the urban renewal of the historic Allegheny Diamond area, only a few historic buildings were saved, including the former city's Carnegie Library, Buhl Planetarium, and Post Office, among others. But nearly everything else was erased in 1958, including a historic market house and many other nineteenth- and early-twentieth-century buildings to make way for parking and new commercial space.

"To address the many problems the planning association [Pittsburgh Regional Planning Association] found [in 1951], the study [from 1954] proposed sweeping changes to the lower North Side's land use and transportation corridors. (. . .) This scheme would eliminate all of the area's 50-to 120-year-old houses, stores, and churches, and almost all of its streets, in favor of high-rise apartments, parking lots, and a shopping plaza. A new limited-access highway just above the redeveloped community would connect California Avenue in Manchester with East Ohio Street, proceeding through northern Manchester, the Mexican War Streets, and Deutschtown, hugging the hillside below Perry Hilltop, Fineview, and Troy Hill" [8] (pp. 206–207).

After the North Side urban renewal, the Urban Renewal Impact Study was published in 1962. The study dealt with the urban renewal processes in Allegheny County, including Pittsburgh. According to the study, "Three major types of change in land use have been continually taking place in Allegheny County's urban areas: 1. Change in size of spatial units without changing the type of use. For example, the division of single-family house into apartments. 2. Change of type of use of particular structures without their demolition. For example, conversion of the Schenley Hotel into a University building [in Pittsburgh, Oakland district]. 3. Demolition, clearance and rebuilding. (. . .) Until the advent of the formal public renewal program in the late 1940′s, these changes occurred almost entirely as the result of variation in private market demand, augmented on occasion by public improvements. Even today, by far the greatest number of changes in land use result from these private forces". [6] (p. A-1).

"The greatest accomplishments of the Pittsburgh Renaissance [clean air and civic revitalization project after the Second World War] are frequently cited, but their impact seems to be imperfectly understood. Effective smoke and flood control have not only changed the basic and immemorial image of Pittsburgh in the eyes of its own citizens and of the world, but they have immeasurably increased the livability of the whole Pittsburgh Region. Their impact is not limited to anyone locality or anyone class of people. It is truly comprehensive" [6] (p. 19).

The transformation of the urban fabric of Allegheny City is total in some areas and partially complete in others, affecting the internal spatial relations of the area and the connection of the neighborhood with other parts of Pittsburgh. Allegheny City was a separate municipality located in the US state of Pennsylvania, just north of downtown Pittsburgh. It was situated across the Allegheny River from Pittsburgh, with its southwestern boundary formed by the Ohio River. Allegheny City existed from 1788 until it was annexed by Pittsburgh in 1907. After the annexation, the waterfront district along the Allegheny and Ohio rivers that was once part of Allegheny City became Pittsburgh's North Shore neighborhood. Spatial syntax analyses are used to examine two scenarios: the current state, and a simulation in which the urban block system (urban fabric) that disappeared as a result of the urban renewal that began in the late 1950s is still preserved today. From the point of view of spatial communication, the inclines connecting the various hills and walleyes of Pittsburgh are also significant, of which only two are in operation nowadays (Duquesne Incline from 1877 and Monongahela Incline from 1870) [9].

Changes in spatial communication and the transformation of the functional syntax and spatial syntax of the area are examined in this study in the case of the Chatham University Shadyside Campus. The area, once 'open', was dominated by detached houses, built mainly in the second half of the 19th century and during the 20th century. Among these buildings are those that are part of universal architectural history, such as the Alan I.W. Frank House (1939–1940) designed by Walter Gropius and Marcell Breuer. The building designed by Gropius and Breuer is also interesting to mention because it is located outside the closed campus of Chatham University, but the only road (Woodland Road) that connects it to the city leads through the closed campus.

The selection of case studies was preceded by preliminary research that dealt with (among other things) the historical, geographical, and architectural characteristics of the given areas. The present introduction reveals an interesting segment of that research, i.e., the relationship between urban structure and geographic features, the built environment of the 19th and early 20th centuries, the Pittsburgh Renaissance era (from the 1940s), and the changes that segregated a neighborhood with a spatially open structure.

2. Methods

2.1. Historical Stratification—Urban Palimpsest

The concept of the palimpsest is a method that traces the process by which new forms are created by considering existing ones and inviting further development through the reuse of previous forms. Gerard Genette, a French scholar, pioneered the use of the palimpsest method, particularly in literary research. He focused primarily on poetics and aimed to understand and examine the continuities and transformations of various elements within texts over time [10] (p. 147). The concept of 'urban palimpsests' [11] (p. 7) aims to bridge the gap between the ways we analyze and understand the literature and how we perceive urban spaces. Huyssen's concept is grounded in the belief that the techniques of literary analysis can be applied to our comprehension of urban spaces. The concept of palimpsest is not limited to literary research; it can also be applied to urban development and cities.

As part of the palimpsest approach, historical stratification involves identifying changes in the urban fabric over time, typically accomplished through the examination of historical maps. The principle of historical stratification is used in the analyses of urban structural changes following their evolution over time: "a spatially varied mixture of

different period types and styles in the townscape acquired through the accumulation and selective replacement of forms" [12] (p. 247).

Cities can be seen as palimpsests, with layers of history—physical, spatial, and social—interacting and accumulating over time. This perspective allows for the study of formal diversities in urban development, recognizing the intricate and interconnected nature of cities as they evolve and adapt (morphogenesis). Each layer represents a chapter in a city's history, and studying them independently reveals the nature of urban growth and transformation. This concept allows for the study of formal diversities in urban development.

Elif Sarihan, a doctoral student of Éva Lovra, in her thesis research on "The Concept of the Urban Palimpsest. The Urban Fabric Transformations in Inherited City image" [13], tested the concept of the palimpsest/layering principle to find hidden values/remains and evidence of their evolutions over time. "Urban fabric emerges from part to whole [14] (p. 165,7) [15] (p. 26) or part to part of urban patterns at different resolutions or different levels of specificity. Therefore, the focus of morphological analysis in the proposed palimpsest concept should be directly observable structural space and cultural habits (type)" [13].

A town can be read and analyzed by its physical attendance, through urban forms, and through the stratification of the physical manifestations of different historical periods and times. The identification of historical morphogenetic structures forms the logical foundation for understanding how formation and transformation patterns coexist. The diverse morphological characteristics of sites, coupled with typo-morphological analysis, provide a basis for delineating units or zones within the historic urban landscape (typo-morphological zoning).

2.2. Integrated Urban Morphology Method and Micro-Urbanism

The integrated urban morphological method, as proposed by Lovra in 2018 [16], draws heavily from the practices of Italian and English urban morphology schools. Saverio Muratori, in his work on morphological practice, focused on typology via four scales (building—district—city—territory) to understand the directions shaping building fabrics, urban organism, and territories [17]. Gianfranco Caniggia further developed the theories of Muratori with a focus on typo-morphology and an understanding of the built form by examining the historical process of its formation. In addition to Caniggia's take on urban typology and morphology (Italian school), the Conzenian approach (English school of urban morphology) is also applicable. In his 1960 study, Conzen (1969) deals with general aspects of urban morphological analysis; among these, he differentiates the town plan, land utilization pattern, and building fabric within the townscape. M. R. G. Conzen's town-plan analysis method seeks to trace the character of towns through their elements and development over time. Urban tissue, as discussed by Caniggia and Maffei, or the plan unit in Conzen's terminology, comprises a diverse combination of streets, plots, and block plans. Conzen's morphological approach is rooted in the concept of morphological periods that reflect diverse social and cultural histories. Each period is recognizable through historical layering. Morphological regions or townscape units represent areas of homogeneous urban form, encompassing both building and plan types. To evaluate the inherited townscape and spatial pattern, besides the typo-morphological approach, the consideration of Conzenian hierarchy principles [12] is essential. Caniggia took the spatial correlation of built objects (co-presence) into account (building level hierarchy on the level of urban tissue); the other aspect is temporal correlation (derivation). "Co-presence and derivation are none other than historical outcomes in space and time. Co-presence is spatial correlation; derivation is a temporal correlation: an object exists in that it belongs to an identified point of the dual process that can be summed up in the unique concept of history" [17] (p. 65). The components related to spatial correlation are elements, structures of elements, systems of structures, and organisms of systems that can be applied generally to individual buildings and to towns. The hierarchy (town) is as follows: 1. Elements: buildings; 2. Structure of elements: organization/groups of buildings (urban tissue); 3. System of structures: combination of urban fabrics (districts); 4. Organism/nucleus of the town or city. Muratori,

Caniggia, and Maffei referred to the principle of aggregation as the very basic phenomena for the hierarchy of elements.

The work of Karl Kropf has had a significant influence on the development of the integrated methodology. The first author was a student of Karl Kropf, whose theoretical and practical lectures were followed in Norway (NMBU) within the framework of a PhD course in 2016. The lectures were based on his later volume, *The Handbook of Urban Morphology* (2017). According to Kropf [18], examining physical factors is the most efficient way to determine a town's character, since the physical aspects are the most obvious in terms of observation, but it is known that without historical, social, or economic impacts, it is impossible to talk about actual urban development. Peter Larkham [19] suggests that elements of urban fabric can be combined at different levels to create a hierarchy within a town.

The steps of urban tissue analyses, according to urban morphology and the integrated method, are the following: (1) Determining the street network and street network patterns. The street network/system refers to the structural changes of the time period. The identification of urban network schemas (simple tissue) is important in terms of further studies and urban tissue determination. The simple tissue is determined by the examination of areas in different towns on maps and plans that went through structural changes in the research period. (2) This is followed by the determination of plots, buildings, and their relationships with each other and with the street network. The analysis of plots and buildings involves analyzing the nature of the relations of plots and buildings to each other and their relations to the street front (shape of plots, construction, buildings with/without internal courtyards, developments in unbroken rows, floor plan of the buildings, etc.). This is completed with the examination of (3) plot series and (4) related subsidiary spaces (voids and areas belonging to building blocks), green spaces, and open spaces. Plot series (blocks) analysis includes shapes, relationship between the blocks and street network, open spaces, and green areas (green areas have high importance in urban typology. Green spaces in the town include parks and alleys, and location and conditions are analyzed. The elements of the method comprise the following: plot; streets and their systems; urban tissue; zones; morphological regions; and townscape. The method also takes into account the factors of pattern formation and determines the elements according to the factors.

The morphological characteristics of a city are determined by spatial changes and the interactions and spatial relationships between components of the urban fabric (streets, green areas, public spaces, city blocks, plots, and buildings). The process of the formation of a given city, the urban structure, and the architectural context of the urban fabric can be understood by understanding the forces (the natural, social, economic, and historical factors) that form the individual collage structures of cities. These interfaces indicate how the cityscape changes in relation to structure and how this interaction manifests itself in reverse. This interaction is the phenomenon of micro-urbanism [20], which takes the type of urban fabric as the basis for study. Micro-urbanism belongs to typo-morphology, the theoretical aspects of which are related to physical urban characteristics, history, and the architectural elements of a city. Typology is a tangible form of conceptual thinking, where patterns of development can be identified through urban architecture and architectural elements. Elements of micro-urbanism include the representation of the structure of a city (urban fabric, combination of built and natural environment, structure) and its buildings (building structure). The historical aspect refers back to changes in the urban landscape. Caniggia and Maffei conclude that the typological process can be understood as a "succession of changes in time, distinctions and applicable mutual spatial influences (. . .). History is a system of time-space individuation readable through its formation and transformation processes" [17] (p. 56).

2.3. Space Syntax—Integration Analysis

The theoretical and methodological underpinnings of space syntax were established by Hillier and Hanson in their seminal work [21], *The Social Logic of Space* (1984). Space syntax adopts a configurational approach within urban morphology, viewing the city as a configuration wherein the primary focus lies in understanding the interconnections among its constituent elements. The objective of space syntax research is to develop descriptive strategies for inhabited spaces, spanning various levels of complexity from individual buildings to settlements, thereby elucidating the underlying social logic.

In relation to urban morphology, [22] summarizes the usability of space syntax, and the author of the present paper has published a study (as a co-author) on the possibilities of the joint practical application of the two methods in relation to the changing environment from the past (19th century) to the current situation [23] (p. 49). The disciplinary interface between urban history and space syntax historical studies is discussed most profoundly in [24], and the current research follows the direction in the application of integrated thinking [25,26]. "Cartographic sources do not represent past encounter fields in a naive sense, nor are they privileged above other forms of evidence. For the period specialist though, the sustained cross referencing of cartographic sources with other archive material, the exploration of extant built environments, where possible, and the deployment of specialized spatial morphological and urban morphological methods including space syntax analysis [21] and Conzenian town-plan analysis [27], where necessary, enhances the historian's critical engagement with his or her intuitions about the social patterning of quotidian encounter fields in the past" [25] (p. 106).

Urban structure analysis serves as a key tool for comprehending the identity of a city or its neighborhoods. To this end, the current research employs the space syntax method, which entails analyzing spatial configurations through a two-step process: (1) determining the properties of the space using descriptive techniques, and (2) examining correlations between these properties and social phenomena [28] (pp. 220–221). This approach investigates the spatial manifestation of social patterns, with a particular emphasis on formal architectural characteristics. Urban structures are perceived as graphs of space utilization by society, where street networks, known as simple tissue in urban morphology, manifest traces of human connectivity.

The current research applies methods of street network analysis within the framework of space syntax, including integration and distance. The scope of the analysis can be tailored according to pedestrian, bicycle, or vehicular approaches, with spatial representation conducted either along axial lines, street segments, or within a predetermined distance radius from each segment. Integration serves as a normalized measure quantifying the distance between a given space and the broader system [21]. Notably, distance is conceptualized not in metric terms, but in topological dimensions, as illustrated in axial integration maps. Here, distance refers to the topological distance between elements within the spatial system, represented graphically with spaces denoted as vertices and their connections as edges. The physical boundaries delineating spaces, along with their shapes and interconnections, significantly influence their utilization patterns [28].

In axial integration maps, the degree of integration for each axis is depicted using a color scale, with gradual shifts in color indicating varying levels of integration, where red axes denote the highest integration and dark blue signifies the lowest.

Space Syntax—Pittsburgh Nowadays and the Early 20th Century (Simulation)

The integration analyses for both the current state and for the urban structure of Pittsburgh were completed with the Space Syntax [29] workflow using Space Syntax Toolkit (version 0.3.10) within QGIS (version 3.34) and DepthmapXnet 0.35. The integration measures how integrated a street is to network. The base map (road network) comprised vector layers created from OpenStreetmap. The line layers in both cases, current state (Figure 1) and historic (Figure 2), went through manual "cleaning" (deleting inaccurate lines), and missing lines were added (roads are presented as single lines in the map). The

graph analysis was conducted with an infinite radius to determine the integration value of the road segments [29] in DepthmapX.
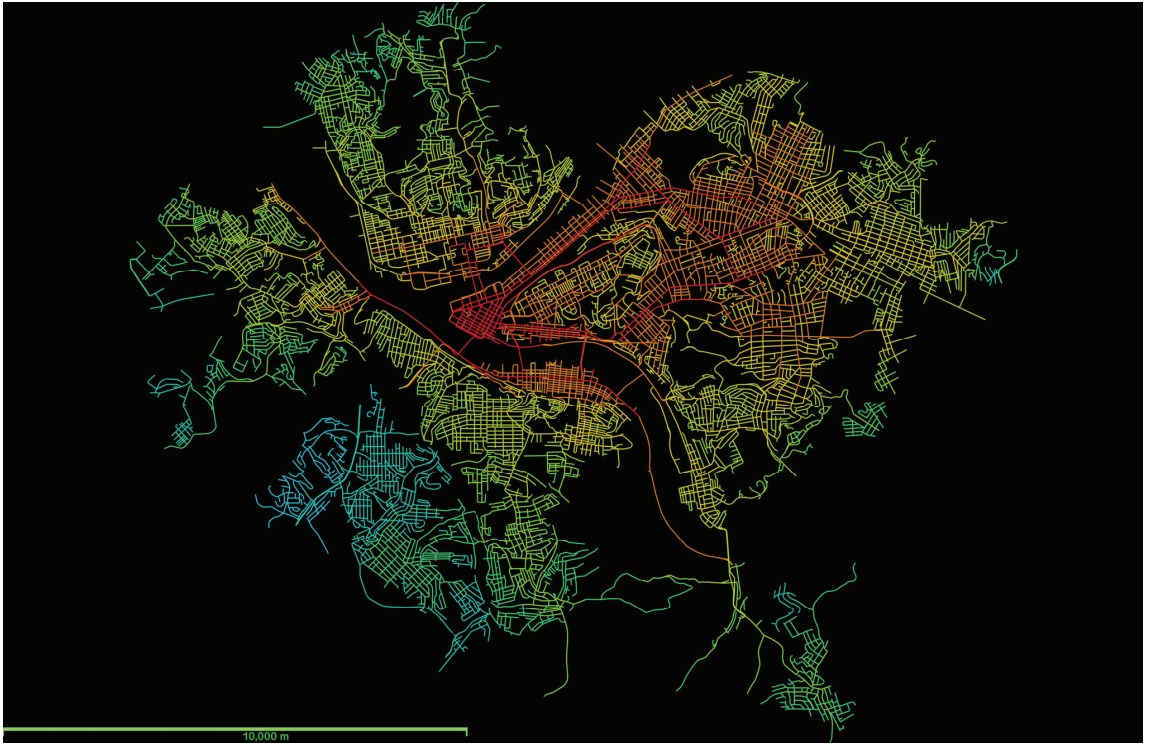
Figure 1. Pittsburgh, PA, nowadays—integration map. The degree of integration for each segment line is depicted using a color scale. The red axes denote the highest integration; dark blue signifies the lowest. The levels between the highest and lowest are gradually shifting. Space Syntax analyses by Z. Bereczki, 2023.

The second integration map focuses on the early-20th-century urban structure of the city considering that the analyzed base map (current state) went through significant changes which affected the integration. The second analysis included the original urban structure of the city: inclines (currently only two, Monongahela from 1870 and Duquesne from 1877, are operating; the number of operating inclines at the beginning of the 20th century was about twelve) [30], the urban structure of the neighborhoods that went through revitalization processes (like Allegheny Center), and Shadyside Campus being open to the public (among the others). The early-20th-century map analysis is a simulation: the base map is not a single historic map, but the OpenStreetMap with reversed urban structure changes.
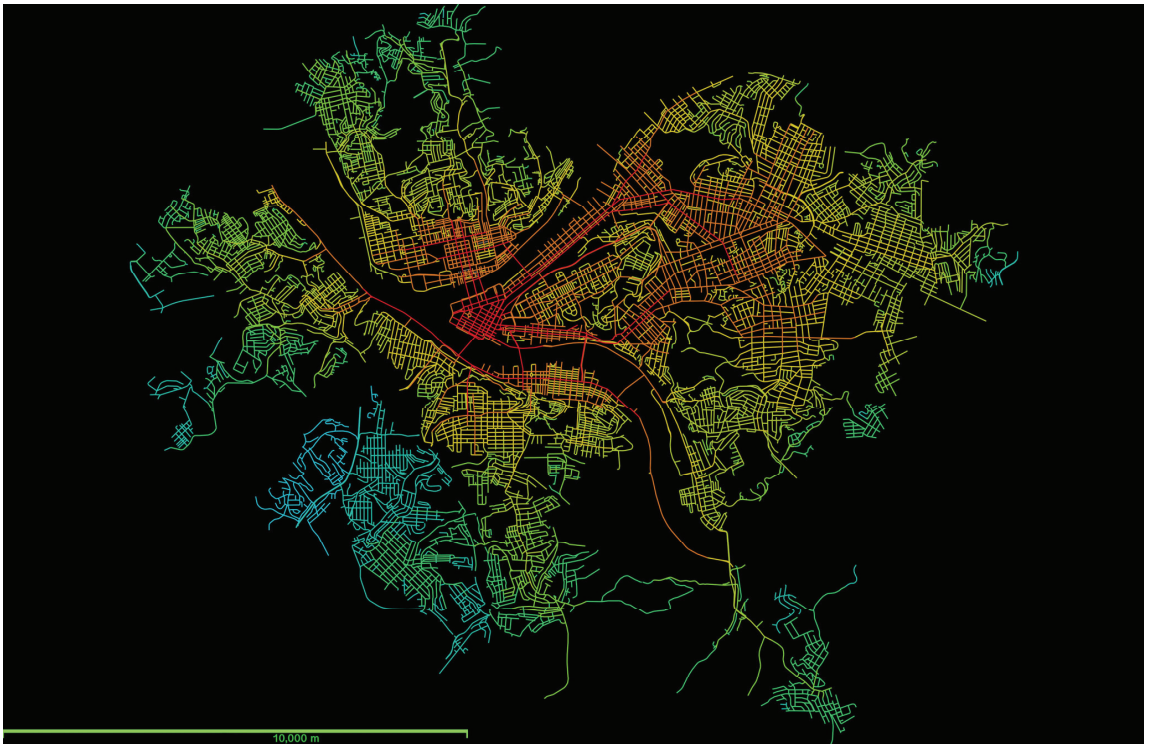
Figure 2. Pittsburgh, PA, at the beginning of the 20th century (simulated situation)—integration map. The degree of integration for each segment line is depicted using a color scale. The red axes denote the highest integration; dark blue signifies the lowest. The levels between the highest and lowest are gradually shifting. Space Syntax analyses by Z. Bereczki, 2023.

2.4. Multi-Faceted Approach as a Tool in the Heritage Urbanism Approach

The heritage urbanism approach was first introduced to the wider public in 2015 at an international conference titled "Cultural Heritage—Possibilities for Spatial and Economic Development." Among the presenters at the conference was the author of the current research. As for a definition, "Heritage urbanism considers the revitalization and enhancement of cultural heritage in spatial, urban, and landscape contexts, and it explores models for its inclusion in contemporary life. Heritage is not viewed as isolated objects but rather as part of the immediate and wider environment" [1] (p. 2). In the current study, 'heritage' is considered tangible: not an isolated urban artifact, but rather an ensemble of buildings and urban structures (urban heritage, by its definition). The 'wider environment' is considered as the system of connecting urban elements, with the town itself as the highest structure. The heritage urbanism approach sets three levels, although this study is focused on the first two levels of the approach: 1. Identification: identity factors, factors of effect, and value factors; 2. Criteria: evaluation criteria, enhancement criteria, and criteria for new interventions; 3. Models: revival and enhancement models.

The historic urban landscape approach represents a holistic and interdisciplinary perspective in urban planning. It signifies a new era in urban development by blending territorial and local values, historical layers with contemporary settings, and culture and nature. This approach emphasizes the importance of recognizing and preserving intangible values alongside tangible heritage, while also engaging various urban scales and typologies [30]. Focused primarily on historic cities, the heritage urban landscape approach underscores the vital role of urban and spatial planning in ensuring the survival and future

of heritage. The historic urban landscape is a perspective that regards urban heritage as an integral part of a complex system comprising diverse elements and historical layers, rather than a distinct category of cultural landscape or site type. This perspective emphasizes the interconnectedness of elements (elements of the complex system) as physical or tangible structures, cultural or intangible elements, historical layers (co-presence and derivation), and the connections between different elements and layers within the urban environment. The 2011 Recommendations on the Historic Urban Landscape [31] integrate heritage conservation with urban development plans and processes, viewing urban heritage as a resource for sustainable development and resilience [31].

On the other hand, the heritage urbanism approach acknowledges that the survival and vitality of heritage are intricately linked to urban and spatial planning. It emphasizes the integration of cultural heritage within the broader living space and local community, whether it be a settlement, town, or cultural landscape. This approach is particularly relevant when cultural heritage sites lack a clear purpose or are underutilized. By actively engaging with heritage through meaningful use, its preservation and continued relevance are ensured. This perspective suggests that heritage should not be shielded from people, but rather actively embraced and utilized for the benefit of communities [1].

Garyfalia Palaiologou and Sam Griffiths define the concept of "heritage urbanism syntax" [32]. It is designed to align historical research with modern urban heritage concerns. It delineates three distinct types: (1) conservation areas, (2) street scales, and (3) spatial cultures. These classifications facilitate critical analysis of how this perspective is applied in urban heritage contexts.

The combination of the applied methods (historical stratification, urban morphology, and space syntax) in this way is not a new integrated method, but rather a way to understand the different areas of a town profoundly and how the changes in urban structure and function create a new heritage or identity via the application of the heritage urbanism and heritage urbanism syntax approaches, with the consideration of aspects of the Heritage Urban Landscape Recommendations.

3. Case Study: Pittsburgh (PA, USA)

"Pittsburgh stands out for its site characteristics, rivers, and resource endowment, especially coal; extensive industrialization and massive iron and steel complexes; distinctive history of pollution; attempts at creating a "Renaissance" for the industrial city; and, most recently, sweeping deindustrialization and attempts at redevelopment, which have powerful implications and promise for renewing aspects of the natural environment" [33] (na). Pittsburgh Renaissance, the twenty-year redevelopment program (1946), included various actions to enhance the natural and built environment, including smoke control legislation, new buildings, parks, highways, among others.

Pittsburgh is defined by the two rivers, Monongahela and Allegheny, at the mouth of the Ohio River, located west of the Allegheny Mountains. According to [34,35], when dealing with the (urban and environmental) history of the city, the rather overlapping development periods can be distinguished based on urban, environmental, economic, and industrial aspects: Steel City (1859–1946); Metropolitan Pittsburgh (1870–1920) [36]; and the formation of the current territory of the city with the annexed Allegheny City on the north bank of the Allegheny River (annexed 1907) and smaller towns on the south bank of the Monongahela River (annexed in 1872), nowadays Pittsburgh's South Side. The period was marked by industrialization, which caused "fragmented urban space" [34] (p. 8), and the early application of urban planning as a result of the 19th century urban reform caused by the World's Columbian Exposition (1893) and millennial progressivism. "Modernization and rapid urban growth brought a flood of immigrants into the industrial city and its suburban mill towns, differentiating and segregating urban and regional space" [34] (p. 8). Examples of these enclaves will be discussed in the following case studies more profoundly. The seminal era of progressive professional planning was between 1910 and 1940, according to [34]; this period was marked by the prohibition as well (Prohibition era: 1920 to 1933), and

in 1936, Pittsburgh suffered the worst flood in its history [37], marking further development directions [33,38]. "Once the outlines of the industrial metropolis had been established by World War I and many riverfront sites built up, new residential, commercial, and industrial developments from the 1920s to the 1970s most often sought available series served by railroad, and increasingly motor vehicles, which were not oriented toward the rivers" [35] (na). The city's industrial base continued to expand in the post-war era, leading to the establishment of the urban renewal program known as Renaissance I (1946–1973). The Housing Act of 1949 was introduced during this time, aiming to revitalize American cities through urban redevelopment (urban renewal) [39], and the aforementioned Pittsburgh History and Landmarks Foundation was founded in Manchester (today a historic district on the North Side of Pittsburgh) in 1964.

By 1970, Renaissance I had reached its culmination with the completion the US Steel Tower and Three Rivers Stadium. In 1974, the transformation of Pittsburgh's urban space was further highlighted with the completion of Point State Park, including the installation of a fountain at the tip of the Golden Triangle. During the 'Reinvention' (1973–present), Pittsburgh underwent a significant transformation marked by the collapse of the steel industry. Beginning in the late 1970s and early 1980s, the once-dominant steel industry in Pittsburgh began to decline rapidly, mirroring the broader trend of deindustrialization across the United States. This decline was exacerbated by economic downturns, such as the recession of 1981–1982. As a result, Pittsburgh's economy underwent a profound shift away from heavy industry towards a more diversified economic base and the city began to focus on more diverse economy sectors, including services and higher education. The higher education institutes in the current study are seen as the new "users" of urban heritage.

3.1. Historic Districts: Allegheny West, Allegheny Commons Park, Deutschtown, Manchester, Mexican War Streets

The historic districts—Allegheny West, Allegheny Commons Park, Deutschtown, Manchester, Mexican War Streets—are situated on Pittsburgh's North Side (originally the independent municipality of Allegheny City), on the north bank of the Allegheny River. A frontier surveyor, David Redick, surveyed the town in 1788 [8] (p. 2), and Franklin Toker states the following: "The urban grafting worked surprisingly well, however, and the basic square-doughnut shape of Redick's town can still be made out. The central square carries institutional buildings as Redick planned, among them the Children's Museum (Figure 3) and a Carnegie Library" [2] (p. 83).

The historic district of Manchester was the pioneering historic district among the others and influenced the protection and preservation of the urban fabric of the neighborhood. The Pittsburgh History and Landmarks Foundation, founded in 1964, significantly influenced the preservation of Manchester's historic homes. A 1970 study led to the Urban Redevelopment Authority's recommendation to reallocate federal funds for the rehabilitation of 1407 housing units, a pioneering effort in the U.S. Recognized for its preservation achievements since 1978, Manchester's experience also inspired the National Trust for Historic Preservation in the 1980s to focus on citizens' rights in determining their neighborhoods' futures [40] (p. 184).

In order to understand the formation and preservation of urban heritage through urban landscape transformation, we used a multilayered approach [41] to analyze the urban palimpsests and urban morphology of the historic districts of Mexican War Streets, Allegheny West (Figure 4), Allegheny Commons Park (Figure 5), Deutschtown, and the former Diamond Square (Figure 6) and its surroundings (Allegheny Center).

Figure 3. Children's Museum of Pittsburgh, former Allegheny City Post Office. Built between 1894 and 1897 by architect William Martin Aiken. The new addition (2000–2004, Konig Eizenberg Architecture and Perking Eastman) linked the former Post Office and the Buhl Planetarium (1939, Ingham & Boyd) and formed the Children's Museum of Pittsburgh of today. Photo by É. Lovra, 2023.

Figure 4. Beech Avenue, Allegheny West (city-designated historic district). In the background is the Calvary United Methodist Church (1892–1895, Vrydaugh and Shepherd, with T. B. Wolfe architects). Photo by É. Lovra, 2023.

Since the 1950s, the area has undergone significant transformation due to the revitalization of Allegheny Center. However, it is here that the city's historic districts are concentrated. Once characterized by a built environment similar to the designated neighboring historic district, Allegheny Center now features the Allegheny Center Mall (Nova Place) and various public buildings, including the Children's Museum. Deeter & Ritchey designed the revitalization plan and the modern center [42].

Figure 5. Allegheny Commons Park (city-designated historic district). The building in the background, the Allegheny General Hospital (1928–1930, York & Sawyer architects), is a national landmark. Photo by É. Lovra, 2023.

Figure 6. One of the Diamond Square Market houses, Pittsburgh, PA, Rutan & Russell architects. Photograph from 1916. Retrieved from the Library of Congress, www.loc.gov/item/2006686205/, accessed on 14 September 2024.

"The center included office buildings, mid-rise apartment slabs, townhouses, and a shopping mall with 2400 parking spaces below. Deeter Ritchey Sippel master planned and designed much of the project. Tasso Katselas added townhouses along the edge (Allegheny Commons East), and the Office of Mies van der Rohe designed an office building (East Commons Professional Building). An international competition chose the design of William Breger, a former employee of Walter Gropius, for the Public Square at the Center's new heart" [42].

Despite initial success, the complex struggled, as its design isolated it from the surrounding neighborhoods. While the housing remains popular, the commercial space failed, with stores replaced by offices. In 1963, an international competition led to William Breger's design of the public square, but it was later replaced by Buhl Community Park (design by Andrea Cochran Landscape Architecture) in 2007 due to neglect [42].

3.1.1. Urban Palimpsest Concept

The concept of the "urban palimpsest" in urban morphology refers to the layering of historical changes within the urban landscape. This can be illustrated by the urban revitalization and urban heritage protection processes of an area. This concept illustrates how different periods leave distinct marks on the built environment, contributing to a continuous process of transformation. As cities evolve, their physical forms reflect the influence of various historical eras, with each new phase altering or building upon existing structures [12]. Much like a palimpsest, where earlier writings are partially erased but still have some traces, urban landscapes are continuously reshaped by successive developments [43].
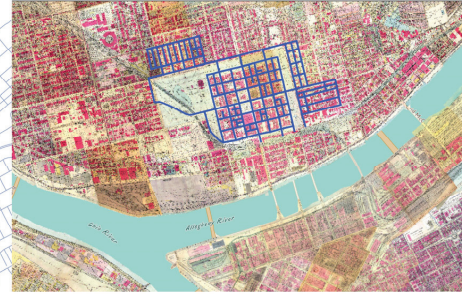
While the urban palimpsest primarily serves as a descriptive concept to explain the temporal layering of urban forms, functions, and patterns, it also captures how traces of earlier urban layers remain visible beneath more recent ones. In this paper, we aim to develop a robust analytical tool by integrating both urban morphology and the urban palimpsest concept. Using a multilevel diagram, which is conceptualized by Karl Kropf [44] (p. 50) [15] (p. 41), we reveal how cities evolve spatially and temporally, capturing the complex interactions between historical processes (temporal) and spatial structures (urban form) across multiple scales. These diagrams offer a powerful method for understanding the space–time relationship, as they allow us to trace how each spatial layer (buildings, streets, blocks, neighborhoods, cities) transforms over time, integrating both spatial hierarchies and temporal stratifications into a coherent scientific framework.

The application of the multilayered model involves three steps (Figure 7). The first step involves temporal layering, i.e., overlapping maps where historical changes are significant, and the transformation of previously established urban forms is inscribed and integrated with newer urban developments within the urban landscape. This temporal layering enables a diachronic analysis (spatiotemporal layering), which is crucial for analyzing structural and historical transformations and continuities. In the case of the selected site, maps from the 1920s serve as reference points to identify the urban heritage and unique natural environment of the heritage districts in Pittsburgh (PA, USA). A contemporary map is used to compare the transformation of the urban landscape, including both natural and built environments, and the integration of bridges and structures with older urban layers while shaping the new urban fabric. These two maps are georeferenced in QGIS [45] to apply the layering principle and enable accurate comparison between the different levels.

Urban morphology is inherently characterized in multiple spatial scales and organized in a spatial hierarchy [46] that includes individual buildings, blocks, streets, urban tissues, neighborhoods, and cities. These spatial structures at different scales are configured in response to historical processes and are subject to temporal layering. Each spatial scale has unique properties embedded within it, corresponding to a particular historical period.

The spatiotemporal layering step (Step 2 in the figure) provides the model characteristics of each layer, showing how earlier and later time steps are interrelated and capturing the unique characteristics of different variables. Each level reveals distinct structural and functional configurations, yet these levels are interconnected. Between the layers, the configurations of buildings, blocks, and streets are the most interlocking variables [15], interacting coherently with co-extensive elements, such as open spaces and street networks. As transformations at one level propagate through to higher levels, changes affect the entire spatial hierarchy. For this purpose, we identified four resolution levels: streets (1), blocks (2), buildings (3), and green spaces (4). The layers in the 1921 map underwent a digitization process to convert the data into a shapefile, while the levels in the contemporary data were sourced from the Pennsylvania Spatial Data Access (PASDA) database [47].

Figure 7. A three-step methodological framework for analyzing urban palimpsests and urban morphology by examining historical stratification. Analysis by E. Sarihan, 2024.
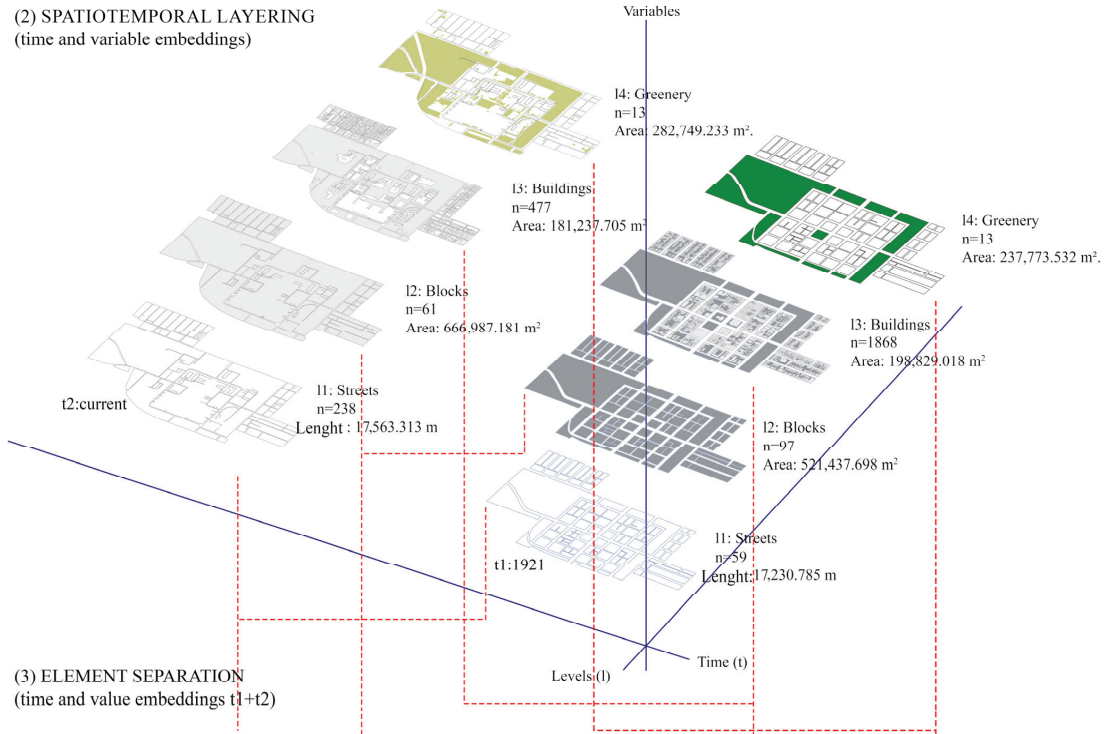
The configuration of these elements (their position within the overall structure) demonstrates a wide range of structural and geometrical variations in the urban landscape over time. The time and value embedding analysis (Step 3 in the diagram) integrates numerical data (values) and their positions within the temporal context, capturing how different spatial transformations and persistent features evolve over time. To evaluate the changes at each step, we integrated GIS methods with statistical analysis.

3.1.2. Urban Palimpsest Concept—Discussion and Conclusion

The integration of the urban palimpsest approach with urban morphology provides valuable insight into the transformation of the urban landscape by focusing on its spatial and temporal dimensions, as well as its spatial scales. Moreover, the configurational properties of spatial levels and their measurable variables clarify changes in urban form, enhancing the understanding of structural transformations between the periods. The resulting spatiotemporal layering of different spatial scales—such as streets, blocks, buildings, and green spaces—across different periods reveals significant differentiation (Figure 8).

Our findings demonstrate that changes in configurational parameters are closely related to significant transformations in blocks, which facilitate the emergence of new urban patterns and guide new directions in urban development.

The standard deviation of block areas in the current state has increased significantly compared to 1921, and the distribution of block sizes demonstrates a wider range, with larger values in the current state. Visual analyses further confirm that the centers of these blocks are undergoing extensive urban transformation. This variation is linked to differences between areas: while some areas, focused on transformation, have grown significantly, others, with persistent block structures, have remained relatively preserved since 1921. These changes have contributed to alterations in the external loads on blocks (streets) and the urban fabric, influencing the syntactic transformation of the street network hierarchy within the heritage site. Streets surrounding the centrally transformed area are designated as more accessible roads for vehicles, generally serving as parking lot roads. This primarily aims to enhance the configurational properties of the heritage site by optimizing both pedestrian and parking traffic volumes. Undoubtedly, changes in block structures within the urban area are also related to modifications in the internal layout of the blocks in their current state, providing insight into how these transformations impact the internal loads on the blocks. Analyzing these changes reveals that transformed blocks with larger values often experience significant alterations. Most buildings within these blocks have been demolished, with the blocks being combined to create mega blocks. This has imposed substantial constraints on the urban landscape, influencing the cultural evolutionary process and often leading to gentrification in these areas. Additionally, the transformation of building levels has affected the number of green spaces in the current period. This shift demonstrates a trend toward the increased use of blocks for green areas. However, the average size of green spaces has decreased dramatically compared to 1921, indicating a trend toward smaller green areas, likely due to the densification of spaces, which has resulted in more fragmented green areas.

In conclusion, our results prove that combining historical stratification principles and urban morphology plays a crucial role in defining heritage patterns, which in turn influences the shaping of future urban landscapes.
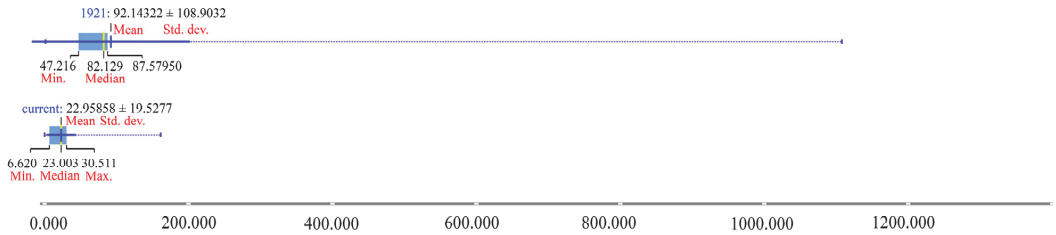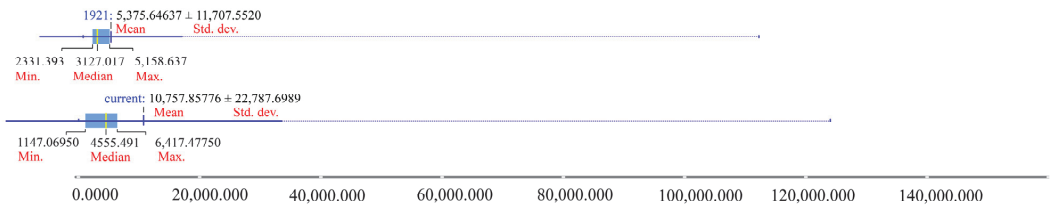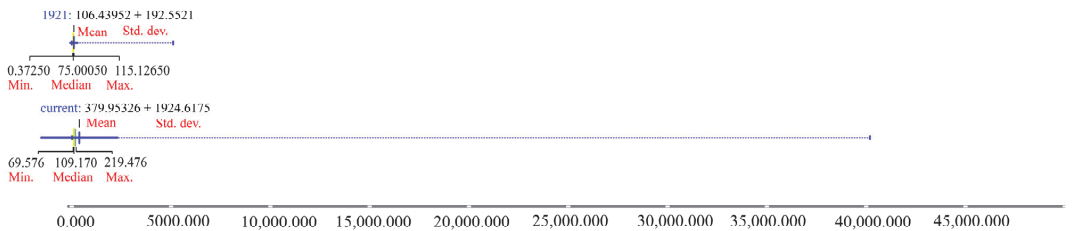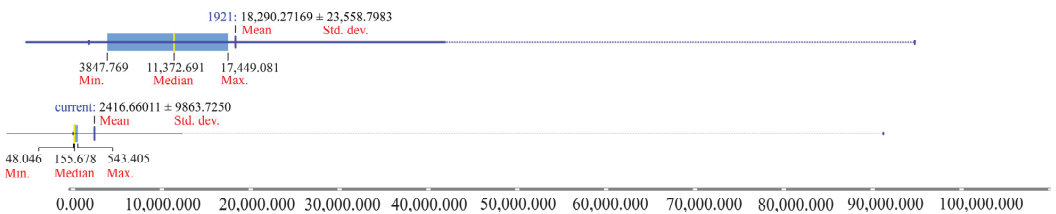
Figure 8. The changes in the distributions of the variables between t1 (1921) and t2 (current). Analysis by E. Sarihan, 2024.

3.2. Shadyside Campus of Chatham University

Chatham University Shadyside Campus used to be part of Woodland Road; in the period of foundation (1869), the university (then college) was situated in the Berry Mansion, Woodland Road, Shadyside neighborhood. The territory is between 5th Avenue, Woodland Road, Wilkins Avenue, and Murray Hill Avenue, and the campus also includes 115 and 126 Woodland Road. Today, it is composed of buildings and lands of former private mansions (including notable personalities from the city, such as Andrew Mellon and Edward Stanton Fickes), and was designated an arboretum in 1998. The area used to be an openly approachable area (streets), with private mansions arising from the second half of the 19th century and during the 20th century. There is a park-like environment nestled within a residential area that stretches across the sloping hills that bridge Squirrel Hill and Shadyside along Fifth Avenue.

The latest institutional master plan of the campus was approved in 2021 [48]. The campus is predominately zoned RM-M (Multi-Unit Residential, Moderate Density), with some R1D-VL (Single-Unit Detached Residential, Very Low Density) sites. The new master plan for the district discusses its perimeter. "The 10-year development envelope builds upon the existing conditions found on the Shadyside Campus and includes both visionary and pragmatic principles and guidelines which support measured growth while allowing flexibility for development in response to campus needs" [48] (p. 39).

Some of the buildings of the territory, including both sides of Woodland Road, are part of the universal architectural history of the 20th century as well, e.g., Alan I. W. Frank House (1939–1940) (Figure 9), designed by Walter Gropius and Marcell Breuer (96 East Woodland Road) [49]. The building is located outside the campus, but the only road (Woodland Road) that connects it to the city leads through the campus. About the building, Barry Bergdoll states the following: "In Pittsburgh they realized their masterpiece of the integration of architecture, furnishings, and landscape" [50].

Figure 9. Photo of Alan I. W. Frank house (1939–1940, Walter Gropius and Marcell Breuer, architects). Photo by É. Lovra, 2023.

The other 20th century masterpiece in the neighborhood is 118A Woodland Road, The Abrams House (Venturi House), designed by Robert Venturi in 1979–1982 [2] (pp. 144–145). The building was nominated as an Individual City Historic Landmark in 2018, but the house was demolished in 2022. As the nomination states, "The Abrams House was the first Postmodern building in Pittsburgh and, as such, represents a unique example of a building style in Pittsburgh. Postmodernism was championed by Robert Venturi" [51].

In the neighborhood, in addition to 118 Woodland Road, there is an another architectural masterpiece from the late 1970s in the vicinity of the demolished Venturi House. The Frank A. Giovannitti House (Figure 10), located near Chatham University and designed by architect Richard Meier, was built from 1979 to 1983.

In addition to these 20th century architectural masterpieces, Franklin Toker [2] lists 19th-century buildings "Ranging in style from Tudor and Gothic Revival to Colonial Revival and Shingle style, they are testimony to the sumptuousness of the era" [2] (p. 142).

The closest city-designated historic district is Murray Hill Avenue, which is the next road. The neighborhood is not among the historic districts of Pittsburgh, but some of the individual houses are protected as Individual City Historic Landmarks. Changes in spatial communication and the transformation of the functional syntax and spatial syntax of the area are examined to show that, besides the built environment of individual buildings and artifacts, urban structure—with its spatial changes—can also act as heritage.

Figure 10. Frank A. Giovannitti House (1979–1983, Richard Meier, architect). Photo by É. Lovra, 2023.

3.2.1. Space Syntax—Shadyside Campus and the Surrounding Area

In order to understand the integration differences between the two states of Shadyside Campus (Figure 11), we had to conduct Space Syntax analyses for the entire city of Pittsburgh.

Figure 11. The area of the current Shadyside Campus at the beginning of the 20th century (simulation)—integration map (**left**). Shadyside Campus, PA, nowadays—integration map (**right**). The degree of integration for each segment line is depicted using a color scale. The red axes denote the highest integration; green signifies the lowest. The levels between the highest and lowest are gradually shifting. Space Syntax analyses by Z. Bereczki, 2023.

A comparative analysis of Pittsburgh's simulated early-20th-century spatial structure and its current state using Space Syntax (Space Syntax Toolkit (version 0.3.10) within QGIS (version 3.34) and DepthmapXnet 0.35) reveals both commonalities and significant changes in the spatial configuration of the urban environment. OpenStreetMap data, which only include public roads, were used for the contemporary analysis. The left-hand map shows that the exclusion of the privately owned Shadyside Campus led to a dramatic increase in road integration in the surrounding area, reaching maximum values (red, orange). In contrast, the right-hand map, representing the earlier period, exhibits a more harmonious distribution of road connections (from green to yellow). The current map does not depict the internal road network of the Shadyside Campus, as these are now private, non-public roads. Consequently, the level of spatial integration between the university campus and its surroundings has been altered. The concept of integration is employed in the spatial

analysis to understand the degree to which the university campus is connected to the rest of the city.

3.2.2. Space Syntax and Urban Morphology—Discussion and Concept

Chatham University Shadyside Campus and its surroundings offer a unique example within the city of a place that, while undergoing transformation, also exemplifies the permanence of spatial, urban, and architectural heritage. This case serves as a model for a multifaceted approach that combines the methods of heritage urbanism and historic urban landscape.

This example focuses on transformation: an open area has become a closed university campus. However, this means that the building and its environment remain, with no change in ownership. A unique urban heritage has emerged that is partly conserved (like a 'museum') but is also in active use. The phenomenon 'museum' refers to Aldo Rossi's explanation that "In this respect, permanences present two aspects: on the one hand, they can be considered as propelling elements; on the other, as pathological elements. Artifacts either enable us to understand the city in its totality, or they appear as a series of isolated elements that we can link only tenuously to an urban system" [52] (p. 59). Woodland Road and its surroundings represent a duality, considering the buildings constructed in the 1970s and 1980s, as well as the open system where the architectural elements (artifacts) were "propelling elements" together in the open street system. In the 21st century, however, the campus's architectural elements have become "pathological elements," but with active use and in conjunction with the street network. Outside the campus, the "propelling elements" remain with buildings designed by Breuer–Gropius and Meier. This also means that the street network might be in transformation, and buildings of significant architectural value, such as the Venturi building, are being demolished.

"(...) a historical or propelling permanence as a form of a past that we still experience and a pathological permanence as some thing that is isolated and aberrant. In large measure the pathological form is identifiable because of a particular context, since context itself can be seen either as the persistence of a function over time or as something isolated from the urban structure, that is, as something which stands outside of technological and social evolution" [52] (p. 60).

The campus is an example of the heritage urbanism approach, which considers not only the enclosed area, but also its surroundings, including the urban tissue (roads, plots, and built and natural environment) and the adjacent historic district.

3.3. Traditional Neighborhood: Troy Hill

Troy Hill, a traditional neighborhood, offers a compelling study of the interplay between human agency and the natural environment. Established by successive waves of immigrants, the neighborhood's built environment is characterized by a rigid American grid system overlaid on a more undulating natural landscape. The urban tissue, including the network of streets and the relationship to neighboring areas, forms Troy Hill's urban heritage. While the neighborhood has evolved over time, adapting to changing demographics and societal needs, it has retained a cohesive visual identity that reflects its historical development which was shaped by a confluence of factors, including real estate investments, infrastructure improvements, and the influx of diverse immigrant communities.

"Allegheny and the North Side had distinctive neighborhoods. Troy Hill had the atmosphere of a German village while the East North Side, or Deutschtown, grew to have its own thriving commercial center" [53] (p. 362). Deutschtown was recognized by the city as a designated historic district, and the buildings on the hilltop of Troy Hill have great continuity with the adjacent neighborhood of the mentioned Deutschtown in East Allegheny. The Troy Hill district also includes Herr's Island—redeveloped in the 1990s into upscale housing, parkland, and office space—and the former industrial area on the river flats owned by H. J. Heinz Company Factories (Heinz Lofts from 2003 to 2005) (Figure 12)

and Penn Brewery (Eberhardt and Ober Brewery Company) from the late 19th century [2] (pp. 102–103), both comprising National Register historic districts.

Figure 12. H. J. Heinz Company Factories (currently Heinz Lofts)—view from East Ohio Street. The early-20th-century buildings were converted to housing units between 2003 and 2005 (r). Photo by É. Lovra, 2023.

Troy Hill, initially established as the village of New Troy in 1833, underwent significant transformation in the late 19th century due to real-estate investments and infrastructure development. "In 1887, an incline was constructed on Troy Hill, part of a pattern of development of a «unique hillside system of steps and funicular railways» which sought to conquer the challenges of Pittsburgh's—and Allegheny's—steep terrain (Cultural Heritage Plan, «Industrial Period: 1850–1940»). The 370-foot incline opened Troy Hill to more rapid residential development by making the hilltop more accessible for workers and families seeking to move away from the more industrialized flats. The Troy Hill incline operated until 1898" [5] (pp. 13–14). While German immigrants formed the dominant cultural group, Troy Hill also attracted individuals from various other ethnic backgrounds, including Scots, Irish, Croatians, Bohemians, Slovaks, Ukrainians, Greeks, and Carpatho-Russians. These diverse communities established religious institutions. The western sector of Troy Hill, known as 'Bohemian Hill', was primarily populated by Czech immigrants in the late 19th and early 20th centuries. At the end of the 19th century, the German newcomers, besides their businesses, also created a cultural hub with various sacral and secular buildings and associations. Giving importance to the local community in the shaping of Troy Hill, it can be concluded that the German and Czech immigrants had the greatest impact on the townscape of the district. The frame houses of the Croatian settlers built on the hillside, together with the manufacturers, disappeared due to flooding and the construction and widening of Route 28 (the St. Nicholas North Side Roman Catholic Church was demolished in 2013) [5]. Troy Hill architecture is dominated by brick and frame-row houses still today. The indirect architectural impact of the immigrant communities can be seen on some of the sacral buildings (the demolished Croatian Roman Catholic Church dedicated to St. Nicolas), but to a lesser extent in the case of secular ones.

The current case study is the traditional neighborhood (hilltop) of Troy Hill in relation to the "Architectural Inventory for the City of Pittsburgh, Allegheny County, Pennsylvania. Planning Sector 1: Troy Hill. Report of Findings and Recommendations" [5]. Based on the report, there are forty-two buildings which are "Listed, Determined Eligible, and Potentially Individually Eligible Resources" [5] (pp. 46–56). Among these, are ten which are determined to be eligible as national-register-listed, national register districts, or city historic landmarks. The following section will evaluate the buildings and ensembles according to micro-urbanism and their spatial context.

"The City's Cultural Heritage Plan notes, «The greatest opportunities for historic preservation in Sector 1 occur in Troy Hill (Figure 13) . . . particularly along Lowrie Street and Voskamp Street [n.b. Voskamp Street is actually in Spring Garden] where late 1800s

homes and churches with impressive architecture strongly contribute to the character of the neighborhood». There is one City-designated Historic Landmark in Troy Hill, the Shrine of St. Anthony of Padua (1700 Harpster Street), and two National Register listed historic districts: the H. J. Heinz Plant and Eberhardt and Ober Brewery" [5] (p. 18).

Figure 13. Troy Hill—Washington Landing/Herr's Island Bridge and Troy Hill hilltop in the background. Along the bridge is the Three River Heritage Trail. Photo by É. Lovra, 2023.

Micro-Urbanism and Spatial Context

Based on [5], the boundaries of the 'Potential Troy Hill National Registered Historic District' were set [5], as shown in Appendix b. According to the integrated urban morphological method, the urban tissue type of the area could be determined. (a) Urban tissue is characterized by regular gridiron street networks that enclose regular blocks. The shapes of the blocks are elongated, regular, rectangular, and separated into two parts (yard and garden), with developments in unbroken rows comprising one- or two-story buildings. (b) Regular street networks with grid-like dynamics (oblong grid: gridiron system). The plots blocks are regular, and divided into two or three sections. A building (residential use) is located in the first section; its façade is tightly placed on the street line in an unbroken row of buildings. The development method is equivalent in the plot series: similar layout shape (rectangular central core with one or two extending elements); behind the residential building (multi-dwelling unit), there is a courtyard, an open (green) area/backyard, or a communal courtyard garden. The potentially eligible ensembles for built heritage protection are mostly residential buildings along Harpster Street, Haslage Avenue, Hatteras Street, and Lowrie Street, with religious and public buildings. The other streets accommodate only single buildings. Lowrie Street is the longest street traversing the hilltop of the Troy Hill. The buildings are listed in [5]: Ober-Guehl House (No. 1501) from c. 1885; Adam Reinemann House (No. 1515–1517) from c. 1877; First Adam Reinemann House (No. 1525–1527) from 1864; store and apartments buildings (No. 1800) from 1880; and an array of other houses (No. 1347 from c. 1885; No. 1511 from c. 1880; No. 1531 from c. 1870; No. 1533 from c. 1870; and No. 1829 from c. 1880).

The hillside neighborhood of Troy Hill has historically maintained a degree of isolation from the surrounding urban fabric. While a short-lived incline connected the hilltop to the city below in the late 19th century, stimulating development, the area's spatial integration has remained relatively unchanged.

A space syntax analysis (Figure 14) reveals that Troy Hill's connectivity to the broader urban network remains limited. The area's integration map, characterized by a gradual shift from yellow to green lines, indicates a lower degree of integration; it indicates that the area remains isolated, as integration in space syntax reveals how well a space fits into the urban structure and how easily the area connects with the rest of the environment.

Figure 14. The area of Troy Hill, Allegheny River, and the Strip District at the beginning of the 20th century (simulation)—integration map (**left**). Nowadays—integration map (**right**). The degree of integration for each segment line is depicted using a color scale. The red axes denote the highest integration; green signifies the lowest. The levels between the highest and lowest are gradually shifting. Space Syntax analyses by Z. Bereczki, 2023.

The comparison of the current state and a simulated early 20th-century scenario (simulated map) underscores the enduring nature of Troy Hill's spatial configuration. The persistence of this pattern over time highlights the significance of the urban fabric, including the street network, as a component of the area's urban heritage. Understanding these spatial dynamics (stagnation), it can be concluded that not only is the built environment part of the urban heritage of Troy Hill hilltop, but so is the urban fabric/street network.

The concept of identity is central to the analysis, and it is rooted in visual perception. Beyond this, we argue that a city's identity is primarily shaped by its urban tissue—the intricate interplay of built forms and spaces. The urban tissue of Troy Hill hilltop is a combination of the cityscape, the built environment, and the natural environment. The morphology of the terrain of the street network is regular, almost grid-like. While there is a degree of universalism in the urban landscape of the area (based on the revival architectural styles and the use of building materials) and recurring micro-urbanism patterns, the harmonious interaction between the inherited built environment and contemporary interventions is key factor in maintaining the continuity of urban heritage in the neighborhood. This balance depends on the relationship between the rhythm of traditional (listed in [5]) and contemporary constructions, guided by vertical or horizontal articulations. This interpretation of identity is significant in Troy Hill hilltop because it allows us to see micro-urbanism not only as a reflection of industrial heritage, the role of immigrants in the shaping the built environment, and a specific era, mainly the second part of the 19th century, but also as a tool for shaping contemporary design decisions (the designated historic districts have Historic District Design Guidelines). Rather than replicating the past, we can achieve harmonious infill or rehabilitation by understanding the underlying structural and façade dynamics.

4. Discussion

Heritage urbanism is a concept that focuses on revitalizing and enhancing cultural heritage within spatial, urban, and landscape contexts. This approach is particularly relevant when cultural heritage sites lack clear purposes or are underutilized. By actively engaging with heritage through meaningful use, its preservation and ongoing relevance can be ensured. This perspective advocates for embracing heritage and utilizing it for the benefit of communities, rather than isolating it.

The historic urban landscape perspective views urban heritage as an integral part of a complex system comprising diverse elements and historical layers, rather than as a distinct category of a cultural landscape or site type. This perspective emphasizes the

interconnectedness of physical or tangible structures, cultural or intangible elements, and historical layers within the urban environment.

On the North Side of Pittsburgh (Allegheny West and the surrounding areas), the integration of the urban palimpsest approach with urban morphology provided valuable insights into the transformation of the urban landscape, focusing on its spatial and temporal dimensions, as well as its spatial scales. This approach facilitated an understanding of the structural transformations resulting in new directions of urban development. These heritage patterns, in turn, highlight the development periods of the town. The spatiotemporal layering of different spatial elements—such as streets, blocks, buildings, and green spaces—across different periods revealed significant differentiation, and changes in configurational parameters are closely linked to significant transformations in blocks, facilitating the emergence of new urban patterns and shaping future urban landscapes.

Chatham University Shadyside Campus and its surroundings offer a unique example within the city of a place that, while undergoing transformation, also exemplifies the permanence of spatial, urban, and architectural heritage. This case serves as a model for a multifaceted approach combining the methods of heritage urbanism and the historic urban landscape. The transformation of the open area into a private university campus resulted in the preservation of the buildings and the environment. In the 21st century, a unique urban heritage has emerged: the campus's built environment has been preserved, although it is still actively used in conjunction with the street network. The campus exemplifies the heritage urbanism approach, considering not only the enclosed area, but also its surroundings, including the urban fabric (roads, plots, and built and natural environment) and the adjacent historic district.

The urban fabric of the Troy Hill hilltop is a combination of the cityscape, the built environment, and the natural environment, with a regular street network. The revival architectural styles found here and the use of building materials have created a homogeneous urban landscape with micro-urbanism patterns. A harmonious interaction between the inherited built environment and contemporary interventions is key to maintaining the continuity of the neighborhood's urban heritage.

"Urban heritage cannot be narrowed down to individual buildings or monuments of historic interest, nor can it be interpreted simply as a totality of built parts. Urban heritage exists in the physical attributes of buildings, public spaces and urban morphology" [54] (p. 13).

Combining the applied methods (historical stratification/urban palimpsest, urban morphology/micro-urbanism, and space syntax) creates an effective tool for gaining a deep understanding of different areas of a city and how changes in urban structure and function have created new concepts of heritage or identity.

5. Conclusions

The current research has explored the application of various approaches to understanding and managing urban heritage, including heritage urbanism, historic urban landscape, and urban morphology with a focus on micro-urbanism. The complex relationship between historical stratification (urban palimpsest concept), urban form, and the evolution of urban heritage can be seen in the selected case studies from Pittsburgh (PA, USA).

"The combination of preservation and adaptive reuse is not just the best way forward for our cities. It is in many ways the *only* way forward" [55] (p. 258).

The integration of the urban palimpsest concept and urban morphology provides a comprehensive understanding of the evolving urban landscape of Allegheny City and the stagnating historic districts in the vicinity. By examining the spatial and temporal dimensions of urban transformation, we have identified significant changes in block structures, street networks, and green spaces. While the increased use of blocks for green spaces is a positive development, the reduction in average green space size highlights the need for careful planning to ensure adequate public green areas. The significance of considering historical context by understanding the underlying heritage patterns, as well as urban

morphology when evaluating and guiding urban change, has been proven using the case study of Allegheny City and the city-designated historic districts in the neighborhood.

The case study of Chatham University Shadyside Campus in Pittsburgh exemplifies the ongoing transformation of urban landscapes. The campus embodies the principles of heritage urbanism by integrating both historic preservation and active use within the broader urban fabric. While some elements of the campus have become "pathological", in Aldo Rossi's terminology (isolated from the evolving urban system), others remain "propelling" forces, shaping the contemporary streetscape. This example highlights the importance of considering both the enclosed heritage site and its surrounding environment, including the street network, existing buildings, and natural environment.

The case study of the traditional neighborhood on the hilltop of Troy Hill shows the importance of evaluating the temporal evolution of the urban environment and micro-urbanism in understanding and preserving urban heritage, particularly in traditional urban spaces. Micro-urbanism, as a subfield of urban morphology, examines urban tissue types, built environments, and spatial arrangements, which is essential for assessing both historical continuity to understand underlying typologies and contemporary transformation with respect of existing heritage patterns. In Troy Hill, historical, architectural, and social elements are deeply embedded in the urban tissue, acknowledged in the historical and structural layers. These layers (urban palimpsest) have to be preserved by the revitalization of significant buildings and ensembles, as we have seen in the case of the Heinz Lofts. The adaptive reuse of historic buildings demonstrates how urban regeneration can coexist with heritage preservation.

Author Contributions: Conceptualization, É.L.; methodology, É.L. and E.S.; software, E.S.; validation, E.S. and É.L.; formal analysis, É.L. and E.S.; investigation, É.L. and E.S.; resources, É.L.; data curation, E.S. and É.L.; writing—original draft preparation, É.L. and E.S.; writing—review and editing, É.L.; visualization, E.S.; supervision, É.L.; funding acquisition, É.L. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy restrictions.

Conflicts of Interest: The authors declare no conflicts of interest.

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Contemporary Transformations of the Historic Urban Landscape of Sarajevo and Social Inclusion as a Traditional Value of a Multicultural Society

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Abstract: The main research question of this paper focuses on the impact of contemporary interventions on the protection of architectural heritage and the transformation of the unique historic urban landscape of Sarajevo, which symbolizes social tolerance. This study examines the tendencies that have been destroying the essence of such a landscape since the beginning of the 21st century. This research primarily relies on the method of direct observation to analyze the ongoing transformation of the urban landscape over the past 25 years. Additionally, previous research findings and relevant documentation regarding the ongoing urban metamorphosis were considered. The historical urban landscape of Sarajevo is the result of complex urban development that began in the mid-15th century. This urban form, still partially recognizable today, reflected prevailing social relationships, particularly the inclusion of different groups instead of their exclusion, which demonstrated tolerance. However, this research shows the incompatibility of today's neoliberal concept with the preservation of an urban landscape that embodies tolerance and excludes social marginalization.

Keywords: urban landscape; architectural heritage; contemporary interventions; Sarajevo; social tolerance; transformation

1. Introduction

Sarajevo is one of the least-understood cities in modern history [1].

The impact of contemporary interventions on the protection of architectural heritage and the transformation of the urban landscape represents a "living" urban phenomenon that has been insufficiently researched and is the main focus of this study. The ongoing transformation of the urban landscape is currently unfolding and will have long-term consequences on the urban form, as well as significant social and economic implications. This is particularly relevant in historical city centers such as Sarajevo, which have been shaped by centuries-old multi-ethnic and multi-cultural traditions. Describing, analyzing, and clarifying the relationship between contemporary interventions, the protection of architectural heritage, and the urban landscape are crucial in order to protect areas that symbolize the possibility of coexistence and diversity in the heart of Europe.

It seems that the prevailing developments in the 21st century, where the imperative of profit often influences urban transformations [1], are in direct opposition to the protection of architectural heritage and lead to negative transformations of the urban landscape. Narrow private interests are clearly in conflict with traditional social values that are based on a historical urban landscape, which excludes the possibility of social marginalization.

Contemporary interventions, in principle, do not contradict the preservation of architectural heritage and the urban landscape. Instead, contemporary architecture can contribute to the positive development of the historical landscape if it aims to improve the cultural, social, economic, and other needs of society. This inclusive concept aligns closely with the multicultural concept upon which the traditional urban matrix was built.

However, interpretations of the concept of "contemporary intervention" remain open to debate. Under the guise of the "Contrast Method", ex novo spaces are constructed to make extra profit at the expense of preserving the historical urban landscape.

In this context, it is worth considering the approaches of some authors who have dealt with similar concepts related to the urban transformations of historical landscapes. Previously, Anna Onesti conducted research on the role of local communities in safeguarding the landscape and counteracting the loss of identity using the example of the historical center of Sassano in Italy (a protected area of Cilento and Vallo di Diano), where the local community was considered a key element in preserving the identity of the area [2].

This work aims to identify rules that can be detected and applied in order to stimulate contemporary interventions focused on preserving authentic architectural heritage and improving the urban landscape of historical cores based on multicultural tradition.

Transformations of urban landscapes, often rooted in particular socio-historical assumptions, are inevitable. However, the crucial task is to identify suitable solutions that effectively balance the imperatives of preservation and sustainable development.

2. Literature Review Related to the Historical Landscape in General

With the aim of gaining a better position in this research within global knowledge and a broader theoretical framework, it is important to conduct a concise review of the literature dealing with similar concepts of historical landscapes, urban transformations, and contemporary interventions in historical landscapes in general.

First of all, the monumental edition Landscape as Cultural Heritage—Methods of recognition, evaluation and protection of Croatian cultural landscapes (2015) by Biserka Đumbović Bilušić was consulted. In addition to technical assistance in determining the different typologies of landscapes in general and the subdivision of cultural landscapes, aligning with UNESCO guidelines, this study is important in terms of adopting a particular perspective on the landscape as "*a territory where people live and work, which at the same time provides the community and the individual with a sense of identity and belonging*" [3].

The relationship between historical landscape and identity is an important concept that influenced the development of this paper. The same is the case with the landscape-transformation relationship: "*Development cannot take place without changes in the landscape, therefore the challenge that is posed today is how to enable changes that will respect the essential features of the landscape and that will also create new values*" ([3], pp. 11–12.).

While considering these "new values", research that explores the relationship between contemporary interventions and the preservation of architectural heritage in general, such as the 2012 Ph.D. thesis by Adi Ćorović, was also consulted. This thesis, which is influenced by Andrea Bruno, explores the possibilities of creating new values within the framework of restoration activities that directly affect the transformation of urban landscapes in historical nuclei.

Regarding urban transformations, the monograph of Mario Mastropiero *Beyond restoration* (1996) is worth mentioning. The key concepts of the restorer Andrea Bruno, who deals with the relationships and overlapping of different historical layers, have been discussed as well.

The research presented in Anna Onesti's *Building recovery in the Historic Urban Landscape approach* (2013) is particularly significant because it not only recognizes the role of local communities as a factor in the preservation of historical townscape landscapes, but also offers concrete solutions and strategies. In this case, it is about Research *in progress* and the exploration of new rules aimed at the recovery of historical townscapes ([2], p. 159).

In addition, the research of Anna Onesti offers solutions such as:

Interactions Experts—Involvement of the local community in the realization of small local activities *to achieve . . . build rules focused on local specificities and ensure. . .* ([2], p. 159). At the same time, as a practical solution, *it focuses on the interaction between different social groups and aims to transfer the "knowledge" of individual groups into a reservoir of common and shared knowledge* ([2], p. 170).

Arturo Gallozzi from the University of Cassino and Southern Lazio, in terms of post-war reconstructions, observed three basic concepts: Internal reconstruction as the renewal of the existing; reconstruction as an extension of the construction of a new urban nucleus; reconstruction as an overall reorganization of the pre-existing urban settlement. The author observes that in reality, it is difficult to realize one of the three offered scenarios; it is rather about compromises, as in the case study of the city Cassino, where the plan of reconstruction is characterized by a conservative spirit, but also narrow private interests, as well as a lack of dynamic awareness of the possibilities of future development [4].

Such experiences present important theoretical support for this paper regardless of the different historical contexts (in the case of Italy, the destruction related to World War II, and in the case of Sarajevo, the siege at the end of the 20th century).

3. Materials and Methods

This research first applied the method of direct observation to study the ongoing transformation of the urban landscape over the past 25 years. Thanks to the application of this method, important moments were recorded, including urban transformation when the protected remains of one of the oldest thermo-power stations in Europe were demolished. In addition, the demolition of one of the most successful examples of the interpolation of modern architecture in the historical nucleus of Sarajevo from 2013 was recorded.

Thanks to the same method, other interventions in the area of Sarajevo Čaršija have been recorded that significantly affect the urban landscape of Sarajevo. Direct observations have been made using photographic and mapping records, especially in research conducted by experts of the Commission to Preserve National Monuments of Bosnia and Herzegovina.

Some of these observations have formed part of the current author's independent research in the last ten years. In this regard, it should be said that the quality of some older photos (which cannot be recreated, given the urban transformation) is not at the highest level. Nevertheless, their documentary value from today's perspective is relatively high and is the reason for their presentation in this manuscript.

The case is similar with mapping records, but it should be said that the scope of such records is limited and related to the administrative restrictions under which the Commission to Preserve National Monuments of Bosnia and Herzegovina operates. This method determined important characteristics of the urban landscape, which were then taken as the basis of this research. They were taken to account for determining the degree and nature of the transformation of the historic urban landscape. Further, we consider the criterion of monumental value, given that a large number of historic micro ensembles enjoyed the highest level of protection, even before the designation of the whole Townscape ensemble of Sarajevo as a national monument.

The second method applied in this research is the study method of investigating previous research findings and relevant documentation related to urban metamorphosis. These materials might be divided into two basic groups. The first group includes materials and documentation created as a product of the study of the urban landscape and architectural heritage of Sarajevo.

Research conducted by the Commission to Preserve National Monuments of BiH from the beginning of the 21st century until today (Jajce barrack (2009); research conducted by Firuz-bey hammam (2008); the site and remains of the historical complex of the thermopower station on Hiseta Street (2015); as well as monographs by various authors might be included in this group.

The same group also includes two important decisions of the National Commission that directly concern the urban landscape, including the decision to adopt the Sarajevo Čaršija as a national monument (2014) and especially the decision to adopt the historic urban landscape of Sarajevo as a national monument from 2020. Monographs can be included in the same category, such as Borislav Spasojević's *The architecture of residential palaces of the Austro-Hungarian period in Sarajevo*, 1988 and Alija Bejtić's *Streets and squares of Sarajevo, topography, genesis and toponymy*, 1973.

The second group of materials is related to the first because it also deals with the topic of the historic urban landscape of Sarajevo, but from the point of view of urban transformations. The emphasis on the method of direct observation stems from the limitation of sources and materials related to the second group, specifically, the limited number of published scientific papers or studies that specifically address the phenomenon of the transformation of the urban landscape in Sarajevo over the past 25 years. Although articles like "Between History and Architectural Laboratory, a case study of Marijin Dvor in Sarajevo" [5] have been published, there is still insufficient historical distance to enable completely objective judgment about the phenomenon. Additionally, the ongoing nature of the transformation process renders works like the Master's thesis titled "Contemporary Interventions in the Historical Nucleus of the City of Sarajevo" [6] less relevant after only one decade due to the intensive transformations.

Based on the listed materials, including the literature that deals with the phenomena of historical landscapes and transformation in general, in Section 4 (Results), the transformation of the historic urban landscape of Sarajevo will be analyzed through several characteristic case studies. These case studies are located either within the area of the Historical nucleus of the Old Town, which was formed during the Ottoman period, or in the historical area of the city on the opposite western side, which developed during the Austro-Hungarian period. Furthermore, the values of the historic urban landscape of Sarajevo will be explored, taking into consideration its historical genesis and main characteristics.

Finally, in Section 5 (Discussion), based on the aforementioned information, the relationship between contemporary interventions, urban transformation, the interests of investors, and the protection of architectural heritage will be discussed.

4. Results—Historic Urban Landscape of Sarajevo: Its Values and Transformations

4.1. Adoption of the Historic Urban Landscape of Sarajevo as the National Monument of Bosnia and Herzegovina

In 2020, the Commission to Preserve National Monuments of BiH concluded its research, leading to the decision to adopt the historic urban landscape of Sarajevo as a national monument (Figure 1)
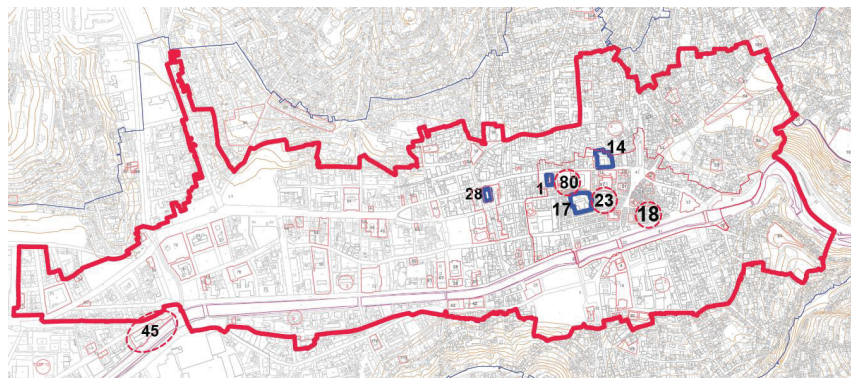
Figure 1. Coverage of the historical urban townscape of Sarajevo with crucial properties that were adopted as national monuments: Gazi Husrev-beg Mosque (17), Old Orthodox Church (14), Old Jewish temple (1), Catholic cathedral (28). Case studies: Kolobara Han (23), Commercial building on Bravadziluk Street (18), Gazi Husrev-beg library (80), Hiseta thermopower station complex (45).

This decision was crucial, as it was made by the highest-level national institution responsible for the preservation of cultural heritage. Prior to this, the "City Ambient Complex Sarajevo" was included in the Temporary List of National Monuments under serial number 546. However, keeping such an important historical urban agglomeration on the temporary list for nearly two decades posed challenges. The boundaries of the

protected area and the corresponding protection measures were not adequately defined, leading to ambiguity regarding the responsible institution. This resulted in overlapping jurisdiction between the entity and cantonal levels, which, in the context of Bosnia and Herzegovina's decentralized state structure defined by the Dayton Peace Agreement of 1995 (consisting of three levels: State, Entity, and Canton), was unsustainable and irresponsible in the long run. Therefore, the decision to adopt the Historic Urban Landscape of Sarajevo as a national monument is a welcome development, as it provides clear definitions for coverage, protection measures, and jurisdiction.

4.2. Short Historical Genesis and Development of the Historic Urban Landscape of Sarajevo and Its Main Characteristics

In order to comprehend the complexity of the historic urban landscape of Sarajevo, it is crucial to understand its development since the 15th century. During this time, the distinctive urban character that still exists today was established.

The oldest part of the Urban Landscape of Sarajevo, the preserved urban matrix of *Sarajevo Čaršija*, serves as a significant testament to the classical phase of Ottoman urbanism in the region of Southeastern Europe, marking the transition to Central Europe. Originally, this matrix reflected social relations, where tolerance towards others and differences was not achieved through territorial concessions, but through permeation. Evidence of this can be seen in the coexistence of places of worship for different faiths in a relatively small area; economic activity involving craftsmen and traders of diverse religions, races, and worldviews conducting business under the same conditions side by side; and the absence of a segregated area for Jews. Many residents of Bosnia and Herzegovina and beyond connect a part of their cultural identity with the social relations symbolized by such an urban matrix [7].

The urban landscape became more intricate during the Austro-Hungarian period (1878–1918) as Sarajevo underwent a transformation into a European city. Urban regulations were implemented, following the model of Vienna. A new city district, Marijin Dvor, emerged in the west, and efforts were made to regulate the historical core of Sarajevo Čaršija. Additionally, reconstruction took place after a devastating fire in 1879, which destroyed 304 houses, 434 shops, and 135 other buildings across 36 streets. As a result, the first Regulatory Plan of Sarajevo was developed, focusing on the central, flat part of the city.

In 1880, a special construction order known as the "Bauordnung" was officially implemented, replacing the Ottoman "Law on Building and Roads" from 1863. Subsequently, in 1893, a new Construction Order was published, which applied to the entire city area [7,8].

The regulation of the Miljacka River occurred between 1886 and 1897 [9]. Unlike the Ottoman period when the city was clearly divided, with the business part in the valley and residential areas on the slopes, the new government primarily focused on developing the valley along the Miljacka river [7]. Consequently, the urban layout shifted from an amphitheater-like design to a longitudinal one. The arrival of the new Habsburg administration brought about fundamental changes in how the city was documented, developed, destroyed, and rebuilt ([1], p. 614).

4.3. The Values of the Historic Urban Landscape of Sarajevo and Their Relation to the Measures of Protection Created by the BiH Commission to Preserve National Monuments

In relation to the long-established values that have developed over centuries, shaping an organic urban framework that mirrors tolerant and diverse social relations, Annex 6 (Guidelines for the Development of the Management Plan) of the decision on the designation of Sarajevo historic urban landscape as a national monument emphasizes, in its initial point, that Sarajevo is already acknowledged and listed on the UNESCO Tentative List as a Unique Symbol of Universal Multiculturalism—a city that remains perpetually welcoming [10].

In this regard, the decision made by the Commission for the Preservation of National Monuments of BH states the following: Article 3 of the General Protection Measures

emphasizes the importance of prioritizing the protection, restoration, and reconstruction of historical buildings over the construction of replicas in order to maintain authenticity; in point 2, it is also stated that the interests of individual investors and the development of the real estate market should not take precedence over preservation efforts; points 6, 7, and 8 highlight the need for physical structures to fully respect and enhance the diverse characteristics of geomorphological structures in the landscape. Additionally, it is recommended that the building tradition be maintained by constructing smaller structures with fewer floors on sloped areas, and larger structures with higher floors on flat areas; the design and construction of physical structures should align with the natural and created conditions of the area, while preserving the existing identity of the space, architectural heritage, and continuity of the landscape structure. The cultural–historical and architectural heritage of the natural and urban amphitheater of the landscape should be treated with respect, following traditional principles and valuing "unwritten rules" and urban elements such as volume, sightlines, roofs, courtyards, green spaces, and water features.

In the same document, Article 5 (1) states that in order to protect the space as a historical urban landscape and ensure its development while preserving authenticity, integrity, and value, it is necessary to create a unique spatial planning document that considers the space as a whole (2). The administrative body is responsible for preparing the spatial planning document and must collaborate with the planning organization/service of Canton Sarajevo. Additionally, Article 15 (Implementation of Protection Measures), point 5, specifies that local self-government units and Sarajevo Canton are required to create, adopt, and implement the Management Plan.

Furthermore, Annex 5 (Guidelines for the Preparation of Spatial Planning Documents and the Plan and Project of Heritage Preservation) states in point 1 of the Guidelines that when preparing the necessary spatial planning document, the area of the national monument should primarily be considered as a historical urban landscape. It is crucial to take into account the entire historical layers of cultural and natural values of the historic urban core, ensuring their proper protection, preservation, and presentation. Additionally, the creation of new elements that align with the ambient context and spirit of the present time, while reflecting cultural identity, should be facilitated.

In the same Annex, point 20 stipulates that upgrades, additions, and interpolations are permissible only if they do not alter the value, ambient context, and visual integrity of the specific micro-locality within the national monument. These interventions should not compromise the character and significance of the national monument (both micro-localities and the entire site) and should enable the appropriate reuse of the building while rehabilitating the micro-locality for regular use. The design of the new building should harmonize with the volumes and ground floor heights of the existing buildings adjacent to the subject building [10].

4.4. Case Studies: Contemporary Interventions and Transformation of the Urban Landscape of Sarajevo

4.4.1. Case Studies Regarding the Historical Urban Area of Sarajevo Čaršija Developed during the Ottoman Period

In this case, our focus will be on several specific instances that demonstrate the overall condition and relationship between urban transformations and protection, particularly in terms of heritage preservation. Even prior to 2014, before the adoption of the historical urban area of Sarajevo Square, there were interventions that directly impacted the current state of the protected historical urban area of Sarajevo, which was established in 2020.

The first significant transformation that affected the area in question after the siege of Sarajevo (1992–1995) was the construction of the "Saraj" hotel (Figure 2) on the hill to the east of Sarajevo Čaršija. This construction, which took place at the beginning of the 21st century, is a "hybrid" structure that was carried out in multiple stages by different designers, without a unified concept or construction project.

Figure 2. Disproportionate Hotel "Saraj" below in visual contact with the historical complex Jajce Barrack as part of the historical urban townscape of Sarajevo, June 2023.

This volume is located below the Austro-Hungarian architectural complex "Jajce Barracks", which has been designated as a national monument [11], and it has been protected at the state level since 2009. Consequently, it competes with the protected architectural complex in terms of size. Although this recent building is not officially part of the formal framework of the historic urban landscape of Sarajevo, it directly impacts its perception, which raises concerns about the overall scope. Insufficient consideration was given to the views, visual perception, and connection with the slopes in the border area of Sarajevo Čaršija during the construction process. This construction took place before the adoption of the decision of the Commission, but it was carried out without the required urban planning approvals.

This is an emblematic case of the demolition of the "House of Crafts" (Figures 3 and 4) in the Sarajevo Čaršija area, which occurred in the 1950s under the influence of regional modernism by the renowned designer Andro Čičin Šain. This building was a masterful creation that harmoniously blended elements of modernity with the intersection of the Ottoman and Austro-Hungarian styles. However, in the midst of the second decade of the 20th century, this remarkable structure was demolished, despite deserving the status of a protected architectural heritage site from the latter half of the century. In its place, a hotel was erected (Figure 5), raising concerns about its compatibility, particularly with the Ottoman architectural elements on the eastern side.

Figure 3. The modern building of "House of Crafts" in Sarajevo Čaršija from the middle of the 20th Century, as valuable attempt at the pacification of the Ottoman and Austro-Hungarian urban matrix before the demolition, 2012.

Figure 4. "House of Crafts" in Sarajevo Čaršija after the demolition, 2013, with the background of Aščiluk Street.

Figure 5. The newly built hotel on the site where the 'House of Crafts', as a valuable creation from the middle of the 20th century, was demolished, June 2023.

Similarly, interpretive reconstructions of historical buildings in the background along Aščiluk Street are observed (Figure 6).

Figure 6. Asciluk Street—arbitration reconstructions, October 2023.

On Prote Bakovića Street, there are archaeological remains of Firuz-beg's hammam from the early 16th century (Figure 7), which are protected at the state level. However, archaeological research has been halted, and the site has been closed off by an unsuitable covering and tin fence (Figures 8 and 9) for years. Therefore, the removal of the insignificant one-story building on the site of the valuable remains of Firuz-beg's hammam [12] is meaningless.

Figure 7. Photo of the placard on the fence of the Archaeological remains of Firuz-beg's hammam on Prote Bakovića Street, October 2023.
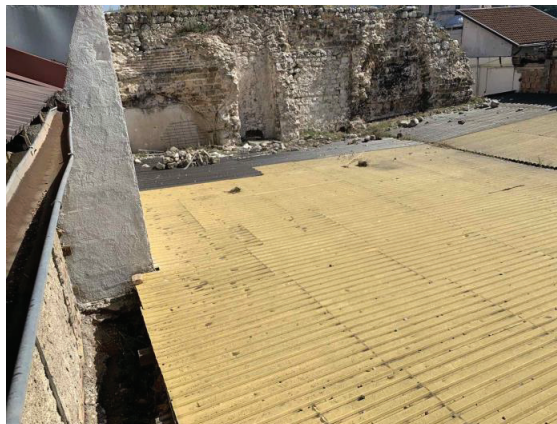
Figure 8. Archaeological remains of Firuz-beg's hammam covered with an unsuitable covering, October 2023.

Furthermore, due to the failure to adopt Amendments and Supplements to the Regulatory Plan from 1975, local catering establishments located within examples of preserved vernacular architecture in the historic core of Sarajevo are unable to obtain permits for any interventions that would align the reasons for protection with the demands of representative hospitality and tourism offerings, while harmonizing the old and the new.

The only allowable work is regular maintenance, even if it is evident that certain parts of the buildings cannot be classified as authentic structures. An example of this is the case of the catering facility "Pod lipom" on the same street.

Figure 9. Archaeological remains of Firuz-beg's hammam enclosed with an unsuitable fence, June 2023.

4.4.2. Case Studies Related to the Marijin Dvor Quarter, Which Developed during the Austro-Hungarian Period and Are Part of the Historic Urban Landscape of Sarajevo

In relation to urban and rural landscapes, there is also a subcategory known as the industrial landscape, which is associated with the remnants of industrial culture. This category holds special historical–architectural and technological–scientific value as it showcases the connection between the land and historical industrial infrastructure. In today's modern world, there is a challenge of revitalizing and preserving industrial landscapes while integrating them into the contemporary urban fabric. By repurposing industrial areas and buildings, new urban values can be realized ([3], pp. 187–188).

From this perspective, the Urban Landscape of Sarajevo itself can be observed, considering the significant examples of industrial heritage in the historical center of the city. This primarily refers to the Marijin Dvor area, where one of the oldest thermal power plants in the region was constructed on Hiseta Street (Figures 10–12) at the end of the 19th century. In 1895, a thermopower station and an administrative building [13] were constructed.

Figure 10. Hiseta thermopower station before demolition (photo from 2015).

As a result of this development, Sarajevo became one of the first cities in Europe to introduce trams. The transformation of this area faithfully reflects the current trend of the relationship between urban development and heritage protection. However, it was a missed opportunity for contemporary intervention to generate new value for the urban landscape.

Figure 11. Hiseta administrative building before demolition of thermopower station on the left side (photo from 2015).
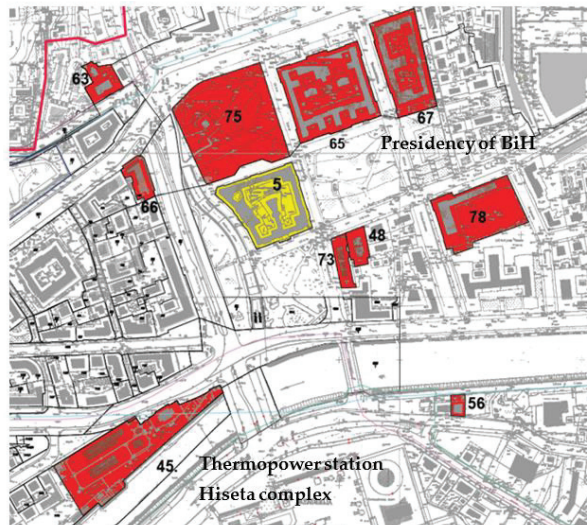
Figure 12. Hiseta thermopower station complex (45) in relation with other previously protected buildings including historical buildings of the Presidency of BiH (65).

The prescribed protection measures are arguably the most liberal measures prescribed in the Commission to Preserve National Monuments' nearly quarter-century practice. These protection measures include, among other things, the following:

Guidelines related to contemporary interpolations:

- ... acknowledging the scarcity of material remains (with only the remains of walls and the absence of industrial plant remnants), modern interventions should aim to highlight the symbolic connotations of the Austro-Hungarian period.
- It is permissible to incorporate modern alternative technologies aimed at environmentally friendly energy production as a form of creative expression... the use of photo-sensitive materials ... might be explored. Additionally, harnessing wind and water energy from the Miljacka River is feasible.
- ...it is important to maintain the functional and historical continuity of the place.
- It is necessary to create a solution that will not disturb the City's ambient whole in terms of form and dimensions...

Prior to the adoption of the Decision on the protection of the architectural complex, Studio "Urbing" created the "Conceptual solution for the restoration and adaptation of the old Electric Power Station for the purposes of creating a Technical Museum—Correction of the Marijin-Dvor Regulatory Plan" in 2011. The plan involved the partial reconstruction, restoration, and adaptation of the power station building into a Museum of Technology, providing a total space of 7234 m^2 with a basement, ground floor, and four additional floors [13].

The question of whether urban transformation can generate new urban landscape values seemed achievable. This optimism was based on a combination of liberal protection measures and the positive atmosphere that prevailed in professional circles. In fact, in 2012, world-renowned restorer Andrea Bruno served as an informal mentor for a doctoral dissertation conducted at the Faculty of Architecture in Sarajevo. The focus of this dissertation was the relationship between critical restoration and Bruno's distinctive restoration work. The central concept of the dissertation was the term "new authenticity" [14]. This concept acknowledged the possibility of preserving architectural heritage while also providing space for contemporary creative architectural expression as part of an integrated protection concept. The ultimate goal was to preserve and transmit integrated authentic values into the future.

Andrea Bruno himself stated that "When the historical layers that lead to its essential transformation overlap in one historical space, it is possible to continue that transformation with more coherent and refined forms. Opportunities to achieve continuity must be used either by adding or subtracting with the aim of removing 'disturbing memories'" ([14], p. 214) [15]. This concept emphasizes that urban transformations should not be halted but guided toward the preservation of authentic historical values.

For some of his restoration projects, Andrea Bruno drew inspiration from medieval builders who demolished the old without prejudice in order to adapt it to new needs. He found inspiration in this vibrant process, rejecting the indiscriminate concept of demolishing the old and instead selectively preserving the authentic elements and creatively integrating them with the new. By following this approach, the urban landscape can not only be preserved but also improved, contributing to the integration of heritage into the contemporary socio-urban context.

Instead, in 2016, an investor submitted the "Conceptual solution for the protection of the building complex of the Hiseta Thermal Power Plant and the interpolation of modern structures" [2]. However, this proposal involved the demolition of architectural heritage, followed by a "faithful" reconstruction of certain parts and the construction of a large contemporary building. This approach stands in opposition to the idea of harmonically integrating heritage into the existing historical urban landscape.

5. Discussion

The relationship between the urban transformation of the historic urban landscape of Sarajevo, contemporary interventions, the protection of architectural heritage, and the various actors and their different interests is complex. When discussing the historic urban landscape of Sarajevo, it is necessary to note that we are dealing with a unique case study in Europe, which Pope Francis during his recent visit in 2015 called "the Jerusalem of Europe" [16].

This townscape represents a unique urban structure that reflects a rich multicultural tradition not only in the area of the Sarajevo Čaršija formed during the Ottoman period, but also in the western part of the city, formed during the Austro-Hungarian period. In the area of Sarajevo Čaršija, places of worship for all four religious groups (Orthodox Christianity, Catholicism, Islam, and Judaism) were built in close proximity, while in the western part of the city formed during the late 19th century, the Austro-Hungarian administration harmoniously coordinated the new urban matrix with the pre-existing one from the Ottoman period. The fundamental traditional urban concept was preserved, and as such, is worth preserving, where the key issue lies in the relationship between the

historic urban landscape and contemporary interventions, which determines the direction of urban transformation.

5.1. Drafting of Spatial-Planning Documents, Actors of Implementation, Decisions Related to the Protection of the Historic Urban Landscape of Sarajevo, and Protection Measures

If we want to evaluate the impact of contemporary interventions on the protection of architectural heritage and the transformation of the urban landscape, it is necessary to first evaluate the effectiveness of the protection measures outlined in the decision to put under protection the historic urban landscape of Sarajevo. The National Commission establishes protective measures for the historic urban landscape of Sarajevo, while the responsibility for implementing the spatial document lies with the Canton at the lower level. Approval for its implementation is required from the intermediate-entity level. However, this system is overly complex and hinders the efficient creation of the plan.

In addition, it is crucial to address certain inaccuracies in the definition of protection measures outlined in the decision to adopt the historical urban landscape of Sarajevo as a national monument of Bosnia and Herzegovina in 2020. One significant point is stated as follows: *Preserving authenticity prioritizes the protection, restoration, and reconstruction of historical buildings over the construction of replicas* (Article 3 of the General Protection Measures—Interventions in the Area of the National Monument, point 1).

The contradiction becomes apparent in the key sentence of the Protection Measures, as it mentions the *reconstruction of historical buildings* while denying the possibility of replicas. It is unclear how authenticity can be preserved through reconstruction while simultaneously avoiding replicas.

To summarize, the Protection Measures of the decision to designate the historical urban landscape of Sarajevo as a national monument should be supplemented with the concept of integral protection—recognizing the possibility of preserving architectural heritage while also allowing space for harmonious contemporary architectural expression. New buildings should reflect the overall ambiance while incorporating elements of contemporary design.

The protective measures of the historic urban landscape of Sarajevo are indeed focused on preserving fundamental traditional values. These measures have established that the protected area is *a symbol of universal multiculturalism, and the interests of individual investors (profit) must not take precedence*. It is necessary to preserve the identity of the place and the continuity of the landscape structure.

However, achieving all of this is not possible due to the complexity of implementing the protection measures, which involves multiple administrative decision-making levels. The National Commission establishes protective measures, the lower-entity level issues permits for activities, and the responsibility for implementing spatial documents lies with the Canton at the lower level.

Another important factor is the influence of interest lobbies, where the priority is the construction of large buildings that will bring greater profit. This prioritization of private interests over social interests is evident in the public urban space.

Despite certain shortcomings, the decision of the Commission to Preserve National Monuments to adopt the historic urban landscape of Sarajevo as a national monument holds great importance. This is because previously adopted individual objects or units of architectural heritage cannot be viewed as isolated cases. They must be observed within the context of the organic connection between architectural and natural heritage, which is precisely what this decision achieves.

5.2. Some Dilemmas Related to the Classification of the Urban Landscape of Sarajevo

To understand the complex urban landscape of Sarajevo and its transformation, it is necessary to briefly examine the general definition and division of landscapes, and then, determine the specific category in which such a landscape can be classified. In this regard, it was important to consult the monumental research work of author Biserko Đumbović Bilušić related to Landscapes [3].

Additionally, the Commission to Preserve National Monuments of BiH defined the "Principles and Guidelines for the Preservation of National Monuments" in 2019 [17]. This document served as the basis for the adoption of the historic urban landscape of Sarajevo as a national monument [10]. It is partly based on the UNESCO Operational Guidelines for the Implementation of the World Heritage Convention from 2017 [18] and the UNESCO Vienna Memorandum from 2005 on the "Historic Urban Landscape" approach [19].

Regarding the definition itself, the Commission adopted the UNESCO Operational Guidelines 2017 definition, which states that a cultural landscape represents the "combined creations of nature and man" ([17], p. 34) [18]. As stated in Annex 3 of UNESCO's Operational Guidelines, the specific assets include *cultural landscapes, historic cities and city centers, and cultural heritage routes* ([17], p. 34) [20].

The World Heritage Convention from 1992 already acknowledges three basic types of cultural landscapes: *consciously created, visibly shaped; organically developed; and associative landscape* ([3], p. 181). However, this division seems incomplete, given the possibility of classifying urban, industrial, or agricultural landscape into all three categories, as many possess more than one feature prescribed by UNESCO guidelines ([3], p. 185).

The reason why the Commission classified the area of Sarajevo in the Urban Landscape category lies in the provision of the UNESCO Vienna Memorandum from 2005. This memorandum states that it represents a "living territory" marked by traces of previous generations as a response to the challenges and benefits of the natural environment. In fact, the landscape of Sarajevo is related to the division of the city from the 15th century into the business part in the valley—Čaršija—and the amphitheater-arranged residential units on the slopes of the surrounding hills—Mahala—as well as the later regulation of the bed of the Miljacka river from the end of the 19th century.

Such a landscape is an expression of time and the people who shaped it, including technical achievements, and intellectual and pragmatic attitudes. The historical urban landscape has a clear structure and recognizable components, including built infrastructure, open spaces, and functions. It encompasses the use of space, spatial organization, visual relationships, vegetation, buildings, and all elements of technical infrastructure, including small-scale buildings and construction details ([3], p. 186) [19].

5.3. Urban Transformation of the Historic Urban Landscape of Sarajevo, Contemporary Interventions, and Protection of Its Architectural Heritage

Considering the ineffective implementation of protective measures, it becomes necessary to analyze the development of events, which have, to some extent, taken on disastrous proportions. It is crucial to understand how "spontaneous" (illegal) urban transformations impact heritage and the urban landscape.

It should be noted that the previously protected historic city area of Sarajevo Čaršija has largely been integrated into the historic urban landscape of Sarajevo. However, the Regulatory Plan of Sarajevo Čaršija from 1975, which called for the demolition of all buildings constructed after 1879 (prior to the Austro-Hungarian period) except for the City Hall, was never implemented. Although these measures from the 1975 Regulatory Plan were suspended by previous protective measures, issues such as traffic management and unresolved matters continue to directly impact the entire historic city area of Sarajevo.

As for the area of Sarajevo Čaršija, a big problem is interventions carried out without urban planning approvals, which are outside of the historic area but in direct visual contact with Sarajevo Čaršija (Hotel "Saraj"). This incoherent structure disrupts the Urban Landscape and visually competes with historically significant buildings such as the Jajce barracks complex.

Interventions that were not foreseen with the 1975 Regulatory Plan include the construction of a hotel on the site of the "House of Crafts", a modernist creation from the 1950s that harmoniously blended with the historic urban tissue. It served as a shining example of how urban transformation can generate, create, and develop new heritage. It is evident

proof that, more than half a century later, the same location experienced a reverse process where urban transformation actually resulted in the degradation of heritage.

Similar to a series of micro-interventions in the area of Sarajevo Čaršija, such as the inappropriate interpretation of vernacular architecture in the same zone along Aščiluk, the same concept was applied with the inappropriate kitsch decoration of a catering establishment situated within the remains of the Kolobara han (Figure 13)—the oldest preserved inn from the 15th century in proximity to the Gazi Husrev-beg mosque (Figure 14).

Figure 13. Kitsch decoration of "Kolobara han", September 2023.
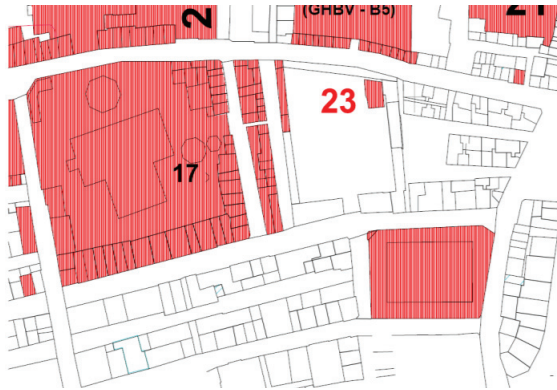
Figure 14. Map of "Kolobara han" (23) in proximity to the Gazi Husrev-beg mosque (17).

These kinds of interventions and the demolition of characteristic examples of architectural heritage represent examples of the irreversible transformation of the historic urban landscape in the very heart of the historical core. Other interventions, such as kitsch decorations in important historical places like Kolobara-han, represent inappropriate interventions that can be corrected with the implementation of protective measures.

In the area of Prota Bakovića Street, after the completion of the excavation of the archaeological remains of Firuz-beg's hammam, a contemporary intervention aimed at a worthy presentation of the protected heritage from the Ottoman period was never carried out. The current *status quo* and the lack of urban transformation in this case represent a significant alteration of the urban landscape.

Earlier, a business building was constructed in Bravadžiluk Street, in the immediate vicinity of the symbol of Sarajevo—City Hall (Vijećnica), which deviates from the traditional urban matrix (Figure 15).

Figure 15. Disproportionate business building on Bravadziluk Street near the City Hall.

Likewise, in the first decade of the 21st century, the monumental Gazi Husrev-beg Library was built: a significant cultural center where priceless library treasures are kept in one place, but also a place where the restoration and study of such treasures is possible.

However, from the perspective of the preserving the historical townscape of Sarajevo, this intervention seems problematic for at least three reasons: The first reason is that a volume that does not correspond to the traditional urban matrix has been introduced. The second reason is that it was built next to Gazi Husrev-beg's madrasa from the 16th century (Figure 16), which is literally overshadowed by a tall building. The third reason is that the volume of the new building is significantly larger than the largest mosque in Sarajevo, which is located on the opposite side of the street (Figure 17).

Figure 16. Gazi Husrev-beg Library—relationship with the historical building of Gazi Husrev-beg's madrasa.

Furthermore, the transformation of the area of the former Hiseta thermopower station in the Marijin Dvor quarter on the opposite west side of the city may have long-term implications for the quality of the historic urban landscape of Sarajevo.

Liberal measures to protect this area were aimed at the preservation of the urban landscape, but at the same time, the interests of potential investors were taken into account, allowing interventions that would serve their profit-making interests. However, it is evident that even the most liberal protection measures are merely a component of the solution and are frequently insufficient. This is due to the conflicting imperative to generate extra profit, which contradicts the fundamental principles of heritage protection.

Figure 17. Map of Gazi Husrev-beg Library (80)—relationship with Gazi Husrev-beg's madrasa (15 and 23) and mosque (17).

The investor's "Conceptual solution" from 2016 declaratively predicted "protection" and the application of the "Principle of democratization of heritage", which the author described as "the involvement of people—users and the local community and their needs in protection, restoration, and use"[2]. The design solution clearly demonstrates tendencies that are in direct conflict with the fundamental reasons for heritage protection and positive urban landscape transformation. The proposed method of "Temporary Dislocation" of the same author suggests dismantling the remaining authentic construction, with the plan to magically return it to its original location after the construction of new business and museum buildings. This project also proposes the use of the "contrast method" for interpolation, including the construction of a disproportionately large tower that not only clashes with the industrial heritage but also disrupts the entire historic urban landscape.

In terms of protection measures, a symbolic "height accent" is indeed included to evoke the collapsed industrial chimney. However, it is inappropriate and, more accurately, wrongly interpreted as a tower with G + 27 floors, situated above the recomposed (reconstructed after dislocation) remains of the authentic structure.

Considering this sequence of events, it is not surprising that no protection measures were implemented until March 2023. The situation nearly spiraled out of control as the building posed a danger to passers-by. Consequently, on 30 March 2023, the demolition of the remaining industrial building began, with only the segment of the northern wall facing Hiseta Street being preserved (Figure 18).

As a result, the historic urban landscape will undergo irreversible changes, and the city will lose authentic material evidence of one of Europe's first thermal power plants, which enabled Sarajevo to have public lighting in 1895, just thirteen years after New York [13].

However, the current state of society, burdened with ideas where profit dictates nearly every decision made by investors, has not allowed for the development of urban transformation based on the best European traditions.

This is about the fact that the essence of the traditional historical urban matrix based on an inclusive multicultural concept is not only related to the existence of different religious places of worship. The essence is connected, above all, to the spatial relationships present in the area of the historic townscape of Sarajevo. These relationships are a reflection of the active involvement of the local community, which traditionally based urban transformations on unwritten rules related to respecting the rights of neighbors (*komšiluk*), which implied restrained interventions. The transformations shown are not in accordance with the essential values of the historic townscape of Sarajevo or with the traditional multicultural identity.
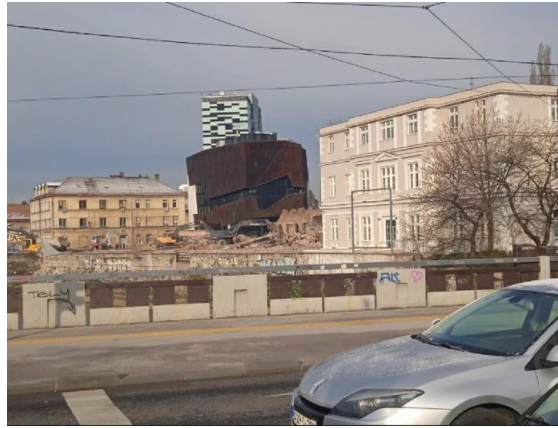
Figure 18. Demolition of the largest part of the historical structure of the former Hiseta thermopower station on Marijin Dvor took place as part of the historical urban landscape of Sarajevo on 30 March 2023.

In that process, traditional knowledge, or the interaction of different social groups, previously mentioned as an important factor by the researcher Anna Onesti, was neglected, and therefore, it is difficult to expect activities that would lead to the recovery of historical townscapes. Such contemporary transformations make impossible the traditional social inclusion present in a multicultural society where every social or ethnic group, since the foundation of Sarajevo in its present form in the 15th century but even earlier, was welcome.

In the part of the city created during the Ottoman period, on the basis of respect for traditional knowledge, it is possible to carry out transformations that will preserve the traditional urban matrix and, at the same time, provide the opportunity for investors to make the necessary income. Revitalization and adaptation to the modern needs of neglected historical buildings and units with the participation of the local community and the preservation of traditional values should be given priority over demolition and mismatched interpolations.

On the other hand, a radical shift in the urban approach is required on the city's western side. The area of the city where the Austro-Hungarian administration built the first specially designed museum in this part of the world (National Museum of BiH) and one of the first thermal power plants in Europe is mostly left to interest lobbies for which the protection of the historical townscape and urban identity is not a priority. The harmoniously imbued urban matrices of the Ottoman and Austro-Hungarian periods, and the period between two World Wars, that reflect a multicultural urban identity are threatened by unarticulated intervention.

The approach must be such that priority is given to social interest. In 2011, the never-realized project of the Museum of Technology [13] was created while preserving the authentic structure of the Hiseta thermal power plant. It is certain that it is not possible to revive the original function, but such a historical symbol of technological progress from the end of the 19th century can be revitalized into a museum, including the contemporary modern technological elements of sustainable design.

When we talk about the general rules related to the transformations of reconstructed cities, the researcher Arturo Gallozzi concluded that in reality, a combination of different concepts is carried out, which implies the reorganization of the pre-existing urban settlement with new construction, where the influence of private interests and low awareness of future development ultimately lead to inappropriate urban development.

If we compare the urban development scenarios from the period after World War II in Italy and the current trends in the transformation of the historic townscape of Sarajevo, it is

possible to confirm that the influence of private interest and low awareness of future urban development on the well-being of the community is a common characteristic.

A common characteristic is that urban reconstruction is considered as a reorganization of the pre-existing urban settlement with new construction, given that ex novo urban development plans are unrealistic in terms of space and finance.

On the other hand, the difference is in the intensity and character of construction within pre-existing urban settlements, where the executed or planned new construction disrupts the balance or renders meaningless the historic townscape of Sarajevo, as a symbol of the cosmopolitan idea of the possibility of realizing a multicultural concept in the present time.

In accordance with the above, considering the research on urban transformations in historic landscapes in general, research should be directed towards determining the intensity of construction that can be achieved without damaging or, in more severe cases, destroying the historical townscape and its associated universal and specific values of the local community. At the moment, it is difficult to answer this question, and it can be assumed that future research will give a polyvalent answer that will depend on different criteria and circumstances.

6. Conclusions

The prevailing logic in today's society is in contradiction with the preservation of heritage. As a result, authentic historical complexes are being dismantled through radical urban transformations, particularly in the historical core. This will undoubtedly have long-term repercussions on the physiognomy of the historic urban landscape of Sarajevo, with consequences that are still unknown. This unique city, with its centuries-old multicultural tradition, already endured the ordeal of destruction during the period of 1992–1995. Now, it faces the even greater challenge of social transition, directly impacting the city's shape and identity.

The impact of contemporary interventions from the end of the second decade of the 21st century, which were not previously foreseen by regulatory plans, has a devastating effect on the urban landscape, directly related to the multicultural character of Sarajevo. From such activities, one can clearly see the predominance of private interest and the pursuit of profit over social interest. Investors often do not feel a special responsibility towards the broader social interest and the preservation of the unique historical urban landscape, which holds significant value in Europe.

In this case, a conclusion is not enough; it is necessary to define some rules that would prioritize social interest over private and work towards changing the negative impact of contemporary interventions:

- It is necessary to propose a simplification of the decision-making and implementation system. The Canton of Sarajevo and the associated institutes for planning and heritage protection should be given greater autonomy when planning the creation of spatial plans, allowing for a freer interpretation of certain protection measures. In such complicated administrative systems, the obligation to create combined work teams should be introduced to increase decision-making efficiency and achieve benefits for the historical urban landscape.
- It is crucial to reduce the influence of interest lobbies on institutions that are directly related to the development of contemporary interventions that affect the transformation of the historic urban landscape of Sarajevo.

The experiences of mobilizing citizens—who, in 2017, expressed their public displeasure through the Association of Architects of BiH regarding inappropriate modern interventions in the area of the archaeological site of Tashlihan [21] in the Sarajevo Čaršija—represent a recipe for effectively combating this phenomenon and stronger involvement of the local community in the process of decision making.

Raising awareness about the significance of preserving cultural heritage within the urban landscape is necessary; furthermore, proactive action is also needed. This includes

introducing stimulating economic incentives that clearly encourage both investors and ordinary citizens to recognize the economic and social benefits of heritage protection.

Such solutions can then be applied to historic urban landscapes around the world that are threatened by thoughtless construction driven by profit interests. The aim is to harmonize contemporary interventions with the protection of architectural heritage in order to improve endangered historic urban landscapes that are often linked to the identities of entire social communities.

Notes

[1] Although an insufficiently researched area, it can be assumed that such a development is to a certain extent connected with the phenomenon of *Neoliberalism*, which is defined as: *A type of liberalism that favors a global free market, without government regulation, with businesses and industry controlled and run for profit by private owners*—Oxford Learner's Dictionaries, neoliberalism noun-Definition, pictures, pronunciation and usage notes|Oxford Advanced Learner's Dictionary at OxfordLearnersDictionaries.com. Available online: https://www.oxfordlearnersdictionaries.com/definition/english/neoliberalism (accessed on 14 September 2023).

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The Identification of Historic Plant Landscape Characteristics and Conservation Strategies for Longevity Hill Based on the WSL Monoplotting Tool

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Abstract: The surrounding environment of architectural heritage sites is integral to cultural heritage protection; plant landscapes play crucial roles in them. Controlling plant spaces and appearances is essential for preserving plant landscapes. A World Cultural Heritage Site, the Summer Palace has undergone multiple changes since the 1860s; restoring and protecting plant landscapes has been an ongoing research focus. However, data accuracy limitations have hindered analyses of the overall spatial characteristics of historical gardens. Here, the historical dynamics and unique landscape features of plants on the front hill of Longevity Hill (FLH) are explored, and conservation and renewal strategies are proposed. Geographic information system (GIS) and WSL Monoplotting Tool are used to identify historical plant spaces. Plant space types are classified, and their landscape characteristics are analyzed. On the basis of historical events, the historical plant spaces on the FLH can be divided into two major categories and six subcategories. The vegetation retention area (south side) was less affected, and the plant landscape along Kunming Lake was the most well-preserved. However, the vegetation-damaged area (north side) was impacted more in the western part than in the eastern part, with notable changes in spatial landscape characteristics, particularly regarding forest function, morphology, and structure. Strategies are proposed for reducing human intervention and adjusting retention areas; furthermore, historical images and spatial grading in damaged areas can be used to suggest landscape adjustment and restoration strategies. This study introduces a method for analyzing the historical characteristics of plant landscapes over time that can be used to protect cultural heritage sites worldwide.

Keywords: world heritage site; plant landscape change; multitemporal; historical photographs; monophotogrammetry; georeferencing

1. Introduction

Historical gardens, as distinctive cultural heritage sites, are protected by their architectural surroundings; they play a pivotal role in urban historical landscapes [1]. Plant landscapes constitute a vital component of these environments. Article 2 of the Florence Charter explicitly underscores the importance of plants [2]: "The historic garden is an architectural composition whose constituents are primarily vegetal and therefore living, which means that they are perishable and renewable". In the context of the Chinese cultural emphasis on garden design, composition, and artistic conception, the preservation of historical gardens addresses the issue of "authenticity", aiming to maintain their original state amid natural changes through human intervention [3]. The spatial relationship of plant landscapes with literati aesthetics, landscape settings, and architecture is a critical aspect of Chinese historical garden design and artistic conception. Globally, historical research serves as the foundation for the conservation and development of historical garden plantings. Historical documentation and comparative analysis are essential in determining the conservation, restoration, and maintenance levels required for plant landscapes [4]. However,

unlike historical buildings, many Chinese historical gardens lack detailed drawings similar to those for architectural structures [5]. Plant studies often rely heavily on classical paintings [6–8] and literary works (primarily poetry and essays) [9,10]. The poetic and abstract representations in these sources contrast with modern design blueprints. Furthermore, owing to scale issues in classical maps and the expressive techniques of Chinese classical paintings, the accuracy of image data is challenging to ascertain, resulting in substantial inaccuracies [11]. Therefore, research often focuses on qualitative assessments of the nature of historical plant landscapes rather than on more precise quantitative studies.

With technological advancement, digital techniques have gradually been applied to the study of historical gardens in recent years [12]. Some studies have attempted to simulate and recreate the historical spatial characteristics of gardens via mathematical models based on parameter systems [13]. However, such methods are not universally applicable to all historical gardens. This is because natural elements, particularly plants, exhibit changing dynamics, and many features have been altered over time. As dynamic data, historical photographs enable analysis of the dynamics and complexity of plant landscapes in historical gardens [14]. When combined with auxiliary digital models, historical photographs assist in documenting changes in plant landscapes [15]. Nevertheless, extracting quantitative information from photographs remains challenging. Compared with satellite and aerial imagery, historical photographs with tilted perspectives lack geographic references. The usefulness of photographs is affected by variations in lighting, vegetation, and other obstructions. Consequently, comparative analyses based on the integration of similar photographs from different historical periods are challenging [16,17]. Such approaches are typically limited to studies of relative changes and cannot be used to estimate actual coverage precisely due to data and technical constraints [14,18]. This situation complicates analyses of plant landscape characteristics in historical gardens. To address these challenges, researchers employ monoplotting techniques to process historical photographs, aligning them with geographical coordinates. The WSL Monoplotting Tool (WSL-MPT), developed by the Swiss Federal Institute, currently permits the geo-alignment of individual oblique aerial images without the necessity for multiple overlapping images, which are typically required by traditional photogrammetric geo-alignment practices. The tool is capable of integrating photographs taken at different angles at different times into a single spatial coordinate, thereby enhancing the accuracy of the analysis [19]. To date, WSL-MPT has been utilized in quantitative analyses of natural disasters [20], glacial processes [21,22], land cover changes, and other fields [23–27]. Nevertheless, the application of the monoplotting tool in conjunction with historical heritage conservation is a relatively uncommon practice. The tool, however, has the potential to serve as a reliable research foundation for the analysis of the spatial configuration and attributes of plants in historical gardens through the utilization of the spatial overlay technique, which combines image data and multitemporal data.

Landscape characteristic assessment (LCA) is increasingly employed in numerous studies to discuss historic garden conservation as a perceptible entity [28]. It comprehensively assesses the geographical, physical, and social perceptions of historical gardens, establishing standards and conceptual frameworks to document their spatial uniqueness [29,30]. The dynamic development of historical gardens necessitates multitemporal analyses of heritage elements, placing them within a coherent framework of spatial and temporal continuity. Analyzing changes in plant heritage through dynamic landscape approaches facilitates the introduction of more precise conservation and development guidelines, as well as policy actions [31,32], thus enhancing the locality of historical gardens.

The Summer Palace, also known as the Garden of Clear Ripples, was inscribed on the UNESCO World Heritage List in 1998. It is an outstanding embodiment of Chinese garden design and artistic creativity, epitomizing the principles and practices of Chinese garden design. It is also renowned as China's most illustrious and well-preserved imperial garden palace [33]. The Garden of Clear Ripples, Jingming Garden, Jingyi Garden, Yuanmingyuan, Changchun Garden, Longevity Hill (LH), Fragrance Hill, and Jade Spring Hill, along with various temple gardens, private gardens, and surrounding environment,

collectively form a vast cluster of gardens in the northwestern suburbs of Beijing known as the "Three Hills and Five Gardens". The Three Hills and Five Gardens represent one of the focal areas within Beijing's historical and cultural city protection system. This cluster has important cultural resource enrichment areas where the cultural belts of Xishan and the Yongding River intersect with the Grand Canal cultural belt, intricately blending traditional historical culture with emerging culture. The central features of the Summer Palace, LH, and Kunming Lake play crucial roles in the organic integration and overall environmental formation of the Three Hills and Five Gardens [34]. LH was rebuilt by bulldozing the foundation hill of Weng, and the artificial cultivation of plants on LH was recorded in the royal regulations of the Qing Dynasty. The design of the plant landscape on LH began in 1750. Over many years, a multitude of tree species were introduced, resulting in the gradual formation of a luxuriant expanse comprising coniferous pines, cypresses, and a diverse array of forests, including deciduous and broad-leaved arborvitae species. Pines and cypresses have always been regarded as a symbol of "high morality and longevity", favored by ancient Chinese royalty and literati, and their design and layout reflect the will and aesthetics of the emperors, emphasizing the creation of an atmosphere of high cultural value [35]. The front mountain of Longevity Hill (FLH) serves as the central focal point and primary viewing interface of the entire garden, representing the pinnacle of national garden artistry with its meticulous layout. The central courtyard and plaza feature a structured planting pattern, with cypress trees interspersed with pine trees. Furthermore, the temple is embellished with symmetrically arranged shrubbery on its flanks. Elsewhere on the FLH, a more naturalistic approach is taken with scattered plantings of pine and cypress trees. The dense greenery of these trees harmonizes with the vibrant hues of the palaces and pavilions, creating a vivid color scheme that epitomizes the grandeur of imperial gardens [35]. Since 1860, the plant landscape of LH has experienced varying degrees of damage due to successive events, including the Second Opium War, the Boxer Rebellion, the invasion of the Eight-Nation Alliance, and World War II. The destruction of the plant landscape of LH has had a significant impact on the cultural value and connotations associated with this natural environment. Subsequent efforts in restoration and preservation have been hindered by economic and political constraints, and a comprehensive restoration approach based on historical landscape studies is lacking. Therefore, there is an urgent need to analyze the changes in the plant landscape of the FLH and study appropriate policies for its conservation [36,37]. The focus of this study is on researching the evolving characteristics of the plant landscape in the Summer Palace, specifically examining different historical periods of the FLH plant landscape via historical photographs. This study aims to identify and analyze these characteristics from the perspectives of plant landscape spatial organization and aesthetic control and provide scientific recommendations for the future management and conservation of the Summer Palace plant landscape. Two research questions are considered:

1. How has the spatial configuration of vegetation changed during the restoration process of the FLH since severe damage occurred in 1860?
2. Compared with the 1860s (late Qing dynasty), what changes have occurred in the botanical landscape and appearance of the FLH?

This study makes several contributions to the field. First, it introduces a novel approach to studying landscape features by combining the identification and analysis of historical garden spatial characteristics with the analysis of extra-garden landscape features. Second, the study employs photographs, which are more precise than traditional literary works and paintings, ensuring data authenticity. The focus is on quantitative analysis, as photographs taken from different angles and periods are integrated into a unified spatial coordinate system, thereby providing more accurate assessments of changes in plant landscape features. Third, the Summer Palace is employed as a case study to provide insights into the conservation of plant heritage from a landscape feature perspective, thereby enhancing our comprehensive understanding of landscape spatiality, plant aesthetics, and cultural heritage preservation. The research findings provide references for

the protection of historical plants at various levels and in different areas within the Summer Palace, a UNESCO World Heritage site, and offer methods for identifying, analyzing, and conserving various heritage elements that have undergone significant historical changes at other cultural heritage sites.

2. Materials and Methods

2.1. Study Area

This study focuses on the FLH in the Summer Palace. The research scope of this paper was delineated by overlaying panoramic photographs of the FLH from 1860 to 2024 within the visible area (method detailed in Section 2.2.1). The geographical coordinates spanned from 116.264° E to 116.272° E longitude and 39.999° N to 39.996° N latitude, covering an area of 7.66 hectares (Figure 1) [35]. The architectural alignment relationships of the FLH are illustrated in Figure 2. A series of isosceles triangles were employed to control the architectural complex, creating an invisible network that bound the entire facade into a stable whole. This facade was akin to a pyramid, enhancing the solemnity of the imagery. Simultaneously, garden designers devised five axial lines as the main visual corridors of the FLH, effectively fulfilling both scenic highlighting and viewing needs and thereby achieving a harmonious blend of variability within rigorous architectural forms.
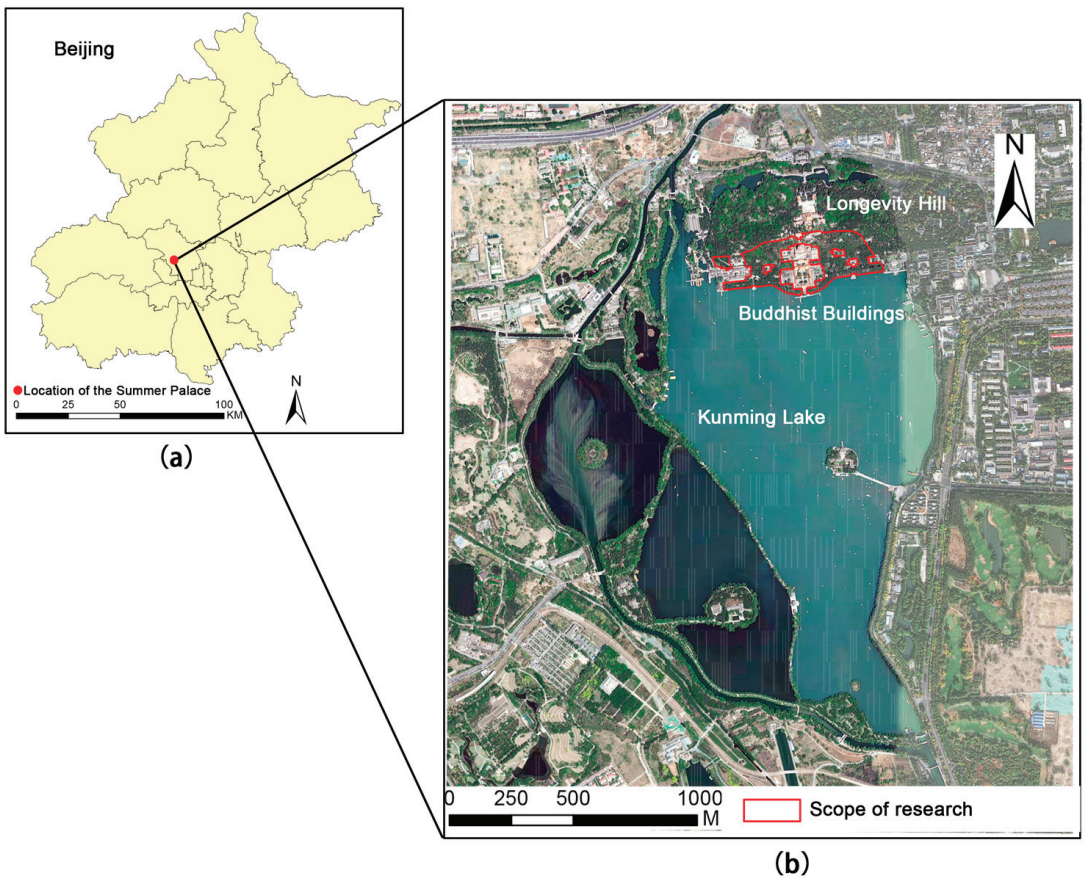
Figure 1. (**a**) Location of the Summer Palace; (**b**) map of the Summer Palace (courtesy of Big Map) with specific study areas indicated by the red line.
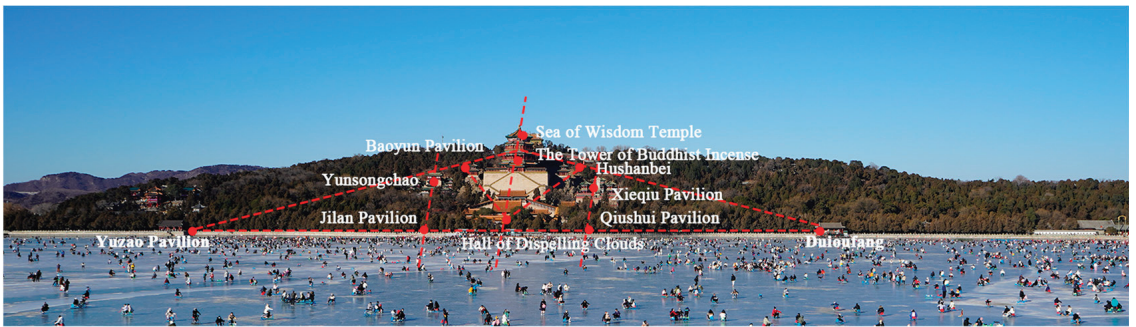
Figure 2. Analysis of the basic architecture and structure of Longevity Hill.

2.2. Data Collection and Preprocessing

2.2.1. Data Collection

The study utilized three types of data: historical literature, historical photographs, and geographic information data.

Historical literature data were sourced from local chronicles of the Summer Palace and government official documents, totaling 145 entries, primarily including "*Records of the Summer Palace*" and "*A Series of Examinations on the Historical Events and Characters of the Summer Palace*". These data are officially recognized by the government and the Summer Palace authorities, ensuring their authority and authenticity. Researchers have used these data to delineate periods of change in the FLH.

Historical photograph data were sourced from government official media, news reports, and public digital libraries with copyright permissions for photographs. These data provided foundational information for historical plant spatial classification and were also used to analyze the botanical landscape characteristics of the FLH during different periods.

The geographic information data included digital elevation model (DEM) data from the Resource-3 satellite launched by China, which is accessible at http://sjfw.sasmac.cn/ (accessed on 15 January 2024). DEM data were extracted via ENVI 5.6 software with a spatial resolution of 5 m. The vector boundary data of the Summer Palace were obtained from "Mapping Essential Urban Land Use Categories in China (EULUC-China): Preliminary Results for 2018 [38]" and satellite images from BIGEMAP (http://www.bigemap.com/, accessed on 23 December 2023). These data significantly enhanced the accuracy of using the WSL single-plot technique for analysis.

This approach integrated diverse data sources to comprehensively analyze the dynamics of the FLH in the Summer Palace, providing a robust foundation for understanding its historical and botanical landscape changes.

2.2.2. Data Preprocessing

According to the collected historical literature data, researchers screened and compiled events influencing the botanical landscape of the FLH (Table A1). Concerning photograph data, researchers selected historical photographs that focused on the main scenery of the FLH, documenting the sources and dates of the photographs (Table A2). Using the WSL single-plot method (Section 2.3), researchers have conducted field surveys to confirm the coordinates and elevations of the photograph capture points (Figure 3). Simultaneously, measurements of the geographic coordinates and elevations of various architectural platforms, which were used to refine the DEM data, were taken.
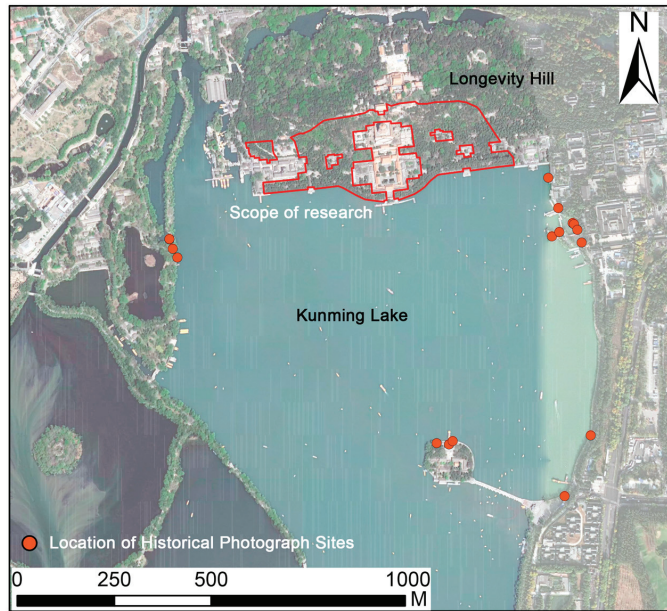
Figure 3. Locations of historical photographs (identified through field research).

2.3. Identification and Classification of Historical Plant Spatial Features

Researchers have utilized the WSL Monoplotting Tool to georeference historical landscape images of the FLH. The fundamental concept involves overlaying raster images onto a digital terrain model (DTM), linking each pixel to attribute coordinates (latitude and longitude) and elevation heights. This allows rays from the camera center through selected points in the photograph to intersect with the corresponding terrain DEM at landscape points (Figure 4) [39]. Through this tool, landscape elements represented in individual terrain photographs can be vectorized in the form of points, lines, and polygons (Figure 5) [40].

Figure 4. Schematic diagram of the WSL Monoplotting Tool.

MPT 2.0 was employed as the analytical software tool; it requires the following input data: (1) digital images, which are captured by digital cameras or obtained through

scanning historical photographs; (2) DTM; (3) aerial photographs or geographic reference topographic maps depicting the outlined areas in the photographs; and (4) control points (CPs), which are precisely and distinctly identifiable positions in both the image (pixel coordinates) and the landscape (real-world coordinates—latitude, longitude, and elevation height), such as road and sidewalk intersections, rock outcrops, and building corners [20].
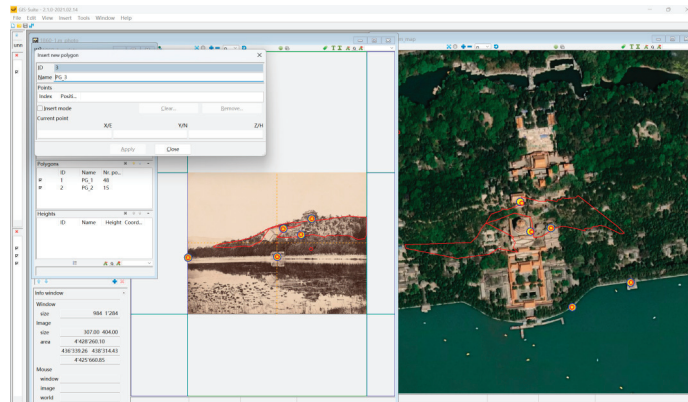
Figure 5. Geo-aligning and adding vectorization to photos via MPT 2.0 software.

Researchers identified historical plant spaces and classified them via the following procedure:

(1) Historical events influencing the plant landscape of the FLH were extracted from historical literature data and sorted chronologically by the occurrence of events.

(2) All historical photographs were georeferenced, and the areas where changes in the plant landscape of the FLH occurred during the first event period were vectorized (Figure 6). The MPT 2.0 tool was used to import vectorization information from the first event period into subsequent historical photographs. Differences in plant landscape areas were further vectorized during each subsequent event period, continuing in chronological order. Changes for each event period in the plant landscape of the FLH were vectorized.

(3) All vectorization information from each period was imported into ArcGIS as shapefiles. The plant landscape space of the FLH was delineated by overlaying the ranges of plant spatial changes across multiple periods.

(4) All spaces were divided into two main categories based on whether each space experienced destruction events. Logical judgment was used to further classify spaces on the basis of the results of each historical event and their impact on each space. This process facilitated the analysis of the historical dynamics of plant landscapes at the FLH and provided spatial references for comparing extraneous landscape features.

| (**a**) | (**b**) |
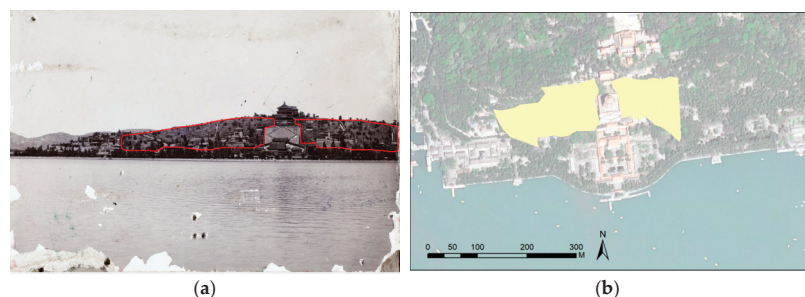
Figure 6. Mapping of vectorized information: (**a**) areas of altered botanical landscapes in the 1900 photographs and (**b**) areas of altered botanical landscapes in the plane mapped 1900. Red line: identification

of the spatial extent of plant damage in MPT2.0 for the 1890 photograph; yellow area: the extent of the red line in the photograph that corresponds to the extent of the red line in the plane after geo-calibration.

2.4. Dynamic Analysis of Off-Forest Landscapes

To comprehensively understand the changes in the FLH botanical landscape from the late Qing Dynasty (1860) to the present, a dynamic analysis of off-forest landscapes is essential [41,42]. Geographic spatial data and remote sensing technology have been effectively used in such landscape quality assessments. These scientific evaluations guide scenic forest management and construction. Researchers have examined the characteristics of the FLH botanical landscape across different periods via the following steps:

First, researchers identified landscape indicators and categorized the scenic forest of the FLH as a near-forest landscape (within a 500 m observation distance) based on historical photographs. They selected morphology, linearity, and structure as key elements for analyzing its near-forest landscape [43–45]. Field surveys tailored to the conditions of the FLH further divided these factors into ten indicators: canopy texture, free-standing trees, patch detectability, shape, distribution, forest canopy contour, patch boundary line, canopy layer, stand type, and life-type composition (Table 1). These indicators classify changes in the characteristics of the FLH botanical landscape.

Table 1. Composition elements of the near-forest landscape of the FLH.

Basic Compositional Elements	Project Description Factor	Class			
Morphology	Canopy texture	Rigid	Soft	Mixed	
	Free-standing trees	Several	Multiple	None	
	Patch detectability	Clear	Identifiable	Indiscernible	
	Patch shape	Regular	Irregular	Indiscernible	
	Patch distribution	Congregate	Well-distributed	Randomization	Indiscernible
Linearity	Forest canopy Contour patch Boundary line	No undulations Straight	Slight undulations Eclectic	Moderate undulations Curve	Significant undulations
	Canopy layer	1	2	3	4
Structure	Stand type	Coniferous forest	Broad-leaved forest	Mixed conifer-broad forest	
	Life-type composition	Trees and shrubs	Trees	Trees and grasses	Trees, shrubs, and grasses

Second, researchers mapped various plant spaces onto historical photographs from periods when plants were present, thus contrasting botanical landscape features.

Finally, by integrating historical contexts from each period, researchers analyzed spatial changes in plant spaces, evaluating differences in current botanical landscape characteristics compared with those in 1860. This analysis provides critical insights into the overall changes in the FLH botanical landscape, supporting enhancements in existing conservation policies.

3. Results

3.1. Key Events Influencing the Plant Landscape of the FLH

The researchers identified eight significant events that impacted the FLH vegetation landscape. These events resulted in three main outcomes: vegetation destruction, vegetation landscape restoration, and changes in vegetation landscape function (Table 2). Events one and three significantly damaged the vegetation landscape of the FLH, as a substantial portion of plants were destroyed by fire during them. Events two and four involved royal-led efforts to restore the vegetation landscape, hindered by financial constraints that slowed the restoration progress. Empress Dowager Cixi emulated the landscaping methods used in the construction of Qingyi Garden in 1750, and her influence impacted the restoration of the vegetation landscape to some extent. Events five and seven transformed the vegetation landscape of the FLH, altering the functional roles of the woodland. During event five,

the transformation of the Summer Palace into a public space shifted its purpose from serving the royal family to serving the public, which also led to changes in the strategies for restoring the botanical landscape. The military presence during World War II also affected the vegetation landscape. In event seven, many fast-growing tree species and fruit trees were planted on LH, shifting the landscape's focus from public service to production and disrupting the original botanical landscape pattern. The subsequent neglect during the three years of natural disasters and the Cultural Revolution led to inadequate management of the botanical landscape in Summer Palace, resulting in the decline and death of numerous trees due to high-density planting. Event six involved replanting 500 trees according to the original configuration style. In event eight, the government focused on the community structure of vegetation, utilizing the distinctive attributes of diverse plant species to enhance the overall aesthetic appeal. This entailed the removal of a multitude of incongruous, miscellaneous trees that had previously been planted and the implementation of extensive, stylistically diverse botanical landscaping initiatives [35–37].

Table 2. Influential events on the botanical landscape of the FLH.

Event	Time	Description	Impact
Event one	1860	The Anglo-French Allied Forces set fire to the Garden of Clear Ripples.	Vegetation destruction
Event two	1886–1895	Empress Dowager Cixi restores the Summer Palace.	Restoration of plant landscape
Event three	1900	The Boxer Rebellion and the invasion by the Eight-Nation Alliance, with Russian and Italian troops occupying the Summer Palace.	Vegetation destruction
Event four	1902–1912	Empress Dowager Cixi restores the Summer Palace.	Restoration of plant Landscape
Event five	1928–1945	The Summer Palace transitions to a public space, with large-scale replanting of trees. The stationing of military troops also causes damage.	Landscape Transformation, functional changes
Event six	1949–1952	Implementation of the "Widespread Greening, Gradual Improvement" policy, involving the restoration and repair of vegetation throughout the garden.	Restoration of plant configuration
Event seven	1958–1972	Following the "Greening Combined with Production" policy, the area saw extensive planting of fast-growing trees and fruit trees, with dense planting of species such as black locust, tree of heaven, and paulownia.	Landscape transformation, functional changes
Event eight	1991–1994	Initiation of a three-year greening adjustment program to gradually restore the historical landscape pattern, restoring the FLH to its original state with lush cypress trees.	Restoration of plant configuration

3.2. Identification and Classification of Plant Spaces on the FLH

The changes in plant landscapes after each of the eight historical events are analyzed and explored by dividing the plant landscape spaces of the FLH into 25 blocks (Figure 7) on the basis of the areas affected by these events. The southern area of the FLH is notably larger and evenly distributed along the east–west sides of the lake. In the northern part of the FLH, especially around Foxiang Ge (Tower of Buddhist Incense), the spatial distribution of the plants is dense, as they are concentrated on both the east and west sides, indicating significant differences in the plant restoration events experienced in this area. These events may have been the source of its varied landscape characteristics. In the southern part of the FLH, the west side of Foxiang Ge, and the northern areas, the distribution of plant spaces mostly formed east–west bands. The northeast side of Foxiang Ge exhibits a greater abundance of plant spaces than the west side. These spaces display distinctive patterns and variations in spatial distribution when compared to other regions. Of particular note are the numerous clustered and enclosed spaces, including zones 15, 16, 18, 19, 20, and 25. Differences in area and morphology are evident, with some spaces showing discontinuities, such as zones 15 and 18.

(**a**)   (**b**)
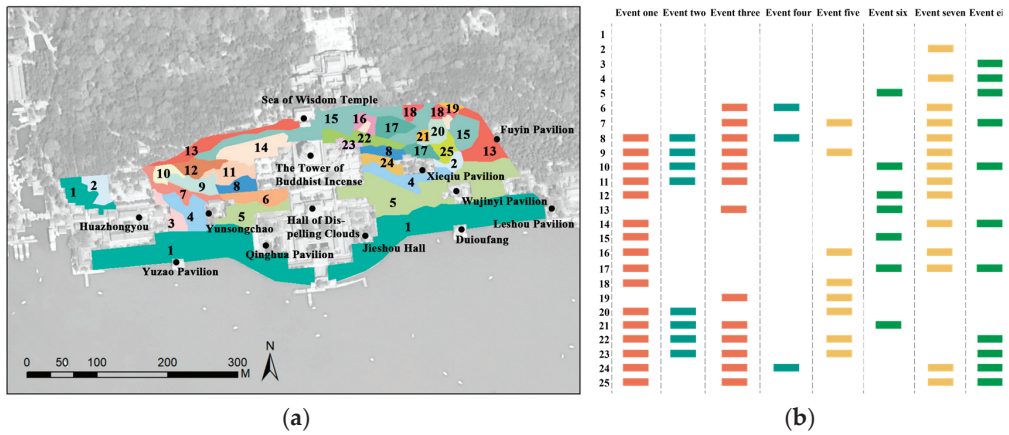
Figure 7. (**a**) Spatial division of the FLH planted landscapes and (**b**) the FLH partition event correspondence chart. Different colors represent the impacts of different events, as detailed in Table 2.

Researchers further classify the 25 spaces on the basis of the content and outcomes of the eight events and their impacts on the FLH. They categorize these spaces into vegetation retention areas (Type I) and vegetation damaged areas (Type II) based on whether they have experienced destruction. Areas that have undergone multiple restorations exhibit more stable ecological structures and historical value than those that have been restored only once. Moreover, spaces experiencing Events Six or Eight tend to exhibit greater historical fidelity in terms of plant landscape restoration than those impacted by Events Five and Seven. Consequently, according to these findings, researchers classify vegetation retention areas into two types and vegetation damaged areas into four types (Figure 8).
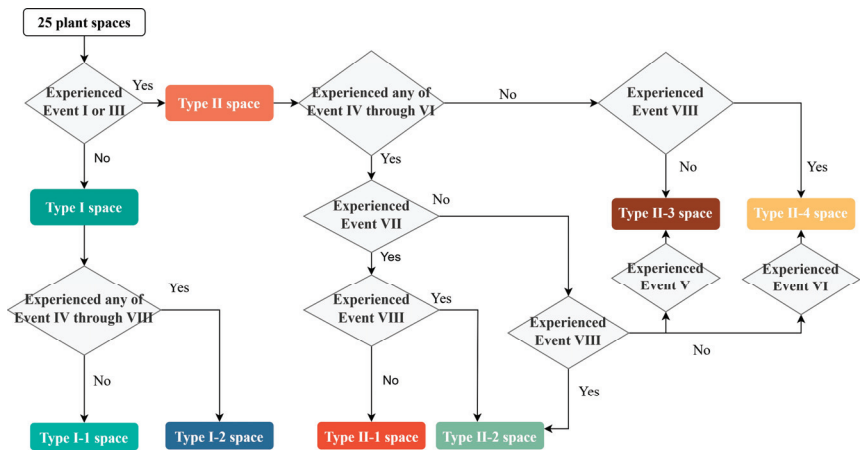
Figure 8. Spatial delineation process of historical plants on the FLH.

The locations of the vegetation destruction area and the vegetation preservation area in the FLH are shown in Figure 9, and the specific locations of the 2 major categories and 6 spatial subcategories are listed in Table 3.

Type I vegetation retention area: This area is located in the central-southern part of the study area, south of Yunsong Pavilion and Wujinyi Pavilion, and covers approximately 4.25 hectares (Figure 10).
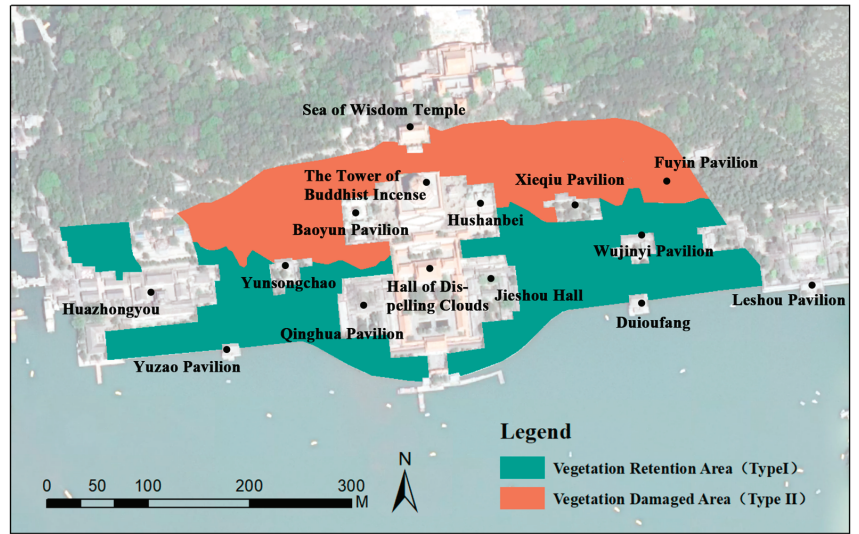
Figure 9. Spatial classification of plants in the FLH.

Table 3. Historical botanical spatial regions of the FLH.

Category	Subcategory	Area (ha)	Location
Type I	Type I-1	2.46	116.264° E—116.272° E, 39.997° N—39.996° N
	Type I-2	1.79	116.268° E—116.272° E, 39.998° N—39.997° N
Type II	Type II-1	0.70	116.265° E—116.267° E, 39.998° N—39.997° N
	Type II-2	0.71	116.266° E—116.270° E, 39.998° N—39.997° N
	Type II-3	0.40	116.265° E—116.271° E, 39.999° N—39.998° N
	Type II-4	1.63	116.267° E—116.270° E, 39.999° N—39.998° N
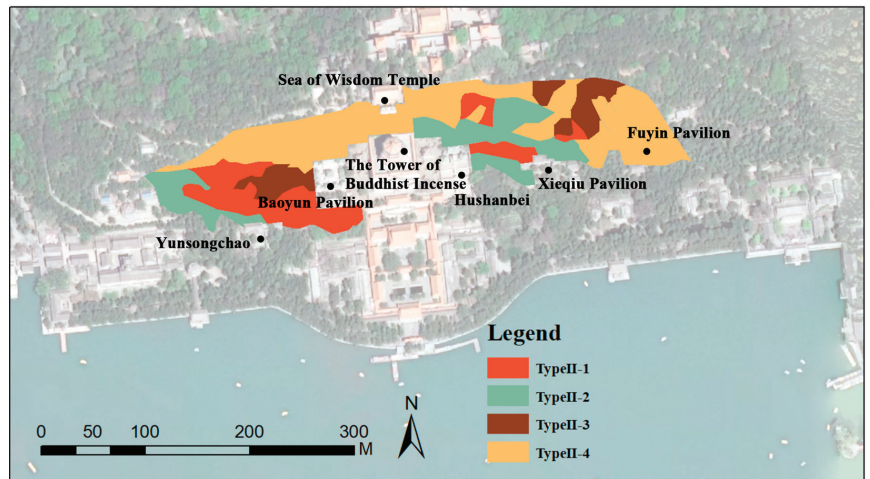
Figure 10. Spatial classification of plants in the vegetation retention area.

Type I-1 space: This space is located in the southern part of the vegetation retention area and covers approximately 2.46 hectares. Along the Kunming lakeshore, it forms a belt-shaped distribution on both sides of the Long Corridor, extending approximately 600 m east–

west from Huazhongyou to Leshou Pavilion. This area has a gentle terrain with extensive recreational platforms and serves as the primary activity zone for tourists. Historical changes in this area have been minimal, predominantly featuring Chinese junipers, with new shrub plantings on the eastern side introduced in the 1980s.

Type I-2 space: This space is located in the northern part of the vegetation retention area and covers approximately 1.79 hectares. Concentrated on the east side of Paiyundian (the Hall of Dispelling Clouds), the south side of Xieqiu Pavilion, and both the east and west sides of Yunsong Pavilion. The spatial boundaries of this area are more irregular than those of Type I-1 areas. Between 1860 and 1950, tree species in this area showed little change. In the 1960s, broad-leaved trees were added to the eastern area, which remains today. By the 1970s, cypress trees had decreased westward, transitioning from the original monoculture of cypress trees around buildings to mixed coniferous and broad-leaved plantings.

Type II vegetation damaged area: This area is located in the central-northern part of the study area, north of Yunsong Pavilion and Wujinyi Pavilion, and covers approximately 3.44 hectares (Figure 11).
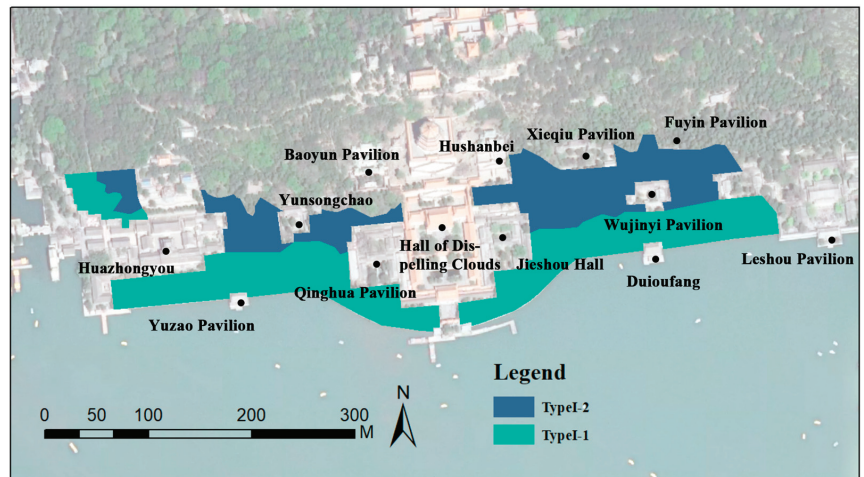
Figure 11. Spatial classification of plants in the vegetation damage area.

Type II-1 space: This space covers approximately 0.7 hectares and is situated primarily west of the Foxiang Ge and Baoyun Pavilion buildings, distributed in an east–west direction. Following the destruction from Events One and Three, this area remained predominantly bare until the 1950s. During Event Five, pine and cypress were replanted; however, the trees were young and did not fully restore the original physiognomy of the area. In the 1970s, during the restoration efforts of Event Seven, broad-leaved tree species were planted for the first time, increasing the planting density. This led to a transformation into a mixed coniferous and broad-leaved forest. Owing to poor planting practices, some trees decayed and died. Currently, the area is mainly populated with cypress trees, but small patches of broad-leaved species remain; these patches are particularly concentrated on the east and north sides of Xieqiu Pavilion.

Type II-2 space: This space covers approximately 0.71 hectares, is irregularly shaped, and is found primarily in two areas. The eastern side of Huazhongyou has a serpentine shape, whereas the western side of Xieqiu Pavilion extends in an east–west belt along the main mountain paths. Following the damage from Events Four and Six, extensive planting of Chinese juniper occurred during restoration, transforming the vegetation cover from wasteland to young coniferous forest. By the 1990s, after Event Eight, struggling cypress and newly grown broad-leaved trees were cleared and transplanted, reintroducing pine

and cypress. However, recent surveys indicate that several broad-leaved trees remain planted in some eastern areas, affecting sightline transparency to some extent.

Type II-3: This type covers an area of approximately 0.4 hectares and is located predominantly on the northeast side of the study area, adjacent to Baoyun Pavilion. It has an irregular, patchy distribution. Along the west side of Baoyun Pavilion, the area extends in an east–west orientation. It is characterized by steep terrain in the southern part, limiting accessibility for visitors. In the northeastern part of the study area, this zone follows a north–south orientation. Following Events One and Three, this area remained largely barren until 1958. Subsequently, there was extensive replanting with broad-leaved tree species such as *Forsythia suspensa*, *Koelreuteria paniculata*, and *Morus alba*. However, Event Eight, which occurred in the 1990s, did not involve significant restoration efforts in this region.

Type II-4: This type covers an area of approximately 1.63 hectares and is widely distributed, located west of Fuyin Pavilion, north and northwest of Foxiang Ge, and east of Zhihui Hai (Sea of Wisdom Temple). It forms an east–west-oriented band. The eastern part is divided into two separate areas by other spaces, whereas the western part extends in a north–south orientation. The eastern section is characterized by a clustered distribution, whereas the western section has a strip-like pattern, flanking both sides of the main walking paths. Like Type II-3, this area was bare land until Event Seven in 1958, when extensive planting of broad-leaved tree species occurred. In the 1990s, efforts were made to adjust the forest structure by removing a substantial number of mismatched trees and planting new, 4 m tall pine and cypress trees. Currently, the western side of this area near the Huazhongyou area still features patches of broad-leaved tree species. In contrast, other parts are dominated by cypress forests, albeit with scattered broad-leaved trees that obstruct the primary scenic views.

3.3. Near-Landscape Features of Vegetation Spaces in Vegetation Retention Areas

Researchers compared the extra-forest landscape characteristics of the vegetation preservation area between the 1860s and the present day, yielding the following results:

In the Type I-1 space (Table 4), there have been minimal changes in the near-forest landscape characteristics, with no significant alterations in morphology. With respect to linear elements, the current canopy contour is less undulating than it was in the 1860s, with increased canopy layers. The planted form of Chinese juniper remains in rows, although overall heights are taller than they were in the 1860s. In terms of structural elements, new shrub plantings are observed on the eastern side, altering the composition of the near-forest landscape from predominantly trees to a mix of trees and shrubs.

Table 4. Type I-1 comparison of near-landscape characteristics outside the spatial forests.

Basic Compositional Elements	Project Description Factor	Time	
		1860s	**Present**
Morphology	Canopy texture	Rigid	Rigid
	Free-standing trees	None	None
	Patch detectability	Identifiable	Identifiable
	Patch shape	Regular	Regular
	Patch distribution	Congregate	Congregate
Linearity	Forest canopy contour	Significant undulations	Slight undulations
	Patch boundary line	Eclectic	Eclectic
	Canopy layer	1	2
Structure	Stand type	Coniferous forest	Coniferous forest
	Life-type composition	Trees	Trees and shrubs

In the Type I-2 space (Table 5), significant changes are evident in the near-forest landscape characteristics. In terms of morphological elements, many broad-leaved trees have been added, resulting in a mixed texture in the current canopy. Adjacent to the

main buildings, the low-density cypress plantation of the 1860s featured scattered trees and distinct plant patches, particularly clustered around the buildings in row formations. Presently, the increased density due to broad-leaved forest additions has resulted in a more even distribution of patches. There are inconsistencies in tree planting among different species communities, leading to irregular patch boundaries. With respect to linear elements, the canopy structure in the 1860s was uniform, with similar tree ages and lower average tree heights. Currently, the forest type in the area has transitioned to mixed coniferous and broad-leaved forests, with abundant broad-leaved plantations on the western side enriching the canopy structure. Structurally, the predominant cypress planting form has been largely maintained overall, but there has been a significant increase in broad-leaved tree planting on the eastern side. This has resulted in a shift from a coniferous forest type to one that is mixed coniferous and broad-leaved. Overall, the Type I-2 space has enriched plant configurations, retaining the original dominance of Chinese juniper as the primary tree species base. However, the addition of broad-leaved trees in certain areas has somewhat disrupted the original characteristics of the near-forest landscape. This change, particularly noticeable in the eastern area near Wujinyi Pavilion, has enriched the landscape but also diminished its former solemn features to some extent.

Table 5. Type I-2 comparison of near-landscape characteristics outside the spatial forests.

Basic Compositional Elements	Project Description Factor	Time	
		1860s	Present
Morphology	Canopy texture	Rigid	Rigid
	Free-standing trees	None	None
	Patch detectability	Identifiable	Identifiable
	Patch shape	Regular	Regular
	Patch distribution	Congregate	Congregate
Linearity	Forest canopy contour	Significant undulations	Slight undulations
	Patch boundary line	Eclectic	Eclectic
	Canopy layer	1	2
Structure	Stand type	Coniferous forest	Coniferous forest
	Life-type composition	Trees	Trees and shrubs

4. Discussion

4.1. Plant Zoning and Grading Protection Strategy in the FLH

Currently, the plant conservation strategy in the Summer Palace focuses on the maintenance of ancient and famous trees and the nurturing of characteristic flowers [35]. However, there is no specific regional strategy or plant landscape management strategy for the protection of the FLH plants. During this study, it was discovered that the plant landscape of the FLH has undergone numerous changes since the 1860s, with significant differences in plant configuration and community structure. Previous vegetation adjustment and renewal strategies were based exclusively on historical data for the restoration of plants on the FLH. There was a dearth of comprehensive management strategies for the overall vegetation landscape of the FLH, and the implementation of graded management plans for different regions was also lacking. Under the premise of adhering to the authenticity of historical heritage and natural laws, managers should fully consider the dynamic succession and development of plant communities. They should also reconcile the conflicts between short-term landscape aesthetics and long-term ecological benefits to preserve the authenticity of the plant landscape of the FLH. Researchers have proposed different conservation strategies for vegetation retention areas and vegetation damaged areas from the perspectives of plant configuration, ecological protection, planting structure, and landscape adjustment. This approach allows for the delineation of distinct conservation approaches for different plant spaces (Table 6).

<p style="text-align:center">**Table 6.** Spatial conservation strategies for historic plants in.</p>

Category	Protection Strategy	Subcategory	Protection Level	Protection Method
Type I	Reduce human intervention and adopt a slow adjustment approach for landscape conservation management.	Type I-1	Level I priority protection	Continue existing ancient tree protection policies, regularly prune trees, and enrich the canopy contour.
		Type I-2	Level II priority protection	Slow adjustment: reduce planting density, reference 1860s historical photos, and coordinate plant landscape with major architectural elements.
Type II	Implement landscape adjustment and restoration based on historical images and spatial classification.	Type II-1	Level I protection	Slow restoration: prioritize ecology, and remove poorly growing broad-leaved trees.
		Type II-3	Level II protection	Further restoration: replant dominant tree species and adjust life form composition.
		Type II-2	Level III protection	Enhance artificial intervention: transplant broad-leaved trees that impact the overall plant landscape, adjust areas with overly dense growth and pay special attention to the design of view corridors.
		Type II-4		

4.1.1. Vegetation Retention Area: Reduced Human Intervention, Slow Adjustment for Character Protection Management

In vegetation retention areas, the overall structure and species composition of plant communities show minimal changes. These areas hold significant historical and cultural value, warranting the highest protection levels. They are categorized into two protection types: Level I priority protection (Type I-1) and Level II priority protection (Type I-2), with Level I protection having greater intensity than Level II protection.

In Type I-1 spaces unaffected by major historical events, the crown contours of cypress forests have gradually stabilized over a century of historical changes. Existing policies for ancient tree protection lack control over tree morphology. To enhance authenticity while preserving ecological conditions, managers should periodically prune trees to adjust and enrich crown contours. Emphasis should be placed on protecting cypress forests and minimizing visitor impacts on ancient trees. Adjustments to newly planted shrubs on the west side should involve replacing them with shorter, sparsely branched species to increase transparency (Figure 12).
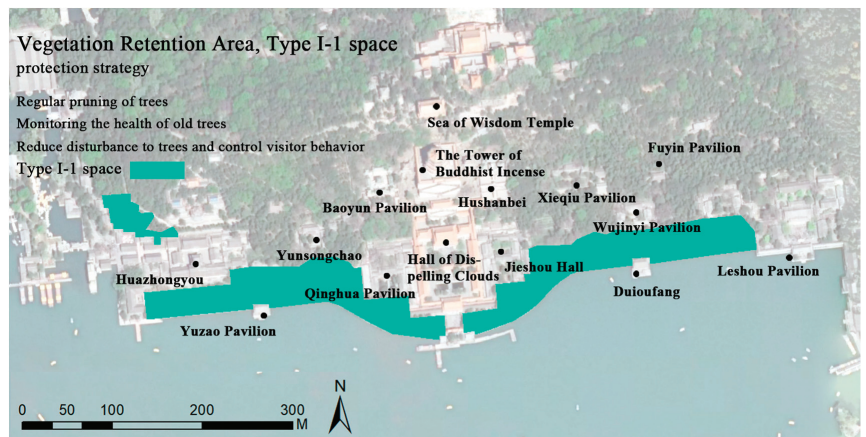
Figure 12. Type I-1 planted spatial landscape conservation strategies.

Type I-2 spaces have undergone significant changes influenced by Events Seven and Eight, differing notably from Type I-1 areas. Management should focus on gradual adjustments, including appropriate clearing of the eastern area near Foxiang Ge and the western area depicted in paintings, to reduce broad-leaved forest obstruction of key sightlines. Compared with the 1860s, the area presents more evenly distributed patches of forest with increased planting density, transitioning from neatly arranged cypress forests to mixed coniferous forests with seasonal variation, which lack the former solemn landscape features. These changes may result from alterations in forest structure in the northern region and shifts in the target audience of the forest service from imperial to public use. In managing this area, historical images from the 1860s to the 1890s can serve as references, guiding natural plant growth patterns with appropriate human intervention. Priority should be given to ensuring the health of ancient trees, controlling the planting density of other species, and removing miscellaneous trees and poorly growing species to enhance openness and preserve key sightlines. East of Foxiang Ge, the selective clearing of inappropriate broad-leaved forests and the dense planting of cypress forests are recommended. For areas surrounding the main building of Foxiang Ge, adjustments in the planting structure should favor cypress trees, harmonizing with the architectural environment (Figure 13).
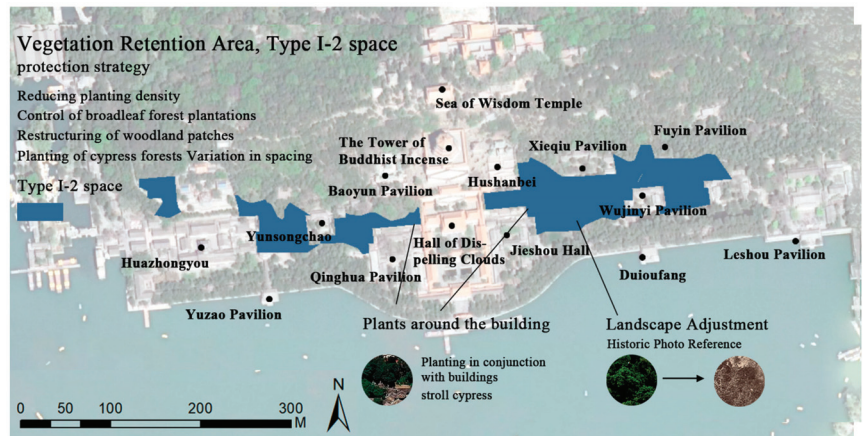
Figure 13. Type I-2 planted spatial landscape conservation strategies.

4.1.2. Vegetation Damaged Area: Historical Image-Based and Spatial Grading Vegetation Character Restoration

Compared with vegetation retention areas, vegetation-damaged areas, which have been heavily impacted by historical events, exhibit lower stability. Consequently, the level of protection intensity needed in this area is lower, and a graded protection strategy can be employed: Level I protection for Type II-2 spaces; Level II protection for Type II-4 spaces; and Level III protection for Type II-1 and Type II-3 spaces. In terms of protection intensity, Level I protection > Level II protection > Level III protection. Existing photographic records do not fully reflect the area's original design concept, complicating assessments of restoration appropriateness. Historical accounts typically describe the vegetation landscape of the FLH as a unified entity, suggesting the restoration of Level I vegetation. Damaged areas could reference the plant landscape of vegetation retention areas depicted in 1860s photos.

Level I protection: Type II-2 space. Following Events One and Three, Type II-2 spaces received the highest frequency of protection and restoration efforts, with minimal alterations to site functionality. Through long-term and repeated restoration, these areas have developed a strong ecological foundation and landscape structure. Previous studies have identified western areas featuring extensive cypress forests similar to those in 1860s photographs, warranting continued preservation efforts and measures to control visitor

damage. Pruning activities should target areas that are potentially obstructing sightlines. On the eastern side, two areas feature broad-leaved forest plantings, which minimally impact sightlines and forest continuity, allowing preservation of existing planting methods. The removal of declining or potentially decaying broad-leaved trees is recommended (Figure 14).
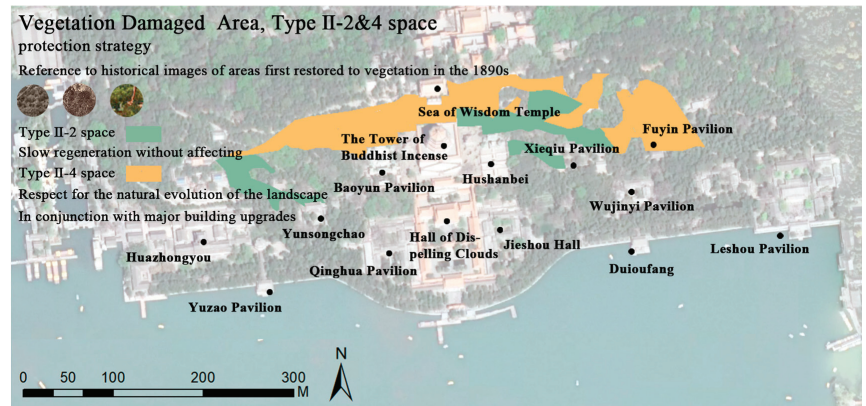
Figure 14. Type II-2 and 4 planted spatial landscape conservation strategies.

Level II protection: Type II-4 space. Located north of the Great Bao'en Longevity Temple complex, the Type II-4 space serves as the background forest for Foxiang Ge and marks the termination of the main architectural axis, thus significantly influencing the overall vegetation landscape of the FLH. Compared with the southern side of Foxiang Ge, the cypress forest in this area has a lower height and planting density and thus fails to fully exhibit the solemn characteristics typical of cypress forests. Restoration efforts may involve transplanting tall coniferous species to the north side of Foxiang Ge to increase the planting density. In the eastern area, farther from the main buildings, adjustments to the current life form composition could involve naturally interspersing pine and cypress trees. Daily management should strictly regulate visitor behavior to minimize tree damage, with periodic pruning to maintain optimal ventilation and light conditions (Figure 14).

Level III protection: Type II-1 and Type II-3 spaces. Through multiple restoration efforts, the vegetation landscapes of Type II-1 and Type II-3 spaces have undergone significant transformations in terms of functionality and appearance. Historical descriptions of planting designs around Foxiang Ge and southern architectural plantings from the 1860s can guide landscape adjustments. On the west side, around Foxiang Ge, phased adjustments can begin by transplanting existing broad-leaved species near the main buildings and planting cypress forests exceeding 4 m in height. Strict control over the aesthetics of the surrounding vegetation should be maintained. In addition to the main buildings, existing planting forms should be initially preserved, with pruning in densely vegetated areas. Once a well-formed landscape aesthetic is achieved around the main buildings, further adjustments can be made. On the higher eastern terrain, which includes major footpaths where visitors view Kunming Lake, the selective pruning of low branches of broad-leaved trees meets scenic viewing needs. Transplanting trees that significantly affect sightlines is recommended (Figure 15).
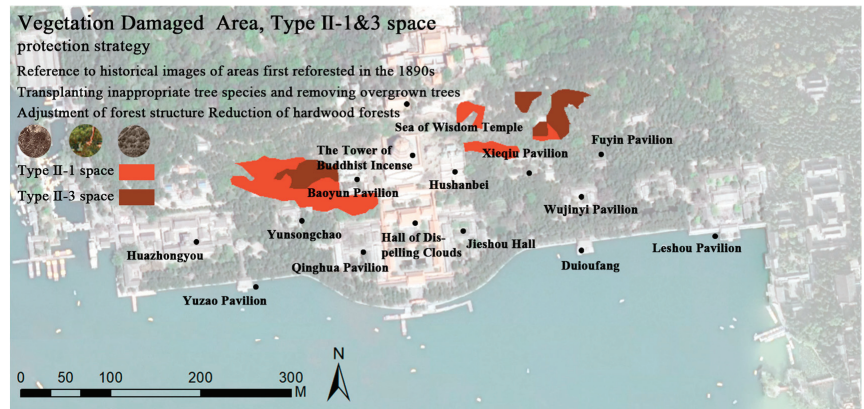
Figure 15. Type II-1 and 3 planted spatial landscape conservation strategies.

4.2. Innovations and Shortcomings of the WSL Monoplotting Tool for the Study of Historical Heritage

The geographic registration of historical photos via WSL monoplotting enables multi-temporal overlay analysis and the identification of spatial characteristics in plant landscapes. Compared with traditional literature analyses and single-image recognition methods, mono-plotting offers significant advantages. First, it addresses challenges associated with spatial referencing of oblique terrestrial images, providing geographic information data for comparative analysis across multiple periods. Second, it extracts vector data from historical photos and integrates seamlessly with ArcGIS functionalities to facilitate spatial data comparisons. This approach visualizes the temporal and spatial dimensions of vegetation space in the FLH, aiding researchers in identifying and analyzing changes in plant spatial characteristics across different periods. The spatial data digitization of historical photos extends research timelines and broadens the potential for comprehensive spatial analysis of plant landscapes via photos. It resolves the challenges of multidimensional and multispatial analysis limitations, thereby enabling the analysis of heritage site plant landscape changes via historical landscape photos.

However, errors inevitably exist. First, the accuracy of the input DEM affects the calibration precision, which is a concern [46]. Due to data confidentiality, 5 m DEM data, compared with 1 m precision, lack some accuracy, potentially affecting area calculations. Second, historical photos from the late 19th to early 20th centuries were less common than those of other periods, and they often had lower pixel resolution and limited color information, hindering the analysis of plant phenology. Furthermore, variations in photograph angles over time, changes in terrain morphology, and different lighting angles during photography may have introduced errors in the calibration process. Additionally, clear positioning points are necessary for calibration; however, vegetation obscures buildings in photos from the 1970s, posing challenges in calibration and data vectorization. These errors may significantly impact analyses requiring finer granularity and smaller study scales.

Overall, monoplotting provides a flexible and convenient way to study changes in historic landscapes, allowing us to compare different information in photographs taken at different times and locations, bypassing differences in viewpoint and location. This provides a new approach to studying changes in historic landscapes at other heritage sites around the world, which is particularly important for sites that have been damaged and are currently difficult to restore due to a lack of accurate historical information.

5. Conclusions

In this study, the WSL Monoplotting Tool was utilized to georeference historical photographs for multitemporal identification and analysis of botanical landscape spaces.

Researchers have investigated the zoning and off-forest landscape characteristics of the FLH and offer two main conclusions. (1) Spatially, the southern part of the FLH (the vegetation preservation area) retains a more intact botanical landscape than does the northern part. The area along Kunming Lake has experienced minimal historical impacts, preserving vegetation most effectively. The western side of the northern part (vegetation destruction area), particularly near Foxiang Ge, exhibited more significant changes in botanical landscape functionality and aesthetics, with notable alterations in landscape features. (2) Regarding off-forest landscape characteristics, the vegetation adjustment strategies of the 1990s did not fully restore the botanical landscape appearance of the 1860s. The northern part of the vegetation preservation area shows substantial changes, characterized by more uniformly distributed forest patches without distinct landscape zoning features. The increase in broad-leaved forests has diminished the individual characteristics of the original coniferous forest image. Compared with the northern area, the southern area presents more pronounced changes in canopy contour lines, as its overall landscape transformations are less pronounced. Proposed zoning and grading protection strategies have been proposed. With respect to zoning protection strategies, the preservation of plant retention areas is of primary importance. Furthermore, the continuation of existing policies for the protection of ancient and non-native trees is a priority. Another objective is to enrich the forest canopy outline through pruning, gradually adjust the vegetation landscape characteristics, and implement landscape adjustment strategies for vegetation destruction areas based on historical imagery. With respect to grading protection strategies, vegetation retention areas are classified into Level I and Level II priority protection categories, while vegetation protection areas are categorized into three levels. Type II-1 areas undergo gradual restoration with the removal of poorly growing broad-leaved trees under Level I protection. Type II–3 areas are replanted with dominant species trees, adjusting the life form composition under Level II protection. Type II-2 and Type II-4 areas receive increased human intervention, transplanting poorly affecting broad-leaved trees under Level III protection to improve the overall vegetation characteristics.

Our research provides substantial evidence in favor of the conservation of the botanical space of the Summer Palace, a site of historical and cultural significance. Our findings offer a framework for the plant space restoration and management of Longevity Hill. Additionally, our research is instrumental in advancing the restoration, preservation, and management of historical gardens and other heritage sites by providing novel methodologies. In particular, the new scientific methodology of using historical data (maps and photographs) in conjunction with the evaluation of gardens, facilitated by emerging technologies, enhances the in-situ nature and authenticity of the study. This represents a significant advancement in the study of historical photographs and maps in historical gardens. It offers a means of preserving and enhancing the reality of the past. At the same time, the methodological tools of this study underscore historical, cultural, and perceptual values, thereby raising awareness of historical resources.

Appendix A

Table A1. Historical events affecting the botanical landscape of LH.

Time	Events	Sources
1860	"British and French allied forces" fire burned Qingyi Garden, the trees in the middle of the FLH were destroyed, and the trees around the whole mountain building were seriously destroyed.	*Records of the Summer Palace*
1886–1895	After the Summer Palace burned down, Cixi diverted naval funds to restore the Summer Palace, which was completed in 1894.	*A Series of Examinations on the Historical Events and Characters of the Summer Palace*
1900	In May 1900, the Boxer Rebellion broke out, and in August, the Eight-Power Allied Forces marched into Beijing, and the Russian and Italian armies entered the Summer Palace, destroying it for the second time.	*A Series of Examinations on the Historical Events and Characters of the Summer Palace*
1902	After the signing of the unequal treaty, Cixi returned to Beijing from Xi'an. In the twenty-eighth year of the reign of Emperor Guangxu (1902), Cixi used a large sum of money to restore the dilapidated Summer Palace.	*A Series of Examinations on the Historical Events and Characters of the Summer Palace*
1912–1924	The Qing dynasty ended in 1912, the Summer Palace was opened as Puyi's private property in 1914 and opened to the public in 1924 after Puyi was expelled from the Forbidden City.	*A Series of Examinations on the Historical Events and Characters of the Summer Palace*
1928	In June 1928, the Republican government established the Summer Palace Management Office. The government of the Republic of China established the "Summer Palace Management Office of the Ministry of the Interior", and the Summer Palace was officially transformed into a public space managed by the central government.	Summer Palace Cultural Relics Management Section
1928–1945	The Summer Palace spent 25 years under the rule of the Beiyang warlords, Japanese imperialists, and Kuomintang reactionaries. Some of the courtyards of the Summer Palace were taken as private apartments by warlords, bureaucrats, traitors, and politicians. Warlords and Kuomintang troops entered and left the gates of the garden at will, damaged cruise ships, cut down trees, and stole cultural relics.	*Records of the Summer Palace*
1949–1952	To carry out the greening policy of "universal greening, repeated improvement" and "popularization first, improvement later", the Ministry of Finance of the Central People's Government allocated construction costs for the restoration of the Summer Palace to give a strong guarantee in March 1950. In 1952, the ancient buildings, cultural relics and vegetation in the garden were repaired and restored.	Summer Palace Cultural Relics Management Section; Beijing Information Archives Network
1958–1967	In 1958, the Beijing Municipal Bureau of Landscape Architecture put forward the "greening combined with production" policy, the Summer Palace planted a large number of fast-growing trees and fruit trees, densely planted acacia, stinking toon, paulownia, and other fast-growing trees. A large number of fast-growing trees and fruit trees, high-density planting, and garden trees decayed and died.	Beijing Information Archives Network
1984	It is clear that "gardening should not be used in conjunction with production" as a guideline, and that the main focus should be on plant landscaping and garden construction.	Qing Dynasty Royal Garden Research Center
1991	The concept of landscaping has changed, focusing not only on quantitative improvement but also on qualitative growth. Summer Palace in line with the trend, opened a three-year greening adjustment, gradually restore the historical landscape pattern, from "greening" to "beautification" change. LH restored the landscape pattern of cypresses planted all over the former mountain.	China News Service (CNA)

Time	Events	Sources
2006	Main buildings on the FLH: repair of the Buddha's Fragrance Pavilion, Paiyun Hall, the promenade and its surroundings	China News Service (CNA)
2010	The drainage system from the Guangxu period has also been re-dredged, utilizing a concealed drainage system that discharges rainwater downhill through culverts and pipes.	Qing Dynasty Royal Garden Research Center
2020	Restoration of the painting tour "The painting tour complex is located in the Summer Palace LH southwest slope, overlooking Kunming Lake. The repair mainly includes the building body, courtyard ground, wall, stone repair and cultural relics components, and ancient tree protection".	Peking Gazette (official government website)

Table A2. FLH's panorama photo information.

Serial No.	Shooting Time	Photographers/Collectors/ Books	Accessed Date	Source
1	1860	Felice Bitto	10 December 2023	https://philamuseum.org/collection/object/131164
2	1890	-	10 December 2023	https://www.loc.gov/photos/?q=41215v&st= slideshow#slide-3
3	1898	-	10 December 2023	https://www.bild.bundesarchiv.de/dba/en/search/ ?yearfrom=&yearto=&query=116-127-102
4	1900	Bayley, Arthur	12 January 2024	https://hpcbristol.net/visual/AB01-01
5	1900	Bayley, Arthur	12 January 2024	https://hpcbristol.net/visual/AB01-02
6	1902	Alfons von Mumm	10 December 2023	https://commons.wikimedia.org/wiki/File: Der_Haiserliche_Sommerpalast_Wan_shou_shan._% E2%85%A0._Gesamtansicht.jpg
7	1905	Firmin Laribe	10 December 2023	https://www.shuge.org/view/firmin_laribe_ photographs_of_china/
8	1910	-	10 December 2023	https://www.prints-online.com/summer-palace-beijing-china-general-view-lake-11584379.html
9	1920	Donald Mennie	12 January 2024	https://hpcbristol.net/visual/Bk04-46
10	1920	*Collection of photographs of China*	12 January 2024	https://www.prints-online.com/summer-palace-beijing-china-panoramic-view-11584371.html
11	1920	*The most interesting views of Peking*		-
12	1930	-	12 January 2024	https: //www.douban.com/photos/album/1629594496/
13	1930	J.P.Koster		*Ground and Aerial Views of China*
14	1930	*Beijing Famous Places*	12 January 2024	https://old.shuge.org/ebook/photos-of-peking/
15	1940	Dmitri Kessel		*American Life Magazine*
16	1940	*Temple and Altar of Heaven*	12 January 2024	-
17	1952	-		Personal Collections
18	1971	Pickowicz, Paul	12 January 2024	https://library.ucsd.edu/dc/object/bb5566521j
19	1974	Albertson, Maury	12 January 2024	https://digitallibrary.usc.edu/CS.aspx?VP3 =DamView&VBID=2A3BXZ8RBULM8&SMLS=1& RW=1659&RH=945&FR_=1&W=1194&H=938
20	1986	-		Personal Collections

Table A2. *Cont.*

Serial No.	Shooting Time	Photographers/Collectors/ Books	Accessed Date	Source
21	1986	-		Personal Collections
22	2020	-	12 January 2024	https://www.vcg.com/creative/802456362.html
23	2024	Author		Personal Collections

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Urban Transformation of the Dubrovnik Summer Villa Setting—From an Idyllic Landscape to an Overbuilt City

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Abstract: The landscape surrounding a summer villa is, in a morphological and experiential sense, an inseparable part of the villa and its garden. This research examines the level of preservation of the historic landscapes of eight summer villas in Dubrovnik and the level of their integration into the urban fabric of the contemporary city. The research methods used include the analysis of the relevant scientific literature as well as the analysis and interpretation of graphic materials, i.e., cadastral maps from the second half of the 19th century, orthophoto maps, and spatial planning documentation. In this paper, the immediate landscape in close vicinity to the summer villas is defined as the protective zone of a summer villa (PZSV). Although the original use and extent of the summer villa landscapes have rarely been preserved, it is possible to establish PZSVs in order to preserve, i.e., reinterpret, the setting of the summer villas, which is necessary to experience them in their totality. This research establishes the general principles that enable the identification of three general models of transformation of the summer villa landscape. Furthermore, this research develops possible scenarios for the enhancement of the summer villa landscape based on the identified models. These models and scenarios are generally applicable in the context of the protection and enhancement of the summer villa landscapes in of the south of Croatia.

Keywords: summer villa landscape; protective zone (PZSV); urban integration; Dubrovnik; Croatia

1. Introduction

The number, location, urban rules, specificity, and excellence associated with the construction of summer villas in the territory of the former Republic of Dubrovnik (The Republic of Ragusa, 15th–19th centuries), today the southeast part of the Republic of Croatia, have resulted in a special type of countryside architecture and an exceptional cultural landscape on a wider European scale [1] (pp. 33–44), ref. [2] (p. 196), ref. [3–8], ref. [9] (pp. 318–326), ref. [10] (p. 340). A summer villa (or summer residence) is a patrician countryside mansion located outside the city serving as an occasional retreat, usually during the summer months, but in the case of Dubrovnik summer villas, they do not just serve as locus amoeuns, or pleasant places [8] (p. 81). The term "summer villa" encompasses not only the main house, which may be of different levels of representativeness, but also the entire land with adjacent structures located within the perimeter wall surrounding the estate (Figure 1). The summer villas of Dubrovnik have several distinctive architectural features: a hewn-stone perimeter wall surrounding the entire plot of land, and within it, a pavilion, a chapel, porches, loggias, arsenals, terraces, outbuildings, and orthogonally organized gardens [1,2,6–8,10–13].

More than 300 summer villas with gardens were constructed in the 15th and especially 16th centuries [5] (p. 5) in the period of the so-called Golden Age of Dubrovnik. There, in a very limited coastal area of the Adriatic Sea, a specific type of garden architecture developed which perpetuated in its stylistic features for several centuries. It is known as

the Dubrovnik Renaissance Garden and presents an unusual phenomenon in the European Renaissance garden architectural heritage [1].
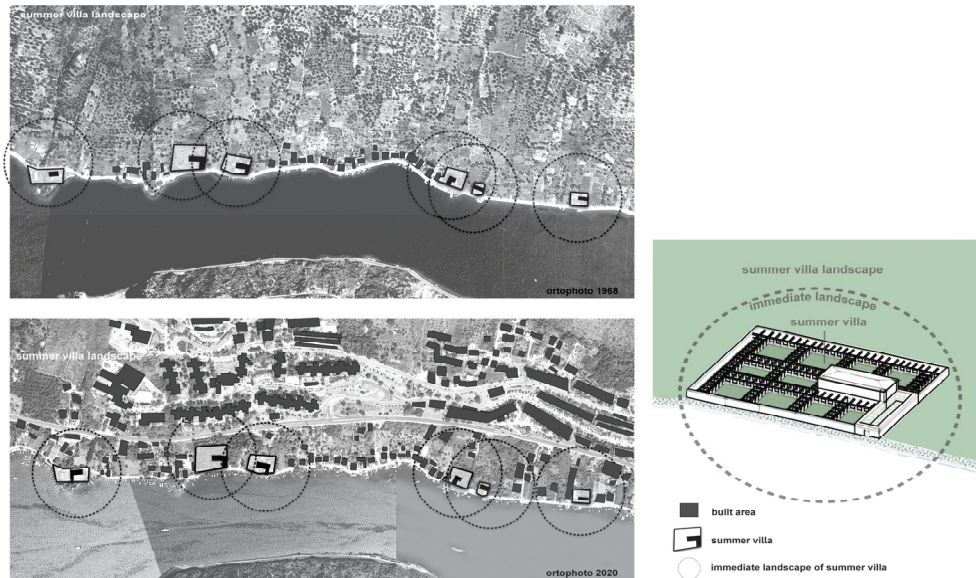
Figure 1. Differentiation of the terms: summer villa landscape, immediate summer villa landscape, summer villa.

Since ancient times, a countryside retreat has implied spending time at an estate used for repose and leisure but also involvement in agricultural activities [14] (p. 176), which is why the Dubrovnik summer villas were surrounded by natural and agricultural landscapes, forming, in fact, an extension of the summer villa and its gardens. In the past, their recognizable agricultural surroundings were functionally and experientially inseparable from the summer villa, creating a perfect setting for the Ancient Roman concept of Otium et Negotium, the balance between work and leisure [6], ref. [15] (p. 191), as well as a source of inspiration for Otium litterarum, leisure time for academic endeavors [16], ref. [17] (p. 89).

The first Dubrovnik summer villas were constructed only slightly later than the first Italian Renaissance villas with gardens, applying the fundamental principles of Renaissance art but in an entirely authentic way [1,11,12]. The visual identity and authenticity of the Dubrovnik summer villas derive from the fundamental feature of the landscape in which they were built—the sub-Mediterranean karst area whose basic element is stone.

Because of that, from the 13th century (when the independent Dubrovnik commune was formed) until its fall in 1806, the former Republic of Ragusa was very deliberate and organized in its efforts to fully utilize these rugged landscapes, by terracing them, i.e., supporting the soil by dry walls, at the very back of the summer villas [18]. These landscapes were planted with vines and fruit trees, and few fertile plains were reserved for wheat. Provisions on planting as well as drywall and path construction in landscapes can be found in the Ragusan Statute as early as the 13th century [19] (pp. 297–324). These agricultural landscapes immediately beyond the perimeter wall of the summer villas were their *passepartout* for centuries.

The Italians were the first among the modern nations to perceive the form of landscape, besides being useful, as something more or less beautiful and to be enjoyed [20] (p. 193), which is why Leon Battista Alberti in his famous treatise defines that the position of a Renaissance summer villa must be such that it allows a view of the surrounding picturesque

cultivated agricultural or natural landscape [21] (p. 120), which can be clearly seen in the works of the Italian Renaissance architect and painter Giorgio Vasari [22] and Palladio's positioning of villas in the landscape [23] (p. 35). The concept of "borrowed landscape", in which the landscapes outside the perimeter walls of the estate become an inseparable part of the villas in the experiential sense is equally present in the Florentine [24] as well as in the Dubrovnik summer villas [1,2,5–7]. The concept of "borrowed landscape" is equally well known in Chinese garden art as well [25].

1.1. Cultural Landscapes Inseparably Associated with Summer Villas—Theoretical Background

In this research, the term "cultural landscape" is used as defined by Jones: "as landscape modified or influenced by human activity; as valued features of the human landscape that are threatened by change or disappearance, and as elements in the landscape with meaning for a human group in a given cultural or socio-economic context" [26].

Cultural landscapes have long been the subject of debate in scientific and professional circles [27,28] (pp. 146–275), ref. [29] (pp. 107–109), ref. [30–32], ref. [33] (p. 226), and yet relatively few papers focus on the principles of protection and integration of the immediate landscape of a summer villa into its urban surroundings [34–42]. The importance of immediate landscape, i.e., its inseparability from architectural heritage—in this case the summer villa and its garden—has been recognized globally and defined in several charters. In this paper, we highlight three of them that are in compliance with this research: Article 6 of the 1964 Venice Charter states the following: "The conservation of a monument implies preserving a setting which is not out of scale. Wherever the traditional setting exists, it must be kept" [43]. Article 7 of the 1981 Charter of Florence stipulates that "whether or not it is associated with a building in which case it is an inseparable complement, the historic garden cannot be isolated from its own particular environment, whether urban or rural, artificial or natural" [44]. The 2005 Xi'an Declaration on the Conservation of the Setting of Heritage Structures, Sites and Areas strongly acknowledges the significance of the setting of a heritage structure, defining it "as the immediate and extended environment that is part of, or contributes to, its significance and distinctive character" [45]. Moreover, the phrase "setting of a heritage asset" is defined as "the surroundings in which a heritage asset is experienced" [45]. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral" [46].

The concept of the inseparability of a villa and its immediate landscape is clearly seen in the example of the summer villas and gardens of the Medici family in Tuscany, fourteen of which were inscribed as unique UNESCO heritage in 2013 precisely because of the preservation of their setting, i.e., what it represents together with the villas—"integration into the natural environment helped develop the appreciation of landscape characteristic of Humanism and the Renaissance" [47]. It is interesting that the buffer zones, i.e., the landscapes that surround them and that are recognized as their inherent value, are several dozen times larger than the areas of the villas with the gardens themselves [47]. The most prominent examples of the preservation of the countryside character of the Medici villas can be seen in Fiesole (protected property area 2.11 ha and buffer zone 44.88 ha), Careggi (protected property area 3.6 ha and buffer zone 55.71 ha), Villa Petraia (protected property area 21.31 ha and buffer zone 276.33 ha), Castello (protected property area 8.33 ha and buffer zone 289.31 ha), Poggio a Caiano (protected property area 9.31 ha and buffer zone 135.63 ha), Trebbio (protected property area 1.6 ha and buffer zone 650.31 ha), Cafaggiolo (protected property area 2.35 ha and buffer zone 649.56 ha), Artimino (protected property area 1.04 ha and buffer zone 701.66 ha), and La Maggia (protected property area 2.1 ha and buffer zone 103.65 ha) [24]. However, both in the case of UNESCO and non-UNESCO heritage, the countryside Tuscan landscape has not been completely preserved, with its Renaissance intended use, but the overall experience of that landscape is still countryside. Today, its countryside area is reduced compared with the original one, and it has undergone certain

construction. This can be seen in the picturesque countryside landscape of the settlement of Fiesole nearby Florence, where the paradigmatic early Renaissance villa of the Medici family is situated, built by Michelozzo di Bartolomeo Michelozzi with terraced gardens. A few centuries later, at the beginning of the 20th century, philosopher Charles Augustus Strong and English architects Cecil Pinsent and Geoffrey Scott built a villa with gardens "a la Italiana" style in its immediate vicinity—Villa Le Balze [48]. Notwithstanding the stylistic features of the house itself and the gardens, these two villas today still "share" the countryside character of the Fiesole landscape (Figure 2), without diminishing each other's visual/experiential value.

Figure 2. Tuscan (Villa Medici in Fiesole) and Dubrovnik (villa Bona—Caboga and Stay—Caboga) summer villa landscapes.

The principle of establishing a buffer zone that protects the UNESCO heritage, whereby the buffer zone has the function of "cushioning" around the monumental area, and whose purpose is to enhance the integrity of the property and create a transition zone between different land uses/zones [49], is applicable to heritage protected on any level, not only on the UNESCO list.

Contemporary principles of the reinterpretation of historical landscapes, which visually and aesthetically contribute to the experience of a historical architectural entity, are also known, such as the Gülistan Garden project with a surface area of 5000 m^2, located outside the historical fortress of Van in the province of the same name in eastern Anatolia (Turkey) [50]. In the context of the protection and preservation of historical gardens and parks in Greece, Athanasiadou proposes several essential steps defining the frame of conservation, restoration, and management applicable worldwide, the primary ones being setting the conservation and restoration goals [51], which can also be applied in the context of historical landscapes of Dubrovnik summer villas.

1.2. Research Problem and Aim

Based on the explained theoretical background, cultural countryside landscapes stretching beyond the perimeter walls are an inseparable part of summer villas and the topic of this paper.

Following the collapse of the Republic of Dubrovnik, the nobility of Dubrovnik lost their status and economic strength, which has led to the majority of summer villas slowly falling into decay in the following decades (due to property-, legal-, and economically based maintenance issues). In the second half of the 20th century, during the socialist regime in the former state (Yugoslavia), many of the summer villas with their estates were confiscated and divided among many users. Although a legal framework for the protection of this valuable heritage existed in the mid-20th century already and scientists have researched and emphasized its value [4,7,52], the majority of urban planning mistakes were made

exactly at that time. Due to the intensive urbanization of Dubrovnik during the 20th century, followed by apartmanization in the 21st century, the cultural landscapes that surrounded the Dubrovnik summer villas have mostly not been preserved [11,12]. These landscapes have almost completely lost their original use and structure, and have significantly reduced in size.

This paper aims at drawing attention to the need to (re)evaluate, preserve, and reinterpret the immediate landscape of a summer villa, which contributes to the countryside setting of the summer villa itself.

Two fundamental questions arise with regards to this: (1) to what extent has the original cultural landscape of a summer villa been preserved as its inseparable component?; (2) to what extent are the Dubrovnik summer villas integrated into the city fabric? The first question begs the second and vice versa.

Based on the selected examples of the Dubrovnik summer villas, the aims of this research were as follows: (1) to determine the historical and present identity features of the immediate landscape of the Dubrovnik summer villas; (2) to determine the existing general models of the transformation of summer villa landscapes; and (3) to highlight possible recovery scenarios of transforming a summer villa landscape into an urban landscape of the 21st century as universal principles applicable in a broader context. This implies analyzing (on selected examples) whether there are still certain unbuilt free spaces immediately next to the perimeter walls of the summer villas that could, on the urban planning level, be defined as protective zones of summer villas for the purpose of (re)establishing landscape spaces similar to the historical ones on the landscape design level.

2. Materials and Methods

In this research, we introduce the term "protective zone of a summer villa" (PZSV) which describes a protected area in the immediate landscape of a summer villa that should be exempt from any adaptation, especially construction, and whose (original) use, i.e., function that complements the intended use of the summer villa, should be preserved as much as possible. In the context of previously mentioned buffer zones, which are larger areas with placed restrictions, PZSVs would be smaller in size compared with the UNESCO buffer but with complete construction restrictions. The aim of establishing protective zones of summer villas is to preserve the setting of summer villas with at least a portion of their original landscape, including reestablishing the same or similar land use as the original landscape, so they can be experienced in their totality, just as they are historically defined—as a summer countryside retreat.

Several research methods were used in this paper. This research is based on the analysis of relevant scientific and technical literature as well as of graphic materials relating to the eight selected examples of publicly owned prominent summer villas in the administrative territory of the city of Dubrovnik (Figure 3). All the selected examples are categorized as a public good and the original boundaries of the summer villas are still largely preserved—this includes the perimeter wall of the estate with more or less preserved buildings and garden elements. They were also selected for their architectural and landscaping excellence under the assumption that architectural heritage categorized as public good (unique and undivided property) should/could be subject to all legislation best practices and methodologies, with the highest standards of conservation of public good and without any individual interests. Another important selection criterion was the distribution of the summer villas, with four summer villas being within and four outside of the UNESCO buffer zone of Dubrovnik. As part of this selection criterion, it was analyzed whether stricter preservation restrictions apply to or will be introduced for historical landscapes of the summer villas within the UNESCO buffer zone.

Austrian cadastral registers from the middle and second half of the 19th century were analyzed to determine historical relationships in the landscape [53,54]. The lack of historical ground plans of the summer villas makes old cadastral registers reliable sources for determining the original use of the surrounding summer villa landscape [40]. In terms of

land use, the cultural landscapes of the Dubrovnik summer villas were mostly unchanged until the end of the 19th century [1].
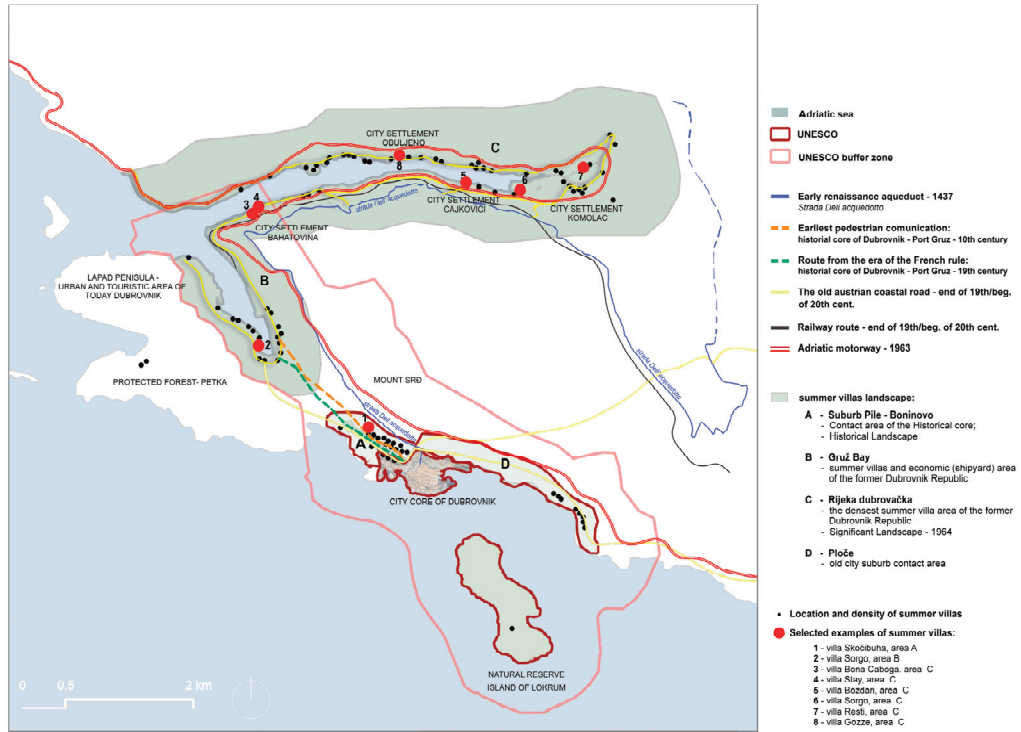
Figure 3. Dubrovnik summer villas—distribution of selected examples.

The current relationships of villas and their settings to the landscape and access routes was analyzed based on the official digital orthophoto browser of the city of Dubrovnik (in the GIS application) and the publicly available digital satellite image of the analyzed area from 1968 and 2024 [55,56], as well as by on-site visits to the selected examples of the Dubrovnik summer villas and a review of available official materials (restoration studies, official web-sites of institutions, and projects). The planned relationship of villas and their settings was analyzed by using current urban plans [57].

This research determines the identity features of the summer villa landscape throughout history, today and in the near future, as formally envisioned in the spatial plan. The identified features of the summer villa landscape enable the analysis and examination of the level of landscape preservation and of the level of integration of summer villas into the city fabric, not only in Croatian, i.e., Dubrovnik, examples. The general models of transformation of the summer villa landscape were developed based on three different examples using the context of each villa's surrounding landscape treatment and the potential of its preservation (No.5 Villa Bozdari, No.7 Villa Resti, No.8 Villa Gozze), including its detailed graphical interpretation. Moreover, scenarios for the protection and enhancement of the summer villa landscape were developed in relation to the three identified models.

Research Area

This research included eight summer villas located in different areas of the administrative territory of the city of Dubrovnik (Table 1, Figure 3): Boninovo (area A, UNESCO buffer zone), Gruž (area B, UNESCO buffer zone), and Rijeka dubrovačka (area C, the greater part of Rijeka dubrovačka is outside the UNESCO buffer zone). Four summer villas are situated

within the UNESCO buffer zone of Dubrovnik: (1) Skočibuha (area A), (2) Sorgo (area B), (3) Bona—Caboga (area C), and (4) Stay (area C).The other four summer villas can be found deeper in the Bay of Rijeka dubrovačka outside the UNESCO buffer zone (area C). They are also representative examples of publicly owned summer villas in Dubrovnik: (5) Bozdari (area C), (6) Sorgo—Skala (area C), (7) Resti (area C), and (8) Gozze (area C).

Table 1. Basic data on the case study summer villas.

Case Study Number	Summer Villa Name	Administrative Area	UNESCO Catgorisation	National/Local Level of Protection
1	Villa Skočibuha	Area A	Within UNESCO buffer zone	Protected cultural property at the national level
2	Villa Sorgo	Area B	Within UNESCO buffer zone	Protected cultural property at the national level
3	Villa Bona—Caboga	Area C	Within UNESCO buffer zone	Protected cultural property at the national level; "Significant landscape" protection of the area at the national level
4	Vila Stay—Caboga	Area C	Within UNESCO buffer zone	Protected cultural property at the national level; "Significant landscape" protection of the area at the national level
5	Villa Bozdari	Area C	Outside UNESCO	Protected cultural property at the national level; "Significant landscape" protection of the area at the national level
6	Villa Sorgo—Skala	Area C	Outside UNESCO	Protected cultural property at the national level; "Significant landscape" protection of the area at the national level
7	Villa Resti	Area C	Outside UNESCO	Protected cultural property at the national level; "Significant landscape" protection of the area at the national level
8	Villa Gozze	Area C	Outside UNESCO	Protected cultural property at the national level; "Significant landscape" protection of the area at the national level

The historical core of Dubrovnik along with the island of Lokrum has been on the UNESCO World Heritage List since 1979 (Figure 3). In 1994, the buffer zone was extended to include the area of the historical garden suburb of Pile—Konali, located immediately to the west of the historical core [58]. In 2018, the buffer zone was once again extended [59] to include the slopes of mount Srđ, at the foot of which lies the historical core of Dubrovnik, including the Sveti Jakov area to the east (area D, Figure 3) and the areas of Boninovo (area A, Figure 3) and the Bay of Gruž (area B, Figure 3) to the west, all of which were historically used as countryside retreats in the former Republic of Ragusa [6], (p. 18), thus becoming an inseparable historical, architectural, and visual element of the city's setting. Most countryside retreats were built in the area of Rijeka dubrovačka (area C) [6], whose mouth has only recently been included in the buffer zone of Dubrovnik even though the elongated bay was once home to over 50 summer villas [12], a significant number of which can still be found today with varying levels of preservation. Rijeka dubrovačka is in fact a five-kilometre-long estuary with specific biological, ecological, and landscape features, which is why it was declared a nature reserve in 1964 and is protected as a significant landscape today [60]. The fact that the summer villa landscapes are located within the UNESCO buffer zone and a protected landscape area highlights the importance of regulating their management.

3. Results

The analysis of the eight selected examples of Dubrovnik summer villa landscapes has shown that the last two centuries, especially the second half of the 20th century and the 21st century, were marked by uncoordinated changes to the immediate historical landscape of the summer villas, that is, by the lack of operational planning guidelines that would enable preserving them in terms of complementary land use and functional connections

with the summer villa, and thus the city fabric. The following sections describe the research results obtained by reviewing the relevant literature, the historical cadastral register of 1837 and its revision from the 1870s, the orthophoto map, and the graphical part of the current urban plan. These individual results were then synthesized to define general models and scenarios and form a conclusion.

3.1. Historical Land Use of the Summer Villa Landscape Based on the Literature Sources

Records from the 15th and 16th centuries show that vineyards had stretched on the slopes in the immediate vicinity of the summer villas [61] (pp. 24–27), [62] (p. 174), as well as olive groves, since the 14th century [6] (p. 16). Previous research has shown that the integrity of the summer villas and their agricultural landscapes in the Dubrovnik area was preserved until the first decade of the 20th century [1,18].

The summer villas analyzed in this paper were used by Ragusan noble families as their summer retreat, or their second home. The summer villas were mainly the farming center of the estate [12,18,63,64], and were very rarely used for residential purposes only. Seven out of the eight summer villas analyzed in this paper are situated at the seafront (No.2, No.3, No.4, No.5, No.6, No.7, No.8, Figures 1 and 2), so access to the sea and connection by sea were extremely important [8]. The layout of these seafront summer villas was, without exception, well planned to ensure that the first-floor rooms and terraces offered a view of the surrounding cultivated landscape, i.e., the picturesque union of the sea and land.

All seafront summer villas had boathouses (arsenals), most often found in wings abutting vertically from the main building, forming their characteristic L-shaped floor plan [6]. The Sorgo—Skala summer villa (No.6 Figure 1) got its colloquial name Skala (Stairs) because of its grand staircase leading down to the sea and being accessible only by boat [6] (p. 350). In the central part of the garden of the Bozdari summer villa, a balcony was designed and constructed to overlook the sea in Rijeka dubrovačka (No.5, Figure 1) [65]. Although the Skočibuha summer villa in Boninovo (area A, No.1. Figure 1) is located in the mainland suburb of Dubrovnik, its hilly position enables a sea view in the distance, and in the past, the cultural landscape surrounding the villa. [66]. The Boninovo area (area A, Figure 1) was originally just a countryside retreat of the Pozza-Sorgo and Altesti families, and it was not until the second half of the 19th century that a part of it was repurposed to serve as the city cemetery [67,68].

The gardens of the eight analyzed villas within the perimeter wall were designed in accordance with the tradition of the Dubrovnik Renaissance garden—an orthogonal network of walking paths under pergolas framing the garden fields. In three gardens, there were significant interventions from the end of the 19th and the middle of the 20th centuries (No.3, No.4, No.6), while in the villas Bona—Caboga (No.3) and Stay—Caboga (No.4), the Renaissance matrix of the garden was negated [18]. The gardens of six villas are dilapidated, unrestored although with a recognizable Renaissance style (No.1, No.2, No.7, No.8), i.e., late Renaissance and Baroque matrix (No.5). Recently, studies and restoration projects have been conducted for six out of the eight villa gardens (No.3, No.4, No.5, No.6, No.7, No.8), where research was carried out in accordance with the Charter of Florence, especially taking into account article 16 of the Charter, which prescribes restoration that will "respect the successive stages of evolution of the garden concerned" [44]. The aforementioned principle is particularly visible in the restoration of the gardens of the Bona—Caboga and Stay—Caboga villas, where both the Renaissance layer and the garden layer from the end of the 19th century are presented [18]. However, in projects for the restoration of villas with their gardens, the landscapes immediately outside the perimeter wall were not restored, given the absence of a planning and administrative framework for viewing these spaces as inseparable from the villa as a whole.

Density of the Dubrovnik summer villas in the analyzed area also reflects the social aspect of the summer villa landscape of that time, where neighboring noblemen gathered in their villas and gardens and discussed art and literature, playing music and performing theatrical plays [17]. During the period of construction of the summer villas, the main main-

land connection in the Rijeka dubrovačka area (area C, Figure 3) and the main connection to the historical core was the route of the Early Renaissance aqueduct built in 1437 [69]. A mainland link between the Boninovo area (area A) and the historical core and the Gruž area (area B, Figure 1) presumably existed in the 9th or 10th century already [70] (p. 15). The front facades of the countryside residences overlooked paths connecting them to the nearby hamlets, i.e., with the neighboring summer villas (Figure 3). Road construction in the Dubrovnik area began during the French administration (1806–1814) on unsurfaced roads, and gained real momentum during the Austrian administration (1815–1918), when wider roads were built to accommodate primarily carriages and, at the end of the 19th century, the first cars: the road along the coast of the Bay of Gruž (area B, Figure 3), the road along the coast of Rijeka dubrovačka (area C, Figure 3), and the road connecting Gruž and the historical core (area A, Figure 3) [67,70,71]. Paths in front of the summer villas in the Gruž and Rijeka dubrovačka areas were at the time extended by filling in the coast and at the end of the 19th century separated from the sea for the first time, without significantly impairing their integrity, i.e., their perimeter walls, or the area behind the villas [4,12,18,72,73].

Preserving and re-evaluating historical connections is of great importance to contemporary cities in which experiencing the city from a pedestrian perspective becomes a priority (historical connections are by far most often pedestrian) [74] (p. 59). Moreover, historical walking paths "to" and "from" summer villas also serve an aesthetic purpose. They are landscape dividers, lines commonly used to demarcate territory along the borders of plots, conforming to the topographical logic of the landscape and thus the property relations existing within it. Historical paths with drywall abuttals in the Mediterranean area, including in Dubrovnik, in fact form the oldest cadastral register embedded in the landscape itself [75] (pp. 107–119).

3.2. Historical Land Use of the Summer Villa Landscape Based on the Analysis of 19th Century Cadastral Registers

This section of the paper summarizes the results of the analysis of the historical use of summer villas and the surrounding landscape based on the information from the 1837 Austrian cadastral register and its revision from the 1870s [53,54]. The analysis of the cadastral registers clearly shows that the summer villas in the analyzed area were located relatively close to each other (500–1000 m) and separated by agricultural land spreading over the slopes of the summer estate. These landscapes were terraced due to the uneven topography, with drywall structures still intermittently visible in the space. The analysis of Austrian cadastral registers has shown without exception that the immediate landscape beyond the perimeter wall facing the back of all eight analyzed summer villas was agricultural land and, to a small extent, indigenous forest and maquis land, thus creating the picturesque countryside setting of the summer villas (Figure 3, Tables A1 and 2). In that regard, no differences were found in the use of the immediate landscape of the summer villas between areas A, B, and C in the period up to 1837, i.e., the 1870s, indicating that the way in which the countryside landscape was traditionally used was preserved for centuries (until the end of 19th century).

Except for the Skočibuha summer villa (No.1 on Figure 3, Tables A1 and 2, all the other summer villas in the study had their main access from the sea. The analysis of historical Austrian cadastral registers from first and second half of 19th century also show that all eight analyzed summer villas were at the time connected with the historical core of Dubrovnik and the rest of the territory by land. This analysis also shows that, for example, the route of the Early Renaissance aqueduct had up to the middle of the 19th century, or for five centuries, had a dual infrastructural role—water supply and as a walking path. The route is marked as Strada dell Acquedotto (Aqueduct Road) in the Austrian cadastral register [53,54].

The revised Austrian cadastral register from the 1870s shows certain changes in the transport connections in the Dubrovnik area that were reflected in the landscape of the summer villas. According to the 1837 cadastral register, the front facades of the summer

villas in the Gruž area (area B, Figures 3 and 4) were initially right next to the sea and connected with a relatively narrow path that conformed to the shape of the plots and terrain and lacked the radius of "modern" roads intended for vehicular traffic. However, the revised Austrian cadastral register from the 1870s also shows a new path along the coast of the Gruž area, and therefore in front of the Sorgo summer villa (area B, No.1, Figures 3 and 4). The path is marked as Strada per Ragusa (Road to Ragusa) on the cadastral map. The path had to be made by filling in a part of the coast, i.e., by taking away some sea territory, thus increasing the distance between the summer villa and the sea. However, the agricultural land at the back of the Sorgo summer villa was preserved at the time (No.2, Tables A1 and 2).

Table 2. Historical and present land use of the summer villa landscape.

Name of the Summer Villa/Location	Purpose of the Summer Villa Past/Present	Historic Garden Extent Preservation within the Summer Villa Wall (Perc.)	Land Uses of the Immediate Landscape—Past/Present		Present Paths and Access Routes to the Summer Villa	Free Spaces in the Immediate Villa Landscape Beyond the Perimeter Wall
			Preserved Cultivated Historical Landscape (Perc.)	Preserved Natural Historical Landscape (Perc.)		
1. Skočibuha/area A UNESCO buffer zone	Noble property/ Public use	100%	0%	13%	Partially preserved historic connectionss; traffic adjacent to the summer villa	No free spaces
2. Sorgo/area B UNESCO buffer zone	Noble property/ Public use	100%	0%	Complete transformation of historic cultural landscape into natural landscape	Partially preserved historic connectionss; road has cut off sea access to the summer villa; traffic adjacent to the summer villa	Partially free spaces
3. Bona—Caboga/area C UNESCO buffer zone	Noble property/ Public use	71%	0%	Complete transformation of historic cultural landscape into natural landscape	Historic connections not preserved; road has cut off sea access to the summer villa; traffic adjacent to the summer villa	Partially free spaces
4. Stay/area C UNESCO buffer zone	Noble property/ Public use	64%	0%	Complete transformation of historic cultural landscape into natural landscape	Historic connections not preserved; road has cut off sea access to the summer villa; traffic adjacent to the summer villa	Partially free spaces
5. Bozdari/area C Outside UNESCO buffer zone	Noble property/ Public use	78%	0%	89%	Historic connections neglected; road has cut off sea access to the summer villa; traffic adjacent to the summer villa	Free spaces
6. Sorgo—Skala/area C Outside UNESCO buffer zone	Noble property/ Public use	82%	0%	92%	Historic connections not preserved; partially preserved sea access to the summer villa	Partially free spaces
7. Resti/area C Outside UNESCO buffer zone	Noble property/ Public use	100%	0%	Complete transformation of historic cultural landscape into natural landscape	Historic connections not preserved; preserved sea access to the summer villa	Partially free spaces
8. Gozze/area C Outside UNESCO buffer zone	Noble property/ Public use	100%	0%	Complete transformation of historic cultural landscape into natural landscape	Historic connections not preserved; road has cut off sea access to the summer villa; traffic adjacent to the summer villa	No free spaces

Figure 4. Historical and present land use of the immediate landscapes of summer villa.

In all the analyzed examples, the Austrian cadastral registers point to the same principle—until the second half of 19th century and the beginning of the construction of roads for vehicular use, the main land roads had avoided the front of the summer villas by being located behind them, outside of the intensive agricultural area. The summer villas on the coast also had the original access to the sea preserved up until the 19th century.

Furthermore, the areas behind the summer villas beyond the perimeter walls were almost entirely agricultural land, and more rarely natural land, even after the construction of roads for the first vehicles (Tables A1 and 2).

3.3. Present Land Use of the Summer Villa Landscape—Situation according to Orthoimagery from 2011 and 2024

The analysis has shown that five summer villas are being actively used for social purposes—as public good (No.1, No.2, No.3, No.4, No.6), while the remaining three are also state/city-owned and will be designated for that purpose in the near future (No.5, No.7, No.8) (Tables A2 and 2). Unfortunately, the immediate cultural landscapes of all the summer villas have been more or less permanently transformed (Figures 4 and 5; Tables A2 and 2). The surroundings of seven out of the eight summer villas have lost their historical land use—agricultural land (Tables A2 and 2). The process of urbanization of the immediate landscapes of these summer villas had already begun at the beginning of the 20th century, and continued, especially in its second half and the beginning of the 21st century. A comparison of the orthoimagery and the 19th-century cadastral maps shows visible changes in the landscapes behind the summer villas beyond their perimeter wall (Figures 4 and 5). Quantitative analysis and a comparison between the previously mentioned period of the 19th century and its present state (Tables A1, A2 and 2) show that historical gardens within the summer villa walls in almost all cases have preserved their original surface. The Bona—Caboga, Stay—Caboga, and Bozdari summer villas have lost a part of their inner gardens due to road construction (Nos.4, 5, and 6, Tables A1, A2 and 2). But it is evident that the summer villa setting, i.e., the land use of the historical landscape has been completely changed (Figures 4 and 5). These days, the summer villa landscapes are incomparable in the sense of land use and surface areas, except for the summer villa Bozdari. On the southern side of Rijeka dubrovačka, a corridor of the narrow-gauge railway constructed between 1898 and 1901 has been embedded into the landscape of the summer villas which has fragmented and isolated the landscape and made it impossible to cultivate (Figures 3 and 5). The corridor passes closest to the Bona—Caboga and Stay—Caboga summer villas, separating them from their countryside landscape—the terraces with vineyards (No.4 and No.5, Figures 4 and 5). The largest intervention into the integrity of the countryside landscape of the summer villas in Rijeka dubrovačka, which also significantly affected the integrity of the summer villa estates, came about in 1963 with the construction of a corridor of the Adriatic Highway (Figures 3–5). The front perimeter walls of the Stay—Caboga and Bona—Caboga summer villas were destroyed and portions of their arsenals and gardens facing the front facade were demolished; a part of the front garden of the Bozdari summer villa was also destroyed, while the Resti and Gozze summer villas were separated from the picturesque countryside landscape behind them (No.3, No.4, No.5, No.6, No.7, No.8, Figures 1, 4 and 5).

During the 1980s, the biggest changes occurred in the landscape of the Gozze summer villa (Obuljeno) (No.8 on Figure 3; No.8 on Figures 4 and 5; No.8, in Tables A2 and 2; Figure 8) as the Nova Mokošica settlement for 10,000 inhabitants was built on the terraces with olive groves behind the summer villa. The countryside landscape of the Gozze summer villa was further disturbed by private houses built right against its north-west perimeter wall (No.8, Figures 3–5 and Figure 8). The immediate landscape of the other two summer villas in Rijeka dubrovačka has also been urbanized by private (residential) properties (No.3, No.7 Figures 4 and 5), commercial properties and parking lots (No.6 on Figures 4 and 5), and dry marinas (No.7 on Figures 4 and 5), all constructed on what used to be the agricultural landscape of the summer villa. The largest urbanization of the summer villa landscape in recent times, or its degradation, occurred at the north-east boundary of the Skočibuha summer villa in Boninovo (No.1, Figures 4 and 5), where a large parking lot has been built, demolishing a portion of the original perimeter wall of the summer villa.
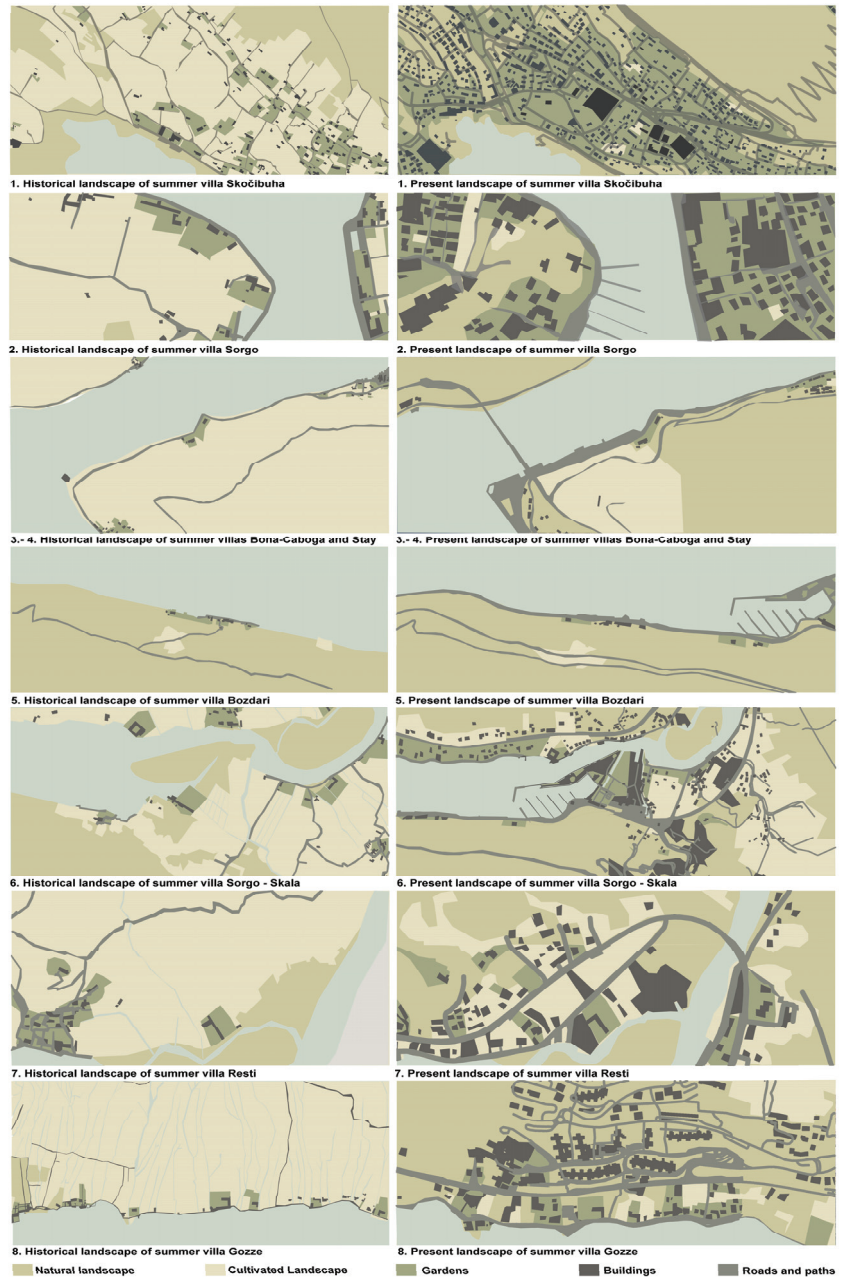
Figure 5. Transformation of the immediate landscape of the Dubrovnik summer villas.

The historical paths in the landscapes of all eight analyzed summer villas have still not been reaffirmed, for example the paths connecting the summer villas in Rijeka dubrovačka (area C, Figure 3) and part of the Gruž area (area B, Figure 3) with the route of the 1437 Early Renaissance aqueduct. The historical route in the Boninovo area (area A) towards the historical core has been partially preserved but insufficiently affirmed as an important historical path (No.1, Figure 3). The original access to the sea—historically the main

connecting route—has been completely fragmented in six out of the eight summer villas, the only exceptions being the Resti summer villa and, partially, the Sorgo—Skala summer villa (No.6 and No.7 on Figures 4 and 5, Tables A2 and 2).

Five summer villas have partially built landscapes (No.2, No.3, No.4, No.6, No.7 on Figures 4 and 5, Tables A2 and 2), while two summer villas have completely built landscapes (No.1, No.8 on Figures 4 and 5, Tables A2 and 2).

The analysis of the current situation (Tables A2 and 2) points to the conclusion that, even though areas beyond the perimeter wall of certain summer villas fall under formal protection, the immediate landscape of countryside estates was subject to uncoordinated changes in the 20th century, depriving summer houses of their "organic" component. The exception is the Bozdari summer villa with a steep rugged terrain behind it; the terrain is north-facing, and thus in the shade most of the year, difficult and unattractive for construction, which has helped keep it covered with stenomediterranean vegetation in different development stages to this day (No.5 on Figures 1–4).

3.4. Planned Land Use of the Summer Villa Landscape—According to the 2005 General Urban Plan of Dubrovnik with Targeted Amendments

In order to analyze the intended use of the summer villas and their surrounding landscapes, i.e., to determine whether it is possible to form PZSVs, as well as to analyze the planned access routes to the summer villas (new paths and revitalization of historical ones), the 2005 General Urban Plan of Dubrovnik with nine "spot zoning" amendments (hereinafter, the GUP) was analyzed [57].

All eight analyzed examples are planned to be used for public purposes (Table 3). All summer villas in the administrative territory of the city of Dubrovnik have been graphically marked on the architectural heritage map in the current urban plan [56]. However, summer villas are not planned as a separate category of use, so the state/city-owned ones are categorized under public and social use, while privately owned ones are categorized under the residential-use category. Moreover, one of the analyzed summer villas, Sorgo—Skala (No.6, Figure 3, Table 3), is categorized entirely under the category of port of nautical tourism.

The category of the summer villa landscape is not systematically recognized in current urban plans. However, some uses of the immediate summer villa landscape may provide a basis for planning a protective zone of a summer villa (PZSV). For example, the immediate landscape beyond the perimeter wall of several summer villas falls into the public and social use category (Table 3). The immediate landscape of five out of the eight summer villas falls into the vegetation buffer and landscape surfaces category—Sorgo, Bona—Caboga, Stay, Bozdari, Resti (No.2, No.3, No.4, No.5, No.7, Table 3). Moreover, according to the Gruški akvatorij Urban Development Plan [75], the Bona—Caboga and Stay summer villas and the immediate landscapes beyond the perimeter walls behind them (No.3 and 4, Table 3; Figures 3–5) are planned to form a single unit—spatial unit A summer villas with a park, with an area of 21,829 m^2. The plan envisions the conversion of the former railway corridor located behind the summer villas (Figure 3) into a pedestrian and cycling route; it also envisions a public city park with educational facilities in the areas behind the summer villas [76].

The current urban plans do not envision the revaluation of historical access routes to summer villas, such as neglected access roads to the route of the Early Renaissance aqueduct (No.3, No.4, No.5, No.6, Table 3), nor do they envision the refurbishment of the ports in front of the summer villas (No.2, No.3, No.4, No.5, No.6, No.7, No.8, Table 3) [57]. However, it is planned to widen the existing roads in front of the summer villas to accommodate pedestrian traffic between the summer villas, both in the Gruž (area B) and Rijeka dubrovačka (area C) areas [57,76,77]. Although this will present an improvement to the access to summer villas, due to insufficient project coordination, the project of connecting a part of the summer villas in Gruž with walkways cannot completely mitigate the failures of the previous project. The recently constructed port of nautical tourism, a marina with docks in Gruž (area B), is located above the elevation point of the existing road passing next to the

summer villas. In addition, the canopies on the docks have blocked the view of the summer villas on the coast, thus visually compromising their integrity. Due to the conflict between the project of the port of nautical tourism and the project of widening the existing road, the visual integrity of the summer villas will not be preserved to a greater extent and the establishment of wider greenbelts has also failed (the space has simply been consumed).

Table 3. Planned land use of the summer villa landscape—according to the General Urban Plan of Dubrovnik (GUP).

Name of the Summer Villa/LOCATION	Planned Land Use of the Summer Villa	Planned Land Uses of the Immediate Landscape	Planned Paths and Access Routes to Summer Villas	Possibility of Planning a PZSV
1. Skočibuha/area A	Public and social use—culture—public library; vegetation buffer and landscape surfaces	Parking lot; cemetery; residential buildings	Local road links; car tunnel	No possibility to plan a PZSV
2. Sorgo/area B	Public and social use—culture; Croatian Academy of Sciences and Arts, Institute of History	Residential buildings; vegetation buffer and landscape surfaces	Local city road; planned pedestrian corridor	Possible to plan a fragmented PZSV
3. Bona—Caboga/area C	Public and social use—culture—venue for concerts, scientific workshops, lectures	Vegetation buffer and landscape surfaces, state road; terminal for ships on cruises; corridor of a new state road; new public park encompassing the Bona—Caboga and Stay summer villas	Pedestrian walkway along the present road	Possible to plan a fragmented PZSV
4. Stay/area C	Public and social use—culture	Vegetation buffer and landscape surfaces; state road; terminal for ships on cruises; corridor of a new state road; new public park encompassing the Bona—Caboga and Stay summer villas	Pedestrian walkway along the present road	Possible to plan a fragmented PZSV
5. Bozdari/area C	Public and social use—culture—multipurpose space—various cultural and social manifestations, presentations, exhibitions. Secondary activities—economic and hospitality.	Vegetation buffer and landscape surfaces; state road; mixed residential use low density (built); corridor of a new state road	Pedestrian walkway along the present road	Possible to plan a PZSV
6. Sorgo—Skala/area C	Port of nautical tourism	Widening and reconstruction of the ACI marina Komolac—reconstruction of the Sorgo summer villa and the adjacent garden; expansion of the port (10 ha); construction of the accompanying communal buildings; mixed residential use	Pedestrian walkway along the present road	Possible to plan a fragmented PZSV
7. Resti/area C	Public and social use—culture—school of old crafts, souvenir shop selling items made in the traditional way through workshops, restaurant with traditional dishes, enogastronomic center	Vegetation buffer and landscape surfaces; built-up residential zone—mixed use—low density	Pedestrian walkway along the present road	Possible to plan a fragmented PZSV
8. Gozze/area C	Public and social use—culture; multipurpose use—social and cultural center of the Nova Mokošica settlement	Predominantly residential mixed use; local road; parking lot	Pedestrian walkway along the present road	Not possible to plan a PZSV

A comparison of the orthoimagery (current situation) and the intended use in the spatial plan (Tables A2, 2 and 3) has shown that six out of the eight analyzed examples (No.2, No.3, No.4, No.5, No.6, No.7) still have certain unbuilt free spaces immediately next to the perimeter wall that could be planned as protective zones of summer villas (PZSVs) (Table 3).

3.5. Basic Models of Transformation of Dubrovnik Summer Villa Landscapes

Based on a detailed analysis of historical and present land uses of three summer villa landscapes analyzed in this paper—Bozdari (No.5, Figures 3–6), Resti (No.7, Figures 3–7), and Gozze (No.8, Figures 3–5 and 8), features have been identified that can be used to determine three basic models of transformation of the Dubrovnik summer villa landscapes, which is a prerequisite for establishing PZSVs in urban planning documentation. In Table 4 criteria for the three main models of summer villa landscape transformation are defined, which are applied to the researched case studies (Table 5).

Table 4. Criteria for defining the three main models of summer villa landscape transformation.

Model	Perimeter of the Summer Villa Wall	Connections	Separation from Original Surroundings	Immediate Landscape	Original Land Use
I. Model of completely preserved immediate historical landscape	Original perimeter wall of the summer villa is mostly preserved.	Historical connections "from" and "to" the summer villa are preserved.	The summer villa is not separated or is partially separated from its original surroundings.	The immediate summer villa landscape is unbuilt.	The original land use of the landscape is preserved.
II. Model of partially preserved immediate historical landscape	The perimeter wall of the summer villa is completely or partially preserved.	Historical connections "from" and "to" the summer villa are completely or partially preserved.	The summer villa is partially separated from its original surroundings—the sea and the landscape behind it.	The summer villa landscape is fragmented due to spot zoning amendments.	The original land use of the summer villa landscape is partially preserved.
III. Model of complete transformation of the historical landscape of a summer villa	The original perimeter wall of the summer villa is partially preserved or not preserved at all.	Historical connections "from" and "to" the summer villa are partially preserved or not preserved at all.	The summer villa is separated from its original surroundings—the sea and cultivated landscape behind it.	The summer villa landscape is significantly fragmented (construction).	The original land use of the summer villa landscape is not preserved.

Table 5. Models of transformation of the summer villa landscape.

Summer Villas/Model Features	1. Skočibuha (UNESCO Buffer Zone)	2. Sorgo (UNESCO Buffer Zone)	3. Caboga (UNESCO Buffer Zone)	4. Stay (Outside UNESCO Buffer Zone)	5. Bozdari (Outside UNESCO Buffer Zone)	6. Sorgo—Skala (Outside UNESCO Buffer Zone)	7. Resti (Outside UNESCO Buffer Zone)	8. Gozze (Outside UNESCO Buffer Zone)
Level of preservation of the original perimeter wall of the summer villa	Preserved	Preserved	Partially preserved	Partially preserved	Partially preserved	Partially preserved	Preserved	Preserved
Fragmentation of the summer villa landscape caused by construction	Fragmented	Partially fragmented	Fragmented	Fragmented	Not fragmented	Fragmented	Fragmented	Fragmented
Original land use of the summer villa landscape	Not preserved	Partially preserved	Not preserved	Not preserved	Preserved	Not preserved	Not preserved	Not preserved
Separation from the seascape	/	Separated	Separated	Separated	Separated	Partially separated	Not separated	Separated
Historical connections "from" and "to" the summer villa	Partially preserved, reaffirmation needed	Not preserved, new pedestrian route constructed	Neglected, possible restoration	Neglected, possible restoration	Neglected, possible restoration	Partially preserved, possible reconstruction	Original sea access preserved	Not preserved
Possibility of establishing a *PZSV*	Not possible to establish a PZSV	Possible to establish a PZSV	Possible to establish a PZSV	Possible to establish a PZSV	Possible to establish a PZSV	Possible to establish a PZSV	Possible to establish a PZSV	Not possible to establish a PZSV
MODEL	III	I	II	II	I	II	II	III
SCENARIO	III	I	II	II	I	II	II	III

The first model enables the planning and establishment of the protective zone of a summer villa (PZSV). The second model enables partial planning and establishment of the protective zone of a summer villa (PZSV), while in the third model the PZSV cannot be planned and established.
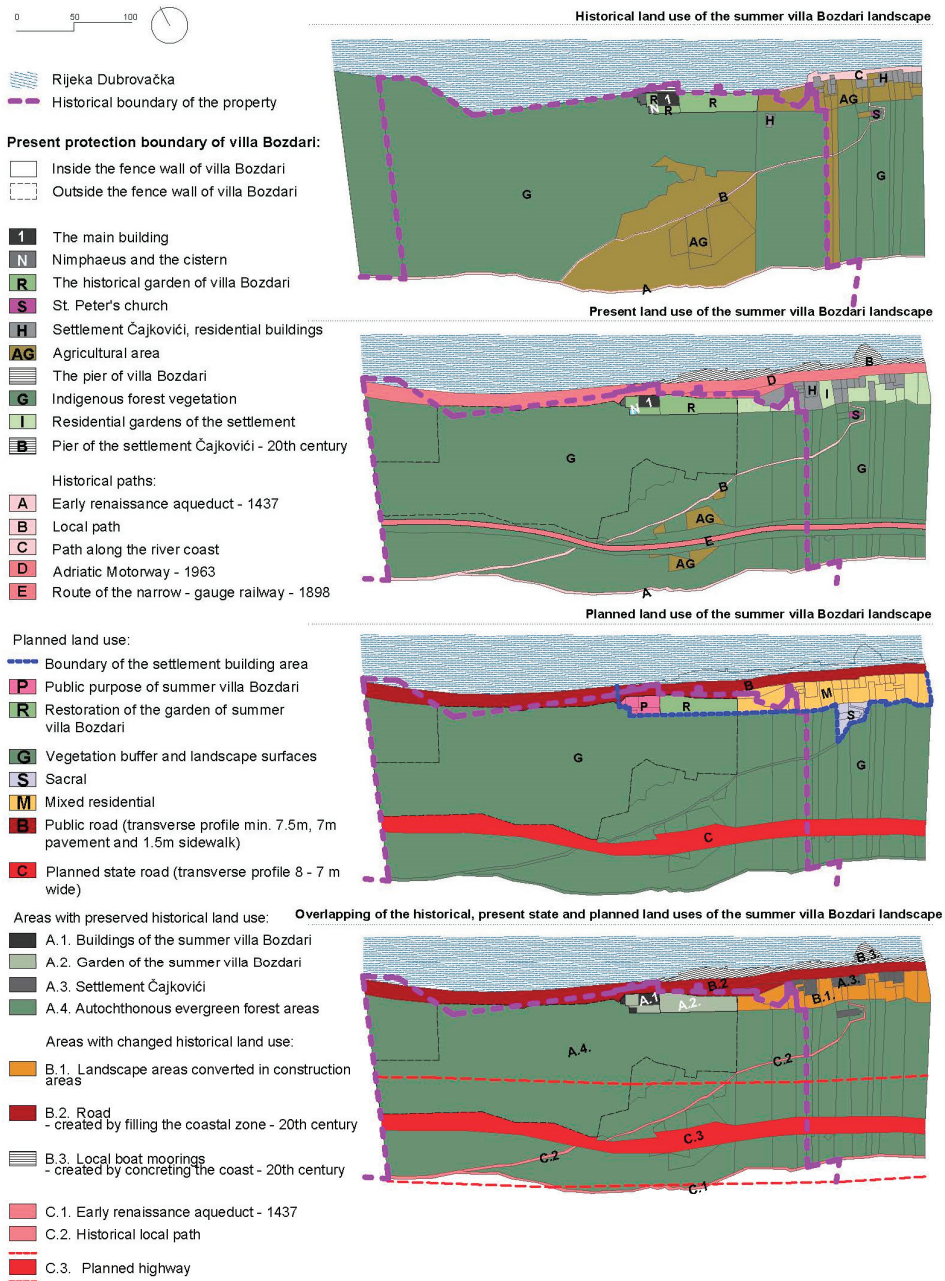
Figure 6. Historical, present, and planned land use of the Bozdari summer villa landscape.
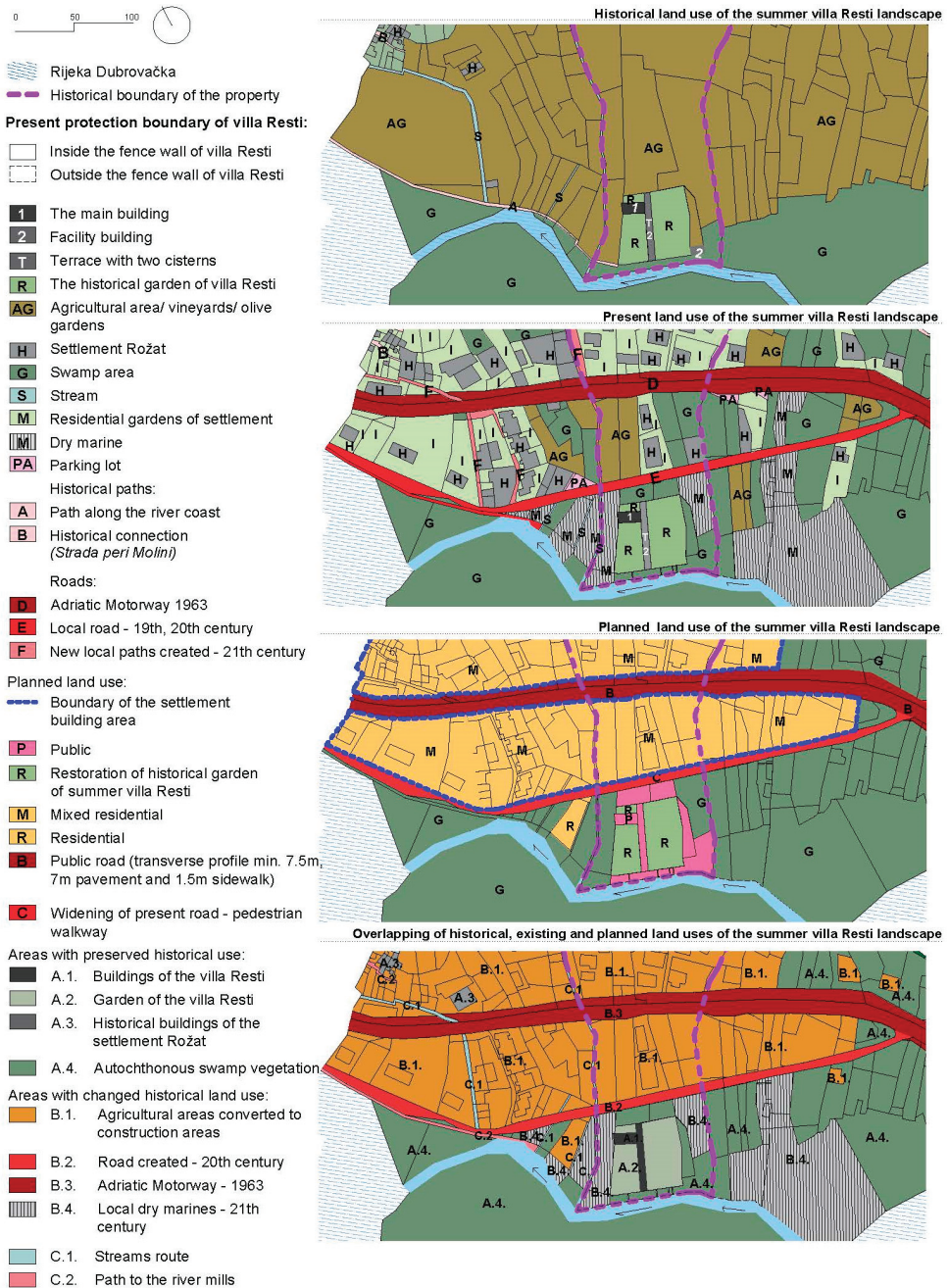
Figure 7. Historical, present, and planned land use of the Resti summer villa landscape.
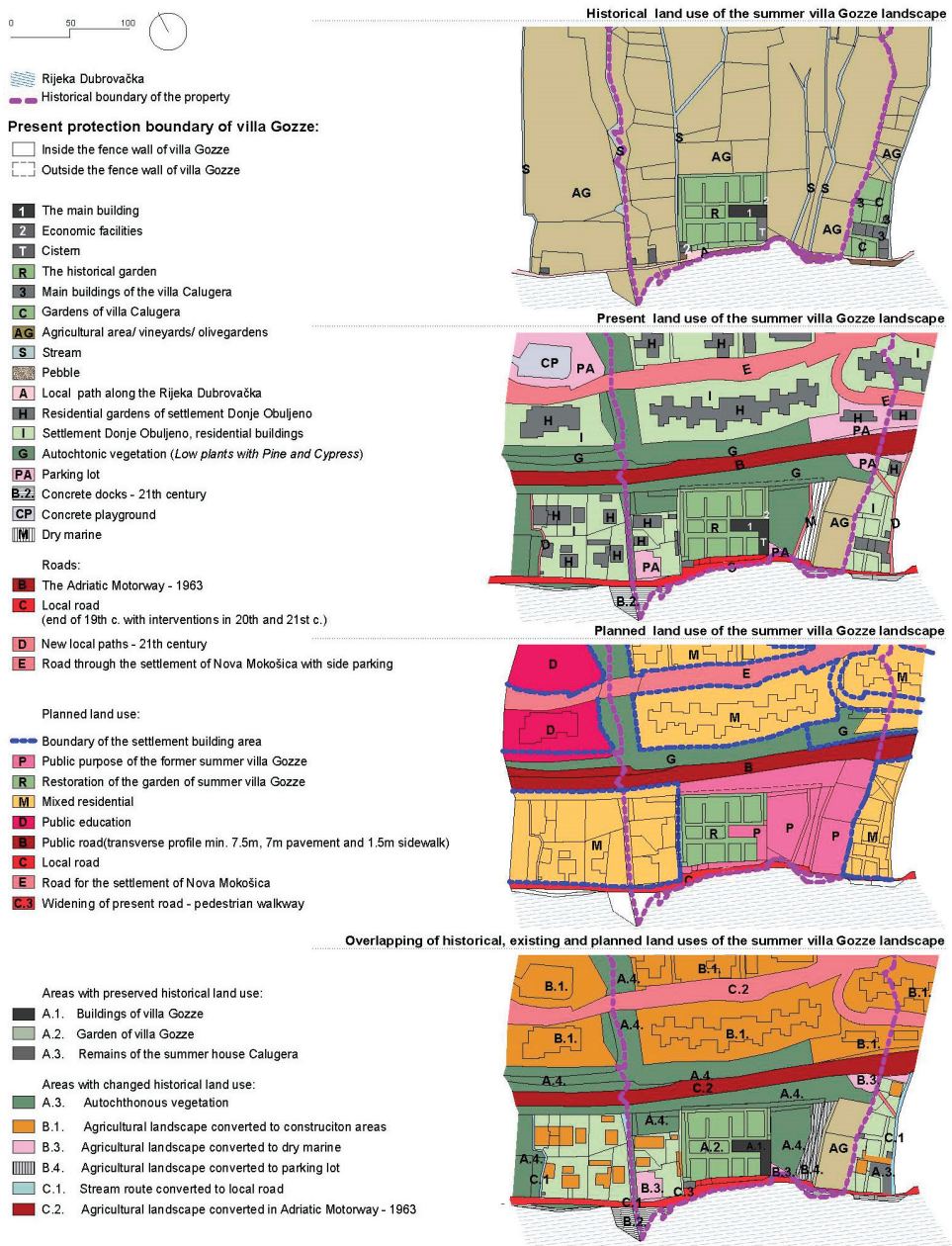
Figure 8. Historical, present, and planned land use of the Gozze summer villa landscape.

The Bozdari summer villa falls under model I (Figures 4–6 and 9) since the landscape behind the summer villa has been completely preserved and the road that cut off direct access to the sea did not compromise its setting as the sea view of the summer villa and the original natural landscape at its back have been preserved. The Resti summer villa falls under model II (Figures 4, 5, 7 and 9) because the original seascape and access to the sea have been completely preserved, while the lateral sides next to the perimeter wall of the summer villa are used as dry docks, which is a reversible intervention—land use

that could be transformed again in the summer villa landscape. The perimeter wall of the summer villa has largely been preserved and in the past represented the historical boundary between private lodgings and the agricultural landscape of the summer villa. Today, the problem is the residential area built beyond the perimeter wall at the back of the summer villa, which significantly degrades its setting (Figures 4, 5, 7 and 9). The Gozze summer villa falls under model III since its immediate landscape has been degraded due to residential construction to the point that some buildings were built right on its west perimeter wall, which permanently compromises the integrity of the summer villa (Figures 4, 5, 8 and 9). The historical paths "from" and "to" the summer villa have been preserved to varying degrees in these three examples. Although overgrown, the historical paths from the Bozdari summer villa can be revitalized and connected to the route of the 1437 Early Renaissance Ragusan aqueduct. The sea access of the Resti summer villa, i.e., its original seafront setting, has been preserved. The Gozze summer villa will be integrated into the city fabric by way of a new pedestrian route system, still in its planning stage.
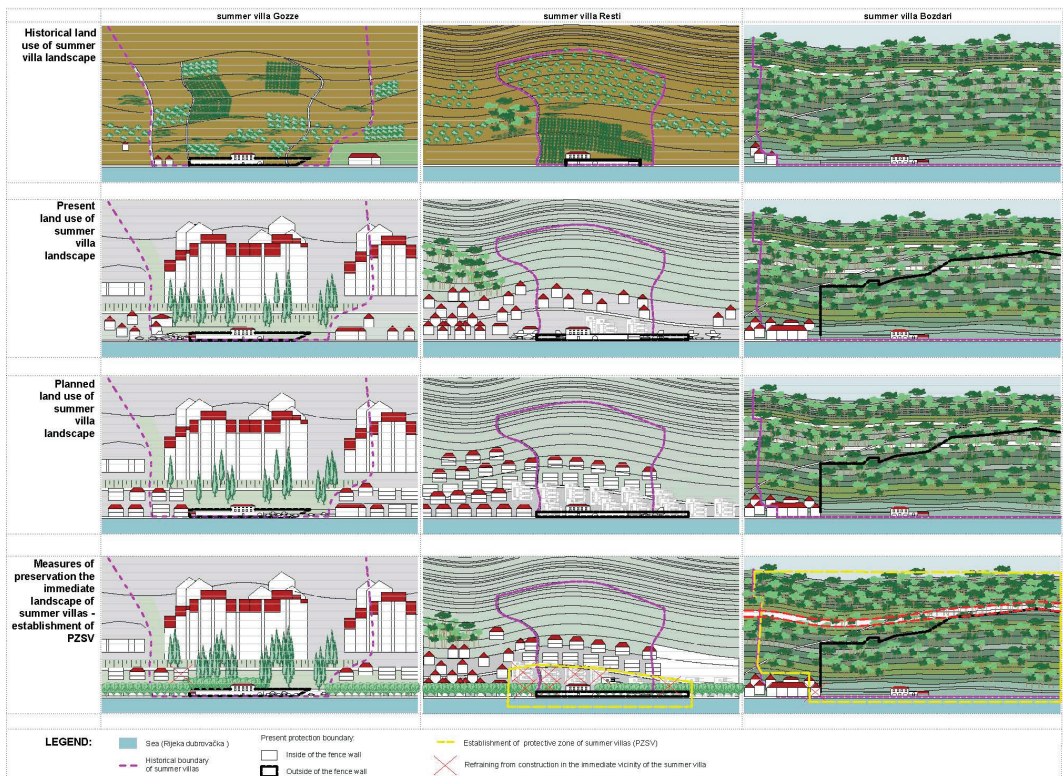
Figure 9. Sketches of the front view of the Bozdari, Resti, and Gozze summer villas with adjacent landscape in the past, present, and planned uses with measures for its preservations.

Based on the identified general models and their features (Table 4), the remaining summer villas were allocated to their respective models (Table 5): Sorgo (No.2) and Bozdari (No.5) would fall under model I, while Bona—Caboga (No.3), Stay (No.4), and Sorgo—Skala (No.6) would fall under model II. Skočibuha (No.1) and Gozze (No.8) would fall under model III. The level of preservation/restoration of the summer villa within its perimeter wall and the architectural excellence of the summer villa and its garden should not be confused here with the possibility of preserving its setting, i.e., with the features of the summer villa's immediate landscape. For example, the possibilities to preserve the setting of the Bozdari

and Resti summer villas and to establish PZSVs are, despite their dilapidated state, far greater than for the Skočibuha, Sorgo—Skala, or Gozze summer villas (Figures 4 and 5).

3.6. Possible Scenarios of Protection and Enhancement of Summer Villa Landscapes and Reintegration of Summer Villas into the City Fabric

A more efficient protection of the summer villa landscapes and the summer villas themselves requires plans that would recognize landscapes around this heritage as a separate urban plan category. In this context, this research suggests the introduction of a protective zone of a summer villa (PZSV) on the urban planning level. The protective zone of a summer villa cannot be uniformly defined due to the differences in topographical features of individual sites and, recently, due to the fact that summer villa landscapes have mostly been built on and have lost their original land use.

Based on the conducted research and the interpretation of the analysis results, three possible fundamental scenarios have been identified that would ensure the protection of the immediate landscape of summer villas, i.e., the establishment of PZSVs on the urban planning level as a basis for the (re)integration of the summer villas into the fabric of the contemporary city.

The first scenario involves the preservation and enhancement of the existing state, where it was established under model I that the immediate historical landscape of the villa has been largely preserved from construction and that it is possible to plan and establish a PZSV. The size of the preserved area enables a series of interventions to restore the original surface cover (olive groves, orchards, natural vegetation), as well as the revitalization of historical paths and access routes to the summer villa (Figure 9).

The second scenario, which correlates with model II, involves activities that imply change, i.e., adaptation and applying new planning guidelines to prevent construction in the immediate landscape of the summer villa and to regulate the distance between building plots and the summer villa plot in terms of the number of floors in the building on the building plot, its architectural style, and the building plot matrix (house–garden relationship) (Figure 9). This scenario includes a series of planning measures to develop the existing and new access routes to the summer villa that are not necessarily historical (e.g., planning tree-lined avenues, greenbelts, pavements, cycling paths), thus enabling a higher level of integration of the summer villas into the city fabric.

The third scenario precludes planning and the establishment of a *PZSV* (Figure 9) and involves only minor measures to mitigate the current state (e.g., tree-lined avenues along the existing roads and buildings to soften the views of the built plots right next to the summer villas). In addition, the revaluation of the summer villas falling under model III would mean using the existing and new paths to include these summer villas in the summer villa network, or "summer villa trails" modeled after "wine routes" and "olive oil routes", thus defining a recognizable summer villa system by which they would be integrated into the city fabric. Recognizing the summer villa system will ensure that these places are recognized today as historical places of the gathering of the nobility, and in the future, not just individually recognized as cultural sites for different cultural manifestations, but also as historically important agricultural spots of the historic Dubrovnik that will present traditional plants, land cultivation, crafts, dishes, famous people who lived and worked there, etc. The creation of a systematic and clearly recognizable network that encompasses contemporary walking, sea, and cycling routes enables the revaluation of the Dubrovnik summer villas as a whole, thus reaffirming even the ones whose setting has lost its essential identity features, including its countryside landscape and historical access routes.

4. Discussion

This research had two main aims: by using the selected examples of the Dubrovnik summer villas, we aimed to determine the original land use of the immediate landscapes of the Dubrovnik summer villas as their inseparable component and the level of their preservation today as well as how the summer villas with their surrounding landscapes

are and can be integrated into the city fabric. The level of preservation of the summer villa landscape was determined by analyzing the original, historical use of the summer villa landscape, prior to contemporary interventions and construction that occurred during the 20th and 21st centuries on the once picturesque agricultural landscape of the summer villas.

It was determined that the summer villa landscapes were in the past functionally and aesthetically directly connected to the summer villas, making them extremely important to the countryside setting of the summer villas, and that these connections have significantly weakened over the past two centuries. At first, this was largely due to the changes in the use of the summer villas themselves, which lost their status as economic centers and lodgings of noble families very soon after the fall of the Republic of Dubrovnik. Because of this, the efficient use and management of immediate landscapes were rarely applied. The fact that the urbanization processes of the 20th century significantly "ate away" the country landscape of the summer villas, whose ownership structure changed over the centuries, is equally important; interventions carried out at the time had almost no consideration for the fact that landscape is an intrinsic part of a summer villa. This was a period marked by the momentum of planned construction of multi-apartment settlements but also by significant occurrences of illegal housing construction, especially visible in the example of Rijeka dubrovačka, which has been a protected landscape since 1964.

In recent history, measures for the protection of landscapes of the summer villas in the area of Dubrovnik have so far not been successful in preserving them. First of all, the protection of the summer villa landscape has "failed" due to the fact that the operational tools for the protection of the summer villa landscape have not been adequately incorporated into the urban planning documentation, and consequently on the project level.

The part of the summer villas that are the subject of analysis were not part of the UNESCO buffer zone of the historical area of Dubrovnik until recently (2018), so the monitoring of that area within the UNESCO framework is yet to be done. But it is questionable how it will be monitored as the summer villas are actually "drowned" into the recently extended buffer area, and are not protected as individual UNESCO heritage sites. This research has shown that there is no difference in the treatment of summer villas within or outside the UNESCO buffer zone.

Some of the summer villas in this research have undergone or are undergoing restoration, but structures constructed over time in their immediate landscape have ruined their value and the overall experiential value, as well as their cultural landscapes—the setting—of most of them. Without their countryside landscape, summer villas are stripped of their core morphological and typological features but also of an important part of their experiential aspect. It is important both from the point of view of the cultural heritage per se and the point of view of preserving landscape/territory for the future, but also from the tourist point of view to present these densely grouped villas within a setting as similar as possible to their original use. The intention of this paper was to draw attention to the need to establish planning principles of preservation and reconstruction of their immediate landscape, which contributes to the countryside settings of the summer villas themselves.

The seascape is an equally important type of landscape for those summer villas that have been built along the coast in the Dubrovnik region since preserving contact with the sea is their core typological feature that also visually contributes to the specific setting of a summer villa. In terms of space, it is important to preserve this connection as a point of access to the summer villa (port). These immediate landscapes of the summer villas are today used for different purposes. Historical pedestrian routes embedded in the landscape have for centuries created logical connections in the landscape. In this research, we emphasize the importance of the preservation and revaluation of historical routes, and in cases where this is not possible, the establishment of new pedestrian ones, in order to integrate the summer villas into a recognizable system and into the city fabric.

It is not possible to completely stop the changes in the landscape surrounding the summer villas, but it is possible to manage it, respecting what has been found and trying to preserve or reconstruct the original characters of the summer villa landscapes. From

the conducted research, we conclude that during the last centuries, several processes took place in the landscape that we are analyzing: once natural landscapes were cultivated, and became the agricultural rural landscape of summer villas, it remained like that until the end of the 19th century, when that cultivated landscape was converted into urban landscape, and today, under the conditions of abandonment of cultivated agricultural landscapes, the relics of free, undeveloped areas are once again partly passing from cultivated to natural landscapes, i.e., small relics left to natural succession.

This research has shown that a portion of the existing built landscapes of the summer villas can be enhanced. The analysis and comparison of the current state and plans have shown that the summer villa landscape should be systematically evaluated on the planning level, and that in the planning process, special attention should be paid to defining protected areas around the summer villas essential for their setting, which is termed the protective zone of a summer villa—PZSV in this paper.

In the case of Dubrovnik summer villas, due to the fragmentation caused by construction in the historic landscape, it is not possible to establish protective zones around the entire area of the densely grouped summer villas, i.e., to establish summer villa landscape in continuum. In regard to the fact that every summer villa has its specific features and relations with the surrounding landscape, and the possibilities of the enhancement of its setting, this research accentuates the need for establishing a PZSV for every individual summer villa. In that way, formed PZSVs would take into consideration the wider urban context and the necessity of regulating the relationships in it, with regard to every single villa. In comparison with the UNESCO buffer zone, a PZSV would be smaller in size (in a certain ratio with the villa and its surrounding), where the possibility of construction would be excluded, with (re)evaluated historical and new connections "from" and "to" the summer villa by which these summer villas would be connected in a recognizable system. Planned land use in immediate summer villa landscapes (PZSV), would also differ in relation to the free space in the surroundings of the summer villa, in relation to the use of a single summer villa and its historical, as well as the present and planned, land use in the close vicinity of summer villa.

As landscape is a construct of interaction between man and nature, i.e., it has a social dimension, a PZSV could be planned as a historic memory of a space, as some relics of agricultural areas that can be read at least as narrow strips of vegetation. It could demonstrate mosaics of autochthonous fruit plantations with workshops on traditional techniques of planting and maintaining these reconstructed landscapes. In this context, these areas for individual summer villas, depending on their future purposes, could also serve for tourist purposes in terms of promoting the authentic agriculture of the area.

The results of this research may provide a framework for drafting urban planning guidelines (evaluation phase, defining corresponding model, determination of PZSV) for the restoration of summer villas on the conservation and project documentation level as a basis for the preservation and enhancement of the historical landscapes of the summer villas in general.

5. Conclusions

This research into the landscape of the eight selected summer villas has identified changes in the land use and extent of the historical landscape of the summer villas and in the access to summer villas over the past two centuries.

The research leads to the following conclusions:

Historical land use of the summer villa landscapes—situations according to the 1837 Austrian cadastral register and its revision from 1870s: the analysis of these registers has shown that the landscapes of all summer villas served as agricultural land, which is their original setting. It has also shown that the historical paths of the summer villas were preserved up until the middle of the 19th century.

Present land use of the summer villa landscapes—situation according to orthoimagery from 2024: the analysis of the current use of the summer villas points to significant changes

in their immediate landscape, mainly the loss of the original land use, and in general, the unsuitable construction right next to the summer villas, which has compromised their setting.

Level of preservation of the historical landscapes of the summer villas: the immediate landscape of the summer villas within the UNESCO buffer zone of Dubrovnik has not been more preserved than that of the summer villas outside it.

Formal protection of the historical landscapes of summer villas: the formal aspect of protection of the landscape of Rijeka dubrovačka has not contributed to a higher level of protection of the summer villas located there, indicating that there is a need to embed the principles of preservation of the immediate landscape of summer villas into the existing urban planning guidelines.

Planned land use of the summer villa landscapes—according to the General Urban Plan of Dubrovnik: the analysis of urban planning guidelines points to a partial rather than a systematic recognition of the need to preserve the immediate landscape of the summer villas. Excluding certain exceptions related to the subsequent rectification of planning omissions from earlier periods, the category of a protected area of summer villas as the basis for the preservation of the setting of summer villas, termed the protective zone of a summer villa in this paper, has not been recognized.

Protective zone of a summer villa (PZSV): a PZSV should be planned and determined on a case-by-case basis in accordance with the extent of unbuilt landscape in the immediate surroundings of a summer villa, the possibility of restoring its historical or comparable land use, and based on the topography of the site.

Models of transformation of the summer villa landscapes: the general models of transformation of the historical landscape of summer villas have been recognized on a general level: the model of completely preserved immediate historical landscape of a summer villa; the model of partially preserved immediate historical landscape of a summer villa; and the model of complete transformation of the historical landscape of a summer villa.

Possible scenarios of protection of the summer villa landscapes and reintegration of the summer villas into the city fabric: three main scenarios for planning and establishing a PZSV have been identified. In the first scenario, a PZSV can be planned and established and the historical access routes to a summer villa can be revalued largely by preserving their current state. In the second scenario, a partial PZSV can be planned and established in line with the model of partially preserved immediate historical landscape of a summer villa. The third scenario corresponds to the model of complete transformation of the summer villa landscape, where a PZSV cannot be planned and only certain measures can be implemented to mitigate the current state.

In this research, we were primarily guided by the planning and conservation principles that the immediate landscape of the summer villas should be preserved from construction. This is why the term protective zone of a summer villa (PZSV) was defined to indicate the first important step on the urban planning level in preserving the landscape of summer villas—their setting.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy restrictions.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A

Table A1. Historical land use of the summer villa landscape—Situation according to the Austrian cadastral register from 1837.

Name of the Summer Villa/Location	Historic Gardens within the Summer Villa Walls (Area in m²)	Historical Land Uses in the Immediate Landscape (Area m²)						Historical Paths and Access Routes to the Summer Villa and towards the Historical Core, Economic Area, and Port Gruž
		Vineyard	Pastur	Olive Groves	Orchard	Arable Land	Indigenous Vegetation	
1. Skočibuha/area A	4828	28,000	15,200	275,000	26,000	/	344,200	Well connected with secondary and main pathways
2. Petar Sorgo/area B	2862	42,190	/	29,951	5231	/	1666	Well connected with secondary and main pathways, coastal access to the summer villa
3. Bona-Caboga/area C	1574	5250	50,000	47,000	/	/	/	Well connected with secondary and main pathways, coastal access to the summer villa

Table A1. *Cont.*

Name of the Summer Villa/Location	Historic Gardens within the Summer Villa Walls (Area in m²)	Historical Land Uses in the Immediate Landscape (Area m²)						Historical Paths and Access Routes to the Summer Villa and towards the Historical Core, Economic Area, and Port Gruž
		Vineyard	Pastur	Olive Groves	Orchard	Arable Land	Indigenous Vegetation	
4. Stay/area C	3193	6100	60,000	40,000	/	/	/	Well connected with secondary and main pathways, coastal access to the summer villa
5. Bozdari/area C	1440	5849	1123	/	1300	/	340,000	Well connected with secondary and main pathways, coastal access to the summer villa
6. Sorgo— Skala/area C	5841	4200	8800	22,000	/	3600	38,600	Well connected with secondary and main pathways, coastal access to the summer villa

Table A1. *Cont.*

Name of the Summer Villa/Location	Historic Gardens within the Summer Villa Walls (Area in m²)	Historical Land Uses in the Immediate Landscape (Area m²)						Historical Paths and Access Routes to the Summer Villa and towards the Historical Core, Economic Area, and Port Gruž
		Vineyard	Pasture	Olive Groves	Orchard	Arable Land	Indigenous Vegetation	
7. Resti/area C	3225	5920	13,022	42,900	35,036	/	152,166	Well connected with secondary and main pathways, coastal access to the summer villa
8. Gozze/area C	1387	126,440	19,969	59,288	95,703	/	2338	Local pathways, coastal access to the summer villa

Table A2. Present land use of the summer villa landscape—Situation according to orthoimagery (2024).

Name of the Summer Villa/Location	Present Land Uses of the Summer Villa	Historic Gardens within the Summer villa Walls (Area in m²)	Present Land Uses of the Immediate Landscape						Built Landscape (Area in m²)				Present Paths and Access Routes to the Summer Villa	Boundaries of Cultural and Natural Heritage Protection	Free Spaces in the Immediate Villa Landscape beyond the Perimeter Wall
			Cultivated Landscape/Naturale Landscape (Area in m²)						Building	Parking Lot	Road	Docks			
			Cutivated Gardens	Pasture	Olive Grove	Orchards, Vineyards	Arable Land	Indigenous Vegetation							
1. Skočibuha/area A	Public use—Dubrovnik Science Library—book depot/neglected	4828	42,183	/	/	/	/	44,875	145,120	40,883	91,758	/	Partially preserved historic communications; traffic adjacent to the summer villa	UNESCO buffer zone; cultural heritage protection within the wall of the summer villa	No free spaces
2. Sorgo/area B	Public use—Croatian Academy of Sciences and Arts—Institute for Historical Sciences – ongoing restoration	2862	17,660	/	/	/	/	40,446	25,363	5692	8355	1822	Partially preserved historic communications; road has cut off sea access to the summer villa; traffic adjacent to the summer villa	UNESCO buffer zone; cultural heritage protection of landscape beyond the summer villa wall	Partially free spaces
3. Bona—Caboga/area C	Public use—City of Dubrovnik—multipurpose cultural events	1123	/	/	/	/	/	118,732	23,366	3000	10,500	14,345	Historic communications not preserved; road has cut off sea access to the summer villa; traffic adjacent to the summer villa	UNESCO buffer zone; protected significant landscape cultural heritage protection within the wall of the summer villa	Partially free spaces
4. Stay/area C	Public use—Croatian Conservation Institute	2045	2919					96,542	2568	884	6680	2200	Historic communications not preserved; road has cut off sea access to the summer villa; traffic adjacent to the summer villa	UNESCO buffer zone; protected significant landscape; cultural heritage protection within the wall of the summer villa	Partially free spaces

Table A2. *Cont.*

Name of the Summer Villa/Location	Present Land Uses of the Summer Villa	Historic Gardens within the Summer villa Walls (Area in m²)	Present Land Uses of the Immediate Landscape										Present Paths and Access Routes to the Summer Villa	Boundaries of Cultural and Natural Heritage Protection	Free Spaces in the Immediate Villa Landscape beyond the Perimeter Wall
			Cultivated Landscape/Naturale Landscape (Area in m²)						Built Landscape (Area in m²)						
			Cultivated Gardens	Pasture	Olive Grove	Orchards, Vineyards	Arable Land	Indigenous Vegetation	Building	Parking Lot	Road	Docks			
5. Bozdari/area C	Public use—City of Dubrovnik—ongoing restoration	1129	451	/	/	/	/	303,002	1588	2300	28,848	2450	Historic communications neglected; road has cut off sea access to the summer villa; traffic adjacent to the summer villa	Protected significant landscape; cultural heritage protection of landscape beyond the summer villa wall	Free spaces
6. Sorgo—Skala/area C	Public use—ACI Marina—ongoing restoration	4774	12,923	/	/	/	/	35,798	15,810	16,883	5776	5400	Historic communications not preserved; partially preserved sea access to the summer villa	Protected significant landscape; cultural heritage protection within the wall of the summer villa	Partially free spaces
7. Resti/area C	Public use—City of Dubrovnik—ongoing restoration	3225	51,027	/	/	/	/	192,408	27,663	15,763	16,105	2200	Historic communications not preserved; preserved sea access to the summer villa	Protected significant landscape; cultural heritage protection of landscape beyond the summer villa wall	Partially free spaces
8. Gozze/area C	Public use—City of Dubrovnik—ongoing restoration	1387	28,104	/	/	/	/	88,580	25,266	2264	9716	70,041	Historic communications not preserved; road has cut off sea access to the summer villa; traffic adjacent to the summer villa	Protected significant landscape; cultural heritage protection of landscape beyond the summer villa wall	No free spaces

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Localized Canal Development Model Based on Titled Landscapes on the Grand Canal, Hangzhou Section, China

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Abstract: After the decline of water transportation along the Grand Canal, the integration of urban development and the preservation of cultural heritage along the canal has become imperative. This paper takes the titled landscape as its research perspective and investigates the cultural significance of the canal through its historical, spatial, artistic, and spiritual dimensions, identifying the "Ten Canal Scenes" (TCS) that encapsulate both the canal's heritage and the unique characteristics of Hangzhou, with the aim of establishing notable urban cultural landmarks. Archival analysis, average nearest neighbor (ANN) analysis, nuclear density analysis, and clustering of resource sites are first used to identify cultural landscape features. Evaluation and decision-making techniques are then used to comprehensively assess and categorize the conservation and utilization value for the TCS based on the value evaluation framework. Finally, it proposes strategies for enhancing the comprehensive values of titled landscapes and addressing socio-economic and cultural dimensions. These efforts seek to reconcile the preservation of the canal's cultural heritage with the ongoing regeneration and development of the city and propose references for a localized canal development model based on titled landscapes.

Keywords: titled landscape; cultural landscape; Ten Canal Scenes (TCS); Grand Canal; eight-scene culture

1. Introduction

1.1. The Need for Localization of Cultural Landscapes

In 1992, the World Heritage Committee formally introduced the concept of "Cultural Landscape", defined as "a heritage object that combines humanity and nature, focusing on a wide range of categories such as territorial landscapes, historical spaces, and cultural places" [1]. Put simply, a cultural landscape emerges from human activities interwoven with natural surroundings, embodying connections to historical events, individuals, and activities, or showcasing traditional aesthetics and cultural values [2]. Intangible cultural heritage also forms an important part of the World Heritage values [3].From the perspective of the cultural landscape, scholars have studied the mechanisms of regional town and settlement evolution; for example, Mohammed A. investigated the influence of the traditional value system on the cultural landscape of Alckas Village in Saudi Arabia and its development and evolution process [4], and Wan, M. et al. combined the cultural landscape perspective with the study of the regional landscape protection of historical towns and settlements to construct land use planning methods that integrate urban landscape protection [5].

In recent years, more research worldwide has focused on natural and cultural landscapes like pastures [6], historic orchards [7], and planting landscapes [8]. This has led to a new area of study within historical geography, focusing on cultural landscape assessment [9]. Researchers are placing greater importance on the cultural value and local traditions associated with these landscapes. For example, geo-site assessments reveal the strong cultural ties between communities, particularly indigenous populations, and volcanic landscapes. By enhancing the emphasis on these cultural factors in current evaluation

methods, an area's unique geo-heritage values can be better conserved [10]. Researchers are also exploring how different people perceive and interact with landscapes. This shows a growing interest in involving communities and stakeholders in decision-making about cultural landscapes [11,12].

Research and theories concerning cultural landscapes offer rich insights into the composition and conservation of these landscapes from the perspective of heritage preservation. However, due to cultural diversity, existing international research focuses and objects differ greatly from those in China. Research on local cultural landscapes with unique characteristics is, therefore, not directly applicable, making it necessary to explore the conservation of cultural landscape heritage in China within its own context. This approach should develop a method for protecting and nurturing cultural landscapes that reflects Chinese characteristics and connotations.

The process of researching cultural landscapes in China is mainly divided into three stages: the introduction of the concept of the cultural landscape and the definition of localized concepts, the research on the division of cultural landscape heritage types, and the exploration of the territoriality of cultural landscape conservation. Some scholars took the lead in introducing the concept of the cultural landscape into China [13,14]. Han [15] and Shan [16,17] reinterpret the concept of cultural landscape heritage by promoting extensive research work on the domestic cultural landscape as a form of heritage. Typological studies and indigenous approaches have been the focus of cultural landscape research. For example, Zhou and Li [18] classified cultural landscape heritages in China based on China's own cultural characteristics. Moreover, Cai [19] and Wang [20] defined and categorized cultural landscapes, focusing on the regional and local characteristics. The existing literature on cultural landscape conservation predominantly focuses on either macro-level conceptual analyses or micro-level case studies, particularly emphasizing villages and cultural heritage. For example, the cultural landscapes of southern Anhui traditional villages have been discussed [21,22]. However, there is a noticeable gap in the theoretical studies and spatial shaping of urban cultural heritage at the meso-level.

As a UNESCO World Cultural Heritage Site, the Grand Canal holds significant importance in navigation, culture, tourism, and recreation. Its extensive influence, elevated status, and diverse value subjects necessitate urgent attention. In 2014, the inclusion of the Grand Canal of China on the World Heritage List marked a significant milestone, highlighting its cultural and historical significance. Subsequently, in 2019, the Office of the State Council of the People's Republic of China issued a directive aiming for the completion of the Grand Canal National Cultural Park by the end of 2023. The construction of the Grand Canal Cultural Belt has become a major strategic task for national cultural construction in China [23].

The transition from the "conservation of the canal" to the "conservation of the canal city" signifies a new phase in the heritage preservation efforts post-inscription. However, as development pressures increase in the local area, conflicts between heritage preservation and development have emerged. Although numerous studies explore the Grand Canal Cultural Belt, they primarily examine suburban or rural areas in other cities traversed by the canal [24–26]. There are fewer studies on urban planning for the type of city center that the canal crosses; for example, Hangzhou, Suzhou, etc. Fewer studies have been conducted on the Grand Canal at the level of urban planning. Hangzhou, with its unique "city–river interdependence", presents distinct challenges. Moreover, modern urban planning, prioritizing functionality and engineering, often overlooks the poetic nuances inherent in traditional Chinese aesthetics. Therefore, in developing the Grand Canal National Cultural Park, there is a need to cultivate a cultural landscape that integrates with the landscape image of the Grand Canal.

1.2. Conflicts between the Protection, Utilization, and Development of Cultural Landscapes along the Grand Canal, Hangzhou Section
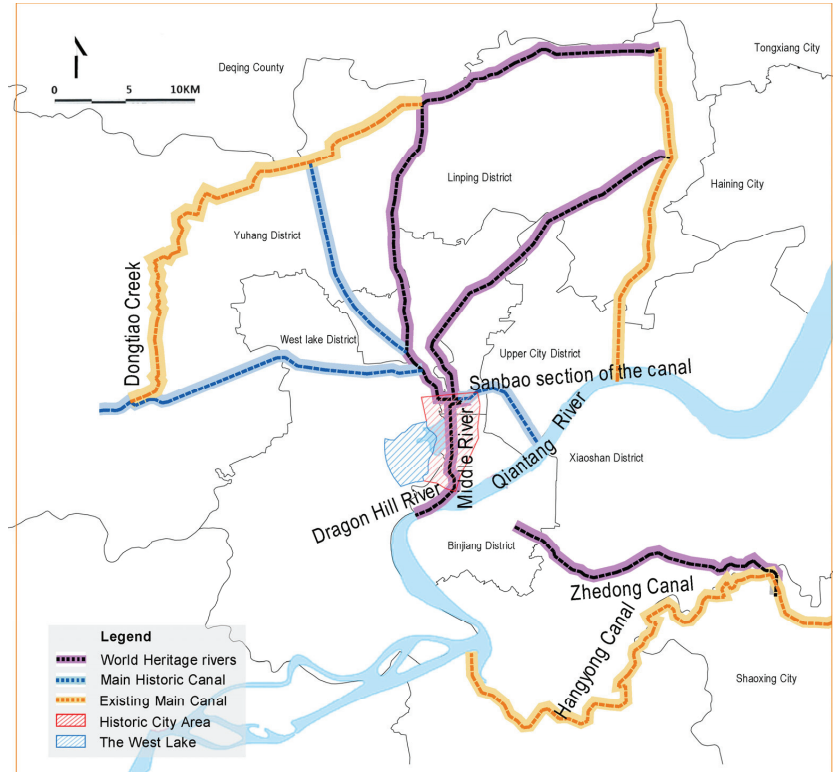
The Hangzhou section of the Grand Canal (hereinafter referred to as the Hangzhou section or "the canal") includes the section of the Jiangnan Canal from Zhenjiang to Hangzhou. The Hangzhou section (hereinafter referred to as the Hangzhou section) has played a crucial role in the prosperity and development of Hangzhou City in history [27] (Figure 1). However, Hangzhou, as the terminus of the Grand Canal, uniquely integrates the canal with its urban fabric, presenting a distinctive "city and river interdependence" compared to other canal-side cities, such as Beijing, Shaoxing, and Ningbo. Unlike other cities along the canal, where the countryside predominantly borders the river, Hangzhou's urban development has been closely intertwined with the canal since ancient times. The Grand Canal's passage through the main urban areas and densely populated built-up surroundings intensifies the conflict between its developmental and conservation values. While the canal served as a vital transportation route in the Tang and Song dynasties, modern transportation has reduced its significance, leading to a weakening interaction between the canal and urban development. On 18 July 2023, with the opening of the Second Canal Passage in Hangzhou's countryside area, most of the ancient canal's function of transporting goods will be shifted out of the city and into the countryside. Large areas of linear urban space around the canal are becoming heritage conservation areas or control zones. In the current national spatial planning framework, the development around the canal and in the northern part of the city faces significant constraints. Therefore, there is a need to find a balance between development requirements and control measures, allowing for flexible adjustments while enhancing the landscape along the canal. Transforming the banks of the Grand Canal into vibrant spaces that integrate seamlessly with the city is essential for fostering a sense of community among citizens. In this context, the effective management of conflicts between heritage protection, development, and utilization along the Grand Canal is essential.

Spatial zoning, project management, and other strategies must be optimized to achieve the construction of the Grand Canal National Park and ensure the overall coordinated development of the "city and river" symbiosis. Moreover, there is a pressing need to enhance analytical techniques to manage cultural landscape protection, development, and utilization more effectively. Scientifically exploring and demonstrating methods of protection and utilization will enable sustainable development while preserving cultural heritage.

In light of these considerations, conducting research and discourse from a multidimensional value perspective, and subsequently developing a tailored systematic evaluation system, could yield comprehensive insights into possible future planning approaches. Such an approach, focused on the local context, could facilitate a multidimensional assessment of the "Ten Canal Scenes" (TCS) or "Ten Canal Views" (TCV) that are selected in this paper, aiming a holistic landscape consideration toward types of urban cultural landscapes and offering targeted recommendations for conservation and development initiatives along the Grand Canal.

1.3. Titled Landscapes with "Poetry and Painting Aesthetics"

Deeply rooted in poetry and painting, China's cultural legacy has significantly influenced urban development through "Poetry and Painting Aesthetics". This connection is exemplified by iconic landscapes like the "Ten Scenes of West Lake" and the "Eight Scenes of Xiaoxiang River", which infuse urban spaces with historical and artistic significance. These cultural landscapes are often called "titled landscapes". They are also referred to as "eight-landscape culture", in which "eight-landscape" does not specifically refer to eight landscapes, but to the idea of "landscape" as comprising sets of claims in the general sense, that is, certain places have a number of landscapes, such as eight or ten or twelve set together.

(**a**)
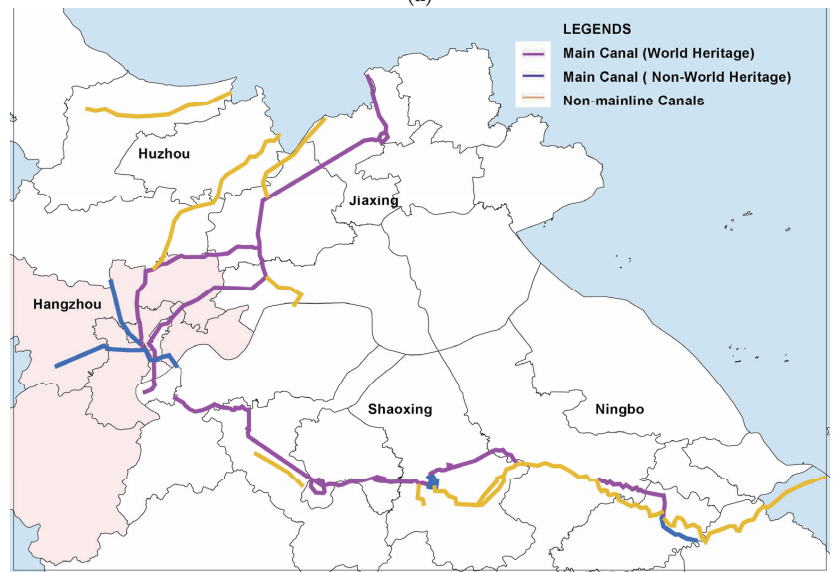
(**b**)

Figure 1. *Cont.*
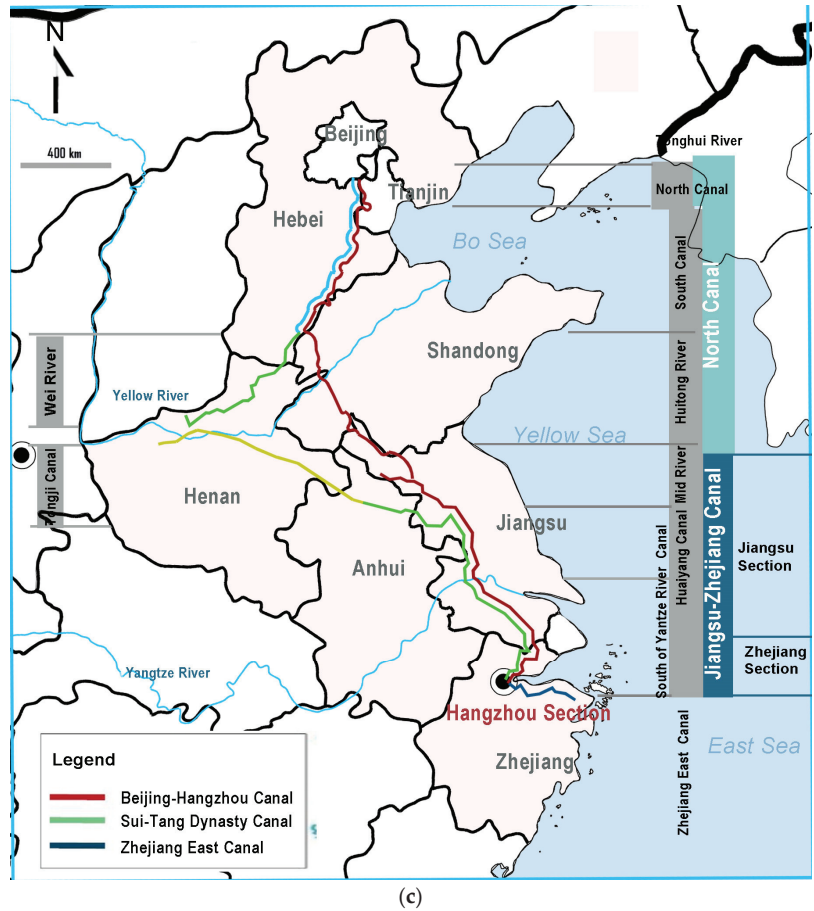
Figure 1. (**a**) The Hangzhou section; (**b**) the location of the Hangzhou section in the Zhejiang section and the "canal in city" dilemma of Hangzhou; (**c**) the location of the Hangzhou section in the Beijing–Hangzhou Grand Canal (drawn by authors, adapted from [28,29]).

1.4. Research Aim

Alongside Hangzhou's urban renewal and development initiatives, there is an urgent need to select TCS in accordance with the canal's resources. Unlike the extensively explored cultural significance of West Lake, the canal offers ample opportunity for the development of its cultural functions, especially following the decline of its transportation role. This study adopts a thematic approach centered on titled landscapes to investigate the cultural landscape elements of the canal across historical, spatial, artistic, and spiritual dimensions. By evaluating the cultural landscape's value, particularly through the TCS model, this research aims to explore the traditional framework and methods to establish impactful urban cultural landmarks. This endeavor seeks to harmonize the imperative to unearth the canal's cultural landscape with Hangzhou's urban development goals. It aspires to achieve the preservation, transmission, and promotion of the canal's cultural heritage while concurrently fostering the creation and personalized management of iconic urban cultural landscapes.

1.5. Research Framework

This paper adopts titled landscapes as its research focus, with a specific emphasis on the canal as the subject of investigation. It systematically classifies and analyzes cultural landscape elements along the canal route, refines the concept of the TCS, and proposes a landscape enhancement strategy for the node spaces associated with these scenes. The main content is structured into the following three stages (Figure 2).
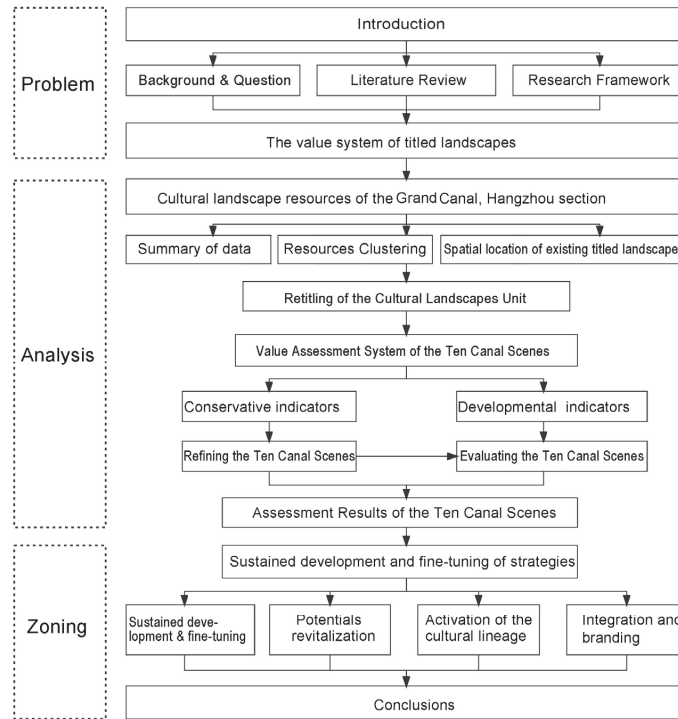
Figure 2. Research framework (source: the authors).

1.5.1. Resources Organization along the Hangzhou Section

The cultural landscape resources along the canal are sorted out. The sample of cultural landscape resources along the canal includes not only heritage historical resources, but also unregistered historical resources, intangible cultural recreational resources, and modern and contemporary architectural landscape resources. Based on the basic data, this paper analyzes the spatial embodiment of cultural landscape resources and the current problems from the definition, classification, distribution, and level of cultural landscape resources, so as to effectively sort them out and extract the title clusters based on the aggregation of resource points.

1.5.2. Assessing the Value of the TCS

The assessment of the current status of the TCS is based on the extraction of clusters and is mainly divided into three parts. The first part constructs a cultural landscape value assessment system based on both conservation and developmental indicators. The second part updates the TCS and proposes new ones so that they are more in line with current realities. By drawing upon conservation indicators and performing a complete examination of cultural landscapes along the canal, this paper aims to inherit and integrate existing titled landscapes while incorporating canal-related cultural elements, Hangzhou culture, poetry, painting, calligraphy, and local chronicles. From this synthesis, this paper aims to extract

a set of TCS characterized by rich cultural connotations that creates a lasting impression of Hangzhou. The third part evaluates the value of the TCS proposed in the second part and suggests countermeasures based on current urban development. We begin by evaluating the TCS based on the developmental indicators, and then couple the results of the conservation and developmental indicators. Finally, this paper summarizes them to form the final results of the value evaluation.

1.5.3. Strategies for TCS Landscape Imagery Construction

Based on the assessment outcomes of the TCS, landscapes will be categorized and segmented. Subsequently, tailored strategic recommendations will be formulated for each category of titled landscapes.

2. Literature Review

2.1. Literature Review on the Titled Landscape and the TCS

2.1.1. The Origin of the Titled Landscape and Its Spread in Pan-East Asia

Regarding the origins of the eight-scene culture, theories like the "Eight Scenes of Xiaoxiang" [30,31] and "Eight Songs of Dongyang" [32,33] have brought differing interpretations among scholars from Japan, the Korean Peninsula, and Vietnam [13,15]. Scholars generally agree that eight-scene culture originated in the pre-Qin era, sprouted in the Wei and Jin Dynasties, matured in the two Song Dynasties, and achieved prosperity in the Ming and Qing Dynasties [34]; from the Southern Song Dynasty, it became a town space landscape creation mode. Figures 3 and 4 show the TCS of West Lake. From left to right, they are as follows: 1—*Autumn Moon on a Placid Lake* (平湖秋月)/*Deep Cave and Valley on Feilai Peak* (飞来洞壑), 2—*Admiring Fish at Huagang* (花港觀魚), 3—*Leifeng Pagoda in Evening Glow* (雷峰夕照), 4—*Early Spring Morning on Su Embankment* (蘇堤春曉), 5—*Clouds Between Twin Peaks* (兩峰插雲), 6—*Evening Bell at Southern Screen* (南屏晚鐘), 7—*Orioles Warbling on Willows* (柳浪聞鶯), 8—*Lingering Snow at Broken Bridge* (斷橋殘雪), 9—*Moon and Candle-light Mirrored in the Lake* (三潭映月), and 10—*Wine-making Yard and Lotus Pool in Summer* (曲院风荷). There is one difference in the composition of the TCS between Lan's illustration and Ye's: Lan replaced *Autumn Moon on a Placid Lake* (平湖秋月) with *Deep Cave and Valley on Feilai Peak* (飞来洞壑). *Feilai Peak* is a unique interpretation of the Ten Scenes from the Ming Dynasty. Sun discussed the similarities and differences between the "Ten Scenes of West Lake" and other landscape paintings of West Lake [35,36], and surmised that "image" is the main theme of the Ten Scenes paintings [37].
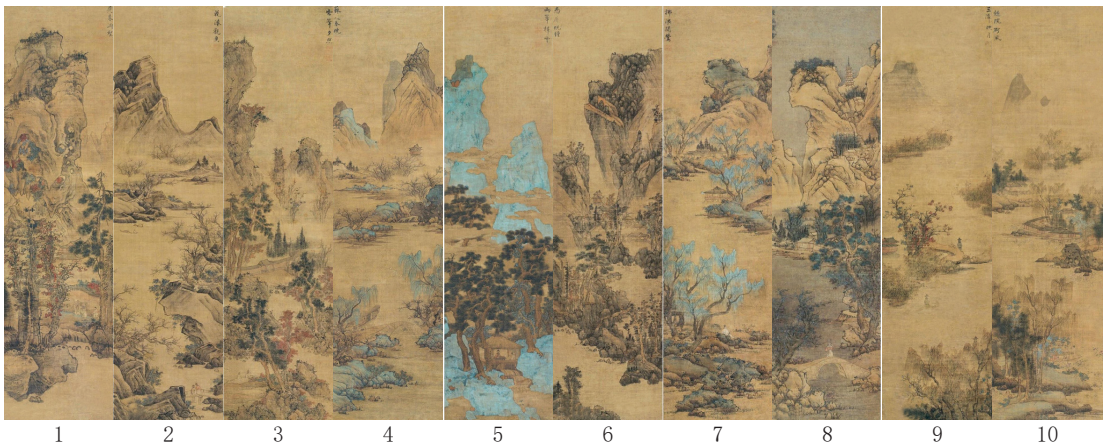
Figure 3. *Ten Scenes of West Lake* painted by Lan Y. in the Ming Dynasty, with *Deep Cave and Valley on Feilai Peak* (飞来洞壑) [35].
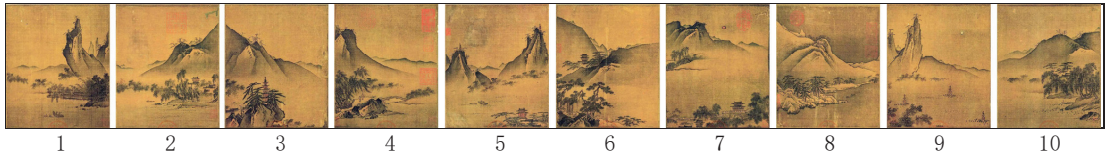
Figure 4. *Ten Scenes of West Lake* painted by Ye X. in the Song Dynasty, with *Autumn Moon on a Placid Lake* (平湖秋月) [36].

There are also variations in the painting styles of the different versions of the TCS depictions. According to legend, Song Di of the Northern Song Dynasty selected the scenery at the merging point of Xiangshui and Xiashui in Zuoling, Hunan Province, and painted the Eight Scenes of Xiaoxiang [30,31] (see Figures 5 and 6). From left to right, they can be named as follows: 1—*Twilight Snow in the River Sky* (江天暮雪), 2—*Night Rain in Xiaoxiang River* (潇湘夜雨), 3—*Autumn Moon in the Dongting Lake* (洞庭秋月), 4—*Evening Bells in the Smoky Temple* (烟寺晚钟), 5—*Sails Returning to the Distant River* (远浦帆归), 6—*Wild Geese Falling in the Flat Sand* (平沙雁落), 7—*Sunset in the Fishing Village* (渔村落照), and 8—*Clear Sky in the Mountain Town* (山市晴岚). The Eight Scenes of Xiaoxiang were painted in a more poetic style by the Qing Dynasty monk Shangrui (see Figure 6) than by Zhang Y. in the Yuan Dynasty (see Figure 5). These cultural landscapes serve as dynamic representations of cultural heritage, enriching urban environments with historical depth and vibrancy. Their designs go beyond spatial arrangements, integrating elements of time and sensory experiences to create a unique perception of space.
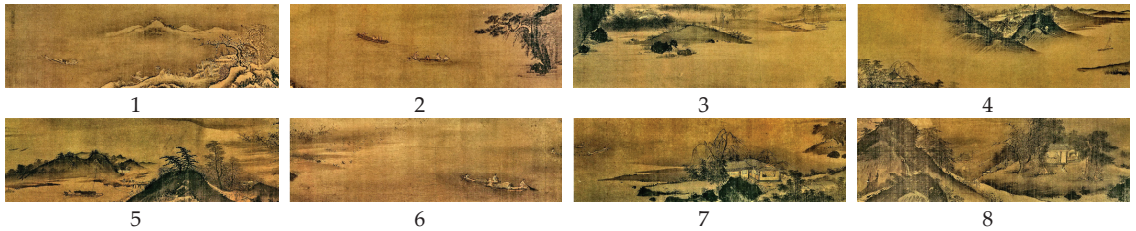
Figure 5. Realistic portrayal of Eight Views of Xiaoxiang by Zhang Y. in the Yuan Dynasty [30].

Figure 6. Poetic portrayal of Eight Views of Xiaoxiang by the monk Shangrui in the Qing Dynasty [31].

In the 12th century, the titled landscape was brought into Korea by the Goryeo painters, and in the 14th-century Kamakura era, it was brought by monks into Japan [5] and by an envoy into Vietnam [38]. Since then, there was a wave of influence into the other areas around the circle of Chinese civilization and the pan-East Asian region, forming a kind of international Oriental cultural phenomenon. In addition to Chinese scholars who study the titled landscape, scholars in the Pan-East Asian regions such as North Korea, South Korea, Japan, and Vietnam, which have been influenced by Chinese culture, as mentioned above, have also studied it [39].

2.1.2. Similar Paradigmatic Titled Landscapes around the World

There are also various similar paradigms of titled landscapes in Europe, America, and the rest of the world. Although they do not have as long and widespread a history as the titled landscapes in China, nor do they have universal standards and official certifications, they still represent important attractions and cultural landscapes in cities or regions. For instance, dating back to the third century B.C., the traveler Antipater listed the "Seven Wonders of the Ancient World" [40], concentrated in the eastern Mediterranean coastal areas. Other notable sets include the "Seven Wonders of the Middle Ages" [41], the "Engineering Wonders of the World" [42], recognized by the American Society of Civil Engineers, the "Natural Wonders of the World" proposed by Lowell Thomas, and the "New Seven Wonders of the World" [43] initiated by the New Seven Wonders Foundation. Famous cities often have their own sets of designated landscapes, such as Venice, London, Paris, and Berlin. These Western landscapes predominantly showcase magnificent human-made structures such as churches, bridges, and tombs, etc., which are unlike East Asia's featured poetic and artistic elements. While they hold historical and cultural value, they are primarily characterized by architectural achievements and are less associated with artistic endeavors such as poetry, literature, and painting. Moreover, while these landscapes may share a unified title, the individual attractions within them often lack unique landscape titles. On the other hand, Western countries boast landscapes with similarities to China's "poetry with paintings" aesthetic. For instance, England's Lake District inspired Romantic poets like William Wordsworth and Samuel Taylor Coleridge to create numerous poems celebrating its natural beauty. Provence, France, attracted renowned artists and writers such as Van Gogh and Paul Cézanne, whose works have become integral to the region's cultural identity. Similarly, Tuscany, Italy, renowned for its medieval towns, ancient castles, and vineyards, served as a haven for Renaissance artists and scholars. These regions offer unique natural landscapes intertwined with literary and artistic heritage, forming vibrant cultural tapestries that continue to captivate tourists and inspire artists worldwide. In the 19th century, the Hudson River School emerged as the foremost North American landscape painting movement, capturing the picturesque and sublime grandeur of American landscapes sought by Romanticism. Through their depictions of landscapes and customs, these painters showcased the vast expanse of the United States, particularly emphasizing its majestic scenery to bolster the national identity. This marked a pivotal moment as the United States began to distinguish itself from European influences, gradually revealing its distinctive artistic style [44]. But these areas usually do not title their landscapes with poetry, nor name a group of them collectively, contrasting with the poetic and abstract titles found in Chinese landscapes, such as *Autumn Moon over the Tranquil Lake* and *Broken Bridge with Lingering Snow*.

2.2. *Literature Review on the Value System of Titled Landscapes*

As the concept of titled landscapes originated in China, Chinese scholars and institutions have increasingly delved into this field in recent years. This surge in interest is not only due to academic exploration but also reflects a growing national recognition of its significance within the tourism industry. Stressing the historical value of titled landscapes, refining their cultural connotations, and leveraging their unique historical and cultural characteristics have become focal points for landscape planning and design. According to our literature review, titled landscape value studies can be categorized into the following three main groups based on different research perspectives: historical, cultural, and spatial perspectives (Figure 7).

2.2.1. Historical Value and Traceability Study of Titled Landscapes

The historical value of the titled landscapes is reflected in the function of the "Eight Scenes" as cultural symbols and scenic records, which not only record the local customs, but also retain a wealth of historical information. Therefore, it can be said that the "Eight

Views" is a local historical source with important cultural significance and extremely valuable historical data [45].
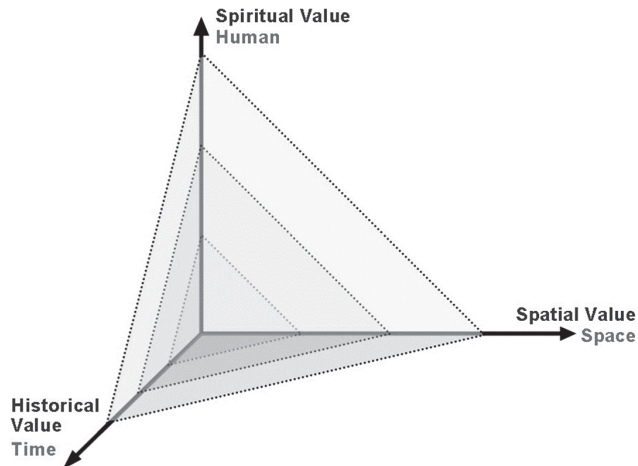
Figure 7. Value system of titled landscapes (source: the authors).

2.2.2. Cultural (Spiritual) Value of Titled Landscapes

Studies on the cultural value of titled landscapes encompass sociological and cultural analysis, poetic and graphic exploration, and investigations into naming conventions. Poetic and graphic studies examine the artistic expressions and cultural exchange inherent in "Eight Scenes" culture [46–48]. "Eight Scenes" culture is a unique art form that has been passed down in many forms, including poetry, painting, cultural exchange, and aesthetic education. The study of poetry and graphic arts is manifested in the exploration of literature, the art of painting, cultural communication, and even aesthetic education.

International research, particularly in Japan and Korea, focuses on the influence of "Eight Scenes" literature and art on their respective cultures. Additionally, scholars analyze the linguistic and aesthetic aspects of landscape names, exploring their conveyance of content, structure, and ideological connotations. Since China's eight-scene culture is mainly exported to foreign countries in the form of poems and paintings, foreign research on the eight-scene culture mainly focuses on the impact of literature and art fields. For example, a Japanese Chinese literature research expert analyzed in detail the spread of the "Eight Scenes of Xiaoxiang" in Japan and its influence on many fields of art in Japan [49]. Rho J H. and An J L. believe that the "Eight Scenes of Xiaoxiang" have been the driving force of literary aesthetics on the Korean Peninsula since they were imported from the Goryeo Dynasty, and they are considered the classic form of its landscape culture [50,51].

In the study of title naming, because the names of the "Eight Scenic Spots" are mostly four-letter words with condensed and vivid characters, some domestic scholars also focus on the study of landscape title naming when they study the literary nature of the titled landscapes; e.g., Lu made a detailed exposition of the content conveyance, structure, ideological connotation, naming source, aesthetic meaning, and other aspects of the traditional "Eight Scenic Spots" in the titles of the landscapes [48]. Wang discussed the origins and evolution of landscape title naming, the basic requirements for naming the landscapes, which are "cut", "elegant", "fine", and "new", as well as the materials and techniques for titling the landscapes [52].

2.2.3. Spatial Patterns and Inheritance and Innovation of Titled Landscapes

The spatial patterns of the landscape are inextricably linked to the natural and human context of towns and cities, which are found throughout China, with a significantly higher

number in the south than in the north, and a significantly higher number in the east than in the west. During the Ming and Qing dynasties, this situation became even more pronounced. In the fields of literature and art, this eight-scene culture has received a great deal of research, but relatively little has been done to utilize and study it in regional landscape planning [53–55]. The protection and restoration of the eight urban scenic spots are mostly combined with modern urban constructions such as parks and green space systems, such as in Ningguo City, which restored and rebuilt the "Eight Scenic Spots of Ningguo" in order to form a new urban park system [56]. Jingning County retains and inherits history and culture by reinterpreting the "Ten Scenes of Hexi", and has developed them into the "Eight Scenes of Jingning Night" [57]. The West Lake Scenic Area in Hangzhou coordinates the restoration of historical buildings and structures recorded in the "Ten Scenes of West Lake" of different dynasties [58]. The "New Eight Scenic Spots" is an innovative action to protect and restore the traditional eight scenic spots. The "New Eight Scenic Spots" continue the traditional naming method [59], inherit the connotation of the scenic spots, and incorporate new attractions, aiming to enhance the public's sense of belonging, highlight the local characteristics, and promote the development of tourism [60].

3. Research Methodology of Evaluation

3.1. The Framework of Conservation and Developmental Indicators

The effective protection of historic cultural landscapes and elements necessitates a comprehensive inventory of historical elements [61]. This involves identifying the principles for dividing cultural landscape units that optimize the economic and technical performance of conservation planning while minimizing the need for intervention. Franch-Pardo et al. evaluated the qualities of visibility, quality, and fragility to assess landscapes' suitability for protection, considering both biophysical and visual landscape aspects. Based on this, they generated maps indicating the suitability of areas for protection [62]. Krajnik, D. et al. analyzed the historical evolution and the natural, urban, and architectural aspects of the cultural landscape, using both general and specific criteria, offering a direction for future interventions aimed at safeguarding historical heritage on the Island of Cres in Croatia and averting damage from subsequent actions, all while promoting the sustainable development of a small historic town [63]. These international studies have demonstrated that the conservation of cultural landscapes requires, first and foremost, a comprehensive survey of heritage resources and a systematic evaluation of indicators.

3.1.1. Evaluation Indicators for the Values of the TCS

With the deepening of the study of the cultural landscape, a variety of interpretive perspectives on the value of cultural landscapes have emerged to carry out theoretical research on the paradigm of cultural landscape values [64–68]. Cao Y. [64] and Fu F. [65] use ephemerality and co-temporality as the evaluation system to measure the historical layers of the time dimension and the landscape characteristics of the spatial dimension. Ephemerality focuses on the complete life cycle of cultural landscape generation and development, and the digging into and protection of historical layers in the time dimension. Co-temporality focuses on contemporary landscape features from a spatial perspective, as well as the identification and protection of landscape features in the spatial dimension. In addition, their theoretical analysis of the cultural landscape value paradigm pays particular attention to the dimensions of human spirituality, such as spiritual value [65], associativity [66], experiential value [67], and so on. For example, Bi X. [68] argues that the concept of wholeness associates nature and culture, promoting their interpenetration, dependence, and coherence. The concept of evolution associates history with the present, recounting the sum of potential landscapes in the process of historical development; this association includes all non-material elements such as history and culture, customs and habits, and the spirit of beauty.

Given the unique "city and river dependence" conditions in Hangzhou, which is significantly differentiated from other canal cities, it is crucial to explore the value coupling

mechanism for balancing the preservation and utilization of the canal's cultural landscape. This includes identifying synergistic mechanisms and promoting the development of a technical system for the preservation and utilization of the titled landscape. Comprehensive evaluation and coupling based on multidimensional factors can offer a viable mechanism for managing value conflicts in the preservation and utilization process of titled landscapes. The study begins with titled landscapes to provide a localized approach to the division of basic units of cultural landscapes.

Based on the relevant literature on the evaluation of the value of the cultural landscape and the cultural characteristics of the titled landscape, this paper argues that the value of the canal's cultural landscape consists of the spatial dimension, i.e., its holistic value; the temporal dimension, i.e., its evolutionary value; and the spiritual dimension, i.e., its associative value. The primary index layer includes the natural value and the landscape value, corresponding to the holistic association of nature and humanity. The historical value and the development value correspond to the temporal values. The spiritual and cultural values correspond to the association of various intangible elements, such as cultural revitalization, aesthetic spirit, and the spirit of faith. Based on Figure 8, the indicators can be categorized into conservation value and development value according to the change cycle of the value. The conservation value includes historical value, cultural value, and spiritual value. This type of value exists in the process of long-term historical development, with a long cycle of stable value change and high conservation significance. The developmental value includes landscape value, economic value, and social value, and has a high potential for change and a short cycle of change, reflecting its present and future value within a certain period of time (Table 1).
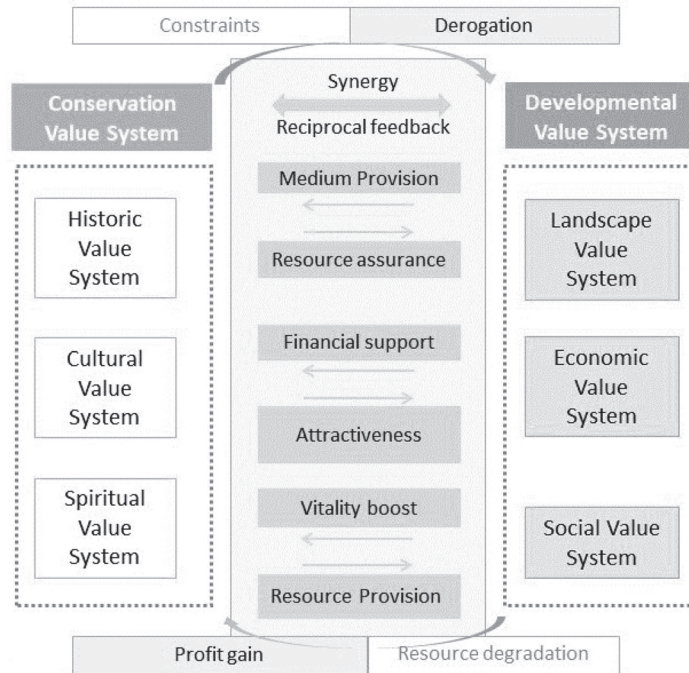

Figure 8. Multidimensional value system for titled cultural landscapes of the canal (source: the authors).

Table 1. Multidimensional value system for cultural landscapes of the canal (source: the authors).

Primary Indicators	Secondary Indicators	Tertiary Indicators	Primary Indicators	Secondary Indicators	Tertiary Indicators
Conservation indication (C)	Historic value (C.1.)	Number of historical and cultural resource sites (C.1.1.)	Developmental indicators (D)	Landscape value (D.1.)	Integrity of preservation (D.1.1.)
		Conservation level of historical and cultural resource sites (C.1.2.)			Diversity of elements (D.1.2.)
		Conservation level of the heritage sections (C.1.3.)			Spatial coherence (D.1.3.)
	Cultural value (C.2.)	Number of intangible cultural heritages (C.2.1.)			Landscape coherence (D.1.4.)
		Number of types of intangible cultural heritages (C.2.2.)		Social value (D.2.)	Educational value (D.2.1.)
		Conservation level of intangible cultural heritages (C.2.3.)			Service value (D.2.2.)
	Spiritual value (C.3.)	Availability of relevant traditional art works (C.3.1.)		Economic value (D.3.)	Usable value (D.3.1.)
		Availability of relevant works of modern art (C.3.2.)			Shipping value (D.3.2.)
					Tourism value (D.3.3.)

3.1.2. Conservation Indicators for the TCS

The protective indicators primarily encompass the historical, cultural, and spiritual resources provided by the entire cluster (refer to Table 2). For instance, the "Gongchen Invites the Moon" cluster must not only consider the historical, cultural, and spiritual attributes of the Gongchen Bridge itself but also account for resources offered by other cultural landscapes within and around the cluster. The primary objective of these protective indicators is to screen and evaluate categorized clusters based on resource point density, ultimately refining 10 representative cultural scenes with historical, cultural, and spiritual significance.

Historical value is primarily assessed through the number of cultural landscape resource points, calculated as the total number of resource points within the cluster after combining the points of each grade in ArcMap10.8. The protection level of the cultural landscape resource points is assessed by the protection grades of different grade resource points within the cluster, calculated using ArcMap10.8 and the corresponding standards. The classification level of the river in the heritage section is determined based on the Hangzhou Grand Canal World Cultural Heritage Protection Plan, considering the classification of protected river channels within the heritage area. The total number of historical and cultural resource points within the 24 clustered titled landscape areas is tallied using ArcMap10.8. Resource points at each level are weighted according to the weights specified in Table 2 to calculate the total score and grade score of cultural landscape resource points.

Cultural value is primarily determined by the number, type, and protection level of intangible cultural heritages within the clustering area. The selection focuses on contents from the national intangible heritage list, the world-class intangible heritage list, and other grades of intangible cultural heritage items obviously relevant to the canal or cluster area. The evaluation is based on the level of intangible heritage items within the cluster area, divided into three categories: items on the national-level intangible heritage list, items on other levels of the intangible heritage list, and no intangible cultural heritage, for assigning scores.

The spiritual value is primarily assessed by the presence of relevant art works in clustered areas or with titles. Works of art are categorized into traditional (such as poems and paintings), folklore, and modern art forms (such as paper-cutting, photography, and performance art) based on formation time.

Primary Indicators	Secondary Indicators	Tertiary Indicators
Historic value (C.1.)	Number of cultural landscape resource sites (C.1.1.)	The total number of resource points within the clusters was calculated by combining the resource points at each level within ArcMap10.8.
	Conservation level of cultural landscape resource sites (C.1.2.)	National cultural heritage units: 5 points; Provincial cultural heritage units: 4 points; Municipal cultural heritage units and sites: 3 points; Other historical and cultural resource sites: historic buildings and industrial heritage and contemporary cultural landscape resource sites: 2 points.
	Conservation level of the heritage sections (C.1.3.)	Class I protected riverbank: 3 points; Class II protected riverbank: 2 points; Class III protected riverbank: 1 point; Non-heritage section of river: 0 points.
Cultural value (C.2.)	Number of intangible cultural heritages (C.2.1.)	Number of intangible cultural heritages.
	Number of types of intangible cultural heritages (C.2.2.)	Intangible cultural heritages are categorized into 10 categories in accordance with the Representative List of Intangible Cultural Heritage at the National Level (ICH) as follows: folklore, traditional music, traditional dance, traditional drama, opera, traditional sports, performing arts and acrobatics, traditional fine arts, traditional arts and crafts, traditional medicine, and folklore. Only the number of intangible heritage categories within the clusters is counted in this indicator.
	Conservation level of intangible cultural heritages (C.2.3.)	2 points for items on the national ICH list; 1 point for items on other ICH lists; and 0 points for no ICH on site.
Spiritual value (C.3.)	Availability of relevant traditional art works (C.3.1.)	With: 1 point; without: 0 points.
	Availability of relevant works of modern art (C.3.2.)	With: 1 point; without: 0 points.

3.1.3. Developmental Indicators for the TCS

The primary objective of the developmental indicators is to assess whether the ten clusters, already abundant in the resource supply, can fulfill the needs of residents, tourists, and urban development (refer to Table 3). By integrating the outcomes of both conservation and development indicators, the final assessment result of the value of the TCS can be derived. This assessment offers insights into the supply and demand dynamics of titled landscape clusters, enabling the formulation of strategic recommendations for the TCS.

3.2. Research Methods and Design

The research focuses on assessing the cultural landscape of the canal, employing a comprehensive evaluation approach that considers multiple levels and types throughout the entire process. This involves performing archival analysis, identifying characteristics, uncovering issues, proposing strategies, and summarizing the model for the conservation and development of the titled landscape.

Primary Indicators	Secondary Indicators	Tertiary Indicators
Landscape value (D.1.)	Integrity of preservation (D.1.1.)	The extent to which the components of the cultural landscape have been maintained in terms of their composition and during their development.
	Diversity of elements (D.1.2.)	This refers to cultural landscapes that are themselves diverse in structures and functions, reflecting the complexity of the assemblage.
	Spatial coherence (D.1.3.)	Whether the building heights and skyline within the cultural landscape meet the height requirements of the Grand Canal zoning district and the requirements for the view corridors of important nodes along the Grand Canal.
	Landscape coherence (D.1.4.)	Whether the cultural landscape's architectural style and volume are in harmony with the landscape along the canal and the traditional architectural style, and whether they meet the aesthetic requirements for the important interfaces along the Grand Canal.
Social value (D.2.)	Educational value (D.2.1.)	This refers to whether the cultural, scientific, artistic, historical, and other values can enhance the social, cultural, and spiritual cultivation of visitors through tourism and publicity.
	Service value (D.2.2.)	Whether it can provide diversified public services, thereby enhancing the quality of life for residents along the canal.
Economic value (D.3.)	Usable value (D.3.1.)	This refers mainly to the economic value of the canal's cultural landscape that can be generated directly by its continued use.
	Shipping value (D.3.2.)	Whether the cultural landscape of the canal can enhance the function of flood control and drainage conservation, optimize allocation of water resources, promote shoreline conservation and wharf service enhancement, etc., so as to enhance the navigability of the canal waterway and contribute to the regional shipping value.
	Tourism value (D.3.3.)	This refers to whether the cultural landscape can enhance the tourism infrastructure and supporting services with cultural and tourism integration to develop high-quality canal tourism routes and products, or to build a canal cultural exchange platform.

3.2.1. Archival Analysis

The archival analysis method serves as the theoretical cornerstone for this study, complemented by the inclusion of historical literature as one of the research subjects. In constructing the evaluation system, this paper integrates insights from various fields and disciplines, including the selection of the city's new eight scenic spots, canal-related titled culture, poetry, painting, calligraphy, and local history, and cultural heritage evaluation indices. This synthesis allows the capturing of the disciplinary developments at the forefront and establishes the theoretical framework comprehensively and objectively. Furthermore, literature reviews and archival research were conducted to collect historical documents relevant to our study.

3.2.2. Identification Technology of Cultural Landscape Features

This technology focused on identifying and processing the cultural landscape characteristic elements of the Hangzhou section. It involved research on identifying and extracting the historical cultural landscape elements and pattern characteristics. This process included constructing a database to facilitate the comprehensive and diversified excavation of potential canal cultural landscape resources.

The research also explores cultural landscapes that harmonize with the city's topography, geomorphology, climatic characteristics, spatial patterns, and distribution of historical environmental factors. The unit division scheme aims to reflect the linear heritage characteristics of the canals, emphasize the central role of units at anchorage points, and acknowledge the uncertainty and ambiguity of unit boundaries. Additionally, it considers three-dimensional spatial information such as the threshold of human vision. By standardizing the scale of data sampling, we ensured consistency with feature patches.

Geographic Information System (GIS) spatial analysis was adopted to analyze spatial data, including the spatial location, distribution, morphology, and other information of geographic objects from spatial data. In this paper, the combing and clustering analysis of cultural landscape resources was based on the spatial analysis method embedded in Arc Map 10.8 to assist in decision-making.

Average Nearest Neighbor (ANN) Analysis

All resource points were de-ranked and merged in ArcMap10.8 for average nearest neighbor analysis by first measuring the distance between the center of mass of each element and the location of the center of mass of its nearest neighboring element; then, we calculated the average of all these nearest neighbor distances. If this average distance was smaller than the average distance in the hypothetical random distribution, the analyzed distribution of elements was considered as clustered elements. If this average distance was greater than the average distance in the hypothetical random distribution, the elements were considered as dispersed elements. The ANN was calculated by dividing the observed average distance by the desired average distance (see Appendix A.1).

Nuclear Density Analysis

Kernel density analysis uses a kernel function to calculate a measure per unit area based on point elements to fit individual points to a smooth conical surface, allowing for visualizing the abundance of resource points. The search radius has no effect on the value of the kernel density, but it does have certain effect on the final visualization and analysis results. If the search radius is too large, the surface of the kernel density is too smooth, resulting in hotspots of the study being covered up and features not being obvious; if the search radius is too small, the surface of the kernel density is uneven, which can reveal the features of the small localities but cannot ensure the continuity and correlation of the large-scale data.

Clustering of Cultural Landscape Resource Site Analysis

Based on the spatial landing and organization of the existing titled landscapes, including merging, deleting, and retitling, the current situation's cultural landscape clustering was derived.

3.2.3. Evaluation and Decision-Making Techniques
Refinement of the TCS

After selecting clustered titles based on the results of kernel density analysis, the titled landscape clusters were quantitatively scored and ranked according to the value indicators, in order to refine the TCS. The above three evaluation indexes were integrated, and the

scores were normalized to the maximum–minimum value, which means that the data are scaled according to the maximum and minimum values, and are announced as follows:

$$y = x - min / max - min \tag{1}$$

where x is the original data, y is the normalized data, and min and max are the minimum and maximum values of the original data, respectively. After obtaining the score normalization results, we then assigned weights for each item and then calculated the weighted sum. The total score could be obtained by directly adding the normalized results, and then the total score was sorted in descending order, and the top ten were identified as the TCS.

Comprehensive Assessment of the Conservation and Utilization Value of the "Ten Canal Scenes"

Conducting field surveys of various cultural landscapes along the canal was essential. This involved evaluating key elements, conducting stakeholder interviews, analyzing the literature, and synthesizing theories and indicators for screening and evaluation. The field survey data could be quantified to ensure that the research is scientific and accurate. By normalizing the scores of conservation and developmental indicators and then calculating the total score, the current assessment results of the TCS were obtained.

4. Results: Cultural Landscape Resources of the Grand Canal, Hangzhou Section

4.1. Summary of Data on Cultural Landscape Resources

Contemporary cultural landscape projects in Hangzhou were mapped using Arc Map 10.8, summarizing resource points based on various categories such as national key cultural heritage units, provincial cultural heritage units, municipal cultural heritage units, municipal cultural heritage points, other historical and cultural resource points, historical buildings, industrial heritage points, and contemporary cultural landscape resource points. The resulting distribution map of organized cultural landscape resource points is illustrated in Figure 9a.

4.2. Clustering of Cultural Landscape Resources

4.2.1. Average Nearest Neighbor Analysis

After the average nearest neighbor analysis of all resource points, the value of the ANN was obtained, i.e., the nearest neighbor ratio is 0.304308, from which it can be concluded that all cultural landscape resource points are significantly clustered in space.

4.2.2. Nuclear Density Analysis

Considering the scope of the titled landscapes, the comfort level of walking accessibility, the degree of aggregation of resource points, and other factors, 1000 m was selected as the search radius for kernel density analysis. The calculated values were divided into nine levels using the natural breakpoint method (Figure 9b), with the darker color representing a higher density of resource point distribution. The 1000 m search radius can show the clustering relationships among resource points well, but the high-density hotspot area features are not obvious. However, the results of the secondary analysis of hotspot areas according to the 500 m search radius (Figure 9c) show that hotspot areas can show more obvious clustering and spatial clustering relationships. Therefore, in this paper, the kernel density analysis was carried out for non-hotspot areas using a search radius of 1000 m and for hotspot areas using a search radius of 500 m.
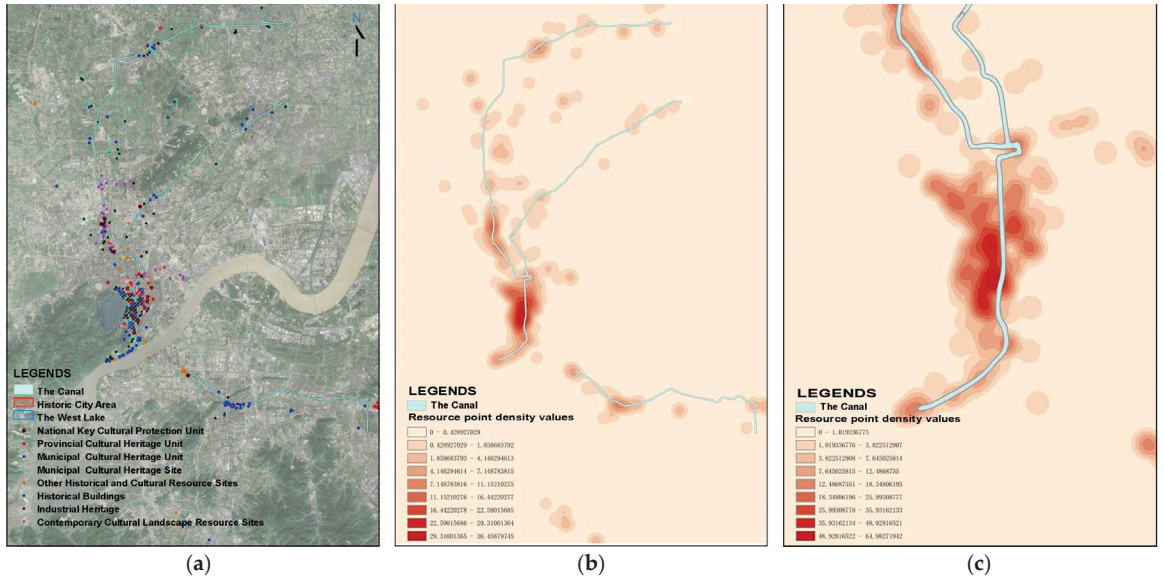
Figure 9. (**a**) Distribution of cultural landscape resource points of the canal. The line of red dots indicates the historic city center; the blue area indicates the West Lake (source: the authors); (**b**) kernel density analysis map for the 1000 m search radius; (**c**) map of the analysis of nuclear density hotspots with the 500 m search radius (source: the authors).

4.3. Spatial Location of Existing Titled Landscapes

The Hangzhou Grand Canal National Cultural Park Plan relies on ten skeleton rivers to form the planning structure, which is composed of "landscape clusters, riverbanks, ten core gardens, and a hundred scenic spots with special features" ([28], p13). Among them, "Hundreds of Scenic Features" refers to a number of characteristic resource spots with outstanding cultural themes and clustering of cultural resources, such as Gongchen Bridge, Dadou Road, and Xiangji Temple. Together, they constitute the Hangzhou Grand Canal National Cultural Park in five sections: Hangzhou Tang (south section), Hangzhou Tang (north section), Shangtang River, Zhedong Canal, Zhonghe River, and Longshan River (see Figure 1) (Appendix A, Table A1).

The titled landscapes of the Hangzhou Tang south section are based on the [Ming] Eight Scenes of Hushu, [Yuan] Qiantang Ten Scenes, Tangqi Ten Scenes, and Ten Scenes of the New Canal (voted on by citizens and experts in 2013) [69]. Hangzhou Tang is just one section of the Hangzhou Canal, and it has a number of currently recognized titled landscapes. With well over 200 inscribed landscapes in all the Hangzhou canals that have ever existed, it is difficult to keep track of them all.

The titled landscapes of Hangzhou Tang (northern section) are based on the 16 Scenes of Qixi [in the Qing Dynasty], the 10 Scenes of Bolu, and the 10 Scenes of the New Canal (selected by citizens and experts in 2013) [69], as well as the cultural landscapes shaped in the new era, which constitute the "Titled Landscape of Hangzhou Tang North".

The Shangtang River section includes the Shangtang River Linping section of the "New East Lake Ten Scenic Spots" and the Gongshu uptown section of the "New Shangtang Eight Scenic Spots".

The titled landscape of the Zhonghe and Longshan Rivers was constructed based on the [Qing] West Lake 18 Scenes, the new West Lake 10 Scenes (from 1984), the third round of the West Lake 10 Scenes voting (2007) [70], as well as the cultural landscape of the new era. They constitute the Zhonghe and Longshan Rivers titled landscape.

In the eastern section of the Zhejiang Canal, there are several versions of the historical titled landscape system from the Ming and Qing Dynasties. According to the principles of the preservation of landscape composition and the feasibility of restoration, and in combination with newly created landscapes at important nodes, the Xiaoshan Eight Scenes evolved to the "Xiaoshan New Eight Scenes".

All of the above titled landscapes were localized in ArcMap10.8, as shown in Figure 11a. It was found that the remains of some of the titled landscapes have now disappeared, such as the Ten Scenes of Linping East Lake. Linping Lake is a sea trail lake, and is also called "East Lake" because it is located in the eastern part of West Lake in Hangzhou. From the Tang Dynasty, Zhang Hu's poem "Passing through Linping Lake" reads as follows: "The mountain threshold is just a lotus leaf islet, and the water carcass is newly constructed with rice planting beds" [71]. Apparently, in the Tang Dynasty, Linping Lake's water rose up to the bottom of Linping Mountain [72] (figures cannot be found). After the lake receded to the south in the Song Dynasty, it came to have an area of more than three thousand acres, with fascinating scenery. Toward the end of the Ming and early Qing dynasties, Linping Lake retreated to five miles east of the town (Figure 10a). In the late Qing Dynasty, Linping Town was developed between Linping Hill, Ding Hill, and Linping Lake (Figure 10b). In the early Republic of China, the silt intensified, leaving only a swamp, and scattered ponds developed. After many years of filling ponds and building fields, Linping Lake eventually became an agricultural field (Figure 10c). The titled landscapes, such as Dinghu Play Moon (鼎湖戏月) and Lotus Island Panboat (莲洲泛舟), eventually disappeared naturally along with the disappearance of the lake. To this day, only Bridge Pier at Dawn (桥墩拂晓) is preserved among all the Linping ancient scenery. Bridge Pier at Dawn (桥墩拂晓) was also known as Osmanthus Fragrance by Ancient Bridge (桂芳复桥).
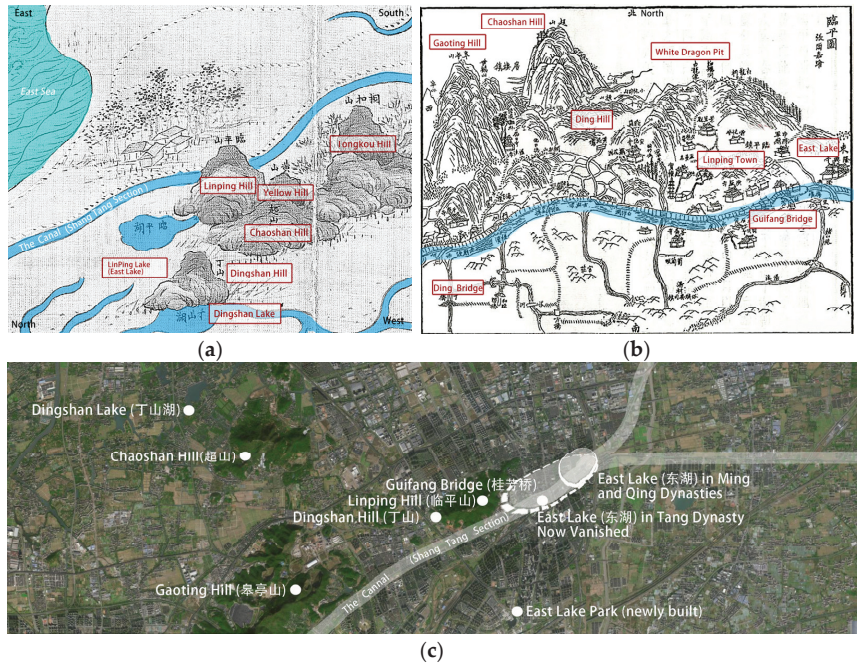
Figure 10. The transformation of East Lake. (**a**) A complete map of Zhejiang [73] (partial, upper east and lower west) in the early Qing Dynasty; (**b**) map of Linping Town in 1884 A.D., late Qing Dynasty [74]; (**c**). The relics of East Lake today (the authors).

The final delineation of the titled landscape comprising the 24 selected clusters, as shown in Figure 11b. In order from north to south, they are named as follows: Pond by the Big Tree (塘隈大树), Guangji Thoroughfare (广济通衢), Dongtang Smoke Village (东塘烟村), Snow Clearing at Chaoshan Peak (超峰雪霁), Osmanthus Fragrance by Ancient Bridge (桂芳复桥), Awe-inspiring Imperial Palace (望宸雄风), Gaoting Peach Blossom View (皋亭观桃), New Dream for the Canal (运河新梦), Old Memory of Hangzhou Steel Factory (杭钢旧忆), Gongchen Bridge Inviting the Moon (拱宸邀月), Inhabitants by Brooks (小河人家), Jiacheng Night Moon (夹城夜月), Dream of Shangtang River (上塘如梦), North Sports Park Endeavors Oars (北园奋楫), Sanbao Ripples (三堡会澜), Wulin Ferry Inquiry (武林问渡), Imperial City Legacy Rhythm (皇城遗韵), Phoenix Mountain Watergate (凤山水门), White Pagoda Ridge Waves (白塔岭涛), Xiling Ancient Ferry (西陵古渡), Moonlight on the Western Hills (西山月色), and Gion Frost Bell (祇园霜钟).

(**a**)

Figure 11. *Cont.*

(**b**)
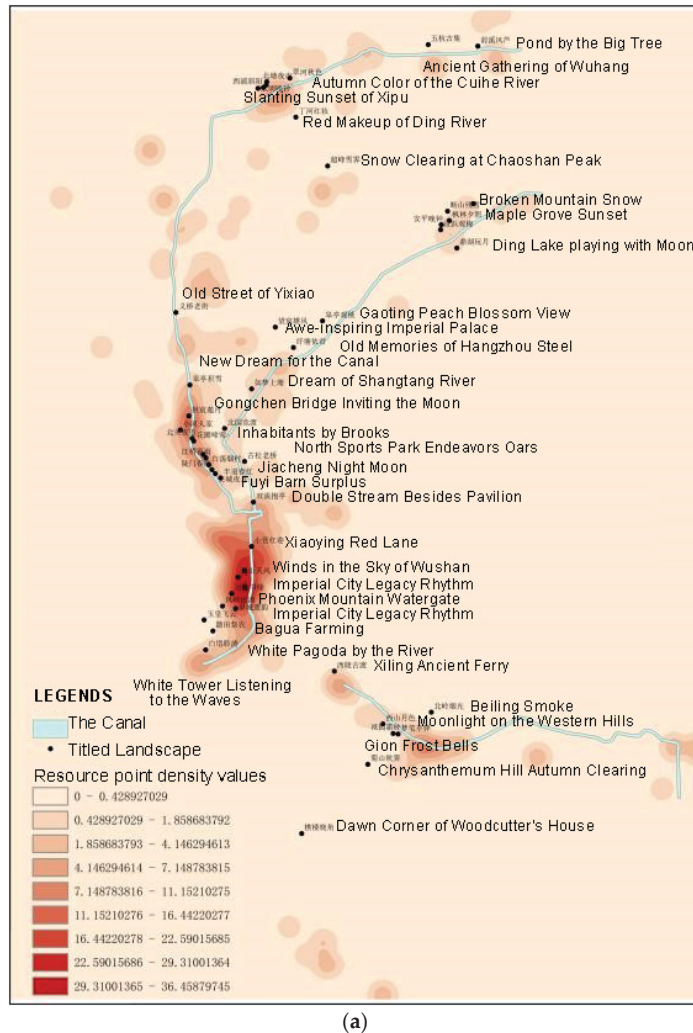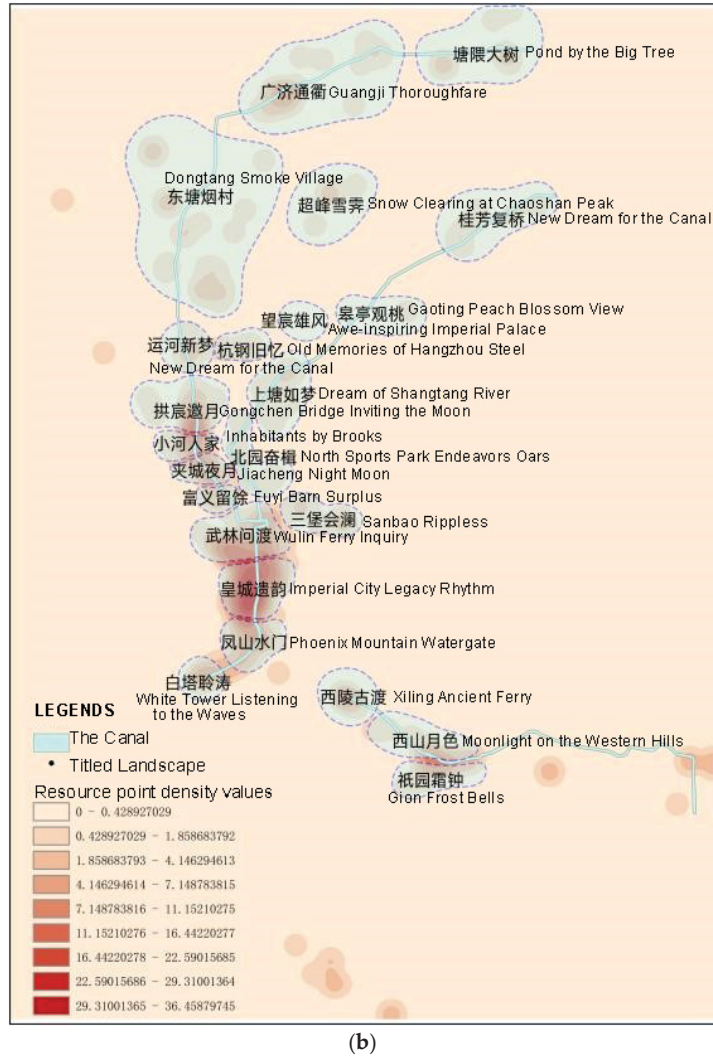
Figure 11. (**a**) Spatial settlement map of titled landscapes in place (source: the authors); (**b**) division of the basic analytical units of the cultural landscape and determination of the titles (source: the authors).

5. Assessment Results: Coupling of the Conservation and Utilization Values

5.1. Evaluation Results of the Conservation Value: Refinement of the TCS

After selecting 24 clustered titles based on the results of kernel density analysis and the selected titled landscapes of the Hangzhou Grand Canal National Cultural Park Plan, the 24 titled landscapes were quantitatively scored and ranked according to the three aspects of historical value, cultural value, and spiritual value; according to Equation (1), the top ten were identified as the TCS (Appendix A, Table A2). They are Wulin Ferry Inquiry (武林问渡), Phoenix Mountain Watergate (凤山水门), Imperial City Legacy Rhythm (皇城遗韵), Gongchen Bridge Inviting the Moon (拱宸邀月), Jiacheng Night Moon (夹城夜月), Guangji Thoroughfare (广济通衢), Fuyi Barn Surplus (富义留馀), Qixi Night Mooring (栖溪夜泊), Xiling Ancient Ferry (西陵古渡), and North Sports Park Endeavors Oars (北园奋楫) (Figure 12).

Figure 12. TCS after refinement (source: the authors).

5.2. Assessment Results of the Utilization Value

After we selected the TCS, we conducted detailed evaluations and the organization of the conservation and developmental indicators for each titled landscape. In the initial screening of the TCS, values were assigned to the "conservation" indices. Subsequently, the "developmental" indices were evaluated and ranked based on the current situational assessment (Appendix A, Table A3).

5.3. Comprehensive Assessment Results of the Conservation and Utilization Values

By normalizing the scores of the conservation and developmental indicators and then calculating the total score, the current assessment results of the TCS could be obtained, as shown in Appendix A, Table A4.

According to the results, titled landscapes with a total score exceeding 1.00, such as the Imperial City Legacy Rhythm (皇城遗韵), Wulin Ferry Inquiry (武林问渡), Gongchen Bridge Inviting the Moon (拱宸邀月), and Guangji Thoroughfare (广济通衢) clusters, exhibited a high level of resource abundance and satisfaction of landscape needs. These clusters possess rich historical, cultural, and spiritual resources and are capable of utilizing and revitalizing these resources effectively to meet the needs of residents, tourists, and urban development.

Conversely, titled landscapes with a total score below 1.00, such as the North Sports Park Endeavors Oars (北园奋楫), represent modern cultural landscapes with lower levels of resource supply. Compared to the traditional titled cultural landscapes, this category still has significant room for improvement in satisfying landscape needs.

Furthermore, there are certain titled landscapes, such as Imperial City Legacy Rhythm (皇城遗韵), Phoenix Mountain Watergate (凤山水门), Jiacheng Night Moon (夹城夜月), and Osmanthus Fragrance by Ancient Bridge (桂芳复桥), where the scores of conservation indicators exceed those of development indicators. This suggests that these clusters possess historical, cultural, and spiritual resources but have not fully utilized them for revitalization and development. In particular, the Phoenix Mountain Watergate (凤山水门), Jiacheng Night Moon (夹城夜月), and Osmanthus Fragrance by Ancient Bridge (桂芳复桥)

clusters exhibit significantly lower development indicator scores compared to other titled landscapes, indicating a need for focused efforts to enhance and develop these cultural landscapes.

5.4. Integrated Planning Propositions Based on the Assessment Results

According to the literature on field landscapes, those with development potential should be utilized thoughtfully for their protection. Conversely, those without development potential but with high conservation value should be safeguarded through standard procedures for cultural monuments, supported by public subsidies [75]. Similarly, based on the evaluation results presented in Appendix A, Table A4, the TCS are categorized into three groups: titled landscapes with a total score exceeding 1.00; titled landscapes with a total score below 1.00, where the score of conservation indicators is greater than the score of development indicators; titled landscapes with a total score below 1.00, where the score of conservation indicators is less than the score of development indicators (Figure 13). For each category, targeted landscape imagery construction strategy suggestions are provided to address specific needs and challenges.
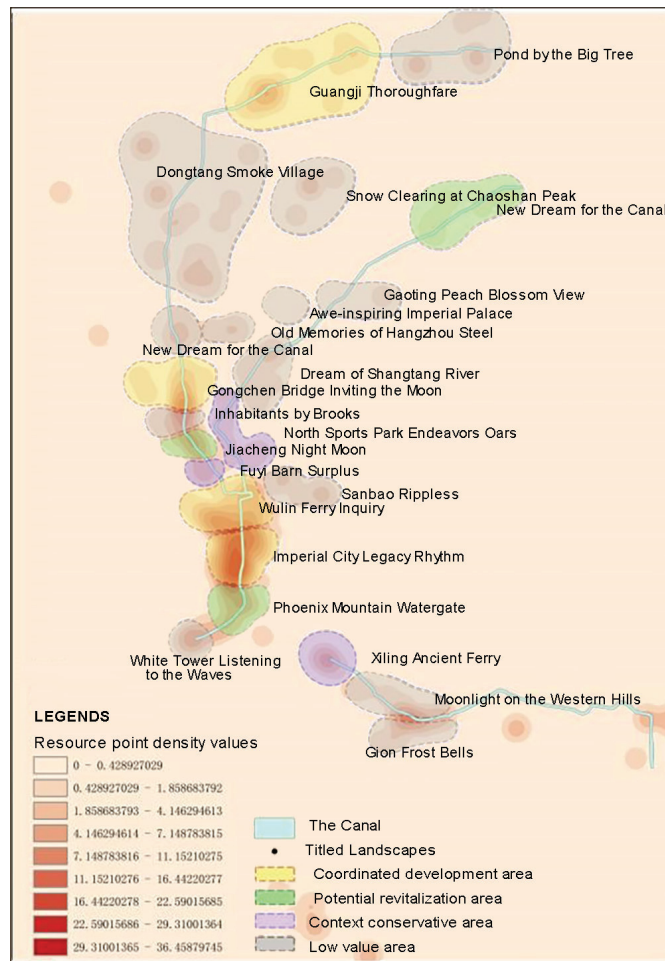

Figure 13. Classification of evaluation scores of TCS (source: the authors).

5.4.1. Sustained Development and Fine-Tuning of Strategies

The titled landscapes with a total score of more than 1.00 include Imperial City Legacy Rhythm (皇城遗韵), Wulin Ferry Inquiry (武林问渡), Gongchen Inviting the Moon (拱宸邀月) and Guangji Thoroughfare (广济通衢). These titled landscapes are more prominent than other titled landscapes in terms of historical, cultural, and spiritual values, have clear cultural themes and representativeness, and have a higher degree of fulfillment in terms of landscape needs, education and publicity, and public services. These kinds of titled landscapes need to maintain their existing advantages and enrich and develop their own characteristics, but they also need to perform some enhancement of their connotations and themes, continuing to focus on the Grand Canal, to become the spiritual and cultural carriers of the canal. For example, the Imperial City Legacy Rhythm (皇城遗韵) needs to further incorporate the Middle River into the Southern Song Dynasty Imperial City town planning, renew the vitality and vitality of the Middle River, and promote the characteristics of the Song Dynasty in an organic combination with the canal, to broaden the cultural platform of the canal. Wulin Ferry Inquiry (武林问渡), on the other hand, needs to continue to deepen the connections between the Wulinmen Pier, the surrounding green spaces, commercial facilities, and the canal, create canal-specific activities, etc., and in this way, it can continue to broaden the content of cultural tourism related to the canal.

5.4.2. Potential Revitalization

Titled landscapes with a total score of less than 1.00 and a conservation indicator score greater than the development indicator score include Phoenix Mountain Watergate (凤山水门), Jiacheng Night Moon (夹城夜月), and Osmanthus Fragrance by Ancient Bridge (桂芳复桥). This kind of title has a high score in terms of the conservation value of the cultural landscape, and also has a strong development potential of its own. For example, Phoenix Mountain Watergate (凤山水门), as the only remaining watergate site in Hangzhou, has a large number of resource points within the cluster, with high historical value and spiritual value; Jiacheng Night Moon (夹城夜月), as the first of the eight scenic spots in Hushu, has high spiritual value; and Osmanthus Fragrance by Ancient Bridge (桂芳复桥), as the only remaining landscape site in Linping, has high historical value and cultural value. However, these kind of titles, for various reasons, have not given full play to their own resource advantages, which is especially true for the clustering performances of Jiacheng Night Moon (夹城夜月) and Osmanthus Fragrance by Ancient Bridge (桂芳复桥).

The theme of the Jiacheng Night Moon (夹城夜月) cluster is city life, but with the development of the city, the cultural attributes have gradually weakened, and the original atmosphere of a water town has been replaced by residential buildings. It has recently been converted to a park, but it is also far away from and weakly connected with the other restored parks of the "Eight Scenes of Hushu", so it scores high in the conservation indicators, but low in the development indicators. The park is also far away and weakly connected with other "Eight Views" restoration parks. If the "Eight Scenes of Hushu" areas within the cluster of the Jiacheng Night Moon can be linked by the Grand Canal, and the cultural and commercial functions of the Cultural Park of the Jiacheng Night Moon (夹城夜月) can be expanded, then the "Eight Scenes of Hushu" and the canal culture can aid in each other's successes and revitalize their significance.

The Osmanthus Fragrance by Ancient Bridge (桂芳复桥) cluster mainly represents the cultural landscape of the Linping area. Because of the disappearance of the East Lake, Linping's "Ten Scenes of the East Lake" has perished for the most part, and other titled landscapes have also gradually become difficult to find over time. Osmanthus Fragrance by Ancient Bridge (桂芳复桥) has the highest value for the conservation of the cultural heritage of Linping, and has assumed the task of being the center of this landscape cluster, but the Guifang Bridge region has traditionally been productive and is in high demand. Additionally, the area around the Guifang Bridge has always been in high demand for commercial production and residence, and residential buildings have been built near the river. This does not provide much space for landscape construction and public service

facilities, so its landscape demand indicator score is the lowest. In order to revitalize this area, it will be necessary to link the cultural landscapes of the whole of Linping and the "Ten Scenic Spots of Donghu Lake", and to strengthen cultural exchanges between various cultural landscapes in Linping along the Shangtang River.

5.4.3. Activation of the Cultural Lineage

Titled landscapes with a total score of less than 1.00 and a conservation index score that is less than the development index score include Fuyi Barn Surplus (富义留馀), North Sports Park Endeavors Oars (北园奋楫), and Xiling Ancient Ferry (西陵古渡). The advantage of these kinds of titled landscapes is that although the resource points within the cluster are not rich enough, there are not enough non-heritage projects, and there are no poem and painting opportunities left due to the sites' over-functionality, the current utilization is better, and the usability, public service, and economic creativity are relatively strong. If these advantages continue to be developed and tapped into, they will become strong representatives of the cultural landscape along the canals.

However, the disadvantage of these kinds of titled landscapes are that the scores of the conservation index are too low, and the degrees of excavation of their own history and culture are not enough. Taking Fuyi Barn Surplus (富义留馀) and North Sports Park Endeavors Oars (北园奋楫) as two typical examples, although the resource points within the Fuyi Barn Surplus (富义留馀) cluster are not rich enough, the central cultural landscape of the Fuyi Barn itself has strong historical and cultural attributes of the canal. Regarding the revitalization and utilization of the Fuyi Barn, it is only used as an art exhibition space, and its cultural attributes have not been activated. If the historical and cultural attributes inside and outside the Fuyi Barn and the surrounding parks are strengthened, the landscape along the canal is fully utilized, and water activities such as passenger terminals are developed, then Fuyi can be activated in all aspects. The internal resources of the North Sports Park Endeavors Oars (北园奋楫) cluster are also not rich enough, but its central cultural landscape, Chengbei Sports Park, is the only modern landscape in the "Ten Canal Scenes". Additionally, the plasticity and inclusiveness of modern landscapes are far greater than those of other landscapes, and if you want to enhance the cultural attributes of this section of the titled landscape, you have to strengthen the connection between the Chengbei Sports Park and the canal and make full use of the artificial landscape connected with the canal in the park. For example, the proper renewal of old industrial buildings and planning and design of landscapes is needed to activate the cultural connections of these areas.

5.4.4. Integration and Branding

Throughout the entire heritage section of the canal, the TCS are located along every major river, linking the entire canal together. In the south end of Hangzhou Tang and the middle section of the river, which are densely populated with titled landscapes, the existing canal tour lines can be utilized, and cruise ships and water buses can be used to connect the titled landscapes with each other. The more distant Guangji Thoroughfare (广济通衢), Osmanthus Fragrance by Ancient Bridge (桂芳复桥), and Xiling Ancient Ferry (西陵古渡) also need special tour lines to connect them with the central area, so as to strengthen the overall nature of the canal, and to give the residents and tourists a holistic perception and impression of the entire heritage section of the canal. In addition, a variety of water culture and art activities should be organized, using canal-related titles, poems, paintings, and other art works as themes to strengthen the intangible cultural and artistic imagery of the canal. On the other hand, the TCS should have landscape imagery that can highlight the characteristics of the canal and echo the titles, which can be restored so that residents and tourists can have a holistic perception and impression of the entire canal. The titles can be restored, and a punch-card point can be set up. Digital means can also be used to create a scene that includes the ancients across time and space to make the canal culture and the image of the canal more deeply rooted in people's hearts.

6. Discussion

6.1. Review of the Aim for the TCS

To elevate the TCS as a hallmark of Hangzhou akin to the renowned "Ten Scenes of West Lake" and to safeguard and rejuvenate the cultural landscape resources along the Hangzhou section, it is imperative to carefully select those scenes that are in alignment with the canal's resources. This will ensure that cultural facility development and recreation efforts are in harmony with the canal's cultural significance. This paper demonstrates a localized canal development model. Most of the current studies compare the potential for heritage utilization along the Grand Canal at a "cross-provincial scale" [76]. This research highlights the need for a tailored approach to the protection and utilization of the Beijing–Hangzhou Grand Canal, particularly the Hangzhou section. It identifies the Hangzhou canal development model as a characteristic case study and provides valuable insights for the planning and construction of the National Cultural Park of the Grand Canal. The technical system for dividing the basic units of the cultural landscape demonstrates systematic thinking and the integration of research methods. By combining bottom-up resource investigation with top-down strategic planning, the study offers a comprehensive approach to understanding and addressing cultural landscape challenges. Suggestions for future decision-making and land management actions are systemized, as shown in Figure 14.
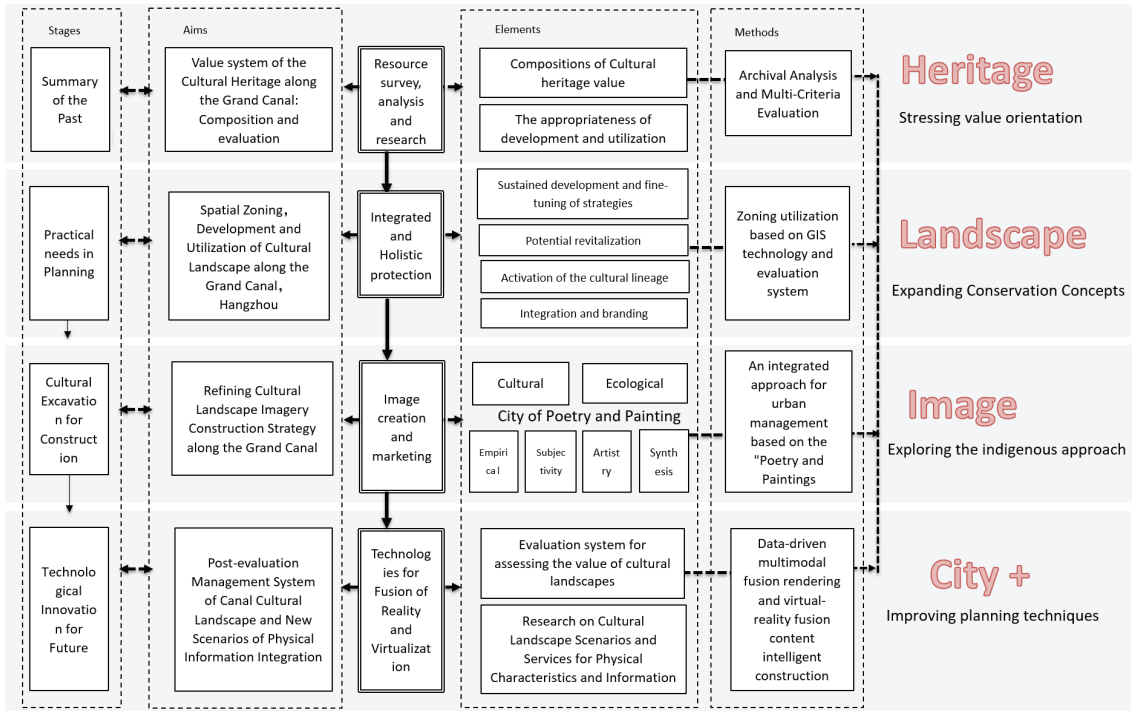
Figure 14. The synthesis of contributions for future decision-making and land management actions (source: the authors).

Theoretically, this paper improves the mechanism of measuring and adjusting the value of cultural landscapes based on layer accumulation theory and multidimensional value attributes. Canal heritage includes different types of heritage, such as "site-type" and "in-use" heritage, but the current concept of the holistic protection of the canal's heritage still remains at the stage of protecting the "site-type" Grand Canal heritage, ignoring the "in-use" heritage. In addition, according to the "Stratification Theory", the cultural

landscape of the canal should not only include the tangible and intangible heritage of the canal, but should also include the new architecture and culture of the present generation, such as the Grand Canal Museum and the Museum of Knives, Scissors and Swords, as well as sports and ecological spaces, such as the Grand Canal Asian Games Park, etc. Most of the current studies only focus on the "historical heritage" along the Grand Canal, but ignore the contemporary cultural landscape [77]. To safeguard cultural landscapes and living traditions, decisions made by cultural heritage protection authorities must be informed by thorough scientific research into cultural traditions and with consideration for the well-being of the tradition's current practitioners [78]. This paper considers the contemporary cultural landscape as a whole. It includes contemporary cultural landscapes in the category of titled landscapes, extends traditional poetry and painting to modern art and contemporary culture, and updates the method of preserving and utilizing the Grand Canal's cultural landscapes, providing a localized perspective. For example, North Sports Park Endeavors Oars (北园奋楫) and Old Memory of Hangzhou Steel Factory (杭钢旧忆) are completely contemporary landscapes that were added in recent years. They display the modern urban image of a sports symposium and a steel factory, which are crucial supplements to the traditional landscapes.

6.2. Contemporary Drawings of the TCS

While the titled landscapes of West Lake possess iconic classical appeal, the portrayal of the canal lacks a similar status. Contemporary Chinese artists have depicted the natural scenery and historical landscapes of the Beijing–Hangzhou Grand Canal from a panoramic viewpoint. However, in the Hangzhou section alone, the imagery of the cultural landscape of the canal is more embodied as a humanistic landscape rather than a natural landscape. Therefore, the TCS of the Hangzhou section need to be more reflective of urban and humanistic characteristics. Contemporary artists' creations of the TCS show a diversity of styles; complementing traditional Chinese landscape paintings, modern illustration styles have also appeared [79] that are often more easily accepted by young people.

6.3. Historical Urban Landscapes (HUL) Approach and Conzen's Urban Morphological Analysis

While exceptionalism may be effective in tailored studies with local objectives, it is not a viable approach for a global investigation into the conservation of cultural landscape heritage. Scientific theories must be applicable across contexts to advance theoretical studies and the spatial shaping of urban cultural heritage. As a canal city, Hangzhou has its special characteristics. However, for the protection of cultural landscape heritage, the spatial creation method proposed in this paper has a certain general significance for promotion. Its generalizability is reflected in the synergy of the research framework with LCA, HUL, and other research frameworks. The landscape character assessment (LCA) in this research adopts zoning approach based on landscape units. This work is comparable with the aims of the historical urban landscapes (HUL) approach that originated in Conzen's Urban Morphological Analysis. Conzen's research on the urban form based on ownership parcels encompasses an exploration spanning from the local to the whole, as well as an examination of the historical evolution process [80]. The "local to whole" research approach underscores the idea that the intricate whole is composed of simpler elements at various levels. Simultaneously, the emphasis on the historical evolution process involves scrutinizing the development of objective phenomena over time. By extracting historical samples and establishing evolutionary sequences, Conzen identified the early form of title parcel division as a crucial influence on subsequent mergers and re-divisions of title parcels [81]. Building on the study of property parcels, the British School of Urban Morphology subsequently tested and extensively explored the potential applications of these concepts in planning practice [82]. In the HUL approach, the sub-regions constituting the urban historic landscape system are called "urban historic landscape units" (HUL units), based on the principles of internal relative homogeneity and external relative heterogeneity. Morphological regions are made up of different levels of morphological regional units,

showing the complex historical geospatial structure of urban morphology [83]. Conzen's morphological area division for the British town Ludlow spanned five levels, allowing for a comprehensive recognition of historical culture and precise protection [84]. By employing spatial zoning, temporal phasing, and methodological separation, a classification and grading system was established, capable of fine management. This system contributed to the continuous development of the urban fabric through metabolism, achieving a balance between the protection of individual property rights and interests and development. This, in turn, realized the healthy resilience of the city, helping it maintain its enduring vitality and dynamism.

6.4. Shortcomings of Reductionist Methods in Cultural Landscape Heritage Conservation

It should be noted that the indicators in this paper are quantitative in nature and are based on the reductionist view of reality. In a reductionist view, one aspect is given excessive emphasis, even to the detriment of other parts. Approaches based on reductionism are unable to handle all the elements and components of the cultural landscape system, both deterministic and nominal ones, demonstrating ignorance and imbalance. They may also be misleading, leading to an unbalanced path in the future developments of cultural heritage conservation [85]. Furthermore, social data are crucial components in the assessment of cultural values of the landscape. In this paper, people's perceptions are represented as spiritual values, which are related to art works and intangible heritage. In future studies, the reductionist approach will be integrated with the holistic approach by adaptive adjustment and debugging of multilevel values. Questionnaires given to residents and experts will also be conducted to produce more comprehensive suggestions.

7. Conclusions

The development of the Grand Canal cultural belt stands as a critical strategic priority within China's national cultural agenda. Provinces and cities along its route, including Hangzhou, are actively engaged in its realization. Despite the decline in the canal's transportation role, there remains significant potential for the cultivation of cultural functions. It is essential to ensure deep coordination between urban character formation, construction, and development efforts, all while addressing the imperative for excavating the cultural landscape of the Grand Canal. This paper, through evaluating the cultural landscape elements of the canal in terms of history, space, art, and spirit, extracts the TCS in line with the local characteristics. Leveraging a value assessment framework, tailored recommendations are proposed to address both the landscape and socio-economic aspects at nodal points, considering variations in scores between conservation and developmental indicators. The recommendations include "sustainable development and strategic fine-tuning" of titled landscapes with overall high scores and "potential revitalizing" for landscapes with relatively greater potential, particularly those with conservation indicators outscoring developmental ones. Furthermore, the paper proposes strategic interventions for "context activation" in areas lacking sufficient historical and cultural connotations, notably those with conservation indicators scoring lower than developmental indicators. Lastly, the paper outlines a comprehensive strategic approach for the "Ten Canal Scenes", aiming to synthesize and enhance the collective impact of these landscapes. The overarching objective is to cultivate memorable urban cultural landmarks, fostering a harmonious alignment between the demands of the canal's cultural landscape preservation and Hangzhou's urban development imperatives.

This paper emphasizes Hangzhou's regional characteristics through a systematic approach to landscape division and innovations in spatial planning methodology. First, this study focuses on the "city and river together" aspect of Hangzhou's cultural landscape, particularly along the Grand Canal. Unlike other sections of the canal that traverse suburban or rural areas, Hangzhou's section passes through the city center. By analyzing the cultural landscape from an urban meso scale, the study offers targeted recommendations with strong local relevance. Second, the technical system employed for dividing

basic units of the cultural landscape demonstrates systematic thinking and integrates sections and blocks. Utilizing both reductionist and comprehensive methods, the study conducts bottom-up resource investigation while also employing system theory to propose top-down strategies and construction modes. This dual approach maximizes the effectiveness of the research methods. Third, this paper innovates by integrating the synergy between the protection and utilization of cultural landscapes. By leveraging the imagery of the TCS and combining it with immersive cultural and tourism experiences, the study explores adaptive technical tools and service technology innovations. These innovations provide a framework for the integration of cultural and tourism development, offering practical solutions for the protection, utilization, monitoring, and management of the Grand Canal's cultural landscape.

Despite its contributions, this paper has several limitations that warrant consideration. For instance, the scale of unit division requires further refinement, and the weights and measurement methods need to be better adapted. The framework of the Ten Scenes of West Lake is comprehensive, encompassing various sensory experiences, seasonal variations, and meteorological factors. However, the refinement of the Ten Canal Scenes has not yet taken into account these factors in a coordinated manner. Additionally, with the opening of the second corridor, there is potential for additional scenic spots to be included, such as Eight Treasures Canal Lock. Moreover, as the second-channel navigation grade is higher, the surrounding countryside landscape could potentially accommodate ten or even twelve views, expanding the scope of the study. Nevertheless, the TCS are not eternal. Instead, the results evaluated in different historical junctures will be, and should be, subject to change. Thus, the process of selecting the TCS can be perpetually revisited and refined, ensuring its relevance and resonance endure across successive epochs.

The suggested future research directions are mainly targeted at refining the spatial study and digital regeneration technologies. For example, the spatial stratification and zoning of the cultural landscape along the Grand Canal should be studied, with a focus on more refined unit divisions, weight adjustments, and model summarization, which could enhance our understanding of the protection, inheritance, and use of canal heritage. The use of digital regeneration technology for cultural heritage preservation should be explored, particularly with a focus on immersive cultural tourism experiences based on the TCS. In this regard, this study could provide a basis for adaptive technological tools facilitating the monitoring and management of the Grand Canal's cultural landscape.

Institutional Review Board Statement: Not applicable.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy restrictions.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A

Appendix A.1. Average Nearest Neighbor (ANN) Analysis

The ANN is calculated by dividing the observed average distance by the desired average distance. The average nearest neighbor ratio is calculated as

$$ANN = \frac{\overline{D}_o}{\overline{D}_E} \tag{A1}$$

where $\overline{D}_o$ is the average of the distances between the measured elements and their nearest neighboring quality centers:

$$\overline{D}_o = \frac{\Sigma_{i=1}^{n} d_i}{n} \tag{A2}$$

$\overline{D}_E$ is the elemental randomly distributed mean distance:

$$\overline{D}_E = \frac{0.5}{\sqrt{\frac{n}{A}}} \tag{A3}$$

In the above equation, d_i is the distance of element i from its nearest neighboring element, n is the number of elements in the region, and A is the area of the envelope of all elements. If the ANN is greater than 1, it is a random distribution; if the ANN is less than 1, it is a clustered distribution.

Table A1. The titled landscape in each sub-section of Hangzhou Grand Canal National Cultural Park (source: the author).

Section	No.	Chinese Title	Title of the Cultural Landscape	Source
Hangzhou Tang (northern section)	1	西浦斜阳	Slanting Sunset of Xipu	16 Scenes of Qixi [from Qing Dynasty], 10 Scenes of Bolu, 10 Scenes of the New Canal (2013) [69], new cultural landscapes
	2	长桥月色	Moonlight on the Changqiao Bridge	
	3	超峰雪霁	Snow Clearing at Chaoshan Peak	
	4	翠河秋色	Autumn Color of the Cuihe River	
	5	永明晚钟	Evening Bell of Yongming	
	6	北塘夜市	Night Market of Beitang	
	7	广济通衢	Guangji Thoroughfare	
	8	丁河红妆	Red Makeup of Ding River	
	9	五杭古集	Ancient Gathering of Wuhang	
	10	前溪风芦	Wind of the Qianxi	
Hangzhou Tang (southern section)	1	夹城夜月	Jiacheng Night Moon	[Ming] Eight Scenes of Hushu, [Yuan] Qiantang Ten Scenes, Tangqi Ten Scenes, Ten Scenes of the New Canal (2013) [69]
	2	陡门春涨	Spring Rise of Steep Gate	
	3	江桥暮雨	Twilight Rain of River Bridge	
	4	西山晚翠	Evening Green of Xishan	
	5	花圃啼莺	Crowing Warblers in Flower Garden	
	6	皋亭积雪	Snow of Gao Ting	
	7	白荡烟村	Smoky Village of White Reeds	
	8	半道春红	Spring Red of Halfway	
	9	北关夜市	Night Market of North Juncture	
	10	香积梵音	Vanishing Sound of Xiangji Temple	
	11	小河人家	Inhabitants by Brooks	
	12	拱宸邀月	Gongchen Bridge Inviting the Moon	
	13	运河新梦	New Dream for the Canal	
	14	义桥老街	Old Street of Yixiao	

Table A1. *Cont.*

Section	No.	Chinese Title	Title of the Cultural Landscape	Source
Shangtang River	1	桂芳复桥	Osmanthus Fragrance by Ancient Bridge	New East Lake Ten Scenic Spots
	2	安平晚钟	Anping Evening Bells	
	3	断山残雪	Broken Mountain Snow	
	4	鼎湖玩月	Dinghu Playing with the Moon	
	5	藕洲泛艇	Lotus Roots Island Panboat	
	6	隆兴望月	Longxing Looking at the Moon	
	7	佛日禅踪	Buddha's Zen Trail	
	8	段浜观梅	Duanbang Guanmei	
	9	枫林夕照	Maple Grove Sunset	
	10	桃堰渔火	Peach Weir Fisherman's Fire	
	11	皋亭观桃	Gaoting Peach Blossom View	New Shangtang Eight Scenic Spots
	12	望宸雄风	Awe-inspiring Imperial Palace	
	13	上塘如梦	Dream of Shangtang River	
	14	北园奋楫	North Sports Park Endeavors Oars	
	15	双流抱亭	Double Stream Beside Pavilion	
	16	丁兰孝道	Dinglan Filial Piety	
	17	纤塘依君	Xiantang by Your Side	
	18	古松老桥	Old Bridge by Ancient Pines	
Zhonghe and Longshan Rivers	1	吴山天风	Winds in the Sky of Wushan	[Qing] West Lake 18 Scenes, New West Lake 10 Scenes (from 1984), the 3rd round of the West Lake 10 Scenes voting in 2007 [70]
	2	玉皇飞云	Yuhuang Flying Clouds	
	3	万松书缘	Wansong Shuyuan	
	4	凤岭松涛	Phoenix Ridge Pines	
	5	小营红巷	Red Lane	New cultural landscape
	6	夜坊清河	Night Square Qinghe	
	7	凤山水门	Phoenix Mountain Watergate	
	8	皇城遗韵	Imperial City Legacy Rhythm	
	9	八卦农作	Bagua Farming	
	10	白塔临江	White Pagoda by the River	
East Section of Zhejiang Canal	1	菊山秋霁	Chrysanthemum Hill Autumn Clearing	Xiaoshan Eight Scenes, Xiaoshan New Eight Scenes
	2	西陵古渡	Xiling Ancient Ferry	
	3	西山月色	Moonlight on the Western Hills	
	4	北岭烟光	Beiling Smoke	
	5	祈园霜钟	Praying for the Garden Frost Bells	
	6	樵楼晓角	Dawn Corner of Woodcutter's House	
	7	杭坞龙湫	Hangzhou Wall Dragon Marsh	
	8	东岳揽胜	East Mountain Embracing the Wonderful Scenery	Two scenes have been remodeled
	9	梦笔亭驿	Dream Brush Pavilion Inn	

Table A2. Evaluation Results of the Conservation Value (Source: the authors).

Titled Landscapes	Chinese Title	Historic Value (C.1.)			Cultural Value (C.2.)			Spiritual Value (C.3.)		Total
		C.1.1.	C.1.2.	C.1.3.	C.2.1.	C.2.2.	C.2.3.	C.3.1.	C.3.2.	
lit. Wulin Ferry Inquiry	武林问渡	0.99	1.00	1.00	1.00	0.40	0.40	0.00	1.00	5.79
lit. Phoenix Mountain Watergate	凤山水门	1.00	0.97	1.00	1.00	0.20	0.07	0.00	1.00	5.24
lit. Imperial City Legacy Rhythm	皇城遗韵	0.59	0.51	1.00	1.00	1.00	1.00	0.00	0.00	5.10
lit. Gongchen Bridge Inviting the Moon	拱宸邀月	0.15	0.14	1.00	1.00	0.40	0.27	1.00	1.00	4.96
lit. Jiacheng Night Moon	夹城夜月	0.16	0.12	1.00	1.00	0.20	0.07	1.00	1.00	4.55
lit. Guangji Thoroughfare	广济通衢	0.15	0.14	1.00	0.50	0.20	0.07	1.00	1.00	4.05
lit. Fuyi Barn Surplus	富义留馀	0.09	0.06	1.00	1.00	0.20	0.13	0.00	1.00	3.48
lit. Qixi Night Mooring	栖溪夜泊	0.06	0.07	0.33	0.50	0.20	0.20	1.00	1.00	3.36
lit. Xiling Ancient Ferry	西陵古渡	0.06	0.04	1.00	0.50	0.40	0.13	1.00	0.00	3.13
lit. North Sports Park Endeavors Oars	北园奋楫	0.04	0.03	0.67	1.00	0.20	0.13	0.00	1.00	3.06
lit. Broken Mountain Snow	断山残雪	0.05	0.06	1.00	0.50	0.20	0.07	1.00	0.00	2.87
lit. Inhabitants by Brooks	小河人家	0.15	0.10	1.00	1.00	0.40	0.13	0.00	0.00	2.78
lit. Gion Frost Bell	祇园霜钟	0.15	0.15	0.67	0.50	0.20	0.07	1.00	0.00	2.73
lit. Gaoting Peach Blossom View	皋亭观桃	0.02	0.02	0.67	0.50	0.20	0.07	1.00	0.00	2.48
lit. Pond by the Big Tree	塘隈大树	0.07	0.06	0.33	0.50	0.20	0.20	1.00	0.00	2.37
lit. Awe-inspiring Imperial Palace	望宸雄风	0.00	0.00	0.67	1.00	0.40	0.20	0.00	0.00	2.27
lit. Moonlight on the Western Hills	西山月色	0.12	0.11	0.67	0.00	0.00	0.00	1.00	0.00	1.90
lit. Dream of Shangtang River	上塘如梦	0.07	0.08	0.67	0.00	0.00	0.00	0.00	1.00	1.82
lit. White Tower Listening to the Waves	白塔聆涛	0.12	0.11	1.00	0.00	0.00	0.00	0.00	0.00	1.23
lit. Sanbao Ripples	三堡会澜	0.06	0.04	0.00	0.00	0.00	0.00	0.00	1.00	1.10
lit. Snow Clearing at Chaoshan Peak	超峰雪霁	0.04	0.05	0.00	0.00	0.00	0.00	1.00	0.00	1.08
lit. Dongtang Smoke Village	东塘烟村	0.24	0.23	0.33	0.00	0.00	0.00	0.00	0.00	0.81
lit. New Dream for the Canal	运河新梦	0.04	0.03	0.33	0.00	0.00	0.00	0.00	0.00	0.40
lit. Old Memory of Hangzhou Steel Factory	杭钢旧忆	0.02	0.02	0.33	0.00	0.00	0.00	0.00	0.00	0.38

Table A3. Assessment results of the utilization value for TCS (Source: the authors).

Titled Landscape	Chinese Title	Landscape Value (D1)				Social Value (D2)		Economic Value (D3)			Total
		D.1.1.	D.1.2.	D.1.3.	D.1.4.	D.2.1.	D.2.2.	D.2.3.	D.3.1.	D.3.2.	
lit. Gongchen Bridge Inviting the Moon	拱宸邀月	4	5	5	5	4	5	5	4	5	42
lit. Guangji Thoroughfare	广济通衢	4	5	5	5	4	5	5	1	5	39
lit. Wulin Ferry Inquiry	武林问渡	5	5	5	3	3	4	5	5	3	38
lit. Imperial City Legacy Rhythm	皇城遗韵	1	5	5	4	5	5	3	1	5	34
lit. North Sports Park Endeavors Oars	北园奋楫	5	3	5	1	2	4	5	3	3	31
lit. Fuyi Barn Surplus	富义留馀	2	2	5	4	4	3	4	2	2	28
lit. Xiling Ancient Ferry	西陵古渡	3	2	5	5	4	3	2	1	3	28
lit. Phoenix Mountain Watergate	凤山水门	2	2	5	4	3	3	1	2	3	25
lit. Jiacheng Night Moon	夹城夜月	3	2	5	3	1	2	4	2	1	23
lit. Osmanthus Fragrance by Ancient Bridge	桂芳复桥	3	1	5	2	1	1	3	1	1	18

Table A4. Integrated value assessment results of the TCS (Source: the authors).

Titled Landscape	Chinese Title	Conservation Indicator Score	Normalized Score 1	Developmental Indicator Score	Normalized Score 2	Normalized Total Score
Imperial City Legacy Rhythm	皇城遗韵	6.97	1.00	34	0.67	1.67
lit. Wulin Ferry Inquiry	武林问渡	5.79	0.70	38	0.83	1.53
lit. Gongchen Bridge Inviting the Moon	拱宸邀月	4.96	0.48	42	1.00	1.48
Guangji Thoroughfare	广济通衢	4.75	0.43	39	0.88	1.31
Phoenix Mountain Watergate	凤山水门	4.42	0.35	25	0.29	0.64
Jiacheng Night Moon	夹城夜月	4.63	0.40	23	0.21	0.61
Fuyi Barn Surplus	富义留馀	3.60	0.14	28	0.42	0.56
North Sports Park Endeavors Oars	北园奋楫	3.06	0.00	31	0.54	0.54
Xiling Ancient Ferry	西陵古渡	3.13	0.02	28	0.42	0.44
lit. Osmanthus Fragrance by Ancient Bridge	桂芳复桥	3.91	0.22	18	0.00	0.22

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Article

Park Heritage of the Island of Krk between Urban Transformations and Climate Change

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Abstract: The island of Krk in Primorje-Gorski Kotar County, Croatia, is also called the Golden Island because of its favorable geographical location, the diversity of natural and urban landscapes, the beauty of the coast and the sea, the wealth of tangible and intangible heritage, and especially because of the opportunities for living and working. During the last century and in this century, urban landscapes have been exposed to dramatic changes that transformed old castles or former smaller settlements of the local population into tourist centers and desirable places for permanent or temporary residence. A significant part of their complex structure is the cultural and historical heritage, within which the island's park heritage has so far been insufficiently recognized and valued. Therefore, this paper examines forty selected public park spaces in the area of all local self-government units of the island of Krk in the context of urban transformations and climate change. It is concluded that the island's park heritage has often been created as a result of urban transformations in which, despite being exposed to constant changes, it is mostly preserved, but that recently, new elements of this heritage are emerging. A new challenge is the threat of the consequences of climate change—increasingly frequent and long-lasting droughts, extreme precipitation and flash floods, stormy winds, rising sea level and salinization, which further emphasizes the need to preserve the park heritage of the island of Krk in the context of resistance to climate change.

Keywords: park heritage; heritage urbanism; urban transformations; climate change; the island of Krk

1. Introduction

Urban landscapes are complex structures formed by numerous material and immaterial layers, among which the cultural and historical heritage is a very important component, exposed to continuous changes over time. Therefore, scientists, considering its role in this context, have developed several approaches. The "deep cities" approach perceives heritage of the urban landscapes as a resource for sustainable local development, by considering not only its historical dimension, but also social and economic ones [1,2]. Many authors agree that the solution for harmonizing urban development and protection of cultural heritage is integral management, which is proven to contribute to the sustainability of local communities, especially if the social and economic values of material heritage are recognized [3]. On the same track is Heritage Urbanism, an internationally recognized scientific approach, which contemplates the revitalization of cultural and historical heritage in a spatial, urban, and landscape context, in such a way that it becomes a driver of social and economic development and improves people's living space [4]. Speaking of heritage and its transformations as a tourism resource, the analysis of different sources of literature indicates the connection of individual, local, and regional viewpoints, which creates an integral image and experience of future tourist values and perceptions. In the context of climate change, the concepts of ecological resilience and transformational continuity are considered in the scientific literature, while scenarios of heritage loss due to the effects

of the climate change have been explored, trying to offer ways for people to deal with it, adapt to it, and accept it as a kind of a transformation offering opportunities [5].

According to the ICOMOS-IFLA [6], historic parks and gardens are considered as architecture in plant material and part of cultural landscapes, i.e., cultural heritage. The topic of this case study is the park heritage of the island of Krk situated in the Adriatic Sea, in the Republic of Croatia, which is very important not only as a tourist resource, but also for the local population [7]. Previous studies related to parks and climate change often refer to different locations around the world with significantly different climate conditions and meteorological phenomena, such as hurricanes, that are not comparable to the Mediterranean climate conditions. However, climate studies in general suggest that the effects of climate change will be especially visible in the Mediterranean, with islands being particularly sensitive [8]. Although there are a few studies in recent years dealing with the impact of climate change on infrastructure and objects significant for tourism purposes, e.g., [9,10], there is a lack of research of climate change influence on park heritage, while emphasizing the tourist destination's image perspective and the issue of the destination's loss of attractiveness due to damage to cultural heritage [11]. No examples of research that would examine climate change influence on park heritage were found for coastal tourist centers in the Mediterranean. Therefore, this work aims to fill the gap in this regard, considering that parks and promenades of coastal tourist places are of huge importance for the identity and image of the town, the ambient atmosphere, and character of the tourist place, for the impression of its maintenance and for the overall aesthetic impression. Furthermore, in its recommendations, ICOMOS-IFLA emphasizes that the study and understanding of the role of heritage in adaptation and mitigation of climate change should be encouraged based on different case studies, in order to improve the adaptive capacity [12]. Hence, this work is also contributing to Mediterranean park heritage research with the analysis of climate change risks. The main goal and purpose of this work is to contribute to the exchange of knowledge and experience to preserve the park heritage as a particularly vulnerable part of the entire cultural, historical, and natural heritage, especially in the Mediterranean area.

The main research question of this paper is as follows: What is the impact of urban transformations and climate change on the park heritage of the island of Krk? Given that the cultural and historical heritage should be viewed through its genesis and the changes it has been exposed to over time, this paper will consider how and under what influences the gardens and promenades on the island of Krk were created; what urban transformations they have been exposed to so far; what characterizes the contemporary urban development of island towns; and what urban transformations are taking place in this connection, as well as whether and how they affect the park heritage. Are new gardens emerging in recent times, and under what influences is this happening? Can they be considered as heritage for the future, that is, can urban transformations develop a new heritage? Furthermore, we will research which threats from climate change could affect each of the identified parks and promenades and, based on such an analysis, conclude which threat would be the most significant.

After the current Section 1, the study is organized as follows. In Section 2, previous research and relevant documents are described in some detail. Section 3 is a brief description of general features, settlement development, and climatic features of the island of Krk and data and methods, after which Section 4 provides a detailed description of the park heritage of the island of Krk, while the results of the analysis are presented in Section 5. Section 6 presents detailed discussion of all aspects of the study. Finally, the main conclusions are presented in Section 7.

2. Previous Research and Relevant Documents

2.1. Previous Research on the Park Heritage and the Climate of the Island Krk

Despite the fact that a large number of monographs [13–18] and scientific and professional articles [19] have been published about the island of Krk, dedicated to natural

beauty, history, architectural heritage, and other elements of tangible and intangible cultural and historical heritage and the economy, especially tourism, they only mention the park heritage to a lesser extent. In connection with the topic of this work is the master's thesis by Dobrila Kraljić about the impact of tourist development on the landscape of the island of Krk [20], but no works or publications were found in which the parks and promenades were dealt with in detail, either at the level of an individual place, municipality/town, or the island as a whole, except several popular articles [21,22] and professional papers of the mentioned author [23,24]. Sijerković wrote about the diversity of Krk's climate [25], which was used in this paper as the main source of data on the climatic characteristics of the island of Krk. Some data, especially those about extraordinary events—extreme rainfall, stormy winds, and floods—were taken from another book by the same author [26] and other papers [27–31].

2.2. Relevant Documents Related to Climate Change

The fundamental document against climate change, as the main problem in environmental protection of the 21st century [6], is the United Nations Sustainable Development Program until 2030, adopted in 2015 with its 17 basic goals, among which are sustainable cities and sustainable communities [32], confirmed by The Paris Agreement on climate change [33] and elaborated by the United Nations document New Urban Agenda adopted in 2016 [34], which provides a global vision of future sustainable, resilient, safe, and inclusive cities and settlements. The European Commission adopted several strategic documents, such as The European Green Deal [35], The Urban Agenda for the European Union [36], The Territorial Agenda 2030 [37], The New Leipzig Charter [38], Declaration from Davos—Towards a high-quality building culture [39], and the New European Bauhaus [40]. At the level of the European Union bodies, the regulation on the restoration of nature is still being harmonized, which, in terms of urban development, calls for the establishment of monitoring of the state of green areas and the number of trees in cities, their preservation and gradual increase, and adaptation to climate change [41]. The Republic of Croatia adopted the strategy with solutions for overcoming the negative consequences of climate change [42] and program for development of green infrastructure in urban areas [43]. Primorje-Gorski Kotar County adopted the program on mitigation and adaptation to climate change [44].

2.3. Global Overview of the Role of Urban Parks in Mitigating the Effects of Climate Change

Numerous studies have been conducted around the world that have confirmed the positive effect of urban parks on mitigating the effect of urban heat islands, thus contributing to the social community as public city spaces [45–49]. Some articles proved that urban parks can also fulfill the function of water infrastructure for flood defence [50]. To find a solution, the action of the wider community and non-governmental organizations is needed, such as the American Trust for Public Land, which showed that parks are a key solution for dealing with the consequences of climate change in cities because they affect the improvement of air quality, mitigate the effect of heat islands, absorb large amounts of precipitation, protecting them from floods, and protect them from rising sea levels and coastal storms. It was also emphasized that parks not only protect the environment, but also strengthen the community's social and economic resistance to climate change [51,52]. Adaptation to climate change in historic gardens is a special challenge. Bowie-Sell surveyed the leading gardeners at National Trust properties in the UK, and found that the most important thing for them is reliable information about climate conditions and about resistant plant species that would at the same time maintain the historic features of the garden [53].

3. Materials and Methods

3.1. General Features, Settlement Development, and Climatic Features of the Island of Krk

The island of Krk in Primorje-Gorski Kotar County, Croatia, is located in the northern part of the Kvarner Bay, closest to the mainland, with which it has been connected by the bridge *Krčki Most* since 1980. The island has an area of 405.78 km^2 and 20,019 inhabitants living in 68 settlements [54] administratively divided into seven local self-government units: the Town of Krk and the municipalities of Baška, Dobrinj, Malinska-Dubašnica, Omišalj, Punat, and Vrbnik (Figure 1). Along with industry and port terminals for oil and gas in the northern part of the island, as well as construction and agriculture, the most important economic branch is tourism. The island is also distinguished by its landscape diversity—from bare areas on the eastern and southern parts of the island to areas covered by autochthonous phytocenological communities of the sub-Mediterranean downy oak (*Quercus pubescens*) forest and fertile fields in the area of Vrbnik and in the municipality of Omišalj. The relief is also very dynamic, with flat parts and fields and hills and the highest peak Obzova at 570 m a.s.l. Its coast with numerous bays has a total length of about 190 km^2 [55].
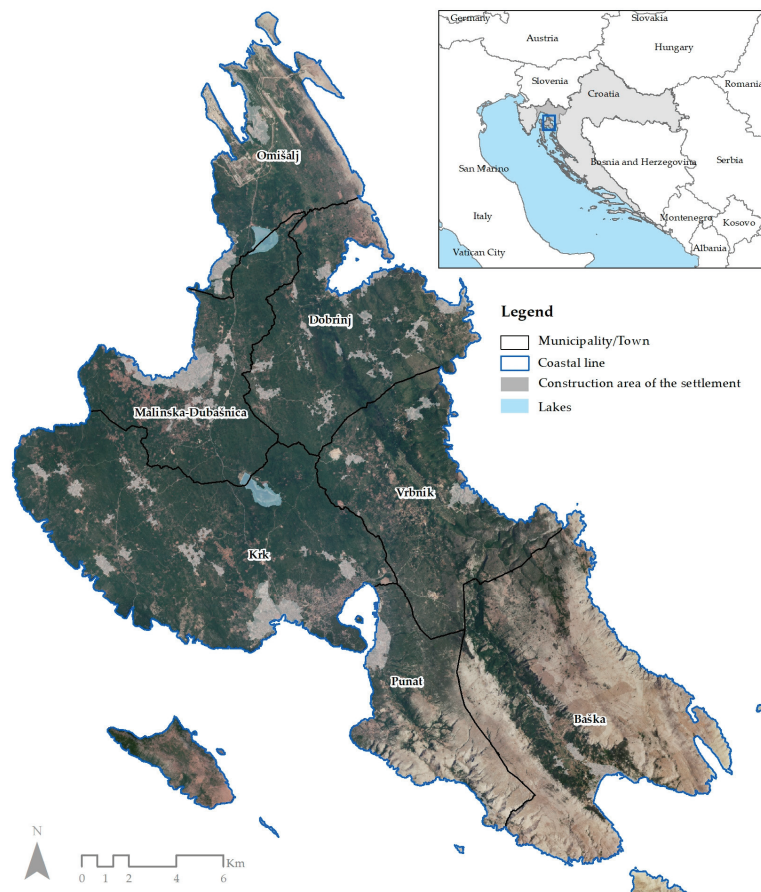

Figure 1. The island of Krk and its location in Primorje-Gorski Kotar County, Croatia (map created in ArcGIS 10.6).

The development of the settlement on the island of Krk was influenced by natural and geographical characteristics, among which the shape of the island, relief, geological

structure, altitude, and climate are particularly important, and exposure to strong winds as the most important of the climatic factors. For this reason, the majority of settlements (88%) are located in the central part of the island, at an altitude of up to 100 m a.s.l., in an area protected from the direct impact of the strongest gale force wind [56]. A little over a hundred years ago, a large number of the local population lived very modestly from seafaring, shipbuilding, agriculture, livestock, and fishing, mainly for their own needs, which resulted in emigration, mainly to America. In the decades after the Second World War, in the 1960s, 1970s, and 1980s, there was a strong development of tourism. Under the influence of these social and economic circumstances, old castles and former smaller settlements of the local population were transformed into tourist centers and desirable places of permanent or temporary residence, so that the island of Krk, with its growing population, is an exception among Croatian islands affected by depopulation [56,57].

The island has a moderate and mild climate which is, according to Koeppen's classification, a moderately warm and rainy climate (Cfsax); according to Thornthwaite's classification, it is a humid climate, which means enough water for plants throughout the year, except for midsummer—in July and August [25,58]. The mean air temperature on the island of Krk is 14.9 °C and the average amount of precipitation is 1208.6 mm [25]. Long-term monitoring of precipitation on the island of Krk shows that the minimum amount of rain falls in July, and the maximum in November [25,58]. The wind rose for the island of Krk shows that winds blow there from all four quadrants [25], and by frequency, the most significant are bora, sirocco, and mistral [26].

Climate projections show that in Primorje-Gorski Kotar County, an increase in air temperature along with a decrease in precipitation will lead to an increase in the intensity and length of drought periods, an increase in evapotranspiration, and a decrease in water supplies. An increase in the intensity of short-term heavy precipitation will cause an increase in the risk of floods and soil erosion. Climate change will be most pronounced in the summer, especially on the islands, among which the island of Krk stands out. The greatest negative impact is considered to be an increase in the sea level, and among the most threatened urban areas are the island of Krk and the town of Krk, as well as other coastal towns [44].

3.2. Data and Methods

The basis for presenting the current situation is the orthophoto map available on the Geoportal of the State Geodetic Administration [59] and data from the ArcGIS 10.6 of the Institute for Spatial Planning of the Primorje-Gorski Kotar County [60]. Based on these data, graphic representations of the location of the island of Krk and all parks and promenades considered in this work were made (Figures 1–3). On these maps, the construction areas of the settlement are marked in accordance with the spatial plans, transferred from ArcGIS, and the locations of public city parks, forest parks, hotel/camping parks, and promenades determined by the field visit, where each of these four categories is marked with a different color and number, which corresponds to that from Tables 1–3.

Table 1. Overview of the park heritage of the island of Krk.

No.	Park/Promenade	Typological Category	Town or Municipality/Settlement	Location
1.	Park Dubec	public town park	Omišalj/ Omišalj	the northern slope between the historic core and the sea
2.	Saint Nicholas Memorial Park (*Spomen-park sv. Mikul*)	public town park	Omišalj/ Omišalj	in the center of the town
3.	Pope John Paul II Memorial Park (*Spomen-park Pape Ivana Pavla II*)	public town park	Omišalj/ Omišalj	edge part of the town, east of the settlement
4.	Park Jaz	public town park	Malinska-Dubašnica/ Malinska	in the center of the town, at the bottom of the old port

Table 1. *Cont.*

No.	Park/Promenade	Typological Category	Town or Municipality/Settlement	Location
5.	a series of parks along the coastal promenade	public town parks	Malinska-Dubašnica/ Malinska	in the center of the town, north of the of the root of the port
6.	park areas along the coastal promenade	public town park	Malinska-Dubašnica/ Malinska	in the center of the town, west of the of the root of the port
7.	roof garden DUBoak	public town park	Malinska-Dubašnica/ Malinska	in the center of the town
8.	Park Kamplin	public town park	Krk/Krk	in the historic core of the town
9.	Big Park (*Veli park*)	public town park	Krk/Krk	in the center of the town, by the sea coast
10.	*Krušija*	public town park	Krk/Krk	in the center of the town, by the sea coast
11.	Little Park (*Mali park*)	public town park	Krk/Krk	in the center of the town
12.	Victims of the First World War Memorial Park (*Spomen-park žrtvama I. svjetskog rata*)	public town park	Punat/Punat	in the center of the town, by the sea coast
13.	Victims of the Second World War Memorial Park (*Spomen-park žrtvama II. svjetskog rata*)	public town park	Punat/Punat	in the center of the town, by the sea coast
14.	Victims of the Homeland War Memorial Park (*Spomen-park žrtvama Domovinskog rata*)	public town park	Punat/Punat	in the center of the town, by the sea coast
15.	Park Marjan	public town park	Baška/Baška	in the center of the town, by the sea coast
16.	St. John Park (*Park sv. Ivan*)	public town park	Vrbnik/Vrbnik	in the center of the town, outside historic core
17.	Our Lady's Park (*Park Gospoja*)	public town park	Vrbnik/Vrbnik	outside the historic core
18.	Park of Croatian veterans (*Park hrvatskih branitelja—Jardin*)	public town park	Dobrinj/ Dobrinj	in the center of the town
19.	Glagolitic Park (*Park glagoljice*)	public town park	Dobrinj/ Gabonjin	in the outskirts of the settlement
20.	Park Ogreni	forest park	Dobrinj	outside the village, along the road to Šilo
21.	Forest park Dražica	forest park	Krk/Krk	in the tourist zone
22.	Forest park Košljun	forest park	Krk	on the islet in Puntarska Draga
23.	park around hotel Adriatic	hotel park	Omišalj/ Omišalj	along the coast, north of the historic core
24.	camping park Omišalj	camping park	Omišalj	outside the town, in Vodotoč Bay
25.	hotel and camping park in Njivice	hotel and camping park	Omišalj/Njivice	along the coast, north of the settlement
26.	Park Haludovo	hotel park	Malinska-Dubašnica/ Malinska	along the coast, north of the settlement
27.	park areas around the Draga beach and the hotel Malin	hotel park	Malinska-Dubašnica/ Malinska	along the coast, west of the settlement
28.	park areas around hotels Dražica, Koralj, Bor and Tamaris	hotel park	Krk/Krk	along the coast, east of the town center
29.	camping park Ježevac	camping park	Krk/Krk	along the coast, west of the town center

Table 1. *Cont.*

No.	Park/Promenade	Typological Category	Town or Municipality/Settlement	Location
30.	park areas around hotel Park	hotel park	Punat/Punat	in the center of the town, along the coast
31.	park areas around hotels	hotel park	Baška/Baška	west of the town center
32.	plantations along the coastal promenade	promenade	Omišalj/Omišalj	north of historic core
33.	plantations along the coastal promenade	promenade	Omišalj/Njivice	north and south of the town center
34.	Paradise path (*Rajska cesta*)	promenade	Malinska-Dubašnica/Malinska	north of the town center
35.	plantations along the coastal promenade	promenade	Punat/Punat	east of the town center
36.	plantations along the coastal promenade	promenade	Baška/Baška	along the coast and the main beach
37.	promenade towards St. John	promenade	Baška/Baška	east of the settlement
38.	Path of the Moon (*Put mjeseca*)	promenade	Baška	east of the settlement
39.	Paradise path (*Rajski put*)	promenade	Vrbnik/Vrbnik	west of the settlement
40.	promenade towards Kozica Bay	promenade	Vrbnik	southeast of the settlement

Table 2. Time of establishment, the initiative for the arrangement of the parks and promenades, and former purpose of space.

No.	Park/Promenade	Time of Establishment	The Initiative for the Arrangement	Former Purpose of Space
1.	Park Dubec	1925–1928	Society for the Beautification of the Place Omišalj	unkempt bare rock
2.	Saint Nicholas Memorial Park (*Spomen-park sv. Mikul*)	1975	Local authorities	former cemetery
3.	Pope John Paul II Memorial Park (*Spomen-park Pape Ivana Pavla II*)	2014	Seven local self-government units of the Island of Krk and Diocese of Krk	undeveloped area along the state road
4.	Park Jaz	1938	Local Bathing Commission	unkempt space near the coast with a water source
5.	a series of parks along the coastal promenade	1938	Local authorities and Tourist board	undeveloped spaces along the coast
6.	park areas along the coastal promenade	1938	Local authorities and Tourist board	undeveloped spaces along the coast
7.	roof garden DUBoak	2022	Local authorities	public town park
8.	Park Kamplin	1864	then municipality and the Diocese of Krk	unkempt green area next to the city walls
9.	Big Park (*Veli park*)	1900	Society for the Beautification of the Town of Krk	undeveloped area outside the city walls
10.	*Krušija*	1970s	Local authorities and Tourist Association	unkempt space near the coast with a water source
11.	Little Park (*Mali park*)	1980s	Local authorities and Tourist Association	unorganized space in the center of the town
12.	Victims of the First World War Memorial Park (*Spomen-park žrtvama I. svjetskog rata*)	1960s–1970s	Local authorities and Tourist Association	unorganized space along the coast

Table 2. *Cont.*

No.	Park/Promenade	Time of Establishment	The Initiative for the Arrangement	Former Purpose of Space
13.	Victims of the Second World War Memorial Park (*Spomen-park žrtvama II. svjetskog rata*)	1960s–1970s	Local authorities and Tourist Association	unorganized space along the coast
14.	Victims of the Homeland War Memorial Park (*Spomen-park žrtvama Domovinskog rata*)	1960s–1970s	Local authorities and Tourist Association	unorganized space along the coast
15.	Park Marjan	about 1955	Local authorities and Tourist Association	unkempt slope near the sea
16.	St. John Park (*Park sv. Ivan*)	1971	Local authorities and Tourist Association	former cemetery
17.	Our Lady's Park (*Park Gospoja*)	1994	Local authorities and Tourist Association	a fenced area next to the church with a lookout point
18.	Park of Croatian veterans (*Park hrvatskih branitelja—Jardin*)	second half of the 19th century	Local authorities	former cemetery
19.	Glagolitic Park (*Park glagoljice*)	2010	Cvetko Ušalj	undeveloped area next to the state road
20.	Park Ogreni	first half of the 20th century	Local authorities	a grassy valley with the source of the Dobrinj stream
21.	Forest park Dražica	1920s	Local Bathing Commission	unorganized green area
22.	Forest park Košljun	1969	Franciscan friars	monastery garden
23.	park around hotel Adriatic	1960s	Hotel investors	undeveloped area by the sea
24.	camping park Omišalj	2018	Camp investors	undeveloped area by the sea
25.	hotel and camping park in Njivice	1970s	Hotel investors	undeveloped area by the sea
26.	Park Haludovo	1970–1973	Hotel investors	undeveloped area by the sea
27.	park areas around the Draga beach and the Malin hotel	1936	Hotel investors	undeveloped area by the sea
28.	park areas around hotels Dražica, Koralj, Bor and Tamaris	1970s–1980s	Hotel investors	undeveloped area by the sea
29.	camping park Ježevac	1970s	Camp investors	undeveloped area by the sea
30.	park areas around hotel Park	1960s–1970s	Hotel investors	undeveloped area by the sea
31.	park areas around hotels	1970–1990	Hotel investors	undeveloped area by the sea
32.	plantations along the castal promenade	1960s	Tourist association	undeveloped area by the sea
33.	plantations along the coastal promenade	1960s	Tourist association	undeveloped area by the sea
34.	Paradise path (*Rajska cesta*)	1930s	Local Bathing Commission	undeveloped area by the sea
35.	plantations along the coastal promenade	1970s	Tourist association	undeveloped area by the sea
36.	plantations along the coastal promenade	1960s–1970s	Tourist association	undeveloped area by the sea

Table 2. *Cont.*

No.	Park/Promenade	Time of Establishment	The Initiative for the Arrangement	Former Purpose of Space
37.	promenade towards St. John	1938	Local authorities and Tourist Board	undeveloped and unkempt area
38.	Path of the Moon (*Put mjeseca*)	1940s	Local authorities and Tourist Board	undeveloped and unkempt area above settlement
39.	Paradise path (*Rajski put*)	1950s	Local authorities and Tourist association	undeveloped and unkempt area
40.	Promenade towards Kozica Bay	1950s	Local authorities and Tourist association	undeveloped and unkempt area

Table 3. Threats to parks/promenades as a result of climate change.

No.	Park/Promenade	Threat of Drought	Threat of Extreme Precipitation and Flash Floods	Threat of Stormy Wind (Bora, Sirocco, and Tramontane)	Threat of Sea Level Rise
1.	Park Dubec	−	+	+	−
2.	Saint Nicholas Memorial Park (*Spomen-park sv. Mikul*)	−	−	+	−
3.	Pope John Paul II Memorial Park (*Spomen-park Pape Ivana Pavla II*)	−	−	+	−
4.	Park Jaz	−	+	−	+
5.	a series of parks along the coastal promenade	−	+	+	+
6.	park areas along the coastal promenade	−	+	+	+
7.	roof garden DUBoak	−	−	+	−
8.	Park Kamplin	−	−	+	−
9.	Big Park (*Veli park*)	−	+	+	+
10.	*Krušija*	−	+	+	+
11.	Little Park (*Mali park*)	−	+	−	−
12.	Victims of the First World War Memorial Park (*Spomen-park žrtvama I. svjetskog rata*)	−	+	+	+
13.	Victims of the Second World War Memorial Park (*Spomen-park žrtvama II. svjetskog rata*)	−	+	+	+
14.	Victims of the Homeland War Memorial Park (*Spomen-park žrtvama Domovinskog rata*)	−	+	+	+
15.	Park Marjan	−	+	+	−
16.	St. John Park (*Park sv. Ivan*)	−	−	+	−
17.	Our Lady's Park (*Park Gospoja*)	−	−	+	−
18.	Park of Croatian veterans (*Park hrvatskih branitelja—Jardin*)	−	−	+	−
19.	Glagolitic Park (*Park glagoljice*)	−	−	−	−
20.	Park Ogreni	−	+	−	−
21.	Forest park Dražica	−	−	+	−
22.	Forest park Košljun	−	−	+	+
23.	park around hotel Adriatic	−	−	+	−
24.	camping park Omišalj	−	+	+	−
25.	hotel and camping park in Njivice	−	−	+	−
26.	Park Haludovo	−	−	+	−
27.	park areas around the Draga beach and the Malin hotel	−	−	+	−
28.	park areas around hotels Dražica, Koralj, Bor and Tamaris	−	−	+	−

Table 3. *Cont.*

No.	Park/Promenade	Threat of Drought	Threat of Extreme Precipitation and Flash Floods	Threat of Stormy Wind (Bora, Sirocco, and Tramontane)	Threat of Sea Level Rise
29.	camping park Ježevac	−	−	+	−
30.	park areas around hotel Park	−	−	+	+
31.	park areas around hotels	−	+	+	+
32.	plantations along the coastal promenade	+	+	+	−
33.	plantations along the coastal promenade	−	−	+	−
34.	Paradise path (*Rajska cesta*)	+	−	+	−
35.	plantations along the coastal promenade	−	−	+	+
36.	plantations along the coastal promenade	−	−	+	+
37.	Promenade towards St. John	+	−	+	−
38.	Path of the Moon (*Put mjeseca*)	+	−	+	−
39.	Paradise path (*Rajski put*)	+	−	+	−
40.	Promenade towards Kozica Bay	+	−	+	−

Selected examples of parks and promenades of the island of Krk were considered in terms of urban transformations based on data on the year or period of their arrangement, according to the entities that gave the initiative for their establishment and to the previous land use. To determine when they were created, the available literature was analyzed—books, scientific and professional papers, articles, internet sources, as well as cadastral maps [61], orthophoto maps and data from ArcGIS. The bearers of the initiatives by which the parks and promenades were arranged were determined by a review of scientific and expert articles, especially scientific monographs on the development of tourism in certain places, published in the first and second decades of this century on the occasion of centenary celebrations [13–15]. The previous land use was determined by looking at the topographic and cadastral maps, as well as literature, where older photos and postcards were particularly useful. Due to the breadth of the topic and the extensiveness of the article itself, the process of valorization of parks and promenades was not carried out, and socio-economic aspects were not considered in detail.

The certainty that the aforementioned general characteristics of climate change in Croatia [42] and in Primorje-Gorski Kotar County [44] are valid for the island of Krk is also confirmed by the fact that they have already been recorded on the island [28]. Due to the increase in air temperature in the last two decades, even changes in sunny and rainy days and usual changes in wind direction have become increasingly absent, instead of which longer dry periods are recorded, followed by sudden extreme amounts of precipitation in a short period that cause flash floods, all accompanied by stormy winds, especially during summer storms [25,26]. In the 21st century, there were several months in which no rain fell at all (for example, in Krk in July 2003, April 2007, March 2012, and December 2015, and in Omišalj in April 2007) [25]. Extreme amounts of rain and flooding have been recorded in recent years, especially in Malinska, Krk, Punat, and Baška (for example, 26 December 2021 [29], 18 November 2022 [30], 3 November 2023 [31], etc.). For the vegetation cover in general, and then for the vegetation base of the parks, it is more favorable if the same amount of precipitation was distributed as evenly as possible, rather than large amounts of rain falling in a short period [62] (when it could produce even strong erosion (e.g., Krk [63]). The negative impact of strong wind, especially gales, on plant cover is manifested not only in the wind pressure on the plant, which can cause trees to have bent trunks and unevenly developed crowns [64], but also in the harmful effect of salt, drying of the substrate—soil and aeolian erosion, whereby larger soil particles carried by the wind can further damage plants [25]. As potential threats to park heritage due to climate change, drought, extreme amounts of precipitation in a short period of time, resulting in flash floods, stormy winds, and rising sea level are recognized [27].
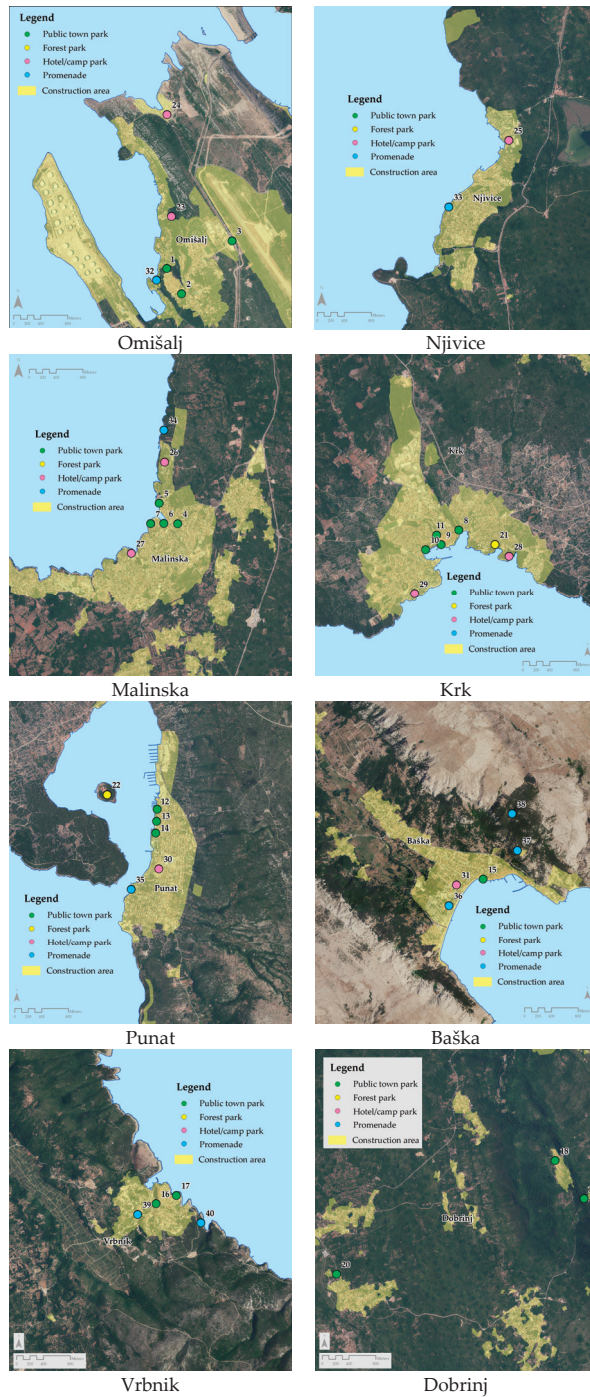
Figure 2. Location of the public town parks, forest parks, hotel/camping parks, and promenades in settlements of the island of Krk (maps created in ArcGIS 10.6).
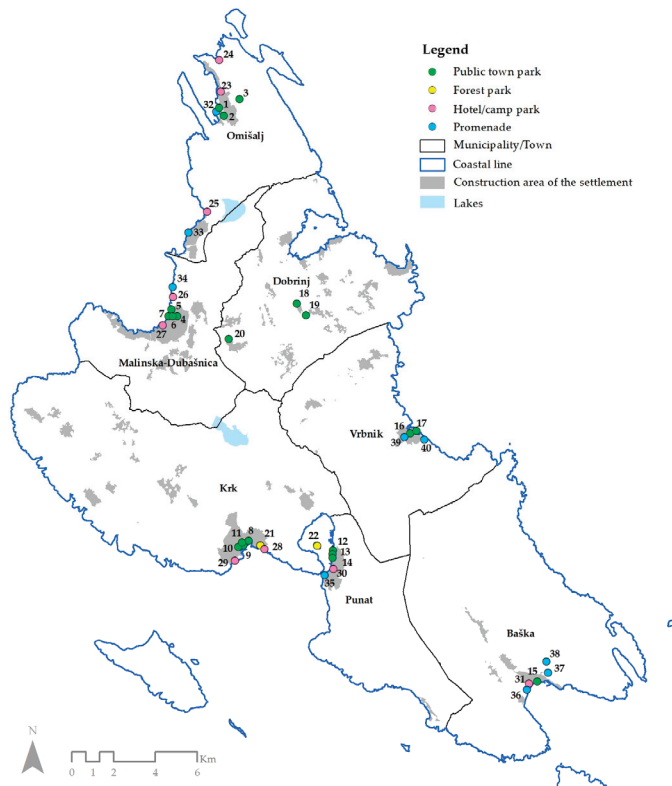
Figure 3. Public parks, forest parks, hotel/camping parks, and promenades on the island of Krk (map created in ArcGIS 10.6).

4. The Park Heritage of the Island of Krk

The park heritage of the island of Krk considered in this paper includes forty selected examples listed in Table 1 and classified into four typological categories: nineteen public town parks, three forest parks, nine hotel and camping parks, and nine promenades. For each example, it is indicated in which town and local government unit it is located, and its location is briefly described and shown on the map.

Due to the large number of such spaces, the authors are mainly focused on the presentation of the public parks and promenades of the central settlements of certain municipalities, i.e., the Town of Krk, with the exception of the municipality of Omišalj, where the selection also includes the parks around the hotel and the camp in Njivice, as since the 1980s, they have had a higher tourist significance than Omišalj, where tourism has lost its importance due to the development of industry. The selection was made based on the criteria of the time of origin; significance for a particular period of settlement development; importance for the tourism development of the place; and especially the importance that each park area has for the image of the town and its recognition. It should be noted that none of the selected parks are officially protected, except for the Košljun Forest Park, which is protected under the Nature Protection Act in the category of a special reserve of forest vegetation [65].

Starting from the premise that we should not only maintain what we have inherited from earlier periods, but that this century should also create new parks that we will leave heritage to future generations, the selection of presented parks included the examples from the second half of the 19th century to 2022. Four parks established in the 21st century (Table 1, No. 3, 7, 19, 24) are as follows. The Pope John Paul II Memorial Park was built to commemorate his first visit to the island of Krk and high-quality design of the park reflects and symbolizes the

spread of the Pope's noble messages in the world. Roof garden DUBoak is included because it is part of the very successful and award-winning architectural project of the DUBoak Maritime Heritage Interpretation Centre. The uniqueness of Glagolitic Park in Gabonjin is that the park is dedicated to the Glagolitic script as the oldest Slavic script. The park is also special because it is not dominated by plant elements, but by stone elements with special meanings and messages. The park in the camp in the Vodotoč Bay near Omišalj is a valuable architectural and landscape achievement in its category. It was realized by the maximum use of the existing vegetation and adaptation to the surrounding area.

Most of the public town parks are small or very small in area (approx. 1000 m^2 or less), but their importance should be seen in regards to the settlements themselves, which are also small (according to the 2021 census, the population of Omišalj was 1877, Njivice 1115, Malinska 816, Krk 3935, Punat 1784, Baška 899, Vrbnik 887, and Dobrinj 89) [51]. Seven public town parks have an area of less than 1000 m^2 (in Table 1, No. 4, 5, 6, 10, 11, 16, and 19), eight of them have an area of approximately 1000 m^2 (in Table 1, No. 2, 7, 8, 12, 13, 14, 15, and 18), three have an area of 1000–2000 m^2 (in Table 1, No. 3, 9, and 17), and only Park Dubec (in Table 1, No. 1) has an area of approximately 18,000 m^2. Forest parks are larger—Ogreni approximately 4000 m^2, Dražica 12,709 m^2, and Košljun 6 ha. Five hotel/camping parks have an area of less than 10 ha (in Table 1, No. 23, 24, 27, 29, and 31), and four larger than 10 ha (in Table 1, No. 25, 26, 28, and 30).

All parks are publicly accessible, they are not fenced, and there are no entrance fees for visiting them. The specificity of hotel/camping parks is that, although they are also publicly accessible, they are used mainly by their guests.

Public city parks, forest parks, and promenades are under the management of town utility companies, with the exception of the protected Košljun Forest Park, which is managed by the "Priroda" Public Institution for management of protected nature areas in Primorje-Gorski Kotar County. Parks of hotels and campsites are maintained by their owners.

Regardless of the location, all the elements of park architecture on the island of Krk considered in this paper had a decisive influence on the present-day image of the settlement (Figure 4), with additional recognition given by plant species that are typical for certain places, for example, mulberries for Omišalj; pines, Aleppo pine, cypresses, and cedars for Malinska; nettle trees for Krk and Vrbnik; holm oaks for Punat; pittosporums for Baška; and wild chestnut and plane trees for Dobrinj [21].

Park Kamplin, Krk

Big Park (Veli park), Krk

Forest park Košljun

Forest park Dražica, Krk

Figure 4. *Cont.*

Park Haludovo

Coastal promenade, Malinska

Roof park DUBoak

Glagolitic Park (Park glagoljice), Gabonjin

Figure 4. Some public town parks, forest parks, parks of hotels, and promenades of the island of Krk. (photos by K. Vahtar-Jurković, except Roof park DUBoak, Copyright 2024, Copyright Maritime Heritage Interpretation Center DUBoak).

5. Results

The results of the research on the park heritage of the island of Krk are analyzed in two subchapters: in the context of urban transformations and in the context of climate change.

5.1. Park Heritage of the Island of Krk in the Context of Urban Transformations

Information about the year or period of arrangement of parks and promenades on the island of Krk, entities by whose initiative they were founded, and the previous land use are shown in Table 2.

Table 2 shows that two public parks were created in the second half of the 19th century; five public town parks, two forest parks, one hotel park, and three promenades were created in the first half of the 20th century; nine public town parks, one forest park, seven hotel/camping parks, and six promenades were created in the second half of the 20th century; and three public town parks and one camping park were created in the 21st century.

Four parks were arranged at the initiative of the local authorities; two parks at the initiative of societies for the beautification; one park, one forest park, and one promenade at the initiative of local bathing commissions; and four promenades at the initiative of tourist associations. Various institutions related to tourism are mentioned because they have changed from the end of the 19th century to the present day, but their activities have always included concern for the arrangement of places, especially for the arrangement of parks and promenades [14,66]. In cooperation with local authorities and the Diocese of Krk, two parks were arranged, in cooperation with local authorities and tourist boards, two rows of park plantations in Malinska, and two promenades, and in cooperation with local authorities and tourist associations, eight parks and two promenades were arranged. Investors of hotels and campsites have arranged nine parks belonging to them. The Franciscan friars arranged the forest park Košljun. The Glagolitic Park in Gabonjin was arranged at the initiative of an individual—Cvetko Ušalj, founder of the Small School of Glagolitic and Ethno Workshop, as part of which, with the help of the locals, in addition to this Glagolitic Park, he arranged the Glagolitic Path [67].

Regarding the previous use of the space, it should be said that three public town parks were arranged on the site of previous cemeteries, one on a fenced area next to a church with a lookout point, and one forest park in a monastery garden. Two of them are arranged on steep slopes, two on unkempt space with a water source in the center of the settlement, one in a grassy valley with a stream source, and one garden on the roof of a building built on a part of the former city park. Pope John Paul II Memorial Park was arranged on the unkempt area along the state road. Most of the parks and promenades, 28 of them, have been arranged on undeveloped and unkempt areas along the coast or on higher areas with a nice view. Different descriptions in the last column of Table 3 are listed depending on the time of the park's creation and the development of the surrounding area.

5.2. Park Heritage of the Island of Krk in the Context of Climate Change

Assessment results of the threats caused by climate change are shown in Table 3. For example, for the threat of drought, a "−" was generally written for the parks and promenades where there is an irrigation system and a "+" where such systems do not exist. However, it should be noted that when assessing the threat, local features were also considered, such as the existence of natural water sources at the location or the inflow of water from the surrounding higher areas and its exposure to insolation. In this way, it was assessed, for example, that for Park Ogreni in the municipality of Dobrinj, although no irrigation system has been implemented there, there is no danger of drought because it is a shady valley (Figure 2, Dobrinj) with a water source. In the course of the field tour, during the evaluation of the risk of drought, plant species resistant to drought planted in the parks were also taken into consideration.

To assess the risk of extreme amounts of precipitation in a short period and flash floods, a "+" is entered in the table where, due to the morphology of the terrain, erosion caused by flash floods can be expected in parks/promenades arranged on slopes—Park Dubec in Omišalj and Park Marjan in Baška; promenades on the slopes in Baška and Vrbnik (Figure 2, Omišalj, Baška, Vrbnik); and at those coastal parks and promenades along the coast where, due to the inflow of torrents from the surrounding steeper area, one can expect such a large amount of water that the soil would not be able to absorb it, especially if it is loamy, less permeable ground.

Due to its geographical position (Figure 1), the island of Krk is exposed to the wind, so the threat to vegetation from stormy winds and wind gusts has been assessed for most parks and promenades, especially for those exposed to bora (NE) as the strongest wind that blows on the island of Krk. It should be emphasized that strong wind gusts from the south—sirocco (SE)—have also been recorded recently, and during summer storms, the western part of the island is exposed to strong tramontane (N-NW) [25,26]. The threat of stormy winds was determined based on the characteristics of the location of an individual park, i.e., the exposure of the town where the park is located to the wind from a specific quadrant with regard to its geographical position, and the exposure of the park itself to that wind direction, taking into account the characteristics of the micro-location (terrain shape, altitude, surrounding built structures).

The threat of sea level rise was assessed in relation to their current position in relation to sea level, for parks and promenades located along lower coasts and by comparison with the coastline vulnerability map [68]. According to official documents in Primorje-Gorski Kotar County, a sea level rise of 62 ± 14 cm is expected by the end of this century [44]. The occurrence of simultaneous tidal waves and extremely large amounts of rain in a short time, which leads to flooding of the waterfront, is particularly dangerous. Such occurrences threaten all built structures along the coast, including coastal parks and promenades that become submerged. It should be emphasized that, more often, such occurrences could threaten the plant base of the parks through salinization. The endangerment of parks and promenades located along the coast, especially those in the area of Omišalj, Malinska, Krk, Punat, and Baška, is mainly due to the rise in sea level, which was also confirmed in the previous study, in which the coastal vulnerability index consists of several partial

sub-indices considering the geological structure, coastal slope, coastal inundation, impact of storms, and wave action. An inspection of the cartographic representations for the area of the island of Krk shows that the coastal vulnerability index is high (4), and the vulnerability from coastal flooding (Figure 5) is very high (5) [68].
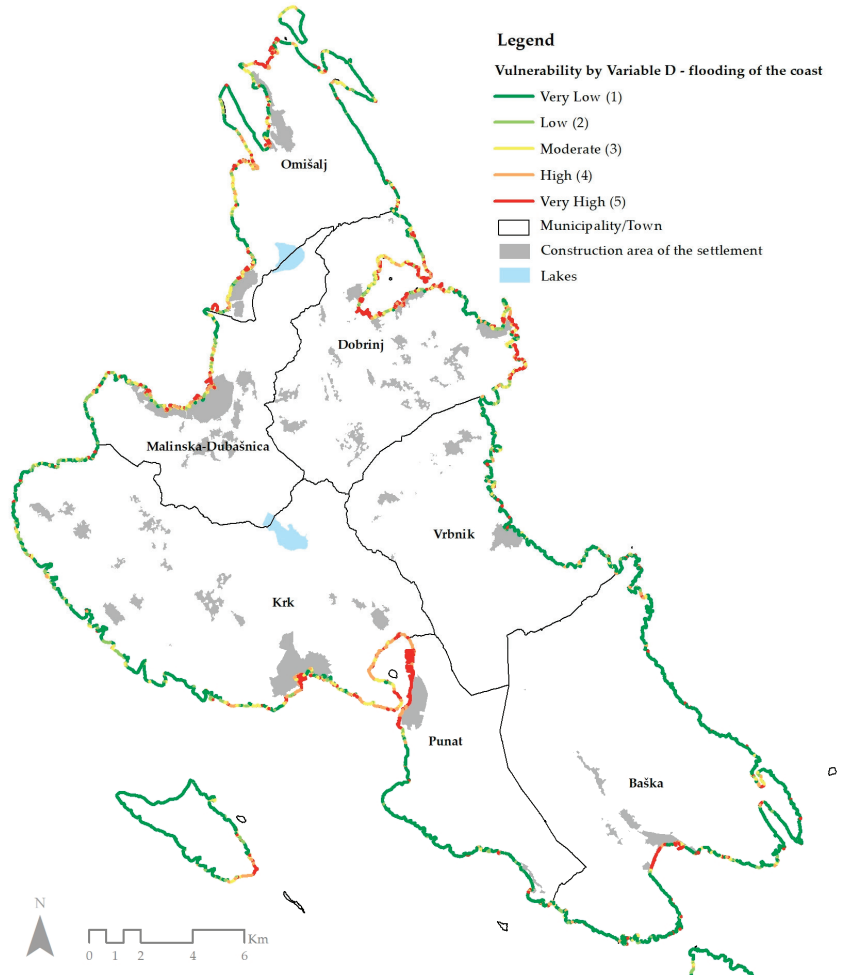

Figure 5. Threat map of the coastal area of the island of Krk due to coastal flooding (Adapted with permission from Ref. [68]. Copyright 2024, copyright Assoc.Prof. Igor Ružić, PhD).

Table 3 shows that six out of forty parks and promenades are potentially threatened by drought, or 15%. The threat due to an extreme amount of precipitation in a short time and flash floods was determined for 15, or 37.5%, of them. Danger from stormy winds is a potential danger for 36 parks and promenades, which is 90%. Due to the estimated sea level rise, 13 coastal parks and promenades, or 32.5%, would be threatened.

6. Discussion

6.1. The Park Heritage of the Island of Krk in the Context of Urban Transformations

In Table 2, the data on the use of land before the development of the parks indicate the urban transformations that resulted in their development.

One of the earliest transformations of that kind was the repositioning of former cemeteries, which used to be located next to the churches in the settlements. Thus, the first

cemetery in Omišalj was next to the church in the center of the old town until 1818, when, based on the decision of the then-Austrian authorities to ban burials next to churches and within the settlement, it was moved to the church of St. Nicholas (in folk speech, Sv. Mikul), which was outside the town at the time. With the further expansion of the town, it became a part of the settlement, so in 1914, the cemetery was again moved to a sufficiently distant new location near the chapel of The Holy Spirit, and in 1975, a park was arranged on that spot [16]. In Vrbnik, until 1956, the local cemetery was located next to the ancient church of St. John the Baptist [17], and in the 1970s, a small park was arranged there. In Dobrinj, next to the bell tower, on the site of the former cemetery, which moved to its current location in 1855 [18], a small park was arranged, which the locals call simply Jardin, and which was recently given the official name Park of Croatian Veterans.

Three parks are arranged around water sources—Jaz in Malinska and Krušija in Krk [69], which were previously local laundry facilities, and Park Ogreni around the source of the Dobrinj stream, which was arranged during the construction of the local water supply.

Most of the parks and promenades were arranged on undeveloped and unkempt areas, often by afforestation of bare areas (Park Dubec in Omišalj, Paradise path and promenade towards Kozica Bay in Vrbnik, and promenade towards St. John and the Path of the Moon in Baška). In the first decades of the last century, with the beginnings of the development of tourism, the park development of the coastal areas of Malinska, Krk, and Baška began. Nevertheless, the largest number of public city parks, hotel/camping parks, and promenades were arranged on undeveloped and unorganized areas by the sea in the second half of the 20th century, during the period of the strongest development of tourism.

Recent transformations have resulted in four new parks. The location of today's Pope John Paul II Memorial Park used to be undeveloped natural land next to the island's main road, whose route, until the 1980s, turned from the main north–south direction to the west and passed through Omišalj. Then, for the needs of the construction of the petrochemical industry, its extension was built to the exit to the main road again. According to urban plans, along this direction, business zones were built, and next to the roundabout where the road diverges to the center of Omišalj, a park with a monument of the Pope was built in a prominent place so that as many passers-by as possible could see it [70]. In the area of Omišalj, in the Vodotoč Bay, a new camp with a landscaped park was recently built. The Maritime Heritage Interpretation Centre DUBoak in Malinska was built on part of the former park with a Mediterranean roof garden and a square in front of the Centre. Although roof gardens are not a tradition of our region, we cannot but agree that, like the unusual architectural achievement of the Centre building itself, this roof garden rising from the parterre is attractive and brings a new quality to the center of the place. The Glagolitic Park was also arranged in the outskirts of Gabonjin on previously unorganized and undeveloped land.

During the first two decades of the 21st century, and especially after Croatia became a member of the European Union, interest in the construction of new and reconstruction of existing properties for tourist purposes increased, especially on the coast where apartment houses predominate. Such properties are surrounded by gardens, in accordance with the provisions of spatial plans, which require that at least 40% of the plot area be covered with landscaped greenery. Recent urban transformations mostly did not affect the parks and promenades covered in this paper, primarily due to the fact that they are registered in spatial plans as public green areas; thus, they are protected from other forms of construction. All local self-government units are aware of the importance of the orderliness of places, especially public parks and promenades, and invest in their maintenance. In addition to legal obligations, the fact that it is part of the local community's culture also affects the arrangement of green areas. At the end of each tourist season, the most beautifully decorated tourist spots are selected at the national level, and the town of Krk has won such a title several times. The local population supports the arrangement of public parks and promenades, which they perceive as part of their social space. The local community partici-

pates in the processes of arrangement and development of parks and promenades through public hearings in the process of adopting spatial plans and through its representatives in municipal councils and tourist boards, and in recent years, the tradition of establishing Societies for the Beautification of Places as citizens' associations has been revived.

Recently, some areas are experiencing renewed transformations. For example, as part of the decision to gradually renovate the entire coastal area of Malinska, in recent decades, more public spaces have been redecorated on the western side of the root of the harbor. Park Marjan in Baška and forest park Dražica in Krk were also renovated. The first transformation of the area of Haludovo resulted in the creation of a park by afforestation of bare land [71], and the second led to the abandonment and complete devastation of the buildings, while the park flourished and reached its full maturity. According to our opinion, an example of a failed transformation is the recent reshaping of the park near the chapel of St. John in Vrbnik with the introduction of inappropriate elements such as the so-called smart benches and a pool with a fountain, but without the established necessary conservation conditions.

Urban transformations also led to the disappearance of certain elements of park architecture or in connection with it. For example, the nursery in the center of Malinska was established in 1936–1938 and operated until the 1960s, and in the 1980s, a parking lot and a market were arranged there. Promenade Ljubavna cesta, built in the 1930s in the Kricin area of Baška, which is now a street leading to the nudist beach and next to which villas were built, has disappeared due to the construction of a residential street. During the last decade, some of the pine trees along the promenade Rajska cesta in Vrbnik were also removed for the reconstruction of residential streets and the construction of buildings according to the program of encouraged housing construction.

All of the above, according to the authors, confirms that urban transformation modifies the existing heritage (either positively or negatively), but also that urban transformation can create and develop new heritage.

6.2. The Park Heritage of the Island of Krk in the Context of Climate Change

Considering the recognized four types of potential threats as a result of climate change, the percentages of exposure of individual parks and promenades to the threats of drought, extreme amounts of precipitation in a short time and flash floods, stormy winds, and rising sea levels were compared, which determined that the most significant threat is from stormy wind (51.4%), followed by extreme rainfall in a short period of time and flash floods (21.4%), then rising sea levels (18.6%), and the least pronounced potential danger was drought (8.6%), primarily due to the irrigation systems already implemented earlier and appropriate drought-resistant plant species (Figure 6). This analysis led to the interesting conclusion that the most significant threat to the parks and promenades of the island of Krk is not sea level rise, which is generally considered the most significant threat, but stormy winds.

Finally, the advantages of parks and promenades in the context of climate change, which have a defensive function in relation to built-up parts of the settlement [6], and the fact that these are areas where the average temperature is a whole degree lower than those in built-up parts of the settlement, should be highlighted [72], so they are desirable places to stay and rest from the summer heat, which is why their preservation and protection is extremely important not only for the local population, but for tourists, too. This is on the trail of all recent European and national documents related to green infrastructure and resistance to climate change, where the green infrastructure to which the park heritage belongs has a special role and significance. Observing the parks and promenades of the island of Krk in this context, some similar examples in the world and in Croatia were analyzed, and it was determined that, as aforementioned, numerous scientific and professional articles highlight the importance of parks in strengthening resistance to climate change, namely by reducing the impact of urban heat islands, with an emphasis on the dependence of this influence on the size of the parks, the type of vegetation planted in them, and the existence of the irrigation system [51,73,74]; by absorbing a large amount of precipitation

and preventing flash floods, calling them "natural sponges that absorb stormwater" [51]; and by affecting air circulation and mitigating the effect of strong winds [74]. At the same time, parks strengthen the local community's resistance to climate change, and have great aesthetic, social, and economic value [51,75,76], which is why the role of landscape architects is highlighted not only in design settlements, but also in the fight against the consequences of climate change [77].
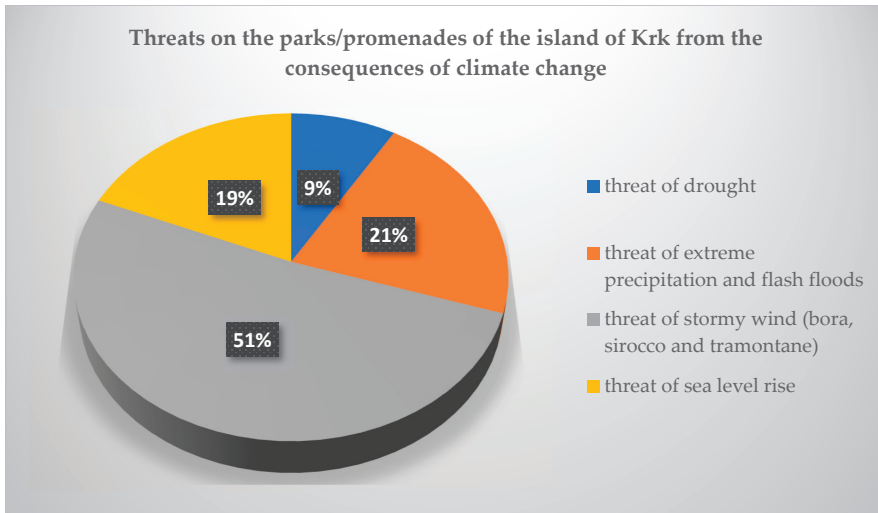

Figure 6. Threats on the parks/promenades of the island of Krk from the consequences of climate change.

7. Conclusions

The park heritage of the island of Krk presented in this paper was created as a result of urban development and transformations, to the greatest extent due to the development of tourism, which transformed the former castles and smaller settlements of the local population into tourist centers. Despite being exposed to constant changes, the park heritage mostly managed to be preserved, and recently, new elements of that heritage are emerging, which confirms that urban transformation transforms heritage, but also that urban transformation can create and develop new heritage. A new challenge to the preservation of the park heritage of the island of Krk is the threat of the consequences of climate change—increasingly frequent and long-lasting droughts followed by storms with extreme amounts of precipitation and strong wind, sea level rise and salinization. On the other hand, parks and promenades, as part of the overall green infrastructure, represent an important factor in the context of climate change resistance, which even more emphasizes the need and obligation of their preservation and protection.

The results of this research could be used in urban planning, tourism development strategies, local action plans against climate change, and in the management and maintenance of parks and other green areas on the island of Krk, and as an example of practice in other similar areas in the Mediterranean area. This research could also serve as a background for further research of the valorization of parks and promenades in general, and their socio-economic impact on the broader society.

Author Contributions: Conceptualisation, K.V.-J.; Data curation, K.V.-J.; Formal analysis, K.V.-J.; Investigation, K.V.-J.; Methodology, K.V.-J. and R.S.J.; Resources, K.V.-J., R.S.J. and J.J.; Validation, K.V.-J., R.S.J. and J.J.; Visualisation, K.V.-J.; Writing—original draft preparation, K.V.-J.; Writing—review and editing, K.V.-J., R.S.J. and J.J. All authors have read and agreed to the published version of the manuscript.

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The Influence of Urban Design Performance on Walkability in Cultural Heritage Sites of Isfahan, Iran

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Abstract: This research explores the impact of urban design performance qualities on pedestrian behavior in a cultural heritage site designated by UNESCO. The study employs a multi-method approach, including a questionnaire survey, empirical observation of pedestrian activities, and empirical axial line and visibility graph analysis using the space syntax technique. The first part of the study involved a questionnaire formatted as a polling sheet to gather expert assessments of spatial performance measures. The second part used a pilot survey to capture the perspectives of end users regarding the study's objectives and their perceptions of the site. Pedestrian flow was observed using a technique called "gate counts", with observations recorded as video clips during specific morning and afternoon periods across three pedestrian zones. The study also examined the behavioral patterns of pedestrians, including their movement patterns. Finally, the ArcGIS 10.3.1 software was employed to evaluate the reliability of the results. The main finding of this research is that pedestrian behavior and walkability in the historical areas are significantly influenced by landmark integration, wayfinding behavior, and the socio-economic functions of heritage sites. This study highlights the importance of using cognitive and syntactic analysis, community engagement, and historical preservation to enhance walkability, accessibility, and social interaction in heritage contexts. In addition, it identifies the need for improvements in urban design to address inconsistencies between syntactic maps and actual pedestrian flow, emphasizing the role of imageability and the impact of environmental and aesthetic factors on pedestrian movement. This research provides valuable insights for urban designers and planners, environmental psychologists, architects, and policymakers by highlighting the key elements that make urban spaces walkable, aiming to enhance the quality of public spaces.

Keywords: urban design; walkability; pedestrian friendly; pedestrian movement patterns; place making; social interactions; cultural heritage site; space syntax

1. Introduction

Walkability, as an attribute of the built environment, lies at the center of debates in urban studies regarding the creation of social and vibrant cities through a sustainable strategy for developing public spaces inclusively. It plays a pivotal role in influencing urban planning decisions for streets in the historic city center, guided by local government policies [1–5]. Walkability spans various disciplines, including its role as the most sustainable form of transportation [6], a recreational activity [7,8], a means of physical exercise for improving health and well-being [9,10], and a way to foster social interaction [11,12]. Currently, people are becoming less physically active, resulting in fewer

pedestrians in public spaces and city streets, consequently increasing the risk of obesity and related diseases [13–16]. This underscores the need to boost walking activities within local communities to enhance health, well-being, and overall quality of life.

Prior studies have indicated a positive relationship between the built environment and mental health [17–19], life satisfaction [20–24], walkable tourism [25–29], and physical activities, including walking [30–33]. Key characteristics of the surrounding environment that support and promote walkability include a comfortable space, a safe and secure physical infrastructure [34,35], connectivity and accessibility [36–38], land-use diversity [39–41], legibility [42–46], and green areas [47,48]. Research extensively shows that urban areas with greater pedestrian accessibility are more likely to boost social interactions and enhance the vibrancy of local communities [49–51]. Moreover, measuring the quality of the streets and their accessibility is associated to social well-beings and the perception of healthy places [24,52,53].

The relationship between walkability and urban design has generated significant attention in recent urban studies, emphasizing the need for pedestrian-friendly environments. Research has shown that urban design qualities such as imageability and transparency significantly influence walking behavior [54]. Additionally, the ongoing discourse on walkability highlights the importance of creating memorable and walkable environments [55]. Cutting-edge methods like space syntax have been employed to capture pedestrian movement patterns and urban form, providing new insights into the dynamic interplay between street networks and functional attractors [56]. Comparative studies have further underscored the impact of different urban forms on walkability, with mixed-use developments emerging as a key factor [57]. In addition to pedestrians' behaviors and perceptions, sustainable attributes of the physical environment, such as comfort and safety, serve as factors in assessing the walkability-friendliness of urban neighborhoods [58,59]. Overall, these findings underscore the critical role of thoughtful urban design in promoting walkability and enhancing the quality of urban life.

While the concept of walkability is widely discussed in developed countries in Europe and the USA, it has become a pressing issue in the rapidly evolving urban policy planning of developing countries like Iran. In historical cities such as Isfahan, authorities have traditionally emphasized the use of private cars, investing in streets and parking lots. Nevertheless, over the past decade, Isfahan, Iran's cultural heritage site reflecting the urban planning vision of the Safavid dynasty from 400 years ago, has been largely pedestrianized. This pedestrianization responds to various pedestrian challenges, including inadequate amenities on sidewalks and a lack of suitable pathways to enhance urban vitality, livability, social interaction, and walking incentives.

Nowadays, pedestrian mobility in Isfahan is being spurred by local urban policies and strategies that promote a mix of transportation options, including walking, cycling, and green means of public transportation, as part of an integrated network aimed at reducing the use of private vehicles. Given that walkability performance can be influenced by historical context, and this research is conducted within a cultural heritage site as a specific urban spatial component, this study yields original outcomes. Therefore, the primary unanswered research question remains: "What are the spatial characteristics of the site that could contribute to the enhancement of walkability and transform it into a walkable heritage site?"

This study employs Sondheim's matrix as a foundational framework to systematically analyze and integrate key urban design qualities, including social encounter, aesthetic appeal, cultural identity, and functionality. By leveraging this matrix, we aim to provide a structured and comprehensive evaluation of these elements within the context of pedestrianization in cultural heritage sites. Recognizing the significant social value of streets and public spaces, the objective is to assess the spatial quality of these pedestrian/cyclist streets and the historic square of Naghsh-e Jahan. To achieve this, qualitative and quantitative methods are employed, including a questionnaire (with statistical analysis using SPSS version 29), count gating, and space syntax analysis and GIS. These methods will aid in

evaluating the practicality and attractiveness of these transition spaces, thereby contributing to a comprehensive assessment of the current situation. However, it is worth noting that these spaces have faced inactivity due to interruptions in the historical site's identity and unforeseen inconveniences resulting from changing street use, which authorities are currently unaware of.

This study aims to understand people's perceptions of specific heritage environments. Beyond data collection, our research has the potential to assist in designing and planning urban social spaces. The proposed placemaking method allows for the prioritizing of parameters that are crucial for the physical development of historic sites, making them more walkable. In this regard, urban planners, stakeholders, city authorities, and UNESCO authorities overseeing cultural sites can benefit from the outcomes and recommendations. In the subsequent sections, the research outline will follow a structured presentation. It will be initiated with an overview of the materials and methods utilized, followed by the presentation of the results and a comprehensive discussion of their implications, and it will culminate with a summary of the key findings, conclusions, and their broader significance.

2. Materials and Methods

2.1. Questionnaire Survey

The methodology employed in this study was centered around the development of two questionnaires based on the Sondheim matrix and modeling templates. These questionnaires were designed to evaluate four categories of pedestrian-influencing variables: social encounters, aesthetics, functional qualities, and cultural identity. The primary focus of this research was the assessment of environmental quality and the interaction between users and their built environment within a cultural heritage site. The study adopted a mixed-methods approach, incorporating both quantitative and qualitative data collection techniques.

2.1.1. First Questionnaire: Expert Assessment

The initial questionnaire, designed in a polling sheet format, aimed to assess spatial performance measures. Experts were tasked with evaluating these measures in relation to block faces within the boundaries of Isfahan's historic site. The Likert scale was used to gather expert responses, with data subsequently converted into a continuous variable. This transformation involved assigning numerical values to each response category, ranging from "1" (indicating "strongly disagree") to "5" (indicating "strongly agree"). To determine the statistical significance of these expert evaluations, a single-sample *t*-test was conducted. This statistical test is employed to compare the mean of a single sample of scores to a hypothesized value. In this case, the hypothesized value was set as the midpoint of the Likert scale, which corresponds to "3".

2.1.2. Second Questionnaire: End-User Perspective

The second questionnaire was designed to capture the perceptions and experiences of end users, including mobile users, commuters, and pedestrians, within a studied historic site. This questionnaire focused on four key categories: social encounter, aesthetic appeal, cultural identity, and functionality, each of which included specific Likert-scale questions rated from 1 ("strongly disagree") to 5 ("strongly agree"). The questionnaire was pilot-tested with a small group of respondents to ensure clarity and relevance, and adjustments were made based on feedback before conducting the full survey.

The sample size for the survey was determined using gate counting data to ensure that a representative sample of 150 respondents was reached, based on Cochran's formula and Morgan's table. Data collection took place in person between 28 September and 11 October 2022, at various locations within the study area during both peak and off-peak pedestrian flow times. These locations were strategically chosen to cover a wide range of pedestrian experiences, including popular routes and quieter areas.

The survey questions covered the four key categories:

- Social Encounter: Respondents were asked to rate the extent to which the space was continuous, pedestrian-inclusive, and well-used, and whether it provided well-planned spaces for social interaction, shelter, and a sense of ownership.
- Aesthetic Appeal: Questions focused on the space's sense of place, character, human-scale design, and the effective use of color, texture, lighting, and space for both formal and informal entertainment.
- Cultural Identity: The survey explored how well the space promoted cultural identity and cognitive associations with the heritage site.
- Functionality: Respondents assessed the ease of access to the site, proximity to public transport, the balance of human and motor traffic, and the space's potential for both social and commercial activities.

The collected responses were used to compare end-user perceptions with expert evaluations of each block face, contributing to a comprehensive understanding of how well the site supported walkability from both a professional and public perspective. These data provided valuable insights into whether Isfahan's cultural heritage site was conducive to pedestrian activity and aligned with the needs and expectations of its users.

2.2. Pedestrian Flow Measurement Using Observation of Gate Counting

Pedestrian flows were quantified employing the "gate counts" technique. This method involves establishing a series of virtual lines (referred to as gates) at specific locations and tallying the number of pedestrians traversing pedestrianized zones. These counts were performed at two distinct intervals: morning (from 10:30 am to 2:30 pm) and afternoon (from 3:30 pm to 7:30 pm) on weekdays throughout the months of September and October 2022, which coincide with the end of summer in Iran and typically feature moderate temperatures.

To ascertain the ingress and egress of individuals within each street segment, video clips were recorded for a duration of two minutes over three days per gate. Gate selection was based on multiple criteria, encompassing foot traffic, the locations featuring the highest density of people (such as entrances to shopping malls or areas offering shading and shelter), historical and cultural landmarks, numerical values of syntactical analysis, and designated sitting zones. Notably, these streets represented key destinations within the cultural site of Isfahan, serving as focal points for visitor engagement.

2.3. Space Syntax Methodology

Space syntax is a graph-based methodology employed by urban designers to assess the spatial characteristics of urban spaces and analyze their impact on walkability patterns and social interactions [60]. The syntactical examination was conducted using the UCL Depthmap 10 software, developed by scholars at University College London. Depthmap is a professional software designed for the syntactical evaluation and identification of spaces, enabling the anticipation of social aspects in pedestrian movement patterns through analysis [61].

The urban plan of the study area was initially created using AutoCAD 2010 software, based on official city planning maps, historical maps, and satellite images as the primary sources for base-maps. These sources ensured the accuracy of spatial configurations and street layouts. Multiple drawings were prepared to focus on the specific case study areas, which were then combined into a cohesive projection. The drawn projections of the urban plan were imported into Depthmap for further analysis. This process allowed for the analysis of spatial configurations across different sections of the urban area, facilitating the analysis of walkability and connectivity.

Given the objectives of this study, two fundamental values, integration and connectivity, were identified as pivotal in the space syntax analysis [62]. A higher degree of integration reflects how easily a space can be reached from all other spaces in the system, indicating its potential to support walkability. Increased connectivity measures the number of directly connected spaces to a given location, representing its local accessibility within

the spatial network [60,63]. For further clarity, integration refers to the degree to which a space is connected to all other spaces in the system, making it central in terms of walkability. Connectivity, on the other hand, measures the number of spaces immediately adjacent or linked to a given space, which reflects its local accessibility. These values are key to understanding how spatial configurations influence pedestrian movement patterns. Space syntax primarily focuses on the mobility patterns of individuals within the built environment, and these patterns are significantly correlated with the degree of integration derived from the spatial configuration analysis, with the potential to enhance walkability in urban public spaces [64].

2.4. Study Area

The study area is primarily situated in the middle of downtown Isfahan city in central Iran, covering approximately 57 hectares. This area is historically known as the "Garden of Naghsh-e Jahan" and dates back to the Safavid dynasty. It is centrally located within the tourist hub of Isfahan (Figure 1). The regeneration project for this area commenced in 2020 and finished 2022, resulting in the pedestrianization of two main streets, Sepah and Chahar Bagh, as well as the Naghsh-e Jahan square, which had been used by motor vehicles for the past 70 years. The transformation of this site into a more pedestrian-friendly space introduced challenges related to motor traffic, the sense of place, functionality, aesthetic aspects, and communication within the area. It is imperative not only to identify these issues but also to comprehend pedestrian flow and behavior. To facilitate a more comprehensive analysis of the site, it has been categorized into three zones, each reflecting its historical functions. It is worth noting that the pedestrian zone is a UNESCO-registered site and holds great significance for the end users. These three historical zones can be visualized on maps as a three-layered pedestrian network, encompassing walking streets, sidewalks, and pedestrian zones.
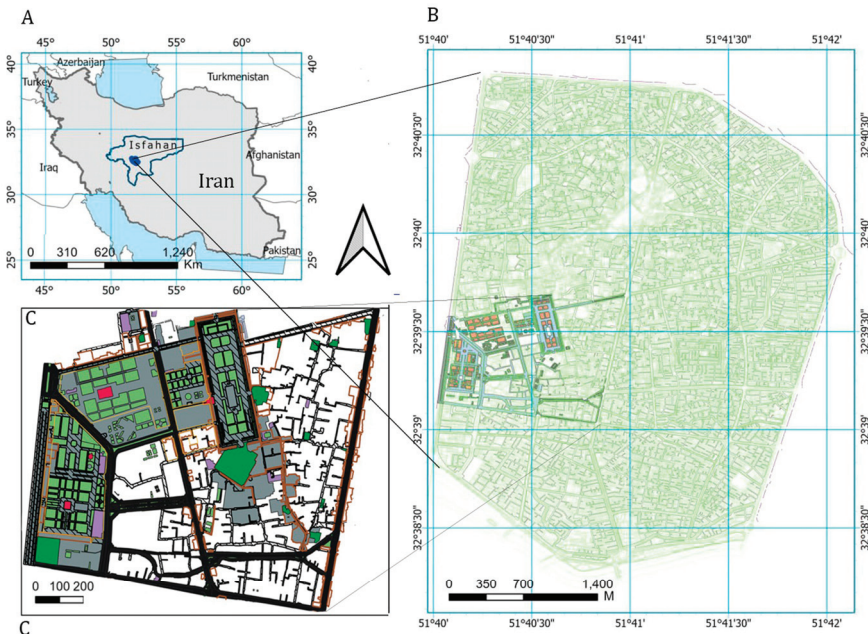
Figure 1. Hierarchical maps of the case study, showing the country, the focused district of the city, and the target cultural heritage site in Isfahan, Iran; (**A**) Country; (**B**) District 3 of Isfahan City; (**C**) Cultural Heritage Site of Isfahan Indicating in Gray Background (Source map: Iran National Cartographic Center and Municipality of Isfahan; incorporating authors' interventions).

Zone 1, Naghsh-e Jahan Square, boasts a rich history and covers around 9 hectares. It includes the Hafez entrance, Qeisarieh gate, and Sepah entrance. The square is a popular tourist destination and underwent construction in two phases in the 17th century. It features a geometric layout based on the golden ratio [65] and is surrounded by waterways and plane trees. Historic landmarks like Ali Qapo and the Shah Mosque add to its significance. The square experienced modifications to accommodate vehicles between 1930 and 1935. André Godard designed the central green space with a large rectangular pond. This zone encompasses gate numbers 1 to 20. Zone 2 encompasses Sepah Street, Ostandari Street, and Tohid Khane Park, along with a metro station at Darvaze-Dolat Square. Pedestrians can access Naghsh-e Jahan Square by walking 750 m along Sepah Street. Tohid Khane Park, located on the site of a historic palace, offers small gardens for picnicking. This zone comprises gate numbers 21 to 43. Zone 3, Chahar Bagh Street, is unique with its sidewalks, pedestrianized streets, and a central sitting area. It runs from Imam Hossein Square to Amadegah Street and is home to historic sites like Chahar Bagh School and the entrance to the Bazaar of Honnar. The study focused on the east side of Chahar Bagh, which is a cultural heritage site (Figure 2). This area also houses Hasht Behesht Park, named after a historic palace, and falls within gate numbers 45 to 77.
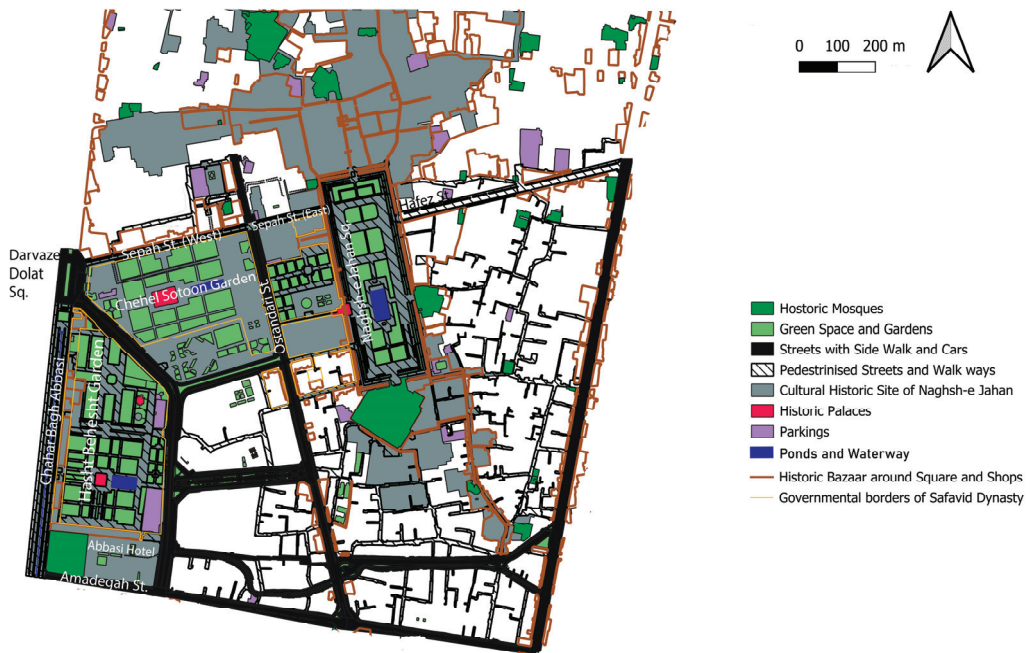
Figure 2. Land-use and pedestrian network in the cultural heritage site of Isfahan, Iran.

3. Results

3.1. Empirical Observations and Questionnaire Analysis

The survey data were analyzed by a panel of 29 experts, with balanced participation from both men and women. Most respondents were aged 20–39, making up 16 of the 28 responses, while 3 were over 70. Seventy-five percent held PhDs or higher qualifications, with 8 holding master's degrees and 6 being professors. In total, 12 respondents were familiar with the case study, 6 had prior travel experience related to it, and 3 expressed interest. In terms of cultural backgrounds, 12 experts were Iranian, 3 Italian, 2 American, and 2 Greek, with others representing diverse nationalities. The results were organized into four categories based on a theoretical framework for analysis and interpretation.

3.1.1. Social Encounter

Approximately 60% of respondents reported visiting the study site accompanied by friends or family. The survey analyzed pedestrian behavior, focusing on factors contributing to street vibrancy, such as passive activities (e.g., sitting), the availability of outdoor dining, motivations for staying, and duration of stay. The clustered bar chart demonstrates that the primary objective for most visitors was to maintain mental peace and well-being, indicating that cultural sites serve as stress relief, though this motivation varies by zone. The "Where_Contact_People" chart highlights that Chahar Bagh facilitated interpersonal communication, while Sepah showed lower engagement in sitting activities (Figure A1).

Environmental factors influencing social encounters were assessed through questionnaires. Shading and sheltering were identified as key contributors to the site's social dynamics, while the proximity to noise was a significant irritant, rated at 2.12 by experts. The illicit trade of motor vehicles and human involvement in transportation were found to cause stress, with experts rating it at 1.25. Table 1 details the number of motor vehicles associated with each gate. The presence of motorcycles in pedestrian areas significantly reduced the sense of safety, with 100% of respondents agreeing on their disruptive impact (Figure 3).

Table 1. The number of motor vehicles passing through gates.

Name of Zone	Gate Numbers	Number of Motor Vehicles Passing
Naghsh-e Jahan (Zone 1)	Hafez axis (Gate 2)	3 to 5 motor vehicles
	Northern axis (Gate 4 to 11)	7 to 10 motor vehicles
	Through green space (Gate 19)	2 motor vehicles
	Sepah entrance (Gate 20)	4 to 10 motor vehicles
Sepah (Zone 2)	Gate 21 to 26	10 to 13 motor vehicles
	Gate 30 to 36	2 to 6 motor vehicles
Chahar Bagh (Zone 3)	Chahar Bagh street (all gates)	0 to 1 motor vehicles
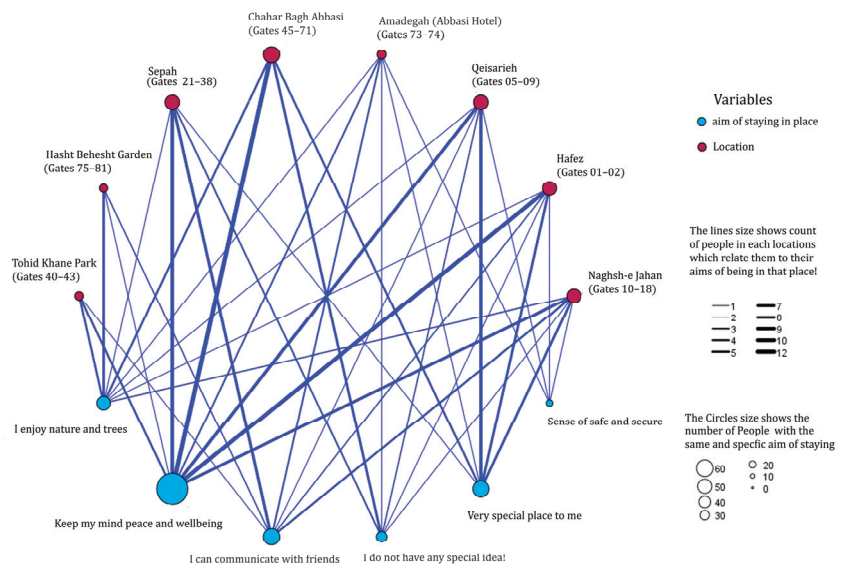
Figure 3. Relationship map between locations and aim of staying obtained from questionnaires.

Hafez Gate, serving as the eastern entrance to the square from Gate 2, stands out as one of the most heavily frequented gates within the site. Benches were situated on both the right and left sides of the Hafez entrance, adjacent to Gate 12. Surprisingly, these benches remained predominantly unoccupied. One primary factor contributing to this issue was the absence of adequate shading. As twilight descended and the temperature slightly decreased, all available seating spaces quickly reached full capacity. According to available records, an estimated average of 3 to 5 motor vehicles passed through Gate 2 every minute (Table 1). Consequently, the sense of shelter and comfort in this gate appeared scattered and insufficient to accommodate the needs of visitors (Figure 4).
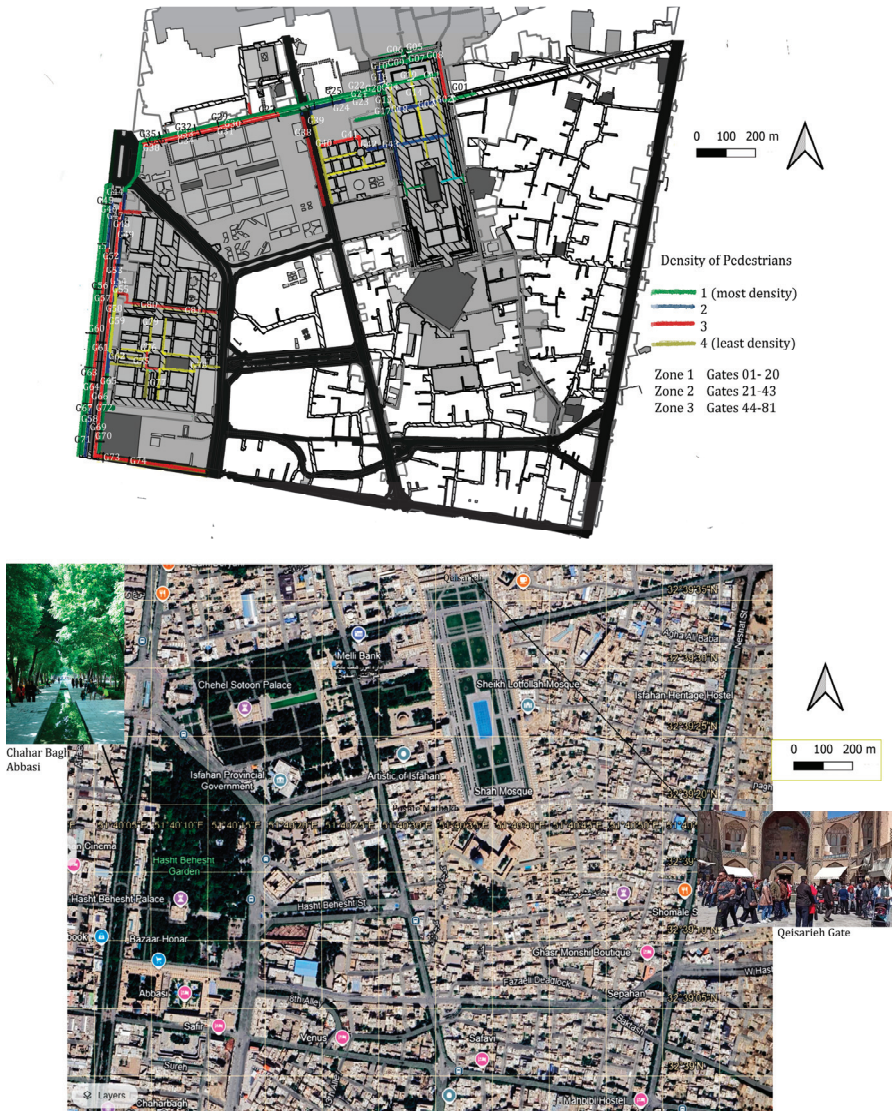
Figure 4. Pedestrian movement flow and density across various zones, accompanied by an ortho-photo map for spatial reference (Source map: Municipality of Isfahan and Google Earth; incorporating authors' interventions).

This pedestrian street, the main route within the square, averaged 15 pedestrians per minute on its asphalt surface but lacked adequate shading. While benches were present, only three to four individuals used the seating near Gates 4 and 11. Gate 4 saw 7 to 10 motor vehicles per minute (Table 1), raising safety concerns. The eastern Sepah area faced an even higher vehicular influx, with 4 to 10 motor vehicles entering the square through Gate 20 per minute, exacerbating safety risks.

Survey responses show Qeisarieh Bazaar as the top choice for 62% of pedestrians visiting Naghsh-e Jahan. Gates 5 and 6 saw 25 to 35 pedestrians per minute, a flow deemed orderly and contributing to vitality with a rating of 3.65. Experts, however, suggested increasing spatial capacity for smoother movement, reflected in a rating of 2.17. Pedestrians at Qeisarieh Gate noted four main issues: lack of trees, offensive odors and uncleanliness of the pond, uneven ground stones, and notably, the presence of motorcycles near the pond. Retail workers parking motorcycles close to the pond significantly deterred people from staying in the area for long periods (Figure A2).

Gates 5 to 10 experienced the highest foot traffic within the square. Despite available benches in Zone 1 (G7 to G10), these remained unused due to inadequate shading and lack of social interaction opportunities. In the evenings and nights, individuals were observed sitting on benches from various directions. In traditional bazaars, cultural exchanges and interactions occurred during transactions, and some people utilized historical platforms near the Gate of Qeisarieh.

The sidewalk between Gates 14 and 15, near the Sepah entrance and Mesgaran Bazaar, offered the best shading in the square, accommodating the highest number of seated pedestrians. This area benefits from green elements and continuous shading due to its shop-lined setting. Traditionally, "Hose Khane" courtyards in bazaars served as social spaces for breaks, fostering community interactions. However, these spaces are no longer present in this case study, leaving only a few benches as resting options. Studies suggest that thoughtful architectural design can enhance social engagement, but this has not been addressed in the current layout.

Experts rated the square as ideal for cultural events (score: 1.67) and noted that vibrant social interactions could enhance enjoyment (score: 2.30). In the evenings, families occupied green spaces every 30 square meters, with about a quarter reporting social interactions during picnics. However, the walkways did not align with pedestrian patterns, requiring crossing lawns to reach the central pond. The lack of shading in Naghsh-e Jahan Square caused discomfort, with people primarily gathering under trees at Gates 19 and along the path between Gates 4 and 18.

The street leading to the square is essentially a connected roadway, particularly evident in the area from the eastern Sepah Gates 21 to Gate 24. Although 83% of the respondents expressed their support for pedestrianizing this route, there was an insufficiently defined space for seating and resting as of September 2022 (due to a construction project between Fall 2021 and Winter 2022). Subsequent research will provide further confirmation on this matter. Notably, between 2 and 6 motor vehicles were observed driving through the crowd between Gates 30 and 36. The junction of Sepah (Gate 27) serves as the central section of Sepah Street and experiences significant congestion.

According to experts, the high number of individuals in this area has made it uncomfortable, often resulting in chaotic conditions. The presence of currency dealers actively utilizing the space from 10:00 to 13:30 and 15:00 to 18:00 further exacerbates the issue. The population at this junction varies throughout the day, with counts decreasing to 80, 50, 20, and 16 at different times, specifically 12:00, 14:00, 17:00, and 18:00, respectively. Interestingly, as the number of wandering traders decreased, true pedestrian traffic found opportunities to move more freely, particularly in the afternoons. Dealers also positioned a significant number of motorcycles, exceeding 20, along the Ostandari sidewalk (Gate 38), akin to the situation at the pond in front of Qeisarieh. According to sources, the large population along Sepah Street has effectively formed an unofficial, distinct trading hub.

The sidewalk adjacent to retail and department stores in western Sepah received a high vibrancy rating of 2.21 from experts. Foot traffic was 60% to 100% higher here compared to the central street zone, based on gate count data. Pedestrians also noted concerns about the limited space for retail and galleries on these sidewalks. Gate 43 observed a high influx of around 20 individuals per minute, likely due to its location between the park and the square, adjacent to a bazaar and an art university, with a restroom nearby. Bench occupancy averaged 10 to 15 individuals per minute. However, parked vehicles and unpleasant restroom odors were consistent annoyances, limiting social interaction at this gate. In contrast, Gate 41's pond had a calming effect and promoted socializing. Visitors mainly consisted of families picnicking, preferring Naghsh-e Jahan Square over Tohid Khane for its appealing atmosphere (Figures A3 and 5).
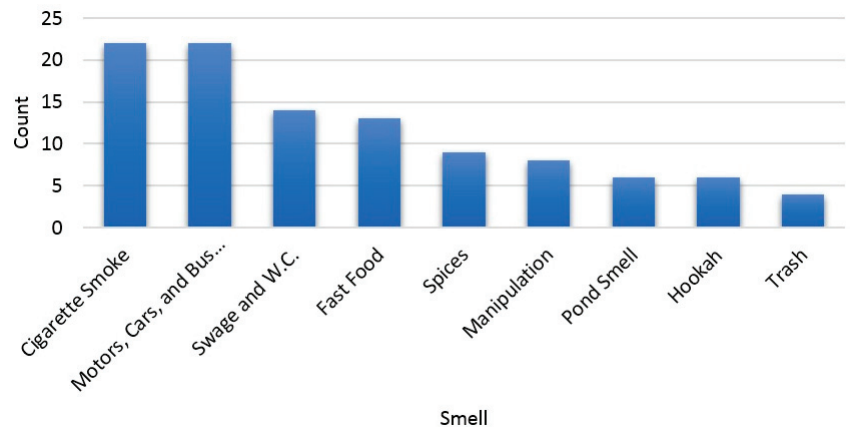
Figure 5. Ranking of off-putting smells in the cultural heritage site.

Chahar Bagh, pedestrianized two years before Sepah Street, features distinct characteristics like shaded trees, diverse retailers, and van cafés, creating a unique social environment compared to Zones 1 and 2. This area is well-regarded for fostering intimate conversations (rating of 2.52) and providing a sense of safety and orientation through its amenities. Experts rated Chahar Bagh as a welcoming space for friends and couples (2.28). Notably, Gate 66, near the café culture of Chahar Bagh, attracts significant foot traffic with café van patronage peaking in the evenings (7, 4, 12, and 24 people at 10:00 AM, 15:00, 17:00, and 19:00, respectively). Despite its pedestrian-friendly features (rating of 1.88), Chahar Bagh had only one café in 2022. The historic garden within Chahar Bagh School, housing an ancient tree from the Safavid era, remains inaccessible to the public (Figure 4).

Pedestrians in Chahar Bagh face challenges such as high foot traffic, narrow sidewalks during peak times, and insufficient amenities for the elderly. Video footage revealed a range of age groups engaging in social interactions at key gathering points. The scent of coffee was well-received, while food odors were notably disliked (Figure A4). Water features significantly increased bench seating usage by providing shading and shelter. Tourist numbers dropped when watercourses were not active (Table 2). Children also benefited from play areas around central ponds. In Hasht Behesht Park, 29% of respondents reported feeling insecure due to hooligans, negatively impacting social interactions. The primary odor nuisances were cigars, hookahs, and vehicle congestion near park entrances. The historical palace within the park appeared undervalued, and the area lacked a welcoming atmosphere. Notably, the highest concentration of visitors, especially the elderly, was found along the pathway with sports facilities at Gate 76.

Table 2. The effect of active and passive fountains on walkability and social gatherings.

Chahar Bagh	Active Fountain in Terms of Flowing			Passive Fountain in Terms of Flowing		
Time	12:00	15:00	16:00	12:00	15:00	16:00
Gate 47	11	13	14	4	6	2
Gate 61	17	14	11	4	6	0

3.1.2. Aesthetic Appeal

The investigation into aesthetics and architectural attractiveness evaluated human scale, imageability, color, and texture across various public spaces. A key finding is the preference for light green and turquoise colors, reflecting pedestrians' identity and cultural perspectives, which could inform future place-making strategies (Figure A4). Imageability, defined as the distinctive property of a location through color, texture, and memorability, showed that Tohid Khane Park was highly rated by both experts and the public for its imageability. This preference highlights the appeal of entering the square through a gate surrounded by lush greenery (Figure 6). Likewise, Figure 7 displays the photo-documentations of these recognizable entrances.
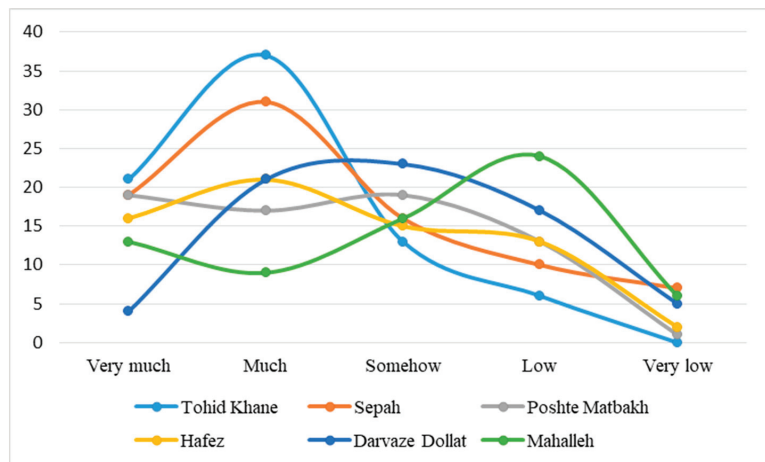
Figure 6. Pedestrians' viewpoint regarding the recognizable and memorable entrance.

Experts rated the imageability of Hafez Street at 2.79, indicating limited visual interest. The street, lined with old restaurants and fast-food outlets, generates substantial pedestrian traffic but competes with the historic site's appeal, scoring only 2.07 for cultural identity. Hafez Street, leading to the bazaar at Gate 2, suffers from cleanliness issues, with one-third of pedestrians highlighting this concern. Overall, Hafez Street is considered unsuitable as a walkable street due to its lack of visual interest and limited engagement beyond its view of the square.

The open space in front of Qeisarieh, with a rating of 2.17, was designed for free movement but suffers from poor footpath quality and uneven surfaces. Pedestrians noted issues such as substandard footpaths, motorbikes near the pond, a narrow bazaar gate entrance, and high crowd density, which disrupt the area's tranquility. Despite these problems, the Qeisarieh bazaar features distinctive characteristics, including a variety of merchants and architectural elements, contributing to its unique ambiance (rated 2.2, Table 3). Many also praised the exceptional view from the rooftop café overlooking the square.
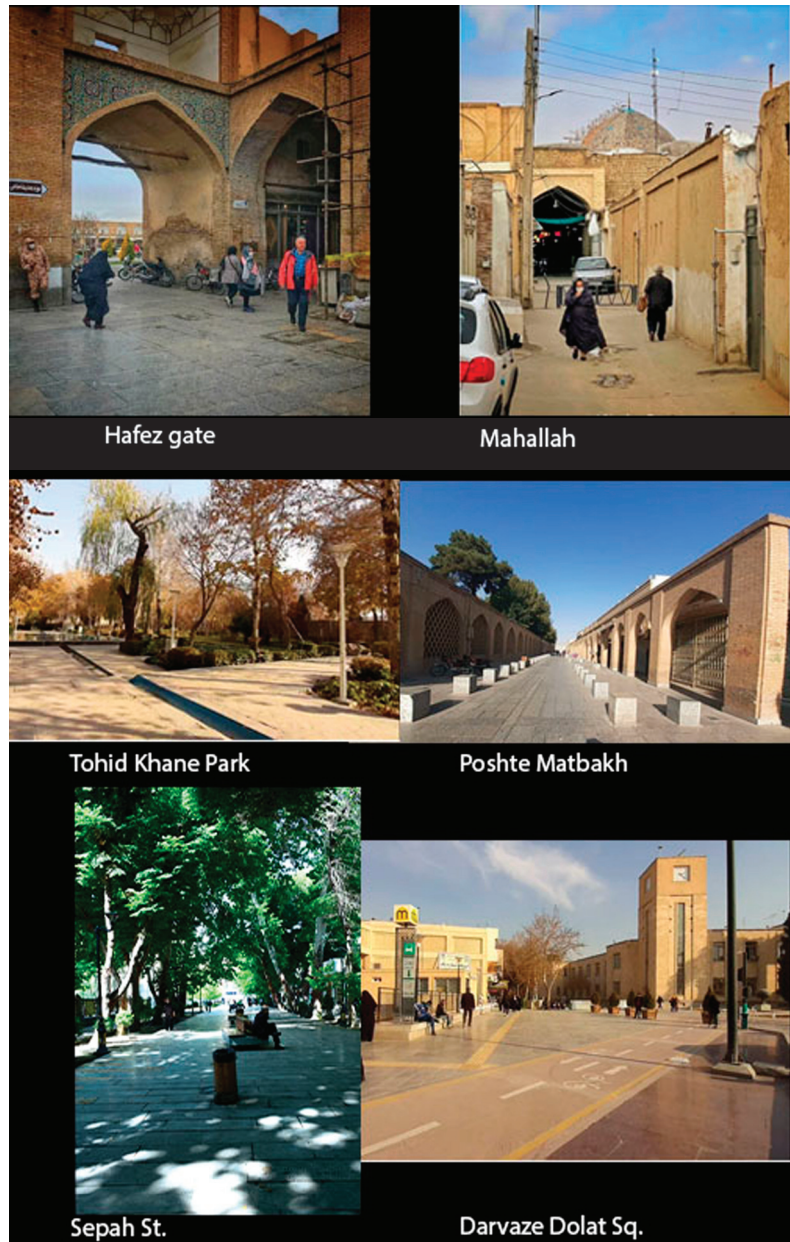
Figure 7. Photo-documentation of the recognizable entrances (authors).

Scholars criticized East Sepah Street for its lack of visual distinctiveness, attributed to the rectangular buildings from the Raza Shah Pahlavi era, which received a low rating of 2.55. The high noise levels from the nearby Chehelsotoon garden further detract from the street's appeal. Pedestrians also rated Sepah Street poorly due to its unremarkable, outdated structures. Experts suggested that shops with large windows could enhance brand visibility. Overall, Sepah Street lacked appeal for pedestrians, who preferred a more engaging journey to the square, even if it meant a longer or less direct route.

Table 3. Inquiries regarding the imageability of Qeisarieh Gate (one-sample statistics).

Criteria	Mean	Std. Deviation	Std. Error Mean
High density of humans makes this environment uncomfortable.	3.3478	1.26522	0.26382
Shop stands and window designs encourage people to shop around.	2.2500	0.73721	0.15048
The size, texture, and articulation of outdoor physical elements (such as basins or flower stands) match human proportions.	2.5455	1.01076	0.21550
There should be sufficient space for pedestrians to sit and relax for their usual period of time.	2.1739	0.83406	0.17391

The sidewalks on Sepah Street, despite aligning with human-scale dimensions such as size, texture, and proportion, are insufficiently spacious relative to pedestrian volume. The preferred walking lane, as identified through gate counts and pedestrian feedback, is underwhelming due to limited views of Chehelsotoon, which experts rated poorly at 2.5. This lack of visual appeal diminishes the historical garden's influence. However, the experience of window shopping and passing through gates from 41 to 61 adds interest to the stroll along Sepah Street.

Chahar Bagh Street, like Sepah Street, features rectangular buildings without setbacks, impacting its imageability negatively. The new Hasht Behesht building, spanning Gate 55 to Gate 72, received poor ratings from both pedestrians and specialists, contributing unattractively to the street's architecture. Pedestrians inside the park also noted its lackluster appearance. Expert evaluations identified elements such as building colors, outdoor dining areas, and varied pavement textures (rated 2.61). The street's middle section, although not monotonous (rated 3.19), lacked historical diversity and trees, which were added 200 years after its establishment. During the day, pedestrian density was moderate (rated 2.33), but evenings saw high congestion, making the environment uncomfortable. Experts appreciated the street's attractiveness when amenities for passive activities were present.

3.1.3. Cultural Identity

Pedestrians were surveyed about their sense of belonging and historic identity (Table 4). The data revealed that Qeisarieh in Naghsh-e Jahan strongly conveyed historical identity, while Chahar Bagh elicited a higher sense of belonging. Chahar Bagh, inspired by Persian gardens, lacked effective integration of these historical elements. Respondents emphasized the importance of preserving historic buildings, trees, and pedestrian pathways, while businesses, lawns, and some ponds were deemed less valuable. A significant 63% of users preferred experiencing the pathway as a garden, rather than as a park. Additionally, 19% favored a blend of garden and park, and 17% supported developing the pathway as a park.

Table 4. Searching for a sense of place in the cultural site of Naghsh-e Jahan through a sense of belonging and a sense of being in a historic location.

Sense of Belonging	Percentage	Sense of Being in Historic Place	Percentage
Chahar Bagh	45%	Qeisarieh	78%
Qeisarieh	32%	Chahar Bagh	10%
Hahst Behesht	13%	Hasht Behesht	8%
Sepah	9%	Sepah and Tohid Khane	6%

Visitors at the Qeisarieh bazaar gate reported the strongest sense of being in a historical location, with 78% highlighting its evocative nature compared to other gates like Hasht Behesht Park, Sepah, and Chahar Bagh. Despite this, a strong sense of belonging was not universally felt. Historically, reverence for preserving buildings was less emphasized, though experts recognized the traditional bazaar's potential to evoke a strong sense of place (rated at 2.08). The sense of belonging was influenced by the scent of spices and the

traditional bazaar ambiance. Residents of Naghsh-e Jahan felt a strong identity, particularly when observing tourists interested in historical sites. While Qeisarieh and Naghsh-e Jahan had a high sense of place, Sepah and Chahar Bagh had lower scores, indicating that the historical expressiveness of monuments enhances the sense of place (Figure A5).

Table 4 indicates that Sepah Street lacks a strong sense of place, belonging, and historic significance. Historically a pathway to the square, it now feels narrow and uninspiring. People's sense of approaching a historic space is mainly driven by their awareness of Naghsh-e Jahan's proximity. The new retail establishments along Sepah Street have not fostered a sense of belonging among visitors. However, efforts to preserve the area's trees have been made.

Pedestrians on Chahar Bagh Street reported a strong sense of belonging, with 45% of participants expressing this feeling (Table 4). They preferred Chahar Bagh over other sites like Qeisarieh and Hasht Behesht due to its cultural integration and historical identity (rated 2.08 and 2.25, respectively). Despite this, recreational objectives were less emphasized. The street's cultural elements and historical significance contributed to this sense of belonging, though there were criticisms about the design and functionality of shops. Children occasionally played in the water, but overall, pedestrians favored green, tranquil environments. The centrally shaded lane provided recreational opportunities for both adults and children.

Chahar Bagh has effectively fostered a strong sense of belonging, enhanced by its symbolic features and role as a historical corridor within Persian gardens. It is a key hub for pedestrians, with Chehelsotoon Garden emerging as the most favored destination. The garden's impressive identity and the role of water in creating a connection were highlighted. Data showed a preference for café visits over picnicking, which improved social interaction and underscored Chahar Bagh's unique character within the café culture (rated 1.92). Walking, a cultural preference (rated 2.00), was promoted in Chahar Bagh and Naghsh-e Jahan, contributing to stress reduction and a more welcoming atmosphere. Conversely, Hasht Behesht did not evoke a sense of specialness despite housing the historical Hasht Behesht palace.

3.1.4. Functionality

Key factors affecting the quality of the location include design functionality, connectivity, mobility, public transportation, vehicle traffic, and pedestrian safety. Effective management of both human and motorized traffic, optimizing mixed-use areas, and proximity to residential zones are crucial. Transportation to Naghsh-e Jahan primarily involves driving and taxis. Streets like Ostandari and Bagh Goldaste, though lacking bus services, show potential for regeneration into walkable areas with better integration into the surrounding environment. Despite their current use as driveways, these streets are well-connected to main hubs.

Qeisarieh, at Gates 5 and 6, is the most frequented spot in Naghsh-e Jahan, attracting 64% of pedestrians. It is a key shopping hub, with 58% of respondents identifying it as a primary destination. Its popularity stems from its central location and accessibility from Sepah Street, extending to the Hafez entrance. Visitors come for shopping, recreation, and a traditional atmosphere. However, safety concerns arise from motorcycle congestion, which has led to dissatisfaction among all respondents. Visits to Qeisarieh include shopping (29%), shopping and recreation (29%), work (19%), and exploration (14%) (Figure A6).

The diversification of retail options in Naghsh-e Jahan may be a contributing factor that increased people's inclination for walking, as indicated by the experts' opinion rating of 2.33. This diversity resulted in a distinct character in Naghsh-e Jahan compared to the Sepah gates. Notably, Gate 20 experienced significant crowding, with an average of 20–30 people passing through per minute, leading to substantial pedestrian flows along the axis. In the historic cultural site of Naghsh-e Jahan, pedestrians expressed that their points of interest and public transportation stations were within a walkable distance. Those who utilized the subway and walked to Sheikh Lotfollah and Hafez on the east

side of the square reported that distance was not a problem for them (approximately 1200 m). However, it is noteworthy that only 25% of respondents used the subway as their mode of transportation (see Figure 8), and all respondents were under 70 years old. Consequently, the pedestrianization of streets leading to the square did not impede access to public transportation. Isfahan, unfortunately, did not benefit significantly from an efficient subway system, as it remained limited to one line as of 2023. While other public transportation, mainly buses, remained efficient, the predominant use of cars and taxis led to additional challenges.
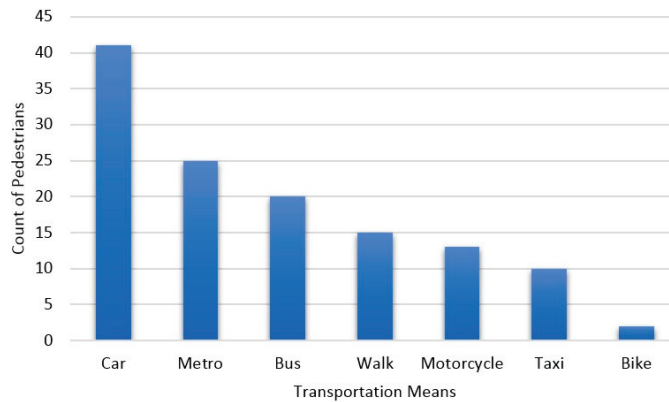
Figure 8. The means of transportation employed to reach the cultural site.

The historical buildings in Naghsh-e Jahan contribute to its uniqueness and sense of place, with landmarks such as the Shah Mosque, Sheikh Lotfollah, Aali Qapou Palace, and Qeisarieh enhancing its historical significance. In contrast, Chahar Bagh has fostered a strong sense of belonging through its cultural elements, such as water features and shaded trees, though these elements have not been fully realized. Despite the growth of green spaces in Naghsh-e Jahan, the central area has not effectively developed a sense of place, with 82% of respondents noting a lack of attachment to this space. The facilities added to the square have not seamlessly integrated with the historical context, with issues such as poorly executed paving patterns and obstructive tree placements reported by 21% of pedestrians.

During the summer, the square experiences a surge in visitors, who engage in picnicking as a means of cultural unity. However, challenges such as insufficient seating and shaded areas during the day, along with poor nighttime illumination, persist. The Azan, a religious ritual, is culturally accepted and considered a significant amenity, with 52% of respondents agreeing that its presence within the square is acceptable. In general, while Naghsh-e Jahan's historical structures and Chahar Bagh's cultural elements provide a sense of place, practical issues such as integration, maintenance, and amenities still need addressing to enhance the overall user experience.

Before pedestrianization, Sepah and Chahar Bagh Streets primarily served as shopping areas. Post-pedestrianization, pedestrians continued to frequent the sides of these streets where shops and passage galleries are located (see Figure 4). Approximately 57% of pedestrians identified the 750 m stretch of Sepah Street as their main route to Naghsh-e Jahan. Sepah East, a high-traffic thoroughfare, is used for shopping, access to the square, currency dealings, and banking. Pedestrians employ various transportation modes, including the metro, motor vehicles, and walking from adjacent areas. However, Sepah Street suffers from unclear functional designation, with structures failing to clearly indicate their purpose—whether for shopping, transit, or leisure. Additionally, unofficial trading activities alongside official buildings, such as banks, contribute to functional confusion and density issues. Despite these challenges, such activities are seen as integral, with even historical elements like Melli Bank retaining pedestrian significance.

Experts have criticized the decision to designate Sepah Junction at the intersection of Ostandari and Hakim Streets as a shared space, deeming it a detrimental choice that has compromised the area's identity. With 57% of visitors traversing Ostandari or Sepah, the high volume of taxis at the beginning of Ostandari has exacerbated traffic congestion and disrupted pedestrian movement. In contrast, Chehelsotoon Garden, a notable Persian garden adjacent to Sepah and Ostandari, has significant potential to enhance the appeal of these streets. Despite its limited public access, the garden could contribute to making the surrounding areas more engaging for pedestrians.

Chahar Bagh was primarily used for walking and recreation, with 60% of individuals walking and 16% engaging in recreational activities. Preferences indicated a stronger inclination toward visiting Chahar Bagh (51%) compared to Chehelsotoon (41%). This suggests distinct visitation preferences, with 40% of people visiting both the square and Chahar Bagh in a single trip. Historically, Chahar Bagh and the square (Meidan Naghsh-e Jahan) functioned separately, with no direct connection between them. Additionally, pedestrians from Siose-pol bridge, connecting the city's north and south sides, used this historical route, which is accessible by metro due to two stations along it. Parking lots adjacent to Chahar Bagh further underscore its connectivity beyond the subway.

Regrettably, according to the obtained data, Hasht Behesht Park was not a central hub frequently visited by individuals. Despite its considerable potential to be an outstanding garden comparable to Chehelsotoon, the park did not attract a substantial number of visitors. Notably, Hasht Behesht Park had good connectivity with other key hubs such as Chahar Bagh, Sepah, and even Ostandari; however, the utilization of this park by the public was limited. Access to Hasht Behesht was predominantly achieved by car or bus, with individuals either parking in lots along Baghe Goldaste Street or utilizing bus transportation.

Based on the results of the statistical analysis, both experts and end-users consistently identified "social encounter" as the most important value of walkability within cultural heritage sites. Experts emphasized environmental factors such as shading, sheltering, and noise reduction to foster social interactions, highlighting the importance of green elements, historical architectural design, and the elimination of disruptive elements like motorcycles. For them, functionality was also highly important, particularly in terms of pedestrian safety, connectivity, and enhancing urban vitality. While experts considered aesthetic appeal moderately important, favoring historical architecture and memorable visual elements, they were moderately to highly focused on cultural identity.

End-users similarly placed a high importance on social encounters, associating them with mental peace and stress relief, particularly in shaded areas with seating. Although they appreciated aesthetic appeal, their emphasis leaned towards practical aspects like cleanliness and maintenance, with a strong preference for visually distinct sites that provided serene environments. Cultural identity was highly valued by end-users, particularly in historically rich areas, where they felt a sense of belonging. However, their concern for functionality, while present, was more moderate, centering around ease of access and comfort. Despite these differences in emphasis, the analysis revealed no statistically significant difference in the factors influencing walkability between the two groups. This suggests that while experts may prioritize functionality and safety more, and end-users might focus more on cultural identity and mental well-being, both groups share similar overall perceptions of the key factors that enhance walkability in cultural heritage sites.

3.2. Space Syntax Analysis

Syntactical analysis in this study was carried out based on one of the most prominent analytical approaches, namely axial analysis (Figure 9). The results obtained from the morphological analysis of space syntax revealed a wide variety of configurational attributes within different streets of the study area. According to the aforementioned findings, three well-known environments are renowned for their societal attractions and tourist destinations, which may enhance walkability in these spaces. Thus, the streets and

roadways leading to these tourist hubs and attractions may warrant consideration. These outstanding tourist hubs in syntactical analysis are Naqsh-e Jahan Square, Hasht Behesht, and Chehel Sotun.
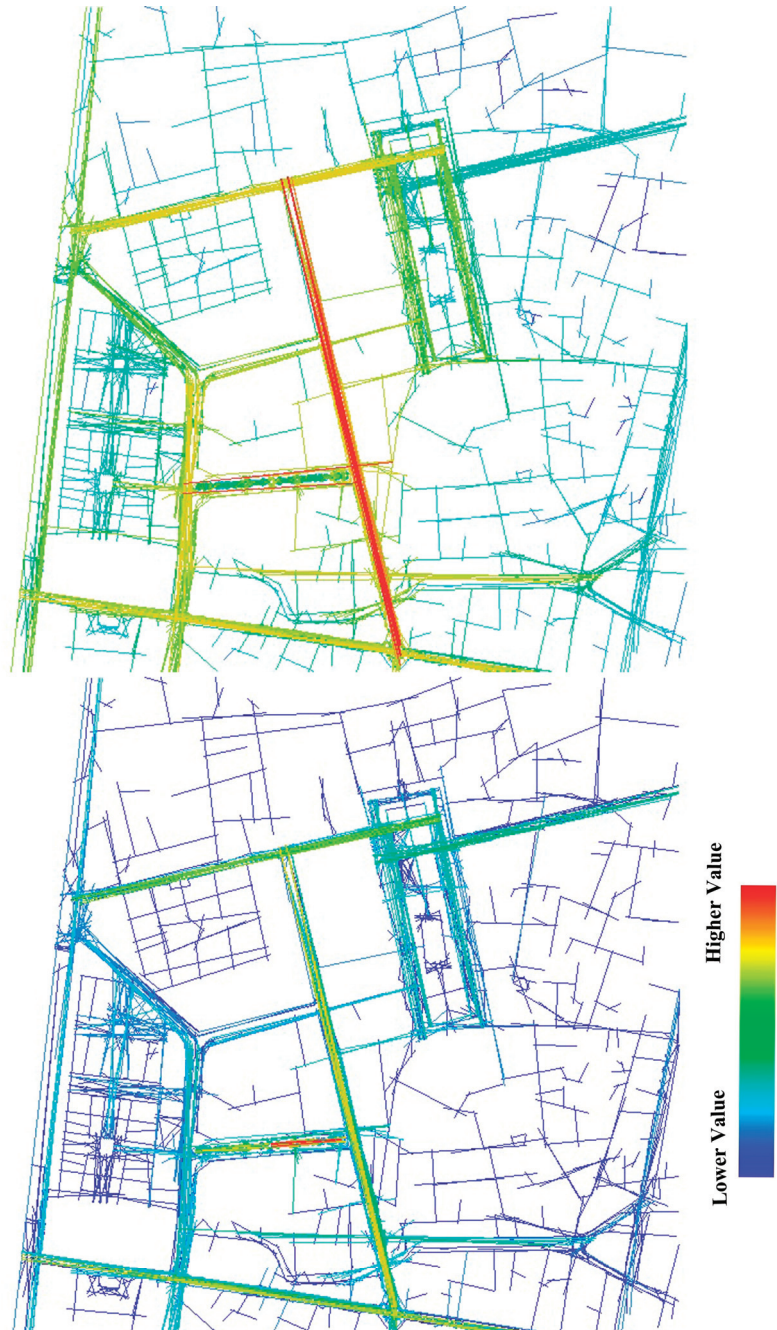

Figure 9. Integration (**upside**) and connectivity (**downside**) graphs of the study area based on space syntax analysis.

Regarding the syntactical characteristics, it should be noted that Ostandari Street is the most integrated space based on configurational attributes, with an integration value of 5.02. Following that, Hasht Behesht Street has an integration value of 4.69, and Sepah Street has an integration value of 4.11. While Hasht Behesht Street is identified as the most connected street with a connectivity value of 351, Ostandari Street comes next with a connectivity value of 256, and Sepah street with a connectivity value of 207; together, these are considered the most accessible spaces in the study area. It should be noted that Chahar Bagh pedestrian avenue, with an integration value of 3.38 and a connection value of 90, has a lower value of configurational attributes based on space syntax analysis (Figure 9).

According to the findings, centrality, wider streets, specific design paradigms, and layout details, such as the pattern of Chahar Bagh in urban design, may enhance integration and connectivity values in the spatial configuration of cities. However, the identified streets are not exclusively designed for pedestrians; they also serve as connectors to the main environments, potentially increasing sociability and walkability. Therefore, the intention is to delve into the morphological characteristics of these main sociable spaces to gauge their walkability potentials. Based on the obtained findings, Ostandari Street, located in the vicinity of Naqsh-e Jahan Square, possesses the most integrated space, facilitating accessibility to this socio-cultural plaza. On the other hand, the most connected street within the study area is Hasht Behesht Street, leading to Hasht Behesht Garden and mansion.

Another street connecting Naqsh-e Jahan Square with Chehel Sotun is Sepah Street, identified as the third integrated and connected street in the study area. To discern the walkability potential of sociable pedestrian areas, each of these walkable areas was subjected to analytical approaches in space syntax. In this step, alongside conducting axial analysis, Visibility Graph Analysis (VGA) was performed. The results of the morphological analysis indicated that Naqsh-e Jahan Square is the most accessible and connectable public milieu, and Chehel Sotun Garden is identified as the most integrated space with the ability to promote walkability (Table 5). The results obtained from the numerical outcomes of the syntactical analysis, as shown in Table 6, verify this finding and are consistent across both axial and VGA analyses.

Table 5. Syntactical graphs of the public spaces in the study area based on both axial and VGA analyses.
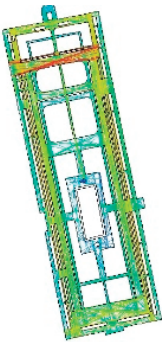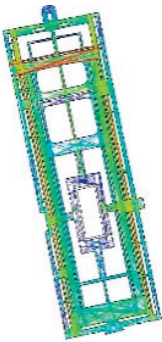
Walkable Gardens	Integration	Connectivity
Naqsh-e Jahan (Axial)		

Table 5. *Cont.*
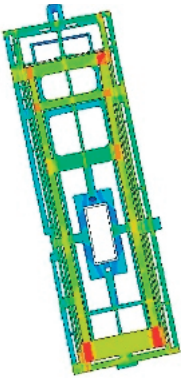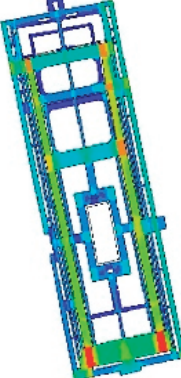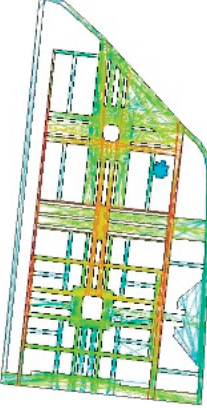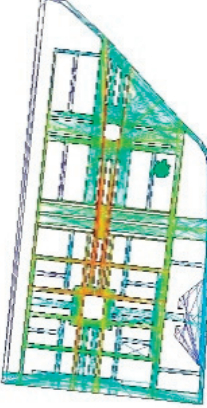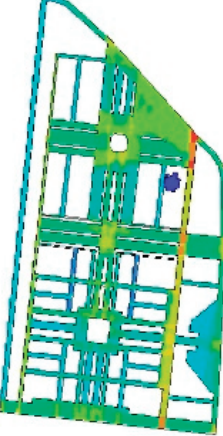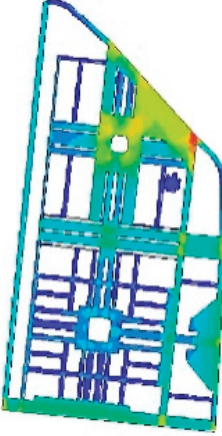
Walkable Gardens	Integration	Connectivity
Naqsh-e Jahan (VGA)		
Hasht Behesht (Axial)		
Hasht Behesht (VGA)		

Table 5. *Cont.*
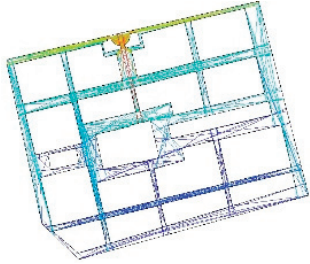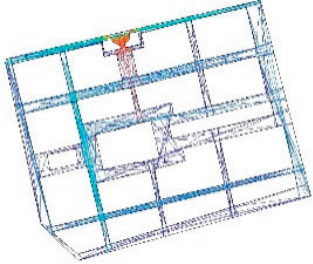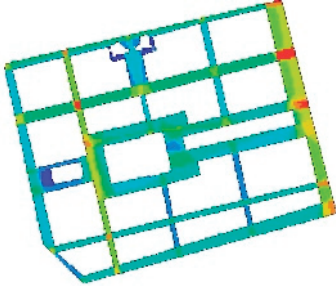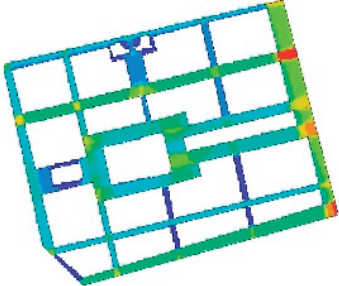
Walkable Gardens	Integration	Connectivity
Chehel Sotun (Axial)		
Chehel Sotun (VGA)		

Table 6. The numerical values for integration and connectivity for the gardens of Isfahan in both axial and VGA analyses.

Gardens	Analysis Type	Max Integration	Mean Integration	Max Connectivity	Mean Connectivity
Naqsh-e Jahan	Axial	9.73	4.2	517	265
	VGA	9.87	6.34	2144	1078
Hasht Behesht	Axial	7.07	4.46	387	197
	VGA	9.92	6.04	1387	699
Chehel Sotun	Axial	11.48	6.88	445	230
	VGA	10.51	6.94	1360	683

4. Discussion

4.1. Interpretation of the Results

The findings from this study underscore the complex interplay between pedestrian behavior, urban design, and heritage conservation within the context of historic cities. The pedestrianization project in Naghsh-e Jahan Square and Sepah Street in Isfahan revealed a significant relationship between pedestrian flow and spatial legibility, with landmarks such as Naghsh-e Jahan Square acting as critical nodes that guide movement and wayfinding behavior. The syntactic analysis combined with real-time gate counting confirmed that spatial integration directly influences the flow of pedestrians. However, minor discrepancies between the observed pedestrian counts and the syntactic predictions suggest that additional factors, such as the presence of physical obstructions or the aesthetic quality of streetscapes, play a role in shaping pedestrian behavior.

The wayfinding behavior exhibited by pedestrians highlighted the influence of both cognitive mapping and environmental cues. Visitors demonstrated a clear awareness of landmarks and destinations, particularly Naghsh-e Jahan Square, which was frequently

chosen as the primary goal of their visit. The cognitive maps formed by pedestrians aligned with the syntactic analysis in some aspects but also diverged in others, indicating that wayfinding is not solely dependent on spatial integration but also on other factors such as spatial memories and reference frames. Pedestrians' strong sense of place, facilitated by the square's historic and cultural significance, reinforced their navigation decisions. However, the lack of legibility at certain entrances, particularly from Hafez and Sepah, affected the overall aesthetic and functional experience, suggesting a need for urban design interventions that enhance imageability and visual coherence.

Social behavior in these pedestrianized areas further illustrated the importance of well-designed public spaces that support social interactions. The data showed that people often visited the square in groups, engaging in social activities such as sitting, resting, and shopping. However, the presence of narrow gates, street vendors, and motor vehicles in certain areas, particularly in Sepah and Qeisarieh Bazaar, impeded the free flow of pedestrians and created congestion. The study suggests that expanding social spaces around key entrances, providing more shaded resting areas, and reducing vehicle intrusion could enhance both pedestrian comfort and social cohesion.

Aesthetic appeal emerged as a critical factor influencing walkability, with Naghsh-e Jahan Square and Chahar Bagh being perceived as more visually pleasing than other parts of the city. Nevertheless, areas such as eastern Sepah, characterized by low imageability and a lack of social cohesion, experienced lower pedestrian satisfaction. The study highlights that while accessibility remains a priority for pedestrians, improving the aesthetic qualities of streetscapes through thoughtful design interventions, such as adding trees and enhancing landscaping, can significantly elevate the pedestrian experience.

The study underscores the importance of cultural identity in pedestrian behavior and urban design. Naghsh-e Jahan Square and Chahar Bagh, as historical landmarks, are central to cultural identity and heritage. The findings suggest that preserving and enhancing these spaces' historical and cultural elements is crucial for maintaining their significance. The adaptation of historical areas, such as the transformation of Chahar Bagh into a pedestrian-friendly space, aligns with preserving cultural identity while accommodating modern needs.

Finally, the functionality of urban spaces played a key role in shaping pedestrian behavior. The results indicated that areas with higher functionality, such as Chahar Bagh, benefited from well-maintained pathways, minimal vehicle intrusion, and a continuous flow of pedestrians. In contrast, locations like Hasht Behesht Park, which suffered from poor infrastructure and a lack of perceived safety, were underutilized by pedestrians. The study points to the need for targeted improvements in these areas, such as enhanced security measures, better lighting, and more accessible pathways, to create a more walkable and enjoyable environment for all users.

In sum, we elaborate on how spatial integration influences pedestrian flow by guiding movement patterns and wayfinding behavior. For instance, higher integration levels make it easier for pedestrians to navigate the space, enhancing both their comfort and social cohesion. Furthermore, physical obstructions such as street vendors and motor vehicles were observed to impede pedestrian movement in areas like Sepah and Qeisarieh Bazaar, confirming that these obstacles disrupt pedestrian flow, particularly in more congested zones. This is supported by both the syntactical analysis and real-time gate counts, which revealed discrepancies between expected pedestrian movement and observed behavior in areas with obstructions. To enhance clarity, we propose mapping these findings by pinpointing specific locations where interventions, such as expanding social spaces or providing shaded resting areas, would be most beneficial. For example, addressing vehicle intrusion near key entrances and improving the infrastructure in underutilized areas like Hasht Behesht Park could significantly boost pedestrian activity, as evidenced by both the space syntax analysis and gate count discrepancies.

4.2. Contribution of the Study

This study makes a novel contribution to the intersection of urban planning, environmental psychology, and social epidemiology by providing a comprehensive analysis of pedestrian behavior before and after the 2022 pedestrianization project in the cultural heritage site of Isfahan. The research advances the understanding of walkability in heritage sites by employing dynamic real-time data, including gate counting, syntactical analysis, and cognitive mapping, to assess pedestrian behavior and the spatial qualities of the urban environment. Unlike previous studies focused on Middle Eastern historical cities, which have often been limited in scope and methodology [66,67], this study integrates both quantitative and qualitative data to create a multidimensional perspective on pedestrianization, walkability, and wayfinding.

The use of real-time data, particularly gate counting, and syntactical analysis through GIS, presents a novel methodological approach for evaluating urban walkability in heritage sites. This approach addresses a gap in the existing literature [68], which has been dominated by traditional, less dynamic methods of assessing pedestrian flow and spatial configuration. The reliability of gate counting in this study is evidenced by its significant correlation with syntactical analysis maps. Although previous studies have demonstrated a significant correlation between connectivity values and urban mobility [69], minor inconsistencies between the observed pedestrian flows and syntactical predictions in this study underscore the complexity of walkability assessments, especially in heritage contexts. These discrepancies highlight the nuanced influence of historical urban layouts on pedestrian behavior, offering new insights that can inform future pedestrianization projects in similar historical settings.

One of the unique contributions of this study is its exploration of cognitive mapping and wayfinding behavior in a historic urban landscape. While previous research has recognized the role of landmarks, spatial memories, and reference frames in wayfinding [70,71], this study advances the field by examining how these factors influence real-time pedestrian decisions in a heritage context. The findings suggest that pedestrians demonstrate strong synchronous social wayfinding behavior, with clear objectives and spatial awareness driven by the recognition of significant landmarks, such as Naghsh-e Jahan Square and Chahar Bagh. This supports the idea that spatial legibility and the presence of key landmarks play a critical role in shaping pedestrian behavior and enhancing the walkability of heritage sites [72].

The study's examination of pedestrian preferences further contributes to the literature by revealing how aesthetic and functional elements influence walkability and social behavior. For instance, while Sepah Street showed the highest pedestrian flow, it suffered from low imageability and poor social cohesion, as previously highlighted by Ameli [73]. This finding contrasts with areas like Chahar Bagh, where a more pleasant walking experience, facilitated by trees and better-designed urban spaces, improved pedestrian satisfaction. The study also draws attention to the role of socio-economic factors in influencing pedestrian flow, as evidenced by the dominance of Qeisarieh Bazaar as a hub for social encounters despite its low integration scores in syntactical analysis [74,75]. This duality between spatial predictions and real-world behavior underlines the importance of combining objective and subjective data in urban studies.

In addition, this research addresses a significant gap in the understanding of the relationship between pedestrianization and social interaction in historical urban settings. Previous studies have largely focused on modern urban spaces, overlooking the unique social dynamics that occur in historical cities [76]. The current study demonstrates that social walking, often occurring in groups, is a vital aspect of pedestrian behavior in heritage sites, reinforcing the notion that walkability is not solely determined by physical infrastructure but also by the social and cultural context [77]. This insight is critical for future urban planning efforts aimed at enhancing walkability and social cohesion in cultural heritage sites.

Moreover, this study contributes to the growing body of literature on the ecological and environmental aspects of urban design in historical contexts. While previous research has emphasized the importance of conserving natural regimes and integrating ecological diversity into urban planning [78,79], this study extends these discussions by examining the landscape features of historical areas like Chahar Bagh and Naghsh-e Jahan. It underscores the need for better integration of green spaces and urban ecology into pedestrianization projects, particularly in areas that have undergone significant urbanization without adequate consideration of environmental issues. This focus on the interaction between hard and soft landscape elements provides a more holistic view of walkability, suggesting that successful pedestrianization in heritage sites requires not only infrastructural improvements but also attention to environmental sustainability.

Finally, the study highlights the critical role of safety and security in determining the walkability of heritage sites. While Hasht Behesht Park demonstrated lower pedestrian flow compared to other areas, the primary factor was a pervasive sense of insecurity. This finding aligns with previous studies on the importance of perceived safety in promoting walkability [58,80,81], suggesting that future interventions in historical urban areas must prioritize the creation of safe, well-lit, and socially vibrant spaces to enhance pedestrian experience and social interactions.

In sum, this study offers several contributions to the field of urban planning and walkability in historical cities. By combining real-time data, cognitive mapping, and syntactical analysis, it provides a dynamic, multi-faceted assessment of pedestrian behavior that accounts for both the physical and social dimensions of urban space. The findings not only advance theoretical understandings of walkability in heritage contexts but also offer practical implications for urban planners seeking to foster sustainable, pedestrian-friendly environments in historic urban areas.

4.3. Implications for Policy and Planning

Urban planners should emphasize enhancing the spatial legibility and cognitive mapping of pedestrians by improving wayfinding aids, such as landmarks and signage. These interventions could make historic areas more accessible and user-friendly, promoting heritage tourism while preserving cultural identity. Moreover, the findings suggest that enhancing sidewalk design and reducing congestion in critical areas, such as near major landmarks, can improve the overall walkability and visitor experience.

Strategically redesigning the main entrances to heritage areas could enhance visitor experiences and improve accessibility. Policy initiatives should focus on pedestrianizing key streets, such as Qeisarieh Gate, while providing adequate spaces for resting and socializing. The study suggests that improving entrance designs, enhancing aesthetic appeal, and ensuring better connectivity to public transportation would support more sustainable and enjoyable pedestrian experiences.

Urban planning policies should focus on enhancing public spaces within historic markets by expanding pedestrian zones, organizing vendor layouts, and improving seating and shade. By fostering social interactions in these spaces, local economies could be boosted, supporting both heritage conservation and community well-being. These interventions would also mitigate congestion and encourage a more vibrant, pedestrian-friendly environment.

Policymakers should integrate urban ecology into the planning of heritage sites by incorporating more green spaces, trees, and natural habitats. This would not only enhance walkability but also contribute to the conservation of historical landscapes. Restoring the ecological elements of places like Chahar Bagh could improve biodiversity while making these areas more appealing and functional for both locals and tourists.

Urban design interventions should prioritize reducing vehicular access and enhancing pedestrian amenities in heritage zones. Planners could implement policies that limit parking within historic cores and develop multi-story parking on the peripheries, thereby preserving the walkable character of the area. This would foster social interactions and enhance the cultural experience of heritage sites.

To improve safety and walkability in historical parks like Hasht Behesht, policy interventions should include enhanced lighting, better surveillance, and a diversity of amenities that promote both active and passive uses of the space. These improvements could transform the park into a safer, more attractive destination for both locals and tourists, supporting urban sustainability goals.

5. Conclusions

This research aims to understand the influence of urban design performance on pedestrian walkability behavior within a cultural heritage site in Isfahan. The study reveals that landmark integration, wayfinding behavior, and the socio-economic functions of heritage areas play a significant role in shaping pedestrian movement and enhancing walkability. The research highlights the value of cognitive and syntactic analysis, community engagement, and historical preservation in promoting accessibility and social interaction in heritage contexts. Importantly, the study identifies the need for urban design improvements to address discrepancies between syntactic predictions and actual pedestrian behavior. This work offers valuable insights for urban designers, planners, environmental psychologists, and policymakers, emphasizing the importance of integrating environmental and aesthetic considerations into urban spaces to foster sociable and walkable public areas.

The study faced challenges due to certain limitations. Firstly, the data utilized were not easily accessible. The information was collected during a period marked by heightened sensitivity and fear, coinciding with unrest in Iran. During this time, respondents were less inclined to participate in surveys. Nevertheless, individuals demonstrated courage in responding to queries related to security and safety. Hence, it becomes imperative to encourage a more diverse pool of respondents to ensure a comprehensive dataset as an outlook for future studies. Secondly, the maps presented by the municipality exhibited a variety of approaches in conceptualizing and operationalizing urban maps. The lack of uniformity among maps generated by syntactic analysis made it challenging to make direct comparisons with gate counting maps, and some minor details were obscured. As a result, the discussion of the selected part was based on the real-world observations rather than relying solely on the maps.

In conclusion, this study suggests that enhancing the legibility and identity of the space can be achieved by preserving and promoting historical monuments, vernacular elements, and socio-economic centers, such as traditional bazaars, which have an overwhelming impact on the creation of cognitive maps for pedestrians. This can help visitors to navigate the space more easily and appreciate its cultural and aesthetic values. Furthermore, footfall on the side of the street with shops was much higher all over the site. While this behavior may be cultural, it is recommended to encourage mixed-use development that can create a diverse and vibrant urban environment on both sides. For instance, preserving and promoting historical gardens like Chehel Sotoon, identified by the VGA as the most integrated space to promote walkability, or connecting a safer environment in Hasht Behesht Park by regenerating it in line with Persian gardens, can have a substantial impact on the creation of cognitive senses for pedestrians. This, in turn, can help visitors to navigate the space more easily and appreciate its cultural and aesthetic values. Additionally, the accessibility of crowded communities to Sepah Street should be reconsidered. It should be designated as a pedestrian-only zone, and during specific hours, shopkeepers should be free for delivery. Enabling individuals to choose a new path to arrive at Naghsh-e Jahan based on their preferences and emotions introduces unpredictability in people's movement patterns. This also creates a more personal, small-scale ambiance, turning the pedestrianized historic cultural zone into an old city.

Author Contributions: Conceptualization, H.M.; Methodology, H.M., R.A. and M.P.; Software, H.M. and R.A.; Formal analysis, H.M. and R.A.; Investigation, H.M. and R.A.; Resources, H.M. and R.A.; Data curation, H.M. and M.P.; Writing—original draft, H.M. and R.A.; Writing—review and editing, R.A., M.P. and D.G.; Visualization, H.M.; Supervision, D.G.; Project administration, H.M. All authors have read and agreed to the published version of the manuscript.
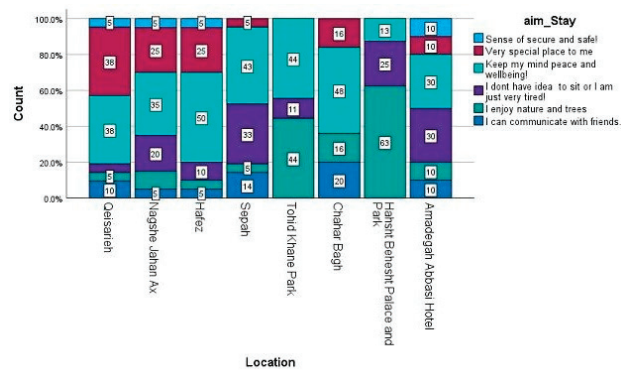
Appendix A

Figure A1. Aim of pedestrians to stay or sit in various locations of the studied cultural heritage site.
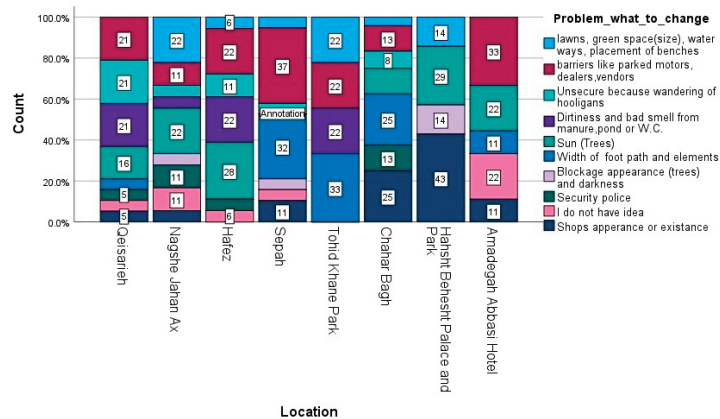

Figure A2. Problems in various locations of the heritage site based on the opinions of pedestrians.
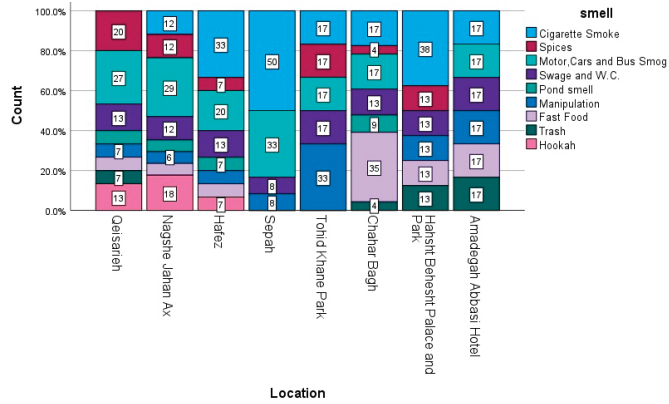
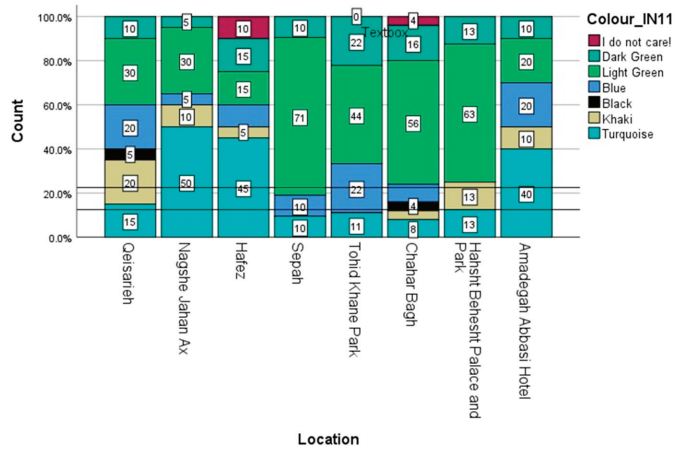**Figure A3.** The worst smells in the cultural heritage site in terms of zones and their location.

Figure A4. Preferred colors for different locations based on the viewpoint of pedestrians.
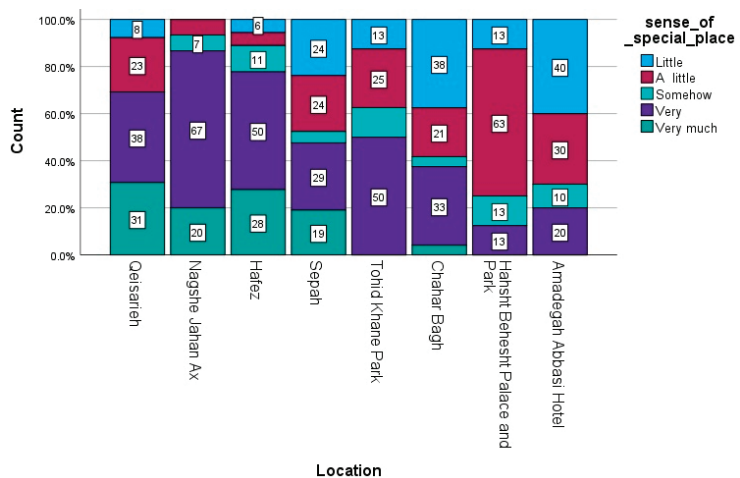

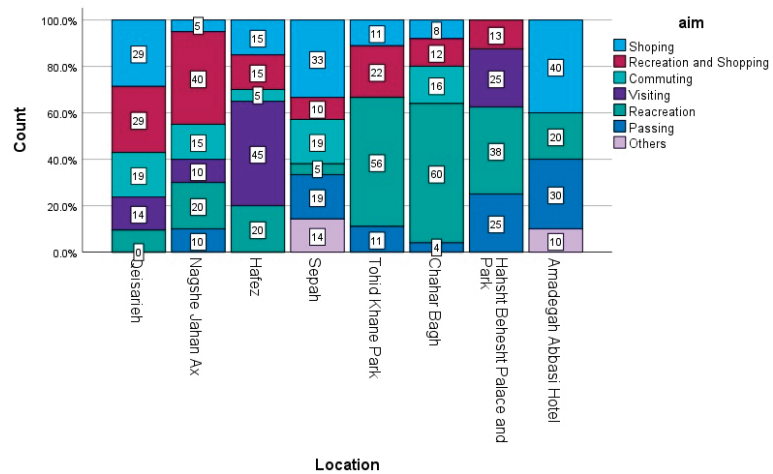**Figure A5.** The sense of place among visitors in different locations.

Figure A6. Purposes of visiting in various locations.

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