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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

Dragana Ćorović [1,*], Marija Milinković [2], Nevena Vasiljević [1], Dezire Tilinger [2], Sandra Mitrović [1] and Zlata Vuksanović-Macura [3]

[1] Faculty of Forestry, University of Belgrade, Kneza Višeslava 1, 11030 Belgrade, Serbia; nevena.vasiljevic@sfb.bg.ac.rs (N.V.); sandra.mitrovic@sfb.bg.ac.rs (S.M.)
[2] Faculty of Architecture, University of Belgrade, Bulevar kralja Aleksandra 73/II, 11000 Belgrade, Serbia; marija.milinkovic@arh.bg.ac.rs (M.M.); dezire@arh.bg.ac.rs (D.T.)
[3] Geographical Institute "Jovan Cvijić" SASA, Djure Jakšića 9, 11000 Belgrade, Serbia; z.macura@gi.sanu.ac.rs
* Correspondence: dragana.corovic@sfb.bg.ac.rs

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

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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].

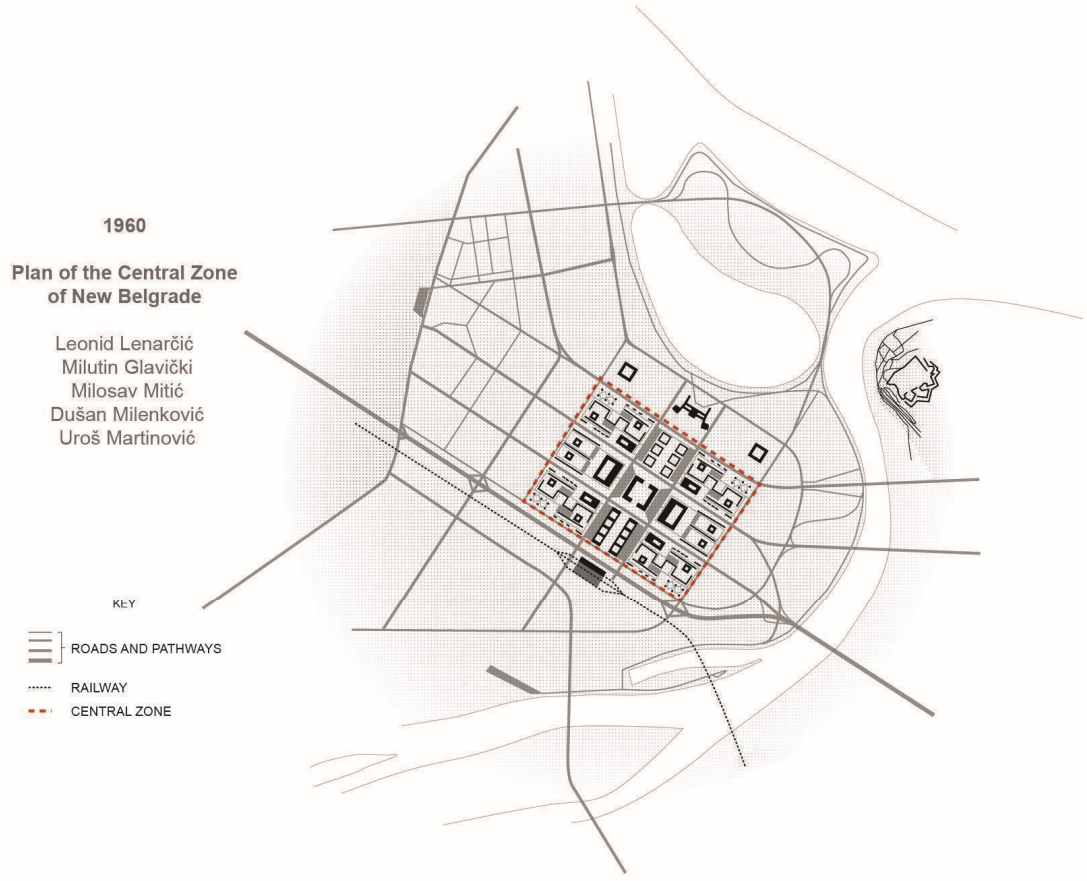


Figure 1. The plan of the Central Zone of New Belgrade, 1960. Graphical illustration prepared by Dezire Tilinger, 2024. Source of map: [6] (p. 182).

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.

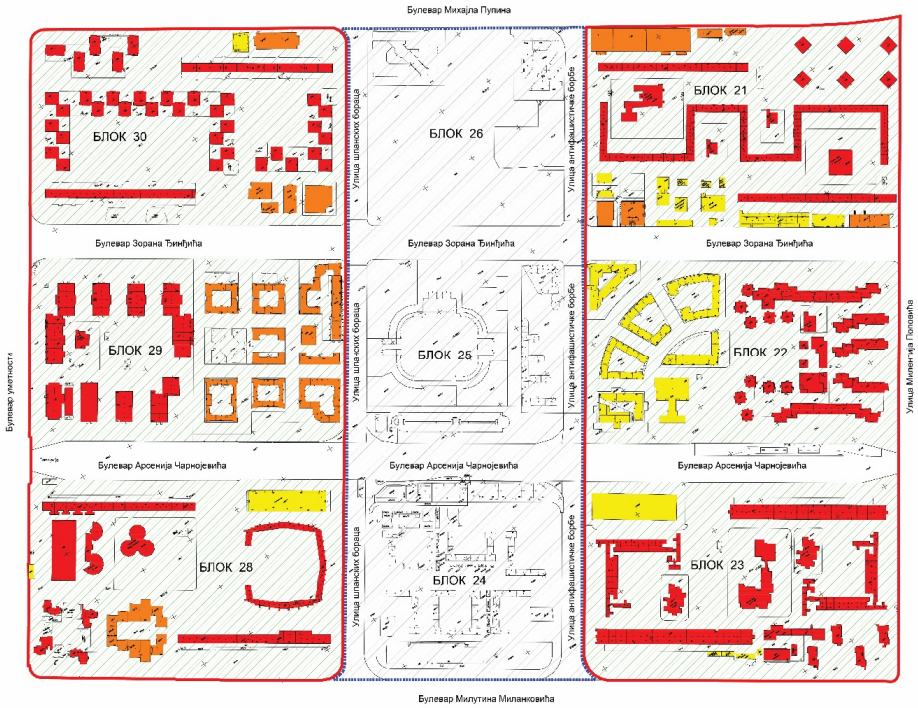


Figure 3. Document issued by the Cultural Heritage Preservation Institute of Belgrade showing the valorisation of buildings of the CZNBg: (1) red—buildings of special value; (2) orange—buildings of value; and (3) yellow—buildings of no value. Source of map: The Cultural Heritage Preservation Institute 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.

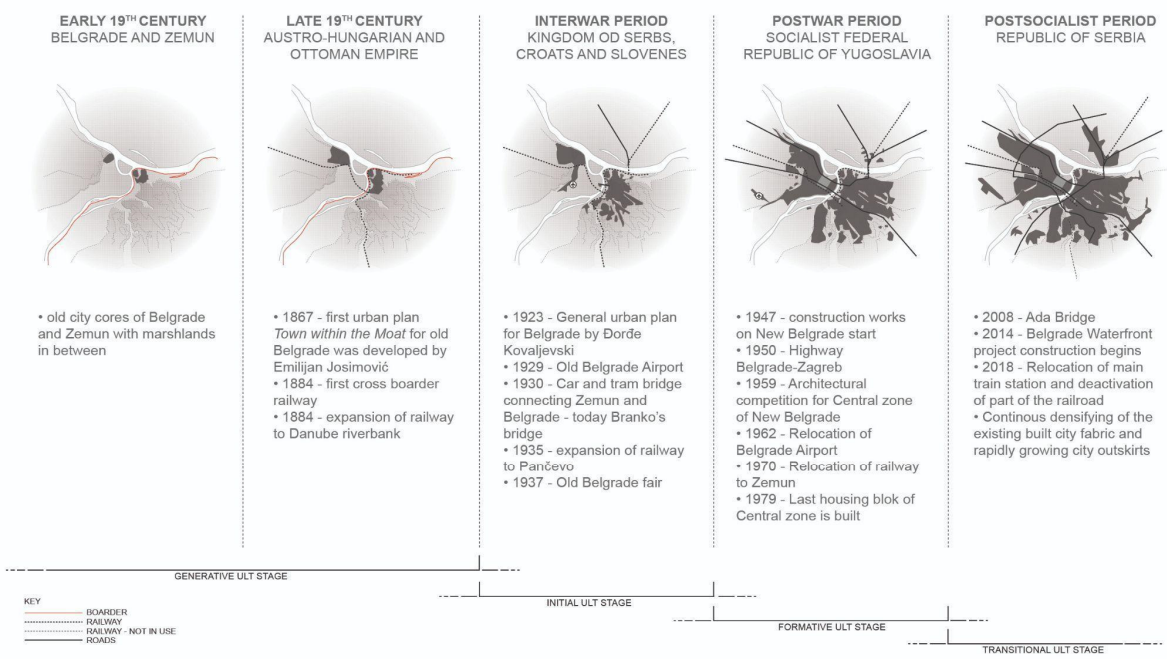


Figure 4. Transformation of the urban landscape of (New) Belgrade. Diagram: A comparative overview of the formation and transformation of the urban landscape of Belgrade and New Belgrade, XIX–XXI centuries. Conceptualisation of map interpretations and diagram: Dragana Ćorović and Dezire Tilinger, 2015, 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).

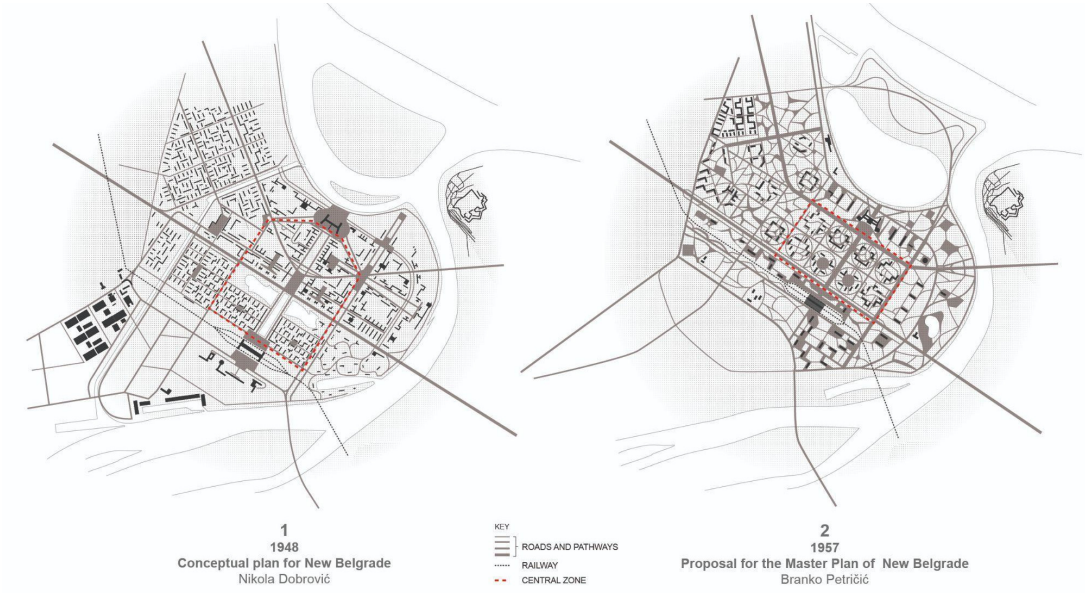


Figure 5. Comparative drawing of two urban plans for New Belgrade. Graphical illustration prepared by Dezire Tilinger, 2024. Source of maps: [6] (pp. 107–154).

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.

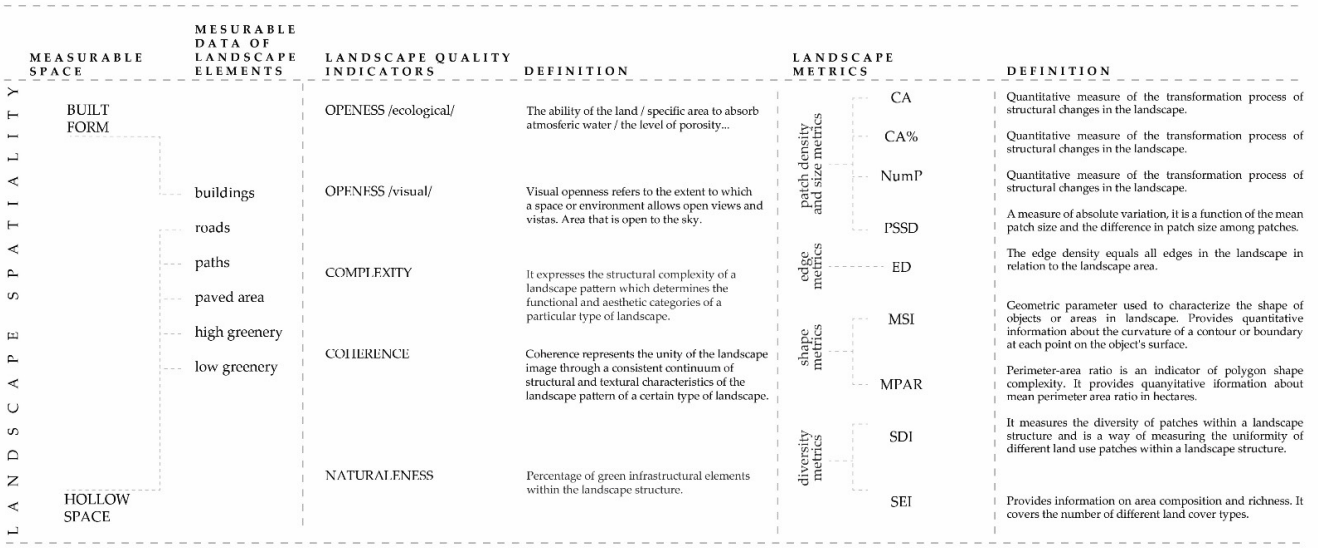


Figure 6. Landscape quality assessment: approach and methodological framework. Conceptualisation of the LQA presentation by Nevena Vasiljević and Sandra Mitrović, 2024. Source of data (Measurable Space): [73,75,78], Source of data (Landscape Quality Indicators, Definition, Landscape Metrics and Definition: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

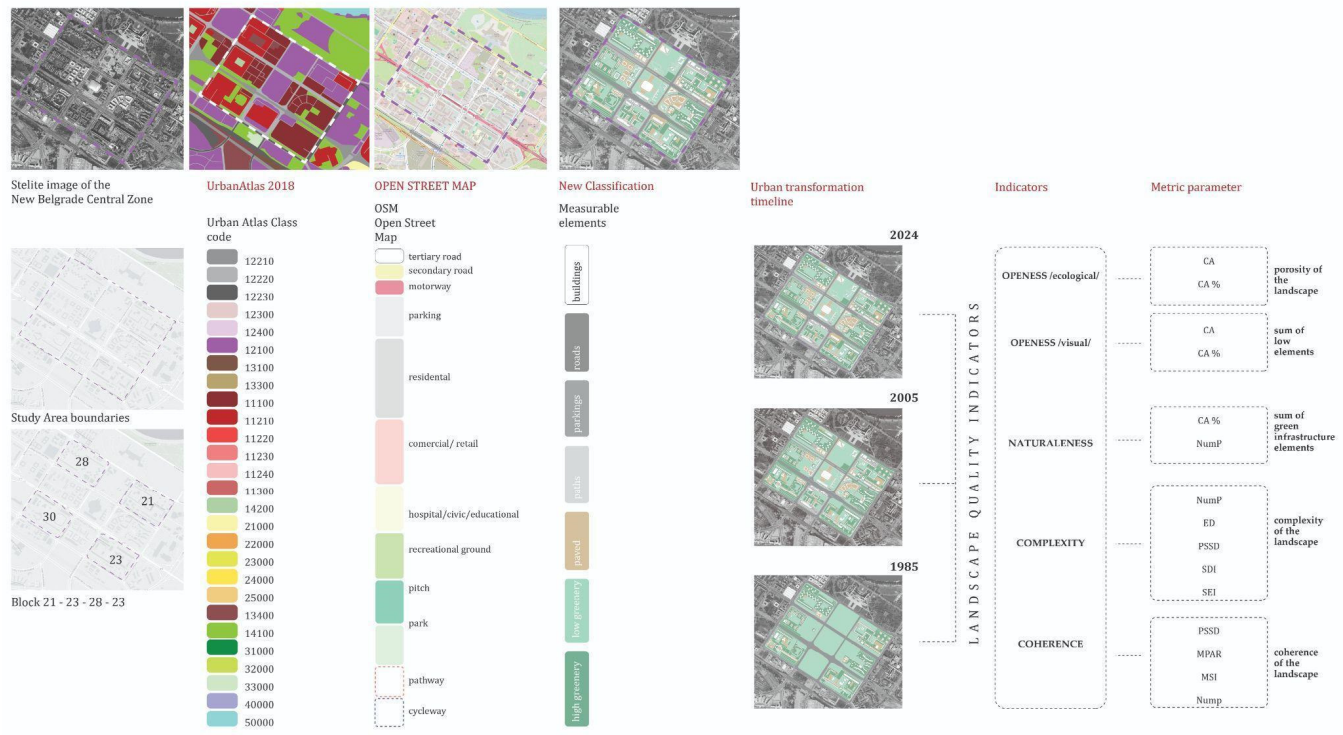


Figure 7. Generation of a new database for the landscape quality assessment. Visual conceptualisation of the database by Sandra Mitrović and Nevena Vasiljević, 2024. Source of database: [68].

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			**CLASS LEVEL**
	2005	96.37	48.95				
	1985	128.08	65.05				
	YEAR	**AREA_ha**	%				
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.

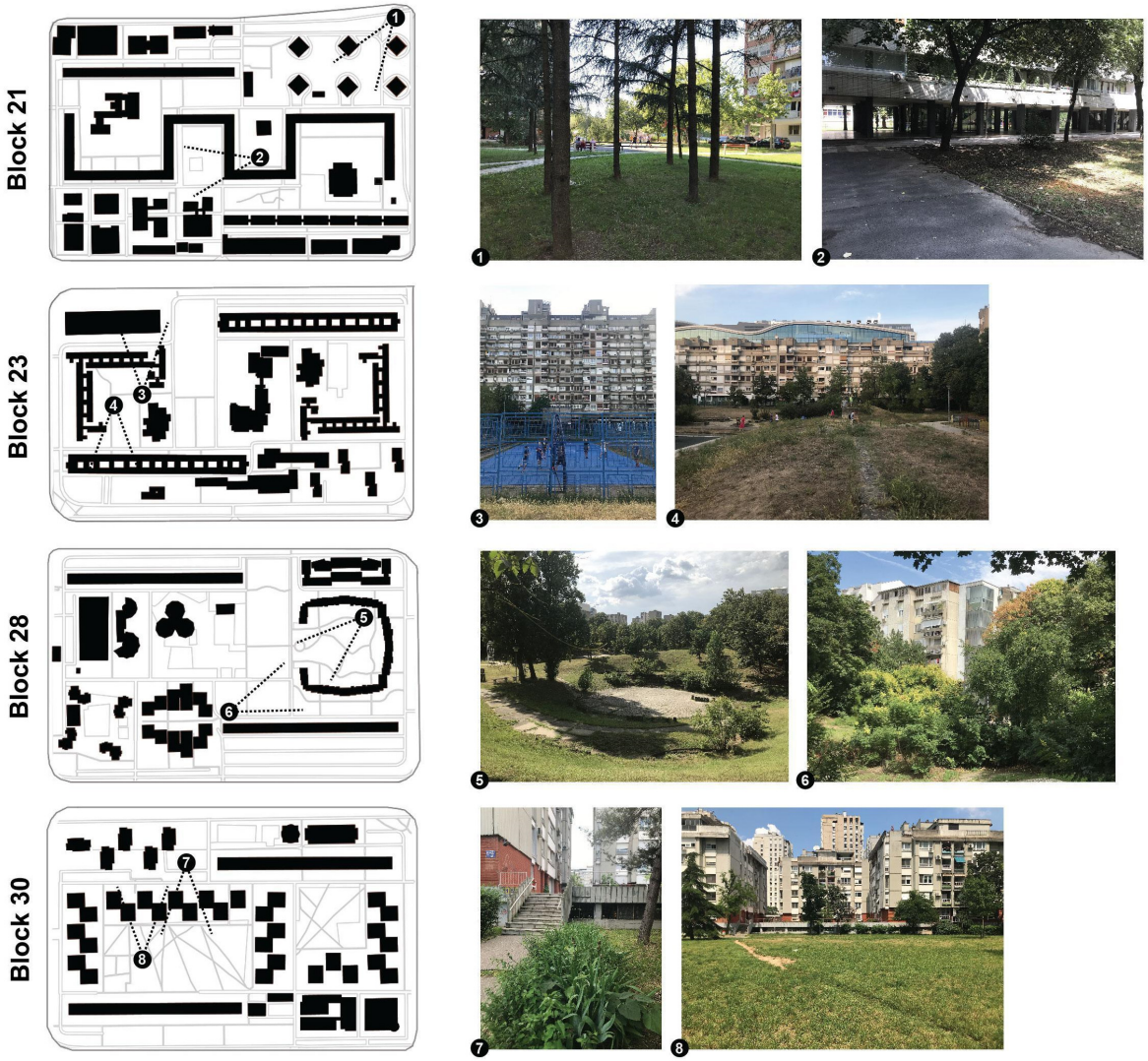


Figure 9. Spatial relationships documented in the vistas of the corner residential blocks of the Central Zone of New Belgrade. The plans for each analysed block, with the positions marked 1–8, and the orientation of the photographer's view, are coupled with the corresponding images: 1—playgrounds and 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.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/land13070906/s1, Figure S1: Block 21—Spatiotemporal ULUC changes, source: Sandra Mitrović; Figure S2: Block 23—Spatiotemporal ULUC changes, source: Sandra Mitrović; Figure S3: Block 28—Spatiotemporal ULUC changes, source: Sandra Mitrović; Figure S4: Block 30—spatiotemporal ULUC changes, source: Sandra Mitrović; Table S1: Urban descriptors for the residential blocks of the Central Zone—an overview according to research by Ljiljana Blagojević [94] and analysis conducted during COST Action 18137; Tables S2–S6: Supplementary tables: Table S2. Landscape metrics for at class level of the New Belgrade Central Zone; Table S3. Landscape metrics for at class level of the New Belgrade Central Zone of the Block 21; Table S4. Landscape metrics for at class level of the New Belgrade Central Zone of the Block 23; Table S5. Landscape metrics for at class level of the New Belgrade Central Zone of the Block 28; Table S6. Landscape metrics for at class level of the New Belgrade Central Zone of the Block 30.

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