LANDSCAPE ARCHITECTURE AND ART

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INTRODUCTION

A collection of scientific papers reflecting the search for balance in the multifaceted nature of landscape space:
1. Assessing the harmony between urban and green spaces:
- historic urban centres and their growing need to address urban climate challenges – heat / frost mitigation, air pollution, flooding caused by intense rainfall, reinforced by the lack of green spaces;
- urban forests as natural multifunctional structures in urban planning, balancing environmental and social systems; urban forests representing a significantly lower resource consumption compared to parks and landscape areas in cities;
- the use of solid wood elements – the return of historic building materials in contemporary urban spaces (small architectural forms in high-rise residential areas, school grounds, theatres, etc.).
2. The transformation of the landscape between urban and rural, where the rural landscape is slowly acquiring the structure of the urban space, as agricultural land with a lower fertility rate is transformed into dense out-of-town housing. Research is also linked to the changing urban silhouette.
3. Preservation of the uniqueness of the cultural heritage and the natural environment (sacred landscapes, manor houses, farmsteads, etc.), the development of overgrowth in the cultural landscape and the obscuring of sight lines, the suppression of the expression of the natural environment (nature of the river bed, relief, depth of the landscape, lateral scenery, etc.).
4. The language of the natural environment, art, architecture and psycho-emotional expression; the role of memorial parks in the search for a synthesis of public remembrance and reflection, the interplay between presence and absence.

PRIEKŠVĀRDS

Zinātnisko rakstu apkopojums, kurā atspoguļojas sabalansētības meklējumi ainavtelpas daudzšķautnainības raksturā:
1. Urbānās un zaļās telpas harmonijas novērtējumi:
- pilsētu vēsturiskie centri un to augošā nepieciešamība risināt klimata problēmas pilsētās – siltuma / salu mazināšana, gaisa piesārņojums, intensīvu lietusgāžu izraisīti plūdi, ko pastiprina zaļo zonu trūkums;
- pilsētu meži kā dabiskas daudzfunkcionālas struktūras pilsētplānojumos, kas sabalansē vides un sociālo sistēmu; urbānie meži, kas veido ievērojami zemāku resursu patēriņu, salīdzinot ar parkiem un ainavu teritorijām pilsētās;
- masīvkoka elementu pielietojums – kā vēsturiskā būvmateriāla atgriešanās mūsdienu pilsēttelpā (arhitektūras mazo formu dizains daudzstāvu dzīvojamos kvartālos, skolu teritorijās, teātru ēku priekšlaukumos utt.).
2. Ainavtelpas transformācijas tendences starp pilsētu un lauku vidi, kur lauku ainava lēnām iegūst urbānās telpas struktūru, lauksaimniecības zemēm ar zemākas auglības koeficientu pārtopot par blīvu ārpilsētas apbūvi. Pētījumi ir saistīti arī ar pilsēttelpas silueta maiņu.
3. Kultūras mantojuma un dabas pamatnes unikalitātes saglabāšana (sakrālā ainava; muižu apbūves ansambļi, lauku viensētas utt.), apauguma attīstība kultūrainavā un skatu līniju aizklāšanās, dabas pamatnes izteiksmes slāpēšanās (upes gultnes raksturs, reljefs, ainavtelpas dziļumplāns, sānu kulises utt.).
4. Dabas pamatnes, mākslas, arhitektūras un psihoemocionālās izteiksmes valoda; memoriālo parku nozīme publiskās piemiņas un pārdomu sintēzes meklējumos, klātienes un prombūtnes mijiedarbība.

Aija Ziemeļniece
Editor of Chief

CONTENT

TRENDS IN THE USE OF TIMBER IN THE BUILT FABRIC OF COPENHAGEN

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Abstract. Innovative approach and existing natural values, proximity to water, green structure are key elements and aspects that combine sustainable activities with high quality of life in Copenhagen's architecture and urban development as a whole. Whether it is new housing developments, new cycle routes, city parks, Copenhagen is at the forefront of architecture and is constantly, continuously preparing for a more sustainable future, while meeting the needs and aspirations of the local population. The most advanced and innovative knowledge from around the world has helped to make Copenhagen a sustainable city of the future, working with quality solutions in architecture, transport infrastructure, energy. At the same time, thinking about meeting the needs of the citizens, culminating in appropriate urban solutions, creating a quality urban fabric. The aim of the study is therefore to look at the trends in the use of timber in the built fabric of Copenhagen from the point of view of visual and aesthetic quality. The study describes the sites surveyed by the authors, based on previous experience and practice, and evaluates a modern building structure developed and designed in the 21st century.
Keywords: timber structure for buildings, trends of use, urban environment

Introduction

Urban gardens, greener streets, and pleasant, colorful courtyards all contribute to Copenhagen's cohesive landscape and building fabric, which is closely related to surface stormwater drainage channels or systems in the urban setting. High-quality methods that show, via tangible examples, how Copenhagen's urban planning integrates and combines not only climate solutions with recreational benefits for the local population, but does so as an essential, cohesive system within the urban environment rather than as a bonus or side effect. For instance, cycling has been emphasized as a clever, secure, and healthful method for Copenhagen residents to get from point A to point B since the 1960s. Currently, Nowadays, 49 % of Copenhagen residents ride their bikes instead of driving a private vehicle to work or school (Marco, 2024). The visual-spatial aspects of architecture are ever-evolving, and architects and urban planners recognize the importance of creating livable, affordable, and sensible urban living spaces by incorporating healthy, lively, and active public outdoor spaces (RUDI, 2009). High-quality urban environments are combined with green structures and a comprehensive approach to sustainable architecture and design. The active and ongoing synthesis of design and construction processes in urban environments is one of the promising directions in contemporary architecture for the development of visual-spatial environments and structural forms (Schröpfer, 2016). Recent technological advancements have introduced rationalistic and commercial tendencies into architecture, necessitating intentional collaboration between architects and urban planners in the development of development plans. In a condensed, visual-spatial structure, the collaborative format rationally balances and brings the various aspects of the urban environment closer together. One of the synthesis tasks in architecture is to create spatially meaningful architecture that enhances emotional potential by considering the psychological perception of the human being as a user of living space, in addition to creating a compact visual-spatial structure. A development complex's visual-spatial solutions and dimensions vary; some components arise from a well-defined plan with a clear architectural intention, while others develop over an extended period of time, progressively changing on the basis of cohesive compositional ideas based on sustainable and balanced socio-economic and urban contextual considerations. In order to create areas and objects that are functionally usable within the urban environment, architects and urban planners logically concentrated on the overall visual image of the area to be designed and developed (Schröpfer, 2016; Īle, 2021). According to the study, political divisions, land use requirements, and inadequate infrastructure investment can all have an impact on the structure of residential development, which can result in issues. Therefore, it is crucial to encourage municipalities to be involved in the design of the architectural and spatial structure and to take specific actions in a balanced manner that do not conflict with the municipality's goals (Bertaud). Architecture is an art form that can endure because it creates an aesthetically pleasing, practical, and materially useful urban environment for people to live, work, and play in. Residential neighborhoods' exterior space is essential to the architectural-spatial structure's revitalization (Babalis, 2016). As a result, the human aspect of urban planning has received little attention, analysis, or study in recent years. Road transportation has received a lot of funding and resources, but other factors that are crucial for the urban environment—like people's ability to walk around cities or multipurpose outdoor areas that can be used as gathering spots—have been overlooked (Gehl, 2011; Stokmane, 2022). The idea that the urban environment is a living thing with a complex metabolism is the foundation of contemporary approaches to urban planning, which support various development concepts (Tîrlă, Manea, Vijulie). As a result, living space organization is determined by the visual-spatial dimensions of architecture, which reflect the logical arrangement and relationships between functional zones. The development of the urban form is also significantly influenced by the appropriate use of materials in all solutions. The use of wood in the built environment is highlighted in the study as a suitable strategy and solution for the urban fabric. A vast array of building materials has been produced in recent decades as a result of the development of new timber materials and the reevaluation of existing timber species. Today's construction uses timber of various sizes. Numerous varieties of Laminated Veneer Lumber (LVL), Cross Laminated Timber (CLT), and Glulam Solid Timber (GLT) panels, beams, and columns are among the most extensive selection of glulam components. According to current research, new timber construction systems are being developed through practical experimentation, which may involve combining timber with other materials or employing better fixing techniques. Additionally, systems or structural solutions that have not been utilized for a long time are becoming more important. Each project's selection of structural solutions and building materials is influenced by a variety of factors. Everybody

working on the project has unique building material ideas, expertise, and experiences. Because the parties involved lack adequate wood experience, wood is frequently left off of the list of potential building materials during the material selection process or deemed inappropriate during the design phase. Even though wood has many benefits and drawbacks as a building material, it must overcome social perceptions and prejudices to compete with other materials. Wood's comeback as a building material in the twenty-first century is attributed to both the state's deliberate collaboration with the forest and timber industries as well as the availability of new, more sustainable wood products. In Scandinavia and some European countries, the situation is favorable. Businesses in the sector are organizing focused events to encourage the use of timber construction, educating professionals and the public through seminars, consultations, and awards for the best timber buildings. They are also working to change building codes to make wood a competitive building material in modern architectural projects (Viğuma, 2020). With experts working diligently on multipurpose urban planning projects, Copenhagen's architectural art of the twenty-first century suitably emphasizes and exemplifies the use of high-quality wood not only in the built environment but also throughout the entire urban environment.

Materials and Methods

Using a comparative approach, the study examines mixed-use neighborhoods that were constructed recently and are situated in particular areas of Copenhagen. These neighborhoods exhibit concentrated urban living while maintaining their unique form, close proximity to waterways, green character, and convenient infrastructure connections. As a result, the study looks at four multipurpose neighborhoods in Copenhagen (Fig. 1), highlighting the background of contemporary urban development while emphasizing various timber details and elements. The paradigm of timber architecture has evolved in the modern era, and reestablishing the standing of wood as a building material requires interdisciplinary collaboration on a national and international scale. While some nations prefer to let the free market determine changes in the volume of timber construction, many are developing systems to encourage the practice. Generally, forest and timber companies and organizations initiate or organize wood promotion strategies that are centered on a national level. Key goals that are being brought up in national and international contexts include sustainability, lowering CO2 emissions, and lessening the negative environmental effects of construction (Viluma, 2020). Therefore, Copenhagen's mixed-use neighborhoods show a logical approach to the development and application of contemporary solutions. Digital maps, publicly accessible materials, and the use of wood through aesthetic qualities in Copenhagen's multipurpose neighborhoods are all analyzed during the research process. Ørestad is the first sizable mixed-use neighborhood to be assessed and examined during the research process. The Ørestad neighborhood is in southern Denmark, 30 minutes from Malmö and 7 minutes from Copenhagen by metro. The region is being developed in line with the currently popular idea of a "compact city" that is connected to the metro in Copenhagen (Īle, 2021; Stokmane, 2022). The second study area is Sluseholmen Kanalby (Danish: Sluseholmen Kanalby), a 135,000 m2 residential development on the Sluseholmen peninsula in Copenhagen's southern harbor area. It was finished in 2008 and features a lot of wood in both the building materials and the public outdoor space, from which large terraces, floating saunas, and boardwalks have been constructed for the use

Fig. 1. Objects of the research area
[created by author's, 2024]

of everyone in the neighborhood. The research process included an analysis of the third mixed-use development, Kaktus Towers, which also has an IKEA store, a low-cost hotel, and residential apartments connected by an elevated public park. Earlier this year, the two towers—the tallest standing at 80 meters—were finished. The fourth space is the Nordhavn Quarter, which combines volumes, vertical garden accents, and green façade structures to create a multipurpose space that offers recreational opportunities to locals on multiple levels.

Results and Discussion

The study process has shown that mixed-use development projects have been developed and implemented in the Nordic region in recent years, in line with one of the key principles - mixed-use in the urban environment. One of the most modern sites is in Copenhagen: Ørestad Syd, which was revisited in the autumn of 2024, based on the authors' research into development trends for the period 2017-2021. The area contains a variety of architectural and landscaping solutions that mark modern development trends, taking into account the use of wood in the urban fabric. One of the distinctive features of Ørestad Syd is Ørestad Syd Himmelbyen, a mixed-use development that aims to combine functions as densely as possible in one complex, including a supermarket area, a children's leisure centre and residential areas on the upper floors. The outdoor space of the residential area is defined as a "City of Heaven", which, similar to the Ørestad Syd area, has a functionally structured inner courtyard. The use of timber in the outdoor solutions creates a visual overall image and architecturally emphasises the timber structure in the built form, which is clearly read from all parts of the street. The presence of timber and the façade finishes visually divide the large building volume into smaller parts through contrasts and the smooth concrete volume, thus achieving human scale dimensions even in the multifunctional outdoor space (Fig. 2, 3). The large staircase along the facade creates a functional link with the semi-enclosed courtyard volume, which is accentuated in places by the timber cladding structure. Not far from the Oerstad Syd area is the Orestad North area, where the round building Tietgen Dormitory stands out. The round shape of the building makes it possible to successfully

Fig. 2. Ørestad Syd Himmelbyen [photos by author's, 2024]

Fig. 3. Ørestad Syd Himmelbyen courtyard [created by author's, 2024]

Fig. 4. Viewpoint from street to the Tietgen Residence Hall [created by author's, 2024]

Fig. 5. The Tietgen Residence Hall with green area [photos by author's, 2024]

organize the functional side of the building, thus there are rooms on the outside, and common rooms and corridors on the inside, which ensure mutual socialization of students. Common rooms are located on the 1st floor, and 360 rooms on the other floors. The Tietgen Dormitory is expressive with its facade structure, where the wooden structure is used in various techniques (Fig. 4, 5).

Sluseholmen, on the other hand, has a different development pattern to Ørestad Syd, as it is connected to water channels, bridges and quays, and the waterfront gives residents access to the water. The overall concept for the neighbourhood was developed by architect Sjoerd Soeters and Arkitema Architects, inspired by the artificial island in Amsterdam. Sluseholmen consists of eight inhabited islands with large and small buildings that architecturally form continuous building blocks, piers and waterfronts that give residents access to the water. For the Sluseholmen area, the authors developed specific architectural and spatial structures, general planning rules that define the use of specific proportions and dimensions, materials and colours. The site comprises 1,350 apartments spread over eight artificial islands and separated by excavated canals. Throughout the block, wood is used not

only for the variety of the building structure on the facade, but also for the outdoor spaces along the canal system, using wooden beams in the waterfront areas (Fig. 6, 7, 8).

The next site to be assessed in the study process is Kaktus Towers, one of the newest sites to be realised in 2024. The visual solution of the towers has a rational approach to economic construction, where an efficient sloped plate structure creates an optimal ratio of proportions, but also a strikingly expressive overall architectural visual image (Fig. 9, 10). The Kaktus towers are built around a central core and have a complex and sculptural expression thanks to the façade, which has a different orientation on each floor. The exterior of the building consists of nearly 500 spiky balconies that wrap around the entire structure, clearly referencing the spiky desert vegetation. The jagged appearance is softened by the facade, which reflects the last rays of the sun in a golden hue - a stark contrast to the otherwise austere appearance of the building. The idea behind the towers was to create a mix of privacy and community, so the buildings include communal spaces such as a gym, kitchen, laundry room and outdoor barbecue area. The aim of the site is that these communal areas will foster

Fig. 6. Sluseholmen building facade structure [photos by author's, 2024]

Fig. 9. Kaktus Towers with park area [photos by author's, 2024]

Fig. 7. Wood elements with greenery [created by author's, 2024]

Fig. 10. Kaktus Towers facade structure[created by author's, 2024]
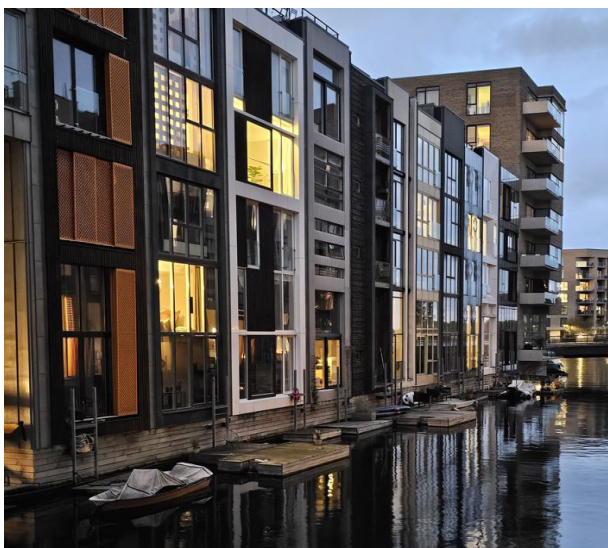
Fig. 8. Sluseholmen buildings with canal [created by author's, 2024]

a sense of community among residents and help to alleviate the loneliness that can be experienced by expatriates or city dwellers living alone.

In addition to concrete for the main frame and metal components, Kaktus Towers' finishing structure incorporates wood in a clean, contemporary design to produce an aesthetically beautiful building structure. The concrete volume of the façade and the timber panels of the façade visually interact with one another throughout the day to create an intriguing building volume structure that is easily readable in the urban setting from a variety of angles. The building's size, the roof gardens' volume, and the various levels of green spaces create an area that is both intriguing and well-balanced throughout the block (Fig. 12, 13). In contrast to the Kaktus Towers concept, Nordhavn is a new neighborhood. Many of the distinctive features of the area's former industrial areas have been preserved and transformed as part of the new quarter in Nordhavn (Fig. 14, 15), which also features new streets and buildings. They establish a cozy and private atmosphere in the streets
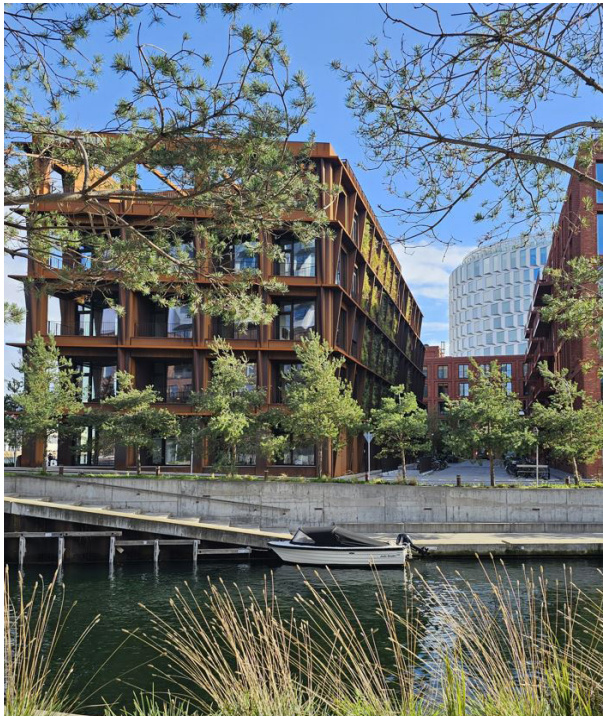
Fig. 11. Nordhavn area [photos by author's, 2024]
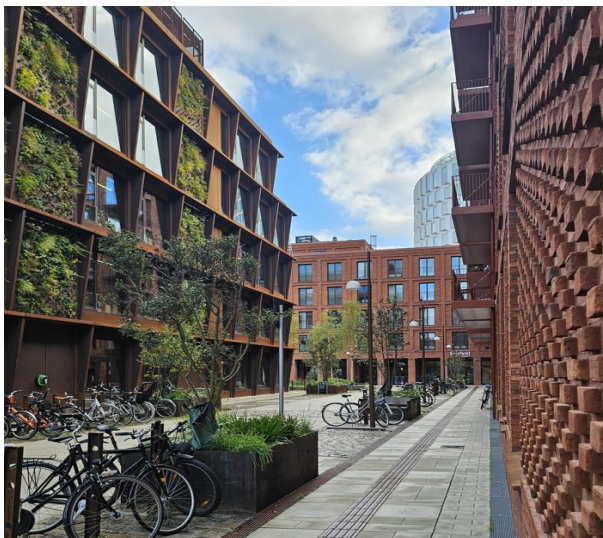
Fig. 12. Nordhavn Porten building [created by author's, 2024]
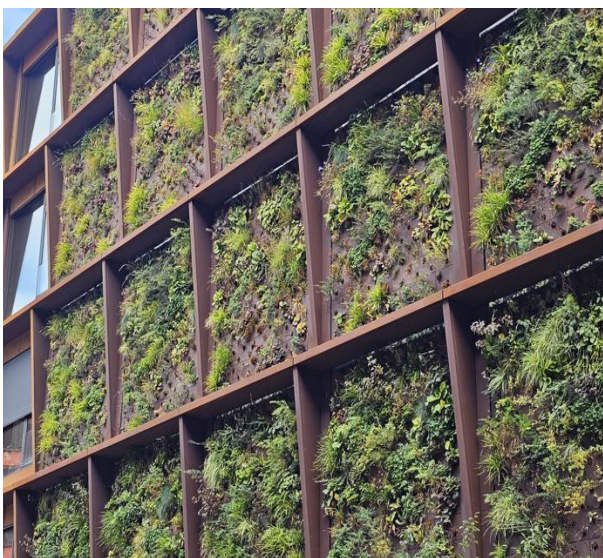
Fig. 13. Green facade structure of Porten building [created by author's, 2024]

and courtyards of Nordhavn by connecting the area with green areas. With views of Sweden and Copenhagen in the distance, the area is encircled by water on all sides. One of the area's highlights is Porten, a versatile office complex that was designed with a nod to the region's industrial past. The four-story building under analysis features a roof terrace, public outdoor gardens, and a metallic maroon façade structure. The Danish Ministry of the Environment supported the development of the Porten building, Copenhagen's first green façade solution, in partnership with BG Byggros and Komproment. The harsh winds, frigid temperatures, and close proximity to sea salt have all been taken into consideration when designing the building concept. The designers selected plants with two distinct qualities: some are aesthetically pleasing, while others are positioned to support biodiversity and are home to as many as 132 native insects. A controlled hydraulic buffer capacity built into the façade also collects rainwater from the roof, guaranteeing a steady supply of water for the plants and preserving plant life all year long. Numerous sensors integrated into the façade track the biodiversity of the façade and its effects on different urban conditions, including the urban heat island effect and noise pollution. A Singaporean building will always appear more opulent than one in Denmark. Therefore, the designers have created a façade that adjusts to the dynamics of Scandinavia's changing seasons rather than attempting to accomplish the impossible. It is anticipated that the façade will serve as a 15% living building element, cooling the streets and lowering noise levels, which will lessen the heat island effect. Future increases in insects and birds can be recorded by recording the variety of animal species present on the site. The Nordhavn block under review has a particularly high wood content, according to the study, with solid wood benches, landscaping platforms, and a variety of wood components (Fig. 16, 17).

Conclusions

The development of an architectural-spatial structure requires an interdisciplinary approach and cooperation between architects, urban planners, landscape architects, environmentalists, engineers and other professionals capable of understanding the values of the existing situation and ensuring the principles of sustainable development in the urban environment. The development of multifunctional open spaces is now the main form of residential development, both in the planning of new residential areas and in the renovation of existing residential areas (Īle, 2021; Stokmane 2022). The architectural-spatial structure defines and emphasises important functions that form links with areas of different character, highlighting certain features in urban planning. A rational and considered planning approach in modern residential areas is based on functionality, which needs to be appreciated and understood when designing new multifunctional blocks, areas. The form and layout of multifunctional open space is influenced by vertical or horizontal building types, which ultimately determine the character and organisation of the urban living space.

The visual-spatial dimensions of architecture in the urban fabric are constantly evolving and changing, resulting in certain principles and conceptual approaches. A livable, healthy and active living space, balanced with architectural-spatial approaches, provides a high quality, visually aesthetic and versatile multifunctional outdoor space.

The areas analysed in this study in Copenhagen focus on spatially structured and high quality living spaces, providing comprehensive approaches to sustainable architecture and

the development of multifunctional outdoor spaces. A holistic approach to the development of multifunctional outdoor spaces involves revitalisation processes or the planning of new buildings and areas, balancing human scale proportions, emotional potential and the psychological perception of the user of the living space.

The conceptual approaches and contemporary solutions of architects, landscape architects and urban planners need to be sound, research-based and provide a quality approach to living space that is imbued with the political and economic aspects of sustainable urban environments.

The study found that wood as a material of the future highlights key trends in both architectural solutions and the development of multi-functional outdoor spaces. As a result, it contributes to an efficient design approach, a creative and viable environment for every citizen, and reduces CO2 emissions in construction. The expectations of users and consumers of mixed-use neighbourhoods are changing and the demand for diverse, short distance, yet comfortable and safe walkable urban living spaces is evolving at the level of contemporary research, resulting in a desire to return, socialise, seek a sense of community for users of areas and develop a sense of place identity. The use of wood in the public urban fabric is one of the high quality approaches to a long term sustainable and environmentally sound solution, and Copenhagen is one of the cities that can and does show significant developments in the built fabric, which is an example of good practice for other potentially developable cities in creating a modern, aesthetically and functionally pleasing urban environment for the public.

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Kopsavilkums
Inovatīva pieeja un esošās dabas vērtības, ūdens tuvums, zaļā struktūra ir galvenie elementi un aspekti, kas Kopenhāgenas arhitektūras un pilsētvides attīstībā apvieno ilgtspējīgas darbības ar augstu dzīves kvalitāti kopumā. Neatkarīgi vai tā ir jauna apbūve dzīvojamos kvartālos, jauni velo maršruti, pilsētas parki, Kopenhāgena ir arhitektūras priekšplānā un pastāvīgi, nepārtraukti gatavojas ilgtspējīgākai nākotnei, vienlaikus apmierinot vietējo iedzīvotāju vajadzības un vēlmes. Vismodernākās un inovatīvākās zināšanas no visas pasaules ir palīdzējušas padarīt Kopenhāgenu par ilgtspējīgu nākotnes pilsētu, strādājot ar kvalitatīviem arhitektūras, transporta infrastruktūras, enerģētikas risinājumiem. Līdz ar to pētījuma mērķis ir aplūkot kokmateriāla izmantošanas tendences Kopenhāgenas apbūves struktūrā no vizuāli estētiskās kvalitātes aspekta puses. Pētījumā aprakstīti autoru apsekoti objekti, balstoties uz līdzšinējo pieredzi un praksi, izvērtēti mūsdienīga apbūves struktūra, kas attīstīta un veidota 21. gadsimtā.

FRAMEWORK FOR ASSESSING STREETSCAPE IN HISTORIC CITY CENTRE

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Abstract. Over time, street landscapes have changed their meaning, from significant gathering, socializing and movement places they have become intense traffic corridors dominated by street transport. Today, however, more and more people are once again beginning to identify streets as more than just corridors for movement and transport, but also as important multifunctional outdoor spaces. Social habits have also changed as the needs for a healthy and safe environment have increased, and people are increasingly choosing environmentally friendly ways of moving, active lifestyles, being outdoors, in nature. The implementation of the needs of modern society on the streets of the historic city centres is complex, influenced by a number of factors: the historical identity of the place, the historic character and elements of the streetscape that are often protected by legal acts; the needs and interests of various interested parties, including accessibility of the streetscape for people with disabilities; the growing need to solve problems of climate in cities – mitigation of heat islands, air pollution, flooding caused by intensive rainfalls, which is complicated by the lack of green areas in the historic city centre. In order to develop the most appropriate solutions for the development of historic streets, it is necessary to identify all the limiting and promotive aspects. The purpose of this study is to develop and to test the methodological framework for the research of historical streetscape as the basis for the development of public space compliant with modern requirements, by performing streetscape analysis based on public needs, historical, ecological and socioeconomic criteria. The developed methodology has been tested in the context of Terbatas Street in Riga city, Latvia. Key results from the study showed that for historic streets it is essential to identify those elements of the streetscape that can be transformed and adapted to modern requirements and societal needs, and those elements that are essential to preserve in order to maintain the historical character and identity of the place. As one of the main conclusions of the study – the overall development strategy of the historic city centre plays an important role in research and development of historic streetscape, which includes both mobility, green infrastructure, public space network, tourism development, as well as functional and ecological links with other parts of the city. Keywords: development of historic city centre, streetscape analysis, accessible public space, street infrastructure

Introduction

Even in the old days city streets were important public spaces where residents gathered and walked together, children played. Over times, as technology developed and people's way of life changed, city streets became dominated by motor vehicles, displacing human presence from there. Today there's more and more talk about human centred urban planning, including returning street spaces to people creating them as a public outdoor space (Gehl, 2010; Maghraoui, 2019). The specific article examines the research of the streetscape of the historic city centre as the basis for their further development planning.

The streetscape research is closely linked to street planning, so landscape analysis should be based on the same principles and criteria used in street design. More and more in the streetscape planning the needs of users of these areas are highlighted in interaction with the physical and functional parameters of the street landscape (width, traffic intensity, etc.). Society as a whole has its basic needs in the public space (Gehl, 2010), just as each group of streetscape users (including people with disabilities) has their own individual needs, which often overlap due to the limited width of the streetscape, and a compromise should be found (Manual for streets, 2007; Inclusive Mobility..., 2021) For example, for safety reasons cycle lanes should preferably be constructed separately from pedestrian pavements, which is not always possible. Therefore, the overall city mobility plan is also important, that allows to find the streets with appropriate physical parameters for cycling routes instead of using narrow streets for this purpose. Similarly, a significant group of users are pedestrians who use street as a public space where they want to be safe, breathe clean air and relax, so the green infrastructure of the street is essential, including the possibility of reducing noise, as well as there are often as a compromise some parking spaces are dedicated for

the creation of greenery and recreation areas. The common city infrastructure planning is also relevant here, which allows to evaluate alternatives to creation of infrastructure on streets which are more appropriate for definite solutions (e.g., development of public transport, micromobility, provision of parking spaces in another location). A well-planned street space must be safe, reducing the potential for conflict between different user groups (safety); comfortable and available, including for people with disabilities (comfort); planned elements of streetscape must be in accordance with other elements and buildings of the street landscape space (coherence); with more direct movement where possible for pedestrians from one point to another (directness); streetscape must be attractive creating a positive and safe aesthetic experience (attractiveness); adaptive and, if necessary, transformable without major reconstruction and investment (adaptability) (London Cycling Design Standards, 2016).

Street planning nowadays is closely linked to sustainability principles, which include ecology, social and economic aspects. As one of the models which is used in several European cities is healthy streets, which is created by the following indicators: pedestrians from all walks of life; people choose to walk, cycle and use public transport; clean air; people feel safe; not too noisy; easy to cross; places to stop and rest; shade and shelter; people feel relaxed; things to see and do (Streetscape Guidance, 2019; Interchange Best Practice Guidelines, 2021).

Modern scientific studies in the field of streetscape research put greater emphasis on the problems in the area of environmental quality created by transport and hard surfacing. Therefore, research on environmental quality of streetscape covers topics of beneficial effects of plants on humans, mitigation of air pollution, heat islands, management

of rainwater, etc. , as well as the possibilities for improvement of environmental quality by choosing appropriate tree species and green solutions (Horte&Eisenman, 2020; Lua et.al., 2018; Vries et al., 2013). In turn, the number of historical street studies is less extensive and mainly there are analysed views applying approaches used in human perception research (El-Deen et.al., 2024; Mundher et.al., 2022).

In Latvia, the research of the landscape space of historical streets of the city in the context of its possible development has not been carried out extensively, historical values of these streets – buildings and other objects have been studied more (Krastiņš, 2012; Krastiņš, 2023). In its turn, for example, in legal acts of Riga City Latvia there is emphasized the preservation of the historical street landscape space, which is influenced by the street profile (proportions of road parts and pavement parameters (Rīgas vēsturiskā centra..., 2013).

The historic centre of Riga city in Latvia is included in the World Heritage List of the United Nations Educational, Scientific and Cultural Organization as a cultural and historical value of international significance. The unique value of this area consists of an indivisible set, which includes both the spatial structure and architecture of the site, the panorama and silhouette of the city, nature elements and greenery, as well as certain lifestyles and other diverse values (Rīgas vēsturiskā centra..., 2006; Rīgas vēsturiskā centra..., 2013; Rīgas kultūrvēsturisko teritoriju..., 2017; Dambis, 2010). The fundamental problem of the area forms in contradiction between the protection of traditional values and the continuous development of the city in accordance with the increasing requirements of the quality of life, which also applies to street development.

One of the long-term development objectives of the city set out in the sustainable development strategy of Riga City is "an urban environment that is comfortable, safe and enjoyable to the people", for which a number of initiatives are applicable: development of traffic infrastructure in accordance with the priority order: pedestrian – cyclist – public transport – motor vehicles – freight transport (commercial transport); environmental quality and adaptation to climate changes, environmentally friendly solutions; a healthy and educated society; a competitive and innovative urban environment; natural and cultural values as a forming elements of the place identity (Rīgas ilgtspējīgas attistības stratēģija, 2014). Under this initiative, it is planned to develop an important city linkage that will connect the historic city centre to the one of the neighbourhoods in the outskirts of the city. At the same time, while being in the densely built central part of the city, it is essential to reduce emissions and noise from motor vehicles by improving air and environmental quality for residents and city visitors. The linkage also partly falls within the protection zone of the historic centre of Riga, where preservation of cultural heritage plays an important role.

Therefore, the aim of this particular study is to develop and to test a methodological framework for the research of historic streetscape, which would allow to assess the historic values to be preserved and opportunities to integrate solutions based on public needs, ecological and economic criteria, healthy streets principles.

The developed methodology has been tested in the context of Terbatas Street in Riga city, Latvia, which is planned to be one of the streets forming the new city linkage. Terbatas Street is characterised by historical spatial structure and elements, but at the same time the location of the street in the city active centre makes it necessary to seek a compromise between modern requirements and the preservation of the historic heritage.

Material and Methods

Method

For the research of streetscape in the historic centre of the city there was used a complex approach consisting of an exploration of the various factors influencing spatial structures of the landscape and the possible future development and public needs (Fig.1). Groups of influencing factors are based on the principles of sustainable development, which consist of balanced interaction between economic, social and environmental aspects and the principles of healthy streets (Streetscape Guidance, 2019; Interchange Best Practice Guidelines, 2021).

In the case of historical streetscape research historical and cultural aspects are most important factors influencing the development of streetscape area and should be highlighted in the research (El-Deen et.al., 2024; Mundher et.al., 2022). It is the **cultural and historical qualities** that will make the place unique, maintaining a close connection with the history of the place, strengthening the identity of the place. It is therefore essential in this section to identify the historical spatial structure, elements and usage of the street landscape as an opportunity to use them to preserve and strengthen the identity of the place. A combined approach is applied to the exploration of cultural and historical qualities by comparing data from historical materials (images, maps, descriptions, interviews, etc.) and street survey in nature, analysing what historical elements and street spatial structure have remained and currently form a character and identity of the place. In the cultural and historical aspects section, it is important to define the spatial structure of the streetscape, determined by the interaction of building facades, driveways and pedestrian pavement parameters, which allows the better modelling of planned changes in the spatial structure of the street, which would not significantly alter the original, historical character of streetscape.
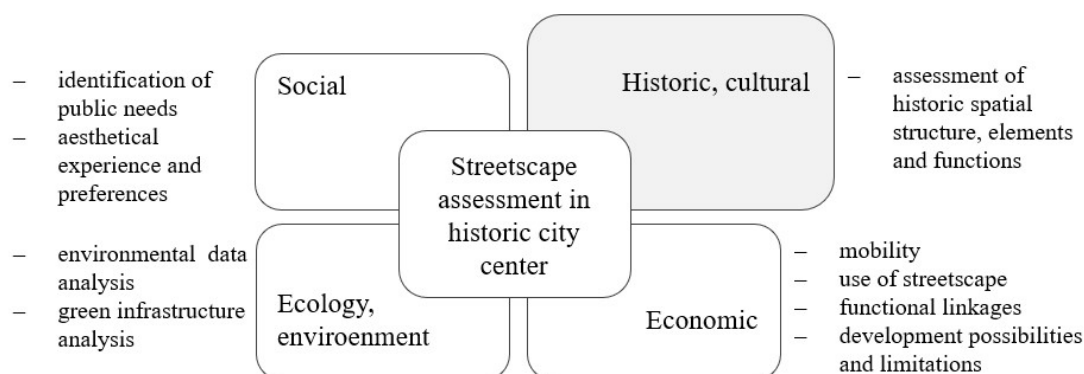

Fig. 1. Main influencing factors and approaches used in assessment of streetscape of historic city centre (created by the authors)

Social quality

In the social dimension block, there are assessed the needs of different groups of users (pedestrians, cyclists, motorists, locals and tourists, people with disabilities, mothers with baby carriages, small children) and the parameters and elements of the streetscape necessary for their implementation (Manual for streets, 2007; Inclusive Mobility..., 2021). The visual qualities of the street landscape are also assessed, not only the views on important and valuable historical objects, but also the aesthetic quality and historic coherence of the used surface materials and streetscape elements.

The ecological and environmental aspects of the place examine the green infrastructure and street vegetation, the ecological linkages with the adjacent green structures (Klemm et.al., 2015; Rehan, 2013; Horte&Eisenman, 2020). Similarly, analyse noise levels, heat islands in the context of environmental aspects (Pētījums Klimata pārmaiņas..., 2016; Aktuālā informācija un pārskati..., n.d.).

Economic aspects include exploration of existing and potential mobility according to user groups (public transport, private transport and parking spaces, cyclists, electric scooters, etc); functional linkages with other parts of the city and important public facilities; exploration of existing and potential usage of the street landscape space in the context of the parameters of the streetscape (amount of free space, possibilities for short-term solutions, for example, street parklets); exploration of possible developments and restrictions (access to buildings, city restrictions for area planning in historic centre, etc)) (Streetscape guidance, 2019, Manual for streets, 2007).

It should be noted that often the streetscape is stretched over several blocks, within which it may be very variable and different. It is therefore necessary in the streetscape research to divide street into sections, the division of which is determined by the spatial structure and elements of the street (how wide the street space is, whether there is planting, cultural and historical elements, outdoor elements, etc.), the intensity of usage (groups and types of users, mobility). According to the division into sections, the exploration of the influencing factors mentioned above is made for each of them. Based on the results of the research, development proposals are subsequently developed for each section of the street.

Research object

Terbatas Street in the historic centre of Riga city, Latvia has been selected for testing of the developed method. Terbatas Street is actively used on a daily basis as it is adjacent to both residential buildings and public establishments – cafes, shops, etc.

The length of Terbatas Street is 1810 m, from the 1919s to 1955s the street had changed its names in line with the political trends of the time, the old name was restored to the street in 1990. The name of Terbatas Street originated from the university founded in Tartu (Estonia) in 17th century, which is the second oldest university in Northern Europe. The street is surrounded by historically significant buildings, four of which are monuments of national significance, there is Vermanes garden at the beginning of the street, which is a significant historic public space and a cultural monument of national significance (Fig.2, Fig.3).

A significant number of historic buildings with distinctive facades - cultural monuments of regional and local significance also located in the streetscape (Lecis&Grandāne, 2024). The authentic cobble stone pavement has remained on separate street sections, a tram moves along the street. Considering the popularity of the street, there have been several ideas of transforming the street into a pedestrian street, also testing summer activity – closing the street to traffic for fixed period in summer in 2020. Within the summer experiment there were interviewed the locals and entrepreneurs who admitted the street has the potential to become a pedestrian street, yet more as part of short-term activity (Novērojumi pētījumam...., 2020; Vasaras ielas eksperiments...., 2020). In recent years, several improvement projects have been carried out for streets perpendicularly connecting to Terbatas Street, including the creation of cycle lanes, which in future will form good links with other urban cycling routes, thus allowing Terbatas Street to develop as a street with pedestrian priority. In parallel, several projects are being implemented aimed at public participation and education, such as green solutions in the public outdoor spaces adjacent to the street; and activities involving the public in the development of the former market territory. These activities in future will create a different landscape of Terbatas Street, with its new place identity.

Results and Discussions

The research of historical streetscape has been tested in the context of Terbatas Street in Riga, including historical, environmental, social and economic aspects, as well as taking into account the principles of the healthy streets approach.

Historical values, spatial structure and elements of the streetscape. Given the objective of the study, which is aimed at creating a safe and qualitative streetscape and infrastructure for different groups of users, therefore particular attention is paid to the parameters of the street space (width of road carriageway and pavements, surface materials) and to the different functions and the usage of the street. As the best approach for consolidation of such information is an inventory of streetscape, which includes data on the

Fig. 2, 3. Existing situation – Terbatas street in Riga city (authors photo, 2023)

Fig. 4, 5. The beginning of Terbatas Street, with a lime trees avenue on the right near the historic Vermanes garden, cobble stone paving dominates
(photo from the beginning of the 20th century) and the overall character of Terbatas Street (photo from 30s of the 20th century) Rīga.
Tērbatas iela. Riga - Dorpater Strasse, 191-; Rīga. Tērbatas ielā 14, n.d.)

Fig. 6. Location of research object – Terbatas street in Riga city and division of Terbatas Street into sections by different landscape structure and architectural
features and elements (created by the authors)

width of street space, elements and materials used, plantings and most important views. Previous studies, for example, the assessment of pedestrian and bicycle traffic flows in the historic centre of Riga (Gājēju un velosatiksmes plūsmu…, 2013) indicate that there is insufficient space for the provision of the flow of pedestrians and cyclists on certain sections of Terbatas Street. Given that there are no existing large trees on several sections of Terbatas Street, either historically or nowadays, therefore there is a possibility to change the profile of the street, while maintaining the historical character, for example by narrowing the road carriageway and expanding the space to be used by different user groups (cyclists, pedestrians, users of touristic and recreational facilities, caffe etc. A significant tree avenue is formed at the beginning of Terbatas Street, where it joins the historic park (Fig.4, Fig. 5).

In turn, the identified cultural heritage objects – historic buildings allow to identify places where the possibilities and assortment of new planting should be carefully assessed, ensuring that planned planting is not too close to or not completely covers the historic facades of buildings.

The value is also the historic cobble stone pavement, which should be preserved as much as possible, which is also determined by the regulations regarding the usage and building of the historic centre of Riga (Rīgas vēsturiskā centra…, 2006). Almost the entire length of the road carriageway part of Terbatas Street is covered with historical cobble stone, whose paving quality varies from section to section of the street. The main challenge here is integration of universal design solutions into historic stone paving areas, for example, in street intersections where pedestrians cross it. Similarly, due to the rough sections of the road carriageway on Terbatas Street cycle traffic is difficult, so cyclists often use sidewalks to move, creating an unsafe environment for pedestrians.

Different sections of the Terbatas Street are characterized by a various architectural and spatial structure of the streetscape. Consequently, Terbatas Street can be divided into three sections with different spatial structures, the nature of which is influenced both by the width of the street on a particular section of the street and by the functions of buildings adjacent to the street (cafes, shops, housing, etc.) and by the presence of trees (Fig. 6).

The spatial structure of 1st section of Terbatas Street, from Merkela Street to Elizabetes Street, consists of two public

Fig. 7, 8. Elements creating the spatial structure of Terbatas Street, from Merkela Street to Elizabetes Street (authors photo, 2023)

Fig. 9, 10. Elements creating the spatial structure of Terbatas Street, from Elizabetes Street to Stabu Street (authors photo, 2023)

spaces – Baumana Square at Brivibas Street and a pavement extension at the intersection of Terbatas Street and Elizabetes Street. The green structure of the street is made up of rows of trees on both sides of the street, greenery at the building of the Ministry of Justice (Fig.7, Fig.8). The amenities are mostly located in Baumana Square and in a pavement extension of Elizabetes Street. The nature and aura of the street are influenced by the flower market and proximity of Vermanes garden. Therefore, the key issues to be addressed at this section in the context of spatial structure are creation of link to public spaces adjacent to the streetscape, ensuring universal design solutions and accessibility, which is currently affected by existing pavement of different quality.

The next section (2nd section) of Terbatas Street, which forms a different spatial structure, is the section from Elizabetes Street to Stabu Street (Fig.9, Fig.10). At this section, the main spatial structures are made up of the historic cobble stone paving, a pavement area of varying surface, width and quality. The perception of the streetscape is differentiated by the design of the windows of shops, cafes and other service providers, and by certain elements of the outdoor space. Only individual trees are found, parklets and bicycle racks, installed in several locations along the section, stand out on the background of grey pavements. On the Terbatas Street 2nd section, the already implemented adjacent street project joins, where also a one-level, raised junction with Terbatas Street is resolved, but cycle traffic is not addressed. Perpendicular streets with already set up or planned cycle lanes are also connecting at this section. Cobble stone paving forms an antiquated aura of the place at this section.

The main issues to be addressed at this section are provision of safe passage for pedestrians on pavements, as bicycles and electric scooters are also currently moving along sidewalks, which could endanger pedestrian safety. Similarly, in some places the pavements are narrowed by the elements

of cafe equipment, parklets and amenities placed on them. There is also insufficient greenery and streetscape facilities, intersection crossing is difficult affected by the rugged cobble stone pavement, also poor-quality pavement in some places, other accessibility issues.

The closing, 3rd section of Terbatas Street ranges from Stabu Street to Matisa Street the spatial structure of which in turn is influenced by the presence of existing, large trees that change the character of the street from "greyish to green" (Fig.11, Fig.12).

There is also a more seamless and high-quality cobble stone pavement. The solution of Bruninieku Street with bike lanes on both sides of the street connects to the section of Terbatas Street, however the intersection with Terbatas Street itself has not been resolved and should be included in the project of the development of Terbatas Street. The conservation and integration possibilities of existing trees in the new solutions, the adaptation of intersections to safe, easy crossing, including environmental accessibility solutions, are among the issues to be addressed at this section. The development of a comfortable and safe environment for pedestrians mitigating the potential impact of cycle traffic and electric scooters on pedestrian safety is also topical at this sector.

Economic aspects have been analysed both from the point of view of usage and in the context of accessibility and functional links between the urban environment. The Terbatas Street is also the most saturated with public facilities of the sections of the planned link to be developed in the future (Fig 13).

The main attraction objects of the city importance are mainly located in the main entrance and at the beginning of the Terbata Street, and they are – Vermanes garden, the Supreme Court of the Republic of Latvia, nearby Esplanade park and the Freedom Monument, connection with Old Riga (Old Town). There is also an important public object – the New

Fig.11, 12. Elements creating the spatial structure of Terbatas Street, from Stabu Street to Matisa Street (authors photo, 2023)
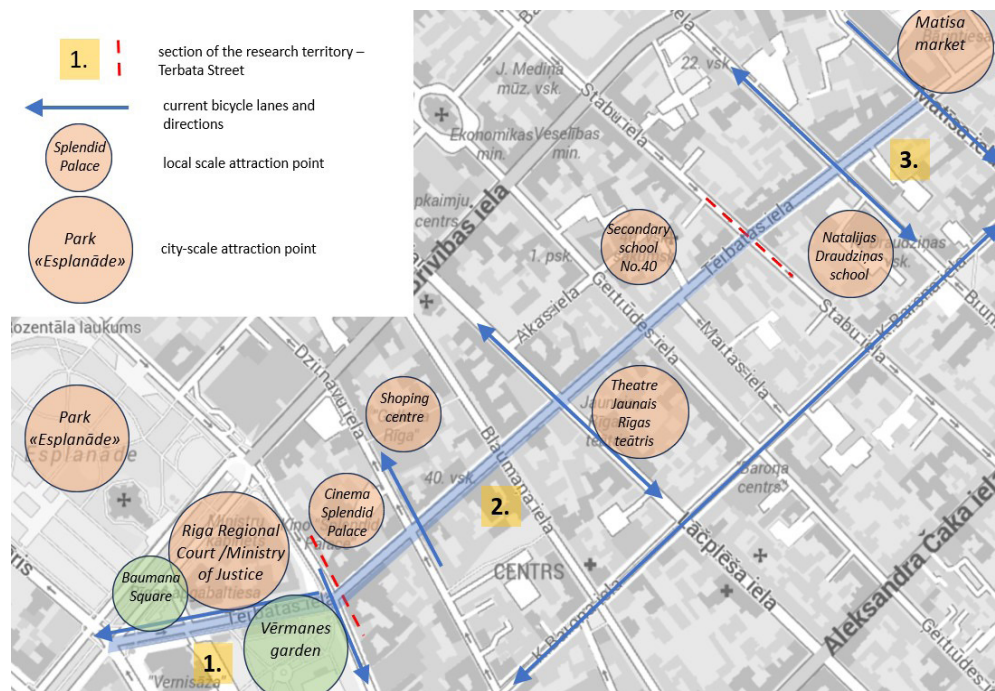
Fig. 13. Plan of existing directions of pedestrian and cyclist movements and main attraction objects on the Terbatas Street (created by the authors)

Riga Theatre, which is visited by people from all over Latvia. Natālija Draudziņa Riga Secondary School is also located at the section of Terbata Street. On both sides of the street there are located dense places for entertaining and catering. The main directions of the pedestrian and cyclist flow are closely linked to the infrastructure built and available on the adjacent street.

Public transport stops have also been explored in the context of accessibility. A trolleybus partly moves along Terbatas Street, existing public transport stops are without a parking extension and without shelter, with only a bench in individual locations. Public transport platforms are a part of a pedestrian pavement area where passengers wait for vehicles. Thus, this narrows the part of the pavement that can be used by pedestrians to move safely and comfortably. Similarly, cafe outdoor terraces, poles, cyclones, as well as other infrastructure elements have been built in pavement areas, which significantly reduces the usable width of the pavement. As a positive solution that does not affect the width to be used on the pavement, there are trolleybus contact wires that are attached to the facades of the buildings and streetlights are also hanging there. Almost all the entrance nodes of the buildings adjacent to the street are with more or less level difference. All these factors do not ensure adequate access to the environment for all street users, which should be resolved as far as possible in street reconstruction projects.

Separate intersections of Terbatas Street with adjacent streets are designed in one level and with adequate quality surface, which ensures accessibility of the environment and easy crossing of the intersection for different public groups, including people with disabilities. Vidzemes (Matisa) market is adjacent to Terbatas Street, which attracts the city's residents intensely, yet no qualitative pedestrian and bicycle infrastructure has been built to achieve this.

The usage of streetscape is also important. In the context of Terbatas Street, for example, there has been a discussion for several years about the development of this section of the street as a pedestrian street, testing it also in the summer street project, after which the views of various interested parties and experts on this activity were gathered. The results of the survey showed support for this idea, however, mainly noting it as the short-term activity (in summer season, on holidays or special holidays) (Novērojumi pētījumam...., 2020; Vasaras ielas eksperiments..., 2020).

Analysis of environmental aspects was performed from the point of view of environmental and ecological quality of the area, analysing available data and studies regarding environmental noise, air pollution and heat islands, as well as from the point of view of the stormwater management (Pētījums Klimata pārmaiņas...., 2016; Aktuālā informācija par vides troksni..., 2021).

Fig. 14. Noise map at historic Centre of Riga and Terbatas Street neighbourhood (created by the authors, using Aktuālās Rīgas trokņu kartes, 2021)

Noise. In accordance with the Regulation of the Cabinet of Ministers of the Republic of Latvia No.16 "The procedure for noise assessment and management" (Trokšņa novērtēšanas un pārvaldības…, 2014), which determines noise level limit values for areas of different functions, then in public building and mixed building areas the noise limit value shall be 55 – 65 dB. According to publicly available data, it could be determined that noise concentration presents directly in street corridors surrounded by multi-storey dense building, reaching noise levels on streets and in its close proximity during the day at 70 – 80 dB. (Aktuālās Rīgas trokņu kartes, 2021) (Fig.14).

Taking into account the noise analysis data, it is possible to identify the main risks – the persistence of high noise levels over a long period of time. One of the main noise sources is road traffic. On reducing its volume and intensity (e.g. reducing private transport traffic, promoting micromobility) it will also reduce overall noise levels. It is also important to preserve existing large trees, as well as to create, as far as possible, new and diverse planting areas that would serve as sound-dampening elements capable of reducing noise intensity. This is highlighted also in The Energy and Climate Action Plan for Riga City (Rīgas pilsētas enerģētikas…, 2021)

Air pollution. Over the period from 2015 to 2019, the exceedances of several standards of air quality pollutants or upper pollution assessment thresholds had been registered in Riga City, as a result of which an action programme for improvement of air quality of Riga City for the 2021-2025 was prepared (Rīgas pilsētas gaisa kvalitātes…., 2021). It includes measures to reduce emissions of five pollutants. In programme there are assessed in detail those measures that may potentially have an impact on air quality, for example, measures to "calm" and reduce transport traffic in the city centre and in residential areas; development of public transport; linkages to the planned parking park system, linkages to the city public transport, railway and regional bus routes. Therefore, in the development of Terbatas Street it is also essential to reduce traffic intensity, which would also reduce air pollution. Support for traffic facilitation will be the creation of elevated, single-level intersections, which at the same time also ensure universal design principles.

Heat islands. Although around a third of the area in Riga is covered by green or water areas, most part of them are located in large massive areas on the periphery of the city, but in the densely built areas of the city centre the vegetation is not sufficient to reduce the heat island effect and overheating of buildings and streets during summer periods. Building dominates towards the historic centre and it is surrounded by a network of streets with hard, waterproof pavement, as well as a small number of large trees. All of this contributes to the formation of heat islands in hot weather. To mitigate this, there is a need to increase the amount of planting, possibly including water elements. The solutions to the project should also include solutions such as planting trees on the side of the street that is most sunbathed and heated, while parking places are located on the shadow side. One of the contributors to the formation of heat islands is an emission from motor vehicles. The development of environmentally friendly types of transport and reduction of traffic intensity will also reduce emissions from motor vehicles, which will have a positive impact on environmental quality. As risks to the reduction of heat islands, there are insufficient free space, unrestricted by the underground communication network, for planting large trees that would perform air cooling and microclimate improvement functions.

Social aspects

In the planned linkage of the historic centre of Riga with the neighbourhood in the outskirt of the city, the most socially and economically active section is Terbatas Street. It can be seen from publicly available data (Baltic Maps, n.d.) that most of the building at this section is used for public or recreational, catering, educational, cultural functions (Fig. 15). It is therefore important at Terbatas Street to find a solution for the creation of free areas in the street landscape as a platform for the implementation of possible activities (outdoor cafes, meeting places and socializing places, etc.). This section is also essential for day-to-day routes as in this area there are a number of schools, important public institutions, shopping centres, etc.

In order to determine the wishes and needs of residents and local entrepreneurs there were analysed several surveys carried out by Riga City municipality. Starting with a survey of residents on life in the neighbourhood of historic centre of Riga (Iedzīvotāju aptauja par dzīvi…., 2013), as well as studies
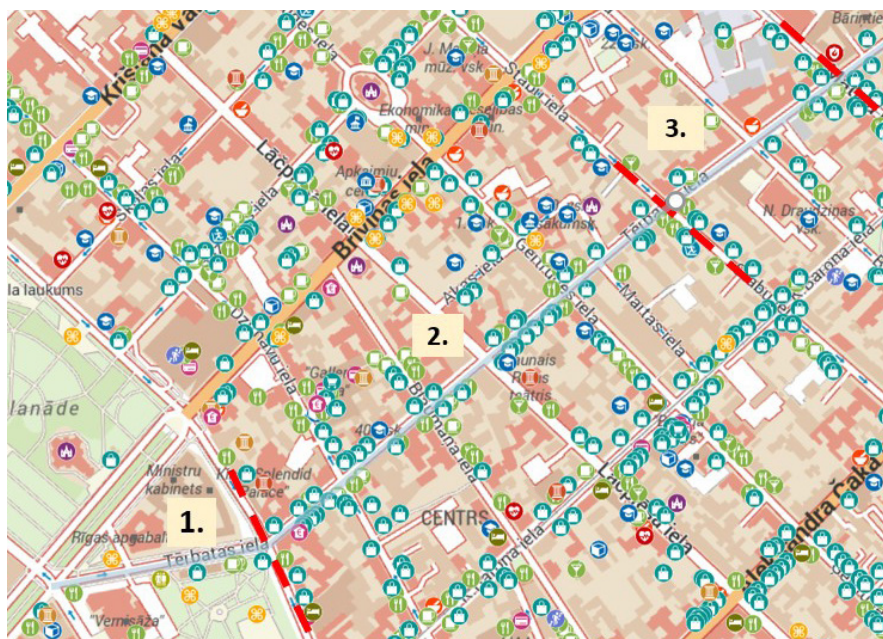
Fig. 15. Recreational, catering, educational, cultural functions (created by the authors using Baltic maps)

of the 2020 (observations and surveys) on the experience and opportunities of Terbatas Street as summer pedestrian street (Novērojumi pētījumam…., 2020; Vasaras ielas eksperiments…., 2020). During the summer street experiment, when Terbatas Street was closed almost entirely to road traffic through monitoring of visitor activities, the results showed increasing activity in sales and service, up to 428 times, a significant increase during the experiment was also recorded for shopping activities as well as drinking or eating activities. During the experiment the visits to private business areas in Terbatas Street as a whole had increased 4.3 times comparing to everyday life. These observations show that Terbatas Street has the potential to develop the streetscape as a multifunctional public space that would contribute social and economic activity in the neighbourhood. This can be developed if there is a sufficient free from motor vehicles area. During the summer street experiment, it was determined that Terbatas Street was actively used in the 2nd section leading up to Gertrudes Street, with usage activity of the next sectors of the street as a public outdoor space diminished. Surveys of visitors of the experiment also contained similar clues, the most suitable for creating a summer street is the section of Terbatas Street from Elizabeth Street to Stabu Street precisely (2nd section). In general, on analysing both the observations and the results of the survey it must be concluded that one of the sections of Terbatas Street could become a short-term platform for different types of activity, allowing both tourists and residents to be attracted (Novērojumi pētījumam…., 2020; Vasaras ielas eksperiments…., 2020).

In turn, when analysing the opinion of residents of the Historic centre neighbourhood regarding the values of the place and their choice to live in the particular neighbourhood, the role of the planting in creating an attractive living environment indicates. While the traffic intensity, noise and lack of parking spaces are mentioned as negative aspects. These issues can be solved by mitigating traffic, increasing green structures or pedestrian areas, providing environmentally friendly types of transport for residents and guests – cycle paths, walking routes, etc. Analysing also the types of movement of the residents of the Historic centre neighbourhood, as well as the location of the destinations to be reached, it should be concluded that the residents of the neighbourhood extensively use both public transport and bicycles and motorized means of transport, mainly because the destinations of daily activities (except the workplace) are mainly located in the city centre (Iedzīvotāju aptauja par dzīvi…., 2013).

A walkout format discussion on Terbatas Street was organized to better understand the needs and expectations of the society, as well as issues related to universal design solutions and accessibility, inviting various stakeholders. The main discussions covered the issue of insufficient free space for pedestrians due to limited street space width to also include there cycling infrastructure, car and public transport (trolleybus).

The methodology of the historical street research allowed to obtain versatile data that highlights the values and positive aspects of the street landscape space that could be used in the street development scenarios, as well as the issues to be solved. According to the research results, the following existing positive aspects can be noted for the development of the entire Terbatas Street:

- The street landscape is made up of several sections that differ in their spatial structure, elements and perception. Therefore, it allows for the development of a diverse public outdoor space.
- Several larger green structures (Baumaņa Square, Vērmanes Garden) connect to the street, which allows for the creation of recreational areas and, in some places, complementary walking routes.
- It is possible to place improvement elements (recreation areas with parklets, benches) on the Terbatas Streetscape, which would promote the 5–10-minute accessibility of various public outdoor spaces by walking or cycling.
- It is important to use historic stone pavement to keep historic landscape character of the Terbata Street
- The research results highlighted the following issues to be solved:
- Easy and safe movement and access to the environment for different groups of society (daily routes of the population – work, educational institutions, local authorities, shops, etc.; tourists or city guests) should be promoted on a single route. Provision of easy pedestrian connections to the key service areas. It is currently provided fragmentarily, which is mainly influenced

by poor pavement conditions, insufficient movement area for pedestrians, disruptive location of road and information signs in the movement area, as well as difficult crossing of street intersections for people with disabilities and visually challenged.

- Possibilities for extending free zones in streetscape to ensure that different functions do not overlap, for example, creation of a cycle lane, leaving pavements only for pedestrians; separation of public transport stops from pedestrian and bicycle traffic; or the usage of free areas for trade, cultural and recreation functions, in certain places also for short-term events.
- In places with historic cobble stone pavement, access to the environment is hampered because the rough surface interferes with movement for people with disabilities, with baby carriages, visually challenged people. However, the historic cobble stone paving will be kept to the maximum extent possible to form the appropriate aura and mood of Riga Historic Centre, considering alternative but equivalent surface only in areas where movement areas for people with disabilities are planned, as well as in the separately formed cycle lanes.
- Better route orientation and attractions by providing information stands and signs.
- Increasing the number of amenities (bicycle storage places, benches, drinking water taps, etc.).
- Opportunities for improving the climate of the city by reducing the formation of heat islands, floods caused by rainfall, pollution (noise, air pollution), using appropriate solutions, for example by providing "green" solutions where possible.

Conclusions

It is important to base on the principles of street planning in the development of methodological framework for the historical streetscape research, where a significant emphasis is precisely directed to meet the needs of different groups of society in the streetscape and promote accessibility of the environment. Public needs are based on the sustainability principles, thus there are used criteria and research approaches in methodology grouped into four groups: cultural-historical, environmental, economic and social. Such a multifaceted approach to the exploration of the historic streetscape also made it possible to analyse the correlations between these different aspects, for example, if it is in the public interest to develop a cycle lane, it is essential not only to identify those preferences, but also to define physical street parameters that would enable or prevent these intentions from being achieved. Which, in turn, points to the need to view the streetscape more broadly by analysing functional linkages with other streets, objects and parts of the city and opportunities, for example, developing a cycle lane on another neighbourhood street whose physical parameters allow it. The case of streetscape assessment of Terbatas Street in Riga clearly demonstrated that the existing street parameters do not allow for meeting all the necessary public needs. Therefore, it was necessary to look at a broader urban area and adjacent streets to assess which functions could be accommodated on Terbatas Street and which could be developed on the neighboring streets.

Consequently, one of the main conclusions of the study is that it is also important in the exploration of the historic street to consider the overall development of the neighbourhood, which includes both mobility, green infrastructure, public space network, tourism development, as well as functional and ecological linkages with other parts of the city. In the case

of Terbatas Street, Riga's Sustainable Development Strategy designated this street as a significant urban corridor that would connect neighborhoods outside the city center. This, in turn, highlights the need to allocate street space for mobility and other outdoor facilities.

The approach taken, based on an exploration of public needs in interaction with other aspects of the landscape, makes it possible to identify those values that should be preserved invariably and things that could re-enter the street landscape. For example, it is essential for historical streets to identify those elements of the street landscape space that can be transformed and adapted to contemporary requirements and societal needs, and those elements that are essential to preserve in order to maintain the historical character and identity of the place. The parameters of historic streetscape— such as the proportion between buildings and the open street corridor—were emphasized as historically significant elements in the Terbatas Street case. Additionally, the historic cobblestone pavement poses a major challenge in ensuring accessibility. Therefore, a compromise must be sought to preserve key historical elements while simultaneously providing public spaces that meet modern societal needs.

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Kopsavilkums

Laika gaitā ielu ainavtelpas ir mainījušas savu nozīmi, no nozīmīgām pulcēšanās, socializēšanās un pārvietošanās vietām tās kļuvušas par intensīviem satiksmes koridoriem, kuros dominē autotransports. Tomēr mūsdienās aizvien vairāk sabiedrības atkal sāk apzināt ielas ne tikai kā pārvietošanās un transporta koridorus, bet arī kā nozīmīgu multifunkcionālu ārtelpu. Tāpat, aktualizējoties vajadzībām pēc veselīgas un drošas vides, mainījušies arī sabiedrības paradumi, cilvēki aizvien vairāk izvēlas videi draudzīgus pārvietošanās veidus, aktīvu dzīvesveidu, uzturēšanos dabā. Mūsdienu sabiedrības vajadzību īstenošana pilsētas vēsturisko centru ielās ir kompleksa, ko ietekmē vairāki faktori – vietas vēsturiskā identitāte, ielas ainavtelpas vēsturiskais raksturs un elementi, kuri bieži vien tiek aizsargāti ar tiesiskajiem aktiem; dažādu ieinteresēto pušu vajadzības un intereses, tajā skaitā ielas ainavtelpas pieejamību cilvēkiem ar funkcionāliem traucējumiem; pieaugošā vajadzība risināt pilsētās pieaugošās klimata problēmas – karstuma salu, gaisa piesārņojuma, lietusūdens radīto plūdu mazināšanu, ko apgrūtina zaļo teritoriju trūkums vēsturiskajā pilsētas centrā. Lai izstrādātu piemērotākos vēsturisko ielu attīstības risinājumus, ir nepieciešams apzināt visus ierobežojošos un attīstībai labvēlīgos aspektus. Šī pētījuma mērķis ir izstrādāt un testēt metodisko ietvaru vēsturisko ielu ainavtelpas izpētei kā pamatu mūsdienu prasībām atbilstošas publiskās ārtelpas attīstībai, veicot ielu ainavtelpas analīzi balstītu uz sabiedrības vajadzībām, vēsturiskajiem, ekoloģiskajiem un ekonomiskajiem kritērijiem. Izstrādātā metodika testēta Tērbatas ielas kontekstā Rīgā. Galvenie pētījuma rezultāti uzrādīja, ka vēsturiskajām ielām būtiski ir noteikt tos ielas ainavtelpas elementus, kurus iespējams transformēt un pielāgot mūsdienu prasībām un sabiedrības vajadzībām, un tos elementus, kurus ir būtiski saglabāt, lai uzturētu vietas vēsturisko veidolu un identitāti. Kā viens no būtiskākajiem pētījuma secinājumiem – ielu ainavtelpu vēsturiskajā pilsētas centrā izpētē un attīstībā nozīmīgu lomu veic kopējā vēsturiskā centra attīstības stratēģija, kas ietver gan mobilitāti, zaļo infrastruktūru, publisko ārtelpu tīklu, tūrisma attīstību, kā arī funkcionālās un ekoloģiskā sasaistes ar citām pilsētas daļām.

METHODOLOGY FOR THE ANALYSIS AND ASSESSMENT OF PANORAMIC VIEWS OF URBANISED LANDSCAPE

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Abstract. The article briefly discusses the methodological assumptions of panoramic view and silhouette analysis and assessment, which the authors have summarised by analysing the studies of other researchers and international guidance documents, and supplemented with their own insights. It is concluded that the assessment of a specific valuable view should include a discussion of the viewing conditions of the area in question from specific viewpoints and a definition of the sector of view and the barriers to view. The view should be analysed and then it must be specified what specifically is valuable in that view – the expression of elements visible in the view, domination and obscuring of objects, the existing relationship/proportion of natural and anthropogenic elements, also possibilities and peculiarities of visual links between objects/areas. The paper presents the authors' proposed sequence of research steps and evaluation method, which includes: (1) selection of relevant viewpoints of the territory under study; (2) description and assessment of view sectors; (3) analysis of relevant panoramas; (4) identification of possible changes in the relationship between the natural environment and the built environment in the panoramic views, and presentation of recommendations. The methodology described in the paper is illustrated by the authors' feasibility study for the development of the northern part of Žvėrynas (Vilnius district) in 2021. The research method presented in the paper allows to make reasoned decisions on the integration/non-integration of new development in the existing valuable urbanised landscape.
Keywords: urbanised landscape, panoramic view, relationship between nature and built environment, Vilnius

Introduction

With rare exceptions, cities are established in captivating natural environments. The natural basis and anthropogenic activity formed urbanised landscape characteristic of cities. Until the early 19th century, neither Europeans nor Americans associated their identity with tangible heritage. The physical remnants of the past became important only when it was perceived that the history of each nation or each epoch was unique and does not repeat itself (Čepaitienė, 2005). Heritage protection, like every phenomenon, has its own beginning, development and change. The content of the cultural heritage object to be protected was changing and the contemporary concept includes architectural and urban design heritage, natural environment, monuments of art, history and archaeology.

Charters, conventions, declarations and recommendations adopted by the Council of Europe, UNESCO (United Nations Educational, Scientific and Cultural Organization) and ICOMOS (International Council on Monuments and Sites) in the 70s and 80s of the 20th century actually establish the notion of urban heritage, the concept of urban heritage emerges. Urban heritage is the unity of persons and place, therefore, their protection is not the protection of individual buildings but rather of the area as a whole, its historic identity. On 15 October 1987 in Washington, ICOMOS adopted the Charter for the Conservation of Historic Towns and Urban Areas (the Washington Charter). It says: "This charter concerns historic urban areas, large and small, including cities, towns and historic centres or quarters, together with their natural and man-made environments". The Charter presents urban qualities to be preserved that include the historic character of the town or urban area and all those material and spiritual elements that express this character, especially (Washington charter, 1987):

- the appearance of the city, which depends on its patterns as defined by lots and streets;
- relationships between urban spaces – buildings and green and open spaces;
- the formal appearance, interior and exterior, of buildings as defined by scale, size, style, construction, materials, colour and decoration;

- the relationship between the town or urban area and its surrounding setting, both natural and man-made;
- the various functions that the town or urban area has acquired over time.

It has been almost half a century of perceiving man-made and natural urbanised landscape as a value. This attitude is also reflected in spatial planning documents of most cities. When it comes to the master plans of Lithuanian cities in particular, they contain the following provision: natural elements (such as rivers, slopes, forests, etc.) are objects-symbols forming the identity of the city and must be preserved and integrated into the contemporary townscape being formed (Kauno..., 2023; Klaipėdos..., 2021; Vilniaus..., 2021a; Vilniaus..., 2021b; Vilniaus..., 2021c). Although it is said that urban structure can be developed preserving the existing relationship between nature and built environment, there is no readily worded methodology how this should actually be done, however.

The authors of this article were involved in preparation of urban development feasibility studies in 2019–2024. The areas under development are in the central parts of major Lithuanian cities (Vilnius, Kaunas and Klaipėda), where not only preservation of valuable heritage areas and their relationship with valuable natural elements but also the identification of development opportunities are particularly relevant. In order to provide an objective argumentation of the proposals, the aim of the studies was not only to make a proposal but also to propose a research methodology. Therefore, the authors, using their professional experience, international and Lithuanian sources of science and practice, have developed a methodology for analysing and evaluating panoramic images of the urban landscape. This article presents the assumptions for the methodology, and the application of the methodology is illustrated with a specific research paper – the 2021 feasibility study on the development of Žvėrynas district in Vilnius.

Methodological assumptions for analysing and assessing a panoramic view or silhouette

The relationship between nature and anthropogenic elements in urbanised landscape is perceived in the panoramic views and silhouettes of cities. In this article, a panoramic view or panorama means a multilayer view of an urbanised or natural landscape visible from a certain viewpoint. Meanwhile, a silhouette is a distant contour line of the view of built environment or natural elements against the sky. To assess a specific valuable view, one should discuss conditions of viewing the area in question from specific viewpoints and define the sector observed and describe the visual barriers. The view should be analysed and then it must be specified what specifically is valuable in that view – the expression of elements visible in the view, domination and obscuring of objects, the existing relationship/proportion of natural and anthropogenic elements, also possibilities and peculiarities of visual links between objects/areas. This section will briefly discuss the methodological assumptions for the analysis and assessment of panoramic view and/or silhouette, which the authors have synthesised from studies by other researchers, analysis of international guidance documents and added their own insights.

Sector observed and visual barriers

Conditions for observing an area are created by built environment and natural peculiarities of the area, formed by the terrain terraces or plains, valleys and slopes of water bodies. Panorama and silhouette viewpoints can allow for observing sectors of different breadth. Viewpoints that are higher (on top of hills or top floors of buildings) usually open wide panoramas and 360° view. Examples of such viewpoints can be the Gediminas Hill Castle and St. John's Bell Tower in Vilnius. Viewpoints located in lower terrain spots can allow for narrower sector observations. The width of a sector observed in panoramic views can be limited by various natural (terrain, greenery) and anthropogenic visual barriers (buildings, engineering structures).

Visual barriers can also occur in the panoramas themselves. They do not narrow a sector observed in panoramic views but create visual "shadows", in other words, cover existing or potential objects behind them. Visual "shadows" can have both positive and negative impacts on panoramas and silhouettes. Scientific literature specifies factors that may create preconditions for the emergence of undesirable visual "shadows" (Vyšniūnas, 2003). A couple of such factors can be pointed out:

- a large land plot creates preconditions for the emergence of large monofunctional volumes, which can create visual "shadows";
- the long edge of a large land plot oriented perpendicular to the direction of viewing from very important viewpoints creates a precondition for the appearance of long horizontal volumes that have a negative effect on the silhouette.

Distinctness of elements in a visible view

The distance between the observer and the object observed is one of the main factors determining the visual distinctness of the latter. In assessment of the urbanised landscape, one can refer to distances determining the visual perception of landscape, as provided for in documents of the European Landscape Convention (Council of Europe, 2017). (Fig. 1 I):

- 0–0.5 km – best perception of a view, its elements, their details;
- 0.5–1.2 km – somewhat good perception of a view, its elements, their details;
- 1.2–2.5 km – a view is perceived as a background, details

A – visible details (0–1.2 km);
B – visible silhouette and volumes (1.2–2.5 km);
C – the view is perceived as a background, merges with natural elements (2.5–5.0 km).

A – zone as it is; B – graph representing the zone; 1 – scale domination zone; 2 – view domination zone; 3 – zone of psychological effect; 4 – the dominant; 5 – scale domination limit; 6 – view domination limit; 7 – limit of psychological effect; 8 – the radius of the exposure zones.
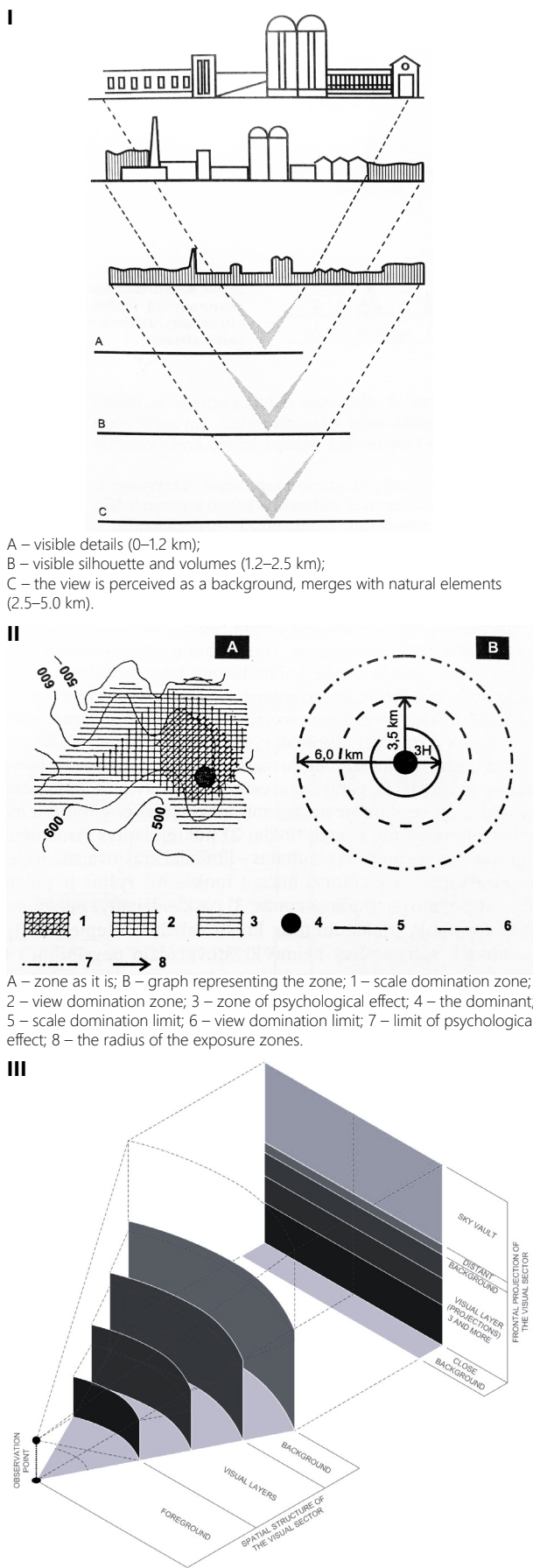
Fig. 1. Graphic illustration of assessment principles: **I** – the dependence of the distinctness of visible objects on the distance to the observer (Šešelgis, 1991); **II** – a visible object exposure zone, according to S. Crowe (Bučas, 2001); **III** – illustration of the principle of multilayer character of the panorama (created by the authors)

of its elements are no longer perceived;

- 2.5–5.0 km – a view is perceived as a background, silhouette.

Based on these distances, it is possible to predict the visual impact of existing and/or potential objects in the area in question in selected main observations.

Domination and obscuring of objects

In the natural and urbanised environment, some objects can be dominant in a view. The dominant can be both horizontal and vertical and is an object that gives an urban or natural structure a semantic character. Those objects that are at least twice as high as the background objects are called a vertical dominant. In the exposure zone, the limits of scale domination, view domination and psychological effect can be identified (Bučas, 2001). The scale domination zone is not more than 3 heights of an object. If objects are spaced at such a distance from each other, they will be perceived as separate/individual dominants. If the distance between dominant objects is less than 3 h (where "h" is the height of an object), the objects will be perceived in groups. The view domination zone is up to 3.5 km. Beyond this limit, objects lose visual clarity, merge with the background. The psychological effect zone is up to 6.0 km. An object beyond this limit, though visible, becomes an impersonal part of the background (Fig. 1 II).

Obscuring of objects in panoramas can be of various extent – from their partial covering to full hiding. Different parameters to evaluate obscuring apply in different countries. The possible coverability of an object ranges from 50% to 80%.

Relationship of nature and built environment in panoramas and silhouettes

A visible panoramic view can be very diverse – it may include only natural elements or only anthropogenic elements or both. Urban panoramas can simply be called urbanised landscape views. Natural elements (terrain, greenery) are often one of the elements that determine and shape the spatial structure of the city. The rich natural diversity of the city is the foundation of a unique and multi-dimensional townscape (Daunora et al., 2004). The natural background can be a finite element, i.e. as the panorama background or as one of the layers among other elements of the spatial structure of the city. In the silhouette, however, it can contrast with anthropogenic elements and at the same time create a harmonious relationship in terms of proportions of different elements.

The relationship that formed between natural elements and built environment and other anthropogenic elements, especially in city panoramas, is often unique. Prof. J. Bučas uses the term "visual anthropogenic saturation threshold", which he considers to be a dividing line between two types of culture-affected landscape: rural (partially affected by anthropogenic activity) and urban (anthropogenic). The visual anthropogenic saturation threshold is defined by covering of the area with view domination zones (3.5 km) (Bučas, 2001). In the urbanised environment, the zones of view domination of a number of anthropogenic elements overlap.

To be able to assess and predict the impact on the relationship of nature and built environment or the change in that relationship in previously captured and currently observed panoramas and silhouettes, it is necessary to define the current situation and specify the proportion or percentage of natural elements and built environment, what dominates in a view and what aim is sought.

Visual links between objects

The possibility of mutual observation of the objects creates visual links. One of the most valuable features is the direction of visual perception. Conditions for the emergence of such links appear due to different heights/altitudes, which depend on the distinctiveness of the terrain and the height of buildings. Visual links are also affected by the proportion of open and built-up spaces.

When integrating new objects falling into the zone of visual links between specific objects in the existing urban environment and in order to maintain the visual links they form, attention should be paid to the ratio of width and height of buildings being designed in the area. Otherwise, the perception of these links in the volumetric-spatial composition of the city can be adversely affected or even completely lost.

Multilayer character of a panoramic view

A view observed in panoramas is most often not homogeneous but rather multilayer. The conditions for the multilayer character are created by the remoteness from the view observed (the distance), the distinctiveness of the terrain and the diversity of the built environment structure, as well as by the boundaries of the urban fabric structure. Panoramas significant for the assessment of the area in question should be split into visual layers. To determine the number of layers and the role of dominant structural elements, the area in the plan is split according to the structural boundaries of the city or the distance of visibility. These boundaries can also be recognised in panoramas from fixed viewpoints. Using this method of plan and view splitting, when watching from each valuable viewpoint, the most important valuable elements of the territory plan and the visible view can be identified, and the newly appearing building-up should not compete with them or otherwise affect them (Figure 1 III).

Valuable features of the urbanised landscape of the Vilnius historic centre specified in documents

The assumptions discussed above allowed the authors to define a methodology for analysing and evaluating panoramic views of urbanised landscapes. The methodology discussed in the article is illustrated with the feasibility study for the development of the northern part of Žvėrynas district prepared in 2021. The feasibility study examines the preconditions for the protection and assessment of valuable views of Vilnius in the broad sense. And in fulfilment of the specific task, the study assesses the impact of potential increase in the height of the shopping centre Panorama (hereinafter referred to as SC Panorama, territory is marked in Fig. 2) on mutual visual links between individual protected areas, valuable panoramic views and silhouettes, the relationship of nature and built environment silhouette, the domination of cultural heritage objects and valuable natural elements in the view. Before presenting the study itself, a brief overview of the urban context of the site will be given.

The Old Town of Vilnius and its visual protection sub-zone

The Old Town of Vilnius was named as an urban heritage site already in the early 20th century, and in 1994 it was added to the list of UNESCO World Heritage Sites. For these reasons, regeneration projects were being prepared for the Old Town of Vilnius (there were even three of them (Dijokiene, 2009)), the statement of determining the valuable features of the Old Town of Vilnius has been prepared and is regularly amended (Kultūros…, 2024a); the master plan of Vilnius city contains a chapter and drawings intended for heritage protection (Vilniaus…, 2021b; Vilniaus,,,, 2021c); the Old Town of Vilnius not only has an area defined as the protected site but also an established visual protection sub-zone (Vilniaus…, 2010). Two more documents started to be drafted in 2023, meant

TABLE 1

Groups of valuable features of the Vilnius Old Town (created by the authors)

A. Exterior townscape of the Old Town	Panoramas; silhouettes; dominants/ensembles
B. Interior townscape of the Old Town	Perspectives; street routes; network of streets and squares; quarters formed by historic streets; boundaries of historic plots
C. Natural elements	Terrain; greenery; hydrographic network; cultural layer
D. Building structures, architectural expression, environmental elements	Building structures and spatial arrangement of the interior; exclusive interior decoration elements, fittings; surfaces of external walls; different decoration of facades, doors, windows, roofs; street and square pavements; elements of engineering structures and transport infrastructure
E. Intangible heritage of the Old Town	Traditions of crafts; lifestyle; culture and art
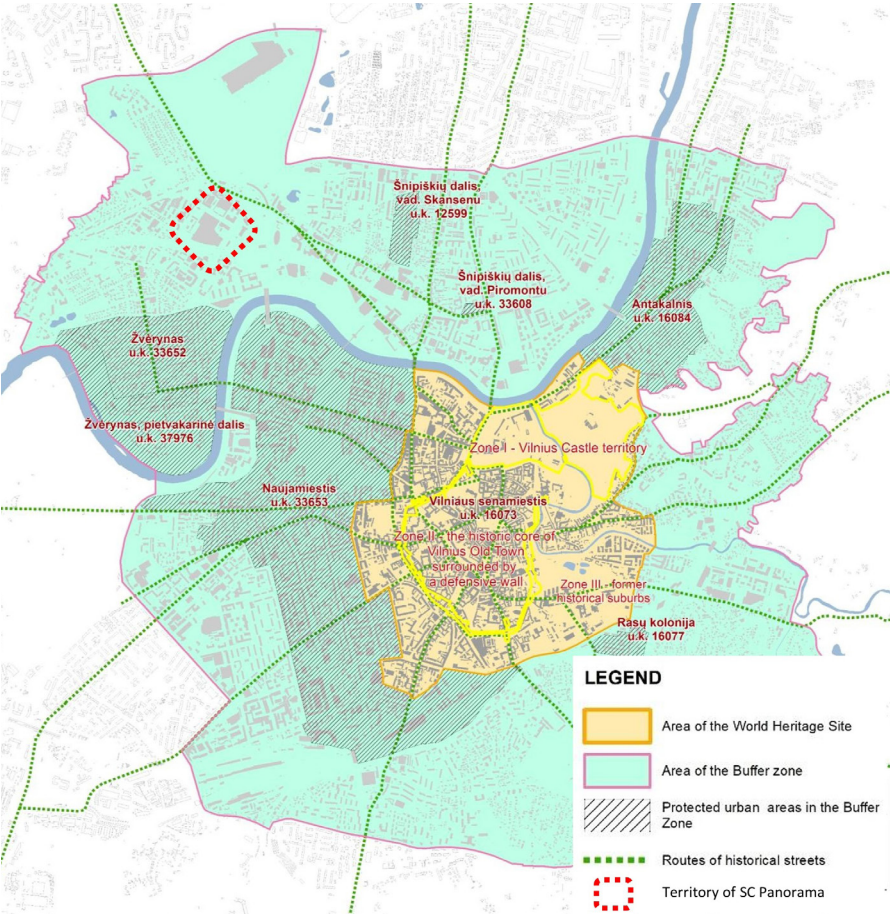
Fig. 2. Vilnius Old Town World Heritage map created using GIS
(Draft of management plan, 2024; UNESCO..., 2024)

for preservation of valuable features of the Old Town: the plan for management of the Vilnius historic centre that is a UNESCO World Heritage Site and the Vilnius Old Town and its protection zone management (special) plan. The latter document is expected to be finalised in two years. When ready, this document will become the main spatial planning document for the Vilnius Old Town and its protection zone, which, among other things, will provide what construction, reconstruction, repair, greenery management work can be performed in specific parts of the said area and what the preconditions and heritage protection conditions for such works are (Pradedamas..., 2024; UNESCO..., 2024).

All these ample documents specify the established valuable features of the urbanised landscape of the Vilnius Old Town. The authors of the article present their grouping in Table 1. The Vilnius district of Žvėrynas, whose territory fragment development feasibility study illustrates the application of the method, is within the Vilnius Old Town visual protection sub-zone (see Fig. 2). Therefore, in this case (as long as the said

special plan is not yet ready), the document that regulates construction possibilities namely in the area of the visual protection sub-zone is most relevant.

The main legal act that applies to the visual protection sub-zone of the Vilnius historic centre (the Old Town) is the Temporary Regulation for Protection of the World Heritage Site – Cultural Monument U1P – Vilnius Historic Centre Protection Zone approved by Order No. J-167 of the Director of the Department of Cultural Heritage dated 19 April 2005 (the "Regulation") (Pasaulinio..., 2005), which establishes the principles of application of the requirements set out in Article 19(2)(2) of the Law of the Republic of Lithuania on the Protection of Immovable Cultural Heritage (Lietuvos..., 2024a) and in Article 19(6) of the Law of the Republic of Lithuania on Protected Areas (Lietuvos..., 2024b) in terms of protecting valuable features of the Vilnius Old Town. The purpose of the World Heritage Site – Cultural Monument U1P – Vilnius Historic Centre Protection Zone is to protect the historically-formed Vilnius Old Town panoramas and

silhouettes, visible from the Vilnius Old Town streets and squares, main routes of entering the Old Town, as well as the Old Town viewpoints specified by the Vilnius master plan and other territory planning documents within the Old Town and in its surroundings.

The temporary protection document defines the construction activities possible in the protection zone:

- In the protection zone, construction of new structures or reconstruction of existing structures, increasing their height or volume, is prohibited, where they, viewing from the Old Town streets and squares, main entrance routes and viewpoints:

- would overshadow, by their height, volume or expression, a protected cultural heritage object or a group of them located in the Old Town or its protection zone, valuable natural elements – hills surrounding the Old Town;
- would interfere with observation of the Old Town or a protected cultural heritage object or a group of them located in its protection zone;
- would block the view of a hill in the Old Town or its protection zone up to at least of a half of its height;
- would alter the Old Town silhouette;
- would be visible from the Old Town streets and squares (this requirement does not apply in case of streets bounding the Old Town).

- A structure to be built is considered to overshadow a protected cultural heritage object or a group of them if, looking from a viewpoint:

- it is elevated above a visible protected cultural heritage object or a group of them;
- it is visible in close proximity to a protected cultural heritage object or a group of them and visually competes, in terms of its volume or height, with or is higher than the protected cultural heritage object or a group of them.

- A structure is deemed visible in close proximity to a protected cultural heritage object or a group of them if, looking from a viewpoint, the distance / viewing angle from the protected cultural heritage object or a group of them to the structure is equal to or less than the visible horizontal part / viewing angle of the protected cultural heritage object or a group of them.

- The visible part of a protected cultural heritage object is that part of it that is not blocked by other structures or terrain. A part of a protected cultural heritage object that is blocked by greenery is treated as visible part of this object.

Characteristic features of the urban structure of the northern part of Žvėrynas

Žvėrynas was a suburb of Vilnius until the 20th century and was officially added to the city only in 1901. The Žvėrynas district development is unique compared to other Vilnius suburbs as Žvėrynas was built up within a very short period of time. It was a recreational out-of-town area, a leisure place for the townspeople for a long time. Until the early 19th century, Žvėrynas, separated from the city by the river and covered with forest, was a private property of Radvila dukes, their hunting grounds.

Žvėrynas is different from other former suburbs by its unique natural situation and proximity to the city centre, the territory planned a century ago and the construction rules adopted at that time, a peculiar stylistic and typological diversity of buildings. It is still dominated by buildings built before 1940. Wooden architecture is particularly valuable in Žvėrynas. Its abundance and concentration, as well as stylistic and typological diversity are unique. Western Europe has almost lost the wooden architecture heritage already in the 19th century due to rapid urbanisation as a result of the industrial revolution. Meanwhile, in Žvėrynas we have a whole spectrum of examples of historicism architecture, which reflect the key trends and influences of architectural fashion in Europe in the early 20th century. In the environment rich with greenery, residential houses were built, the architecture of which has various combinations of Swiss resort, Russian summer house and Polish Zakopane style elements. The abundance of towers, mezzanines, volumetric skylights, balconies and verandas distinguishes Žvėrynas buildings from the built environment of other suburbs of Vilnius of the same period. Due to its undeniable cultural value, Žvėrynas district became a registered cultural heritage area: on 10 May 1994, Žvėrynas, along with other territories surrounding the Vilnius Old Town, was announced an urban heritage site of local significance; on 5 June 2008 the Vilnius City Municipality by its decision No. A121-9897 announced the Žvėrynas territory UV70 as protected by the municipality; in 2010 the valuable features of Žvėrynas were revised and officially recognised as such in statement No. KPD-RM-1582 on Vilnius city historic part under the name of Žvėrynas (unique code of the object in the Register of Cultural Property: 33652) adopted by the Immovable Cultural Heritage Assessment Council on 18 January 2011 (Kultūros..., 2024b).

After WWII, the urban structure of the northern part of Žvėrynas (called Saltoniškės) changed fundamentally: many industrial objects were built; T. Narbuto street, built in the second half of the 20th century, separated this part from the rest of Žvėrynas and the territory between T. Narbuto, Ukmergė and Šeškinė hills lost its functional and structural connections with its adjacent territories; the historically-formed structure of plots and street grid were lost beyond return. From 2000 to the present day, Saltoniškės, especially areas under conversion, face chaotic individual construction, not based on a common urban design concept. The northern part of Žvėrynas is not linked to the city centre either in terms of composition or functionality, failing to take the opportunity to use visual links with the Old Town and capture places for potential viewpoints (Kajackaitė, 2011).

The area in question is adjacent to the Šeškinė slopes geomorphological reserve and the Neris river ox-bow. These natural elements limit the outward expansion of the territory, leaving only the possibility of increasing the building intensity inside the territory. The main element of urban structure to be protected in the area in question is the remaining fragments of the Šeškinė slopes. They are important not only as part of the unique visual identity of Vilnius city, but also as a background in panoramas for urban cores that have emerged in the valley of Vilnius. But a chaotic urbanisation process is already taking place at the foot of the slopes bounding the area in question, therefore, whatever the building-up of the area, it finds itself in the background not only of green slopes but also in the background of built-up. The assessment of view domination zones of Vilnius urban cores is becoming more and more relevant in our days as the Neris river valley witnesses the ongoing formation of a number of such complexes that affect the integrity of both built environment and natural structures.

Application of the method for the assessment of valuable views of the north-western part of Vilnius

Upon reviewing methodological assumptions for the analysis and assessment of a panoramic view and upon assessing the documented valuable features of the urbanised landscape of the north-western part of Vilnius historic centre, the authors developed the assessment method and the sequence of steps and carried out the research: (1) viewpoints relevant

for the area in question were selected; (2) sectors observed were described and evaluated; (3) relevant panoramas were analysed; (4) the potential change in the relationship of nature and built environment in panoramic views was assessed and recommendations were made.

Viewpoint selection

The visual identity of the Vilnius Old Town townscape is perceived from the Old Town external viewpoints and its internal characteristic viewpoints. The master plan of the Vilnius city municipality territory and the statement of determining the valuable features of the Old Town of Vilnius underline the uniqueness and value of the city silhouette and panoramas, specifying points, the views opening from which should not undergo radical changes. Such a method is quite widely applied to cities with clear points of viewing the silhouette. When a city has a prominent terrain and the historic dominants are dispersed (as it is in the case of Vilnius), then the application of the so-called "viewpoints" method may be insufficient. Then the viewing conditions must be evaluated with greater precision, grouping them as points of panoramic overview and points of mass observation (located in low terrain, where people tend to gather – streets, bridges, squares, recreational zones and the like).

The ability to observe the territory in question in the north-western part of the Vilnius historic centre was assessed from 22 viewpoints. Points of observing the territory of SC Panorama in visible panoramas or silhouettes are divided into two categories:

▪ Distant viewpoints, relevant for the relationship of nature and built environment in panoramas and silhouettes and for the assessment of mutual visual links between individual protected areas. These viewpoints are in the top parts of the terrain and allow for observation

towards the centre (with the Old Town and green slopes dominating) and for observation from the centre towards the slopes (with the green slopes and the centre built-up dominating). The distance between these points, located on the opposite sides in terms of cardinal directions, ranges between 2.5 and 3.0 km.

▪ Close viewpoints, relevant for assessing the relationship of nature and built environment in panoramas and silhouettes. These viewpoints are located on the lower terrace of the valley and are about 1.0–1.7 km away from SC Panorama.

Out of these 22 viewpoints, 7 most relevant panoramic viewpoints were later selected and sectors observed from them were evaluated. Upon assessment of sectors visible from 7 viewpoints, only 4 viewpoints were finally selected, which allowed for best observation of SC Panorama territory, with resulting views marked by visual links from/to the Old Town and from/to the hills. The viewpoints also allow for good exposure of the relationship between nature and built environment and assessment of the predicted impact on the domination of visible cultural heritage objects and valuable natural elements.

The following 4 viewpoints were selected for the analysis of the panoramic view:

▪ Three distant viewpoints: the Upper Castle (Gediminas) Hill, Žvėrynas Hill (by Paribio street), M.K. Čiurlionio St. 27 (Vilnius University parking lot);

▪ One close viewpoint: the White Bridge.

Description of the panoramic view sectors

In discussing the conditions for observing the views visible from 7 viewpoints, graphical schemes were made (using the Geographic Information System (GIS) software) and the following aspects were taken into consideration: the distance
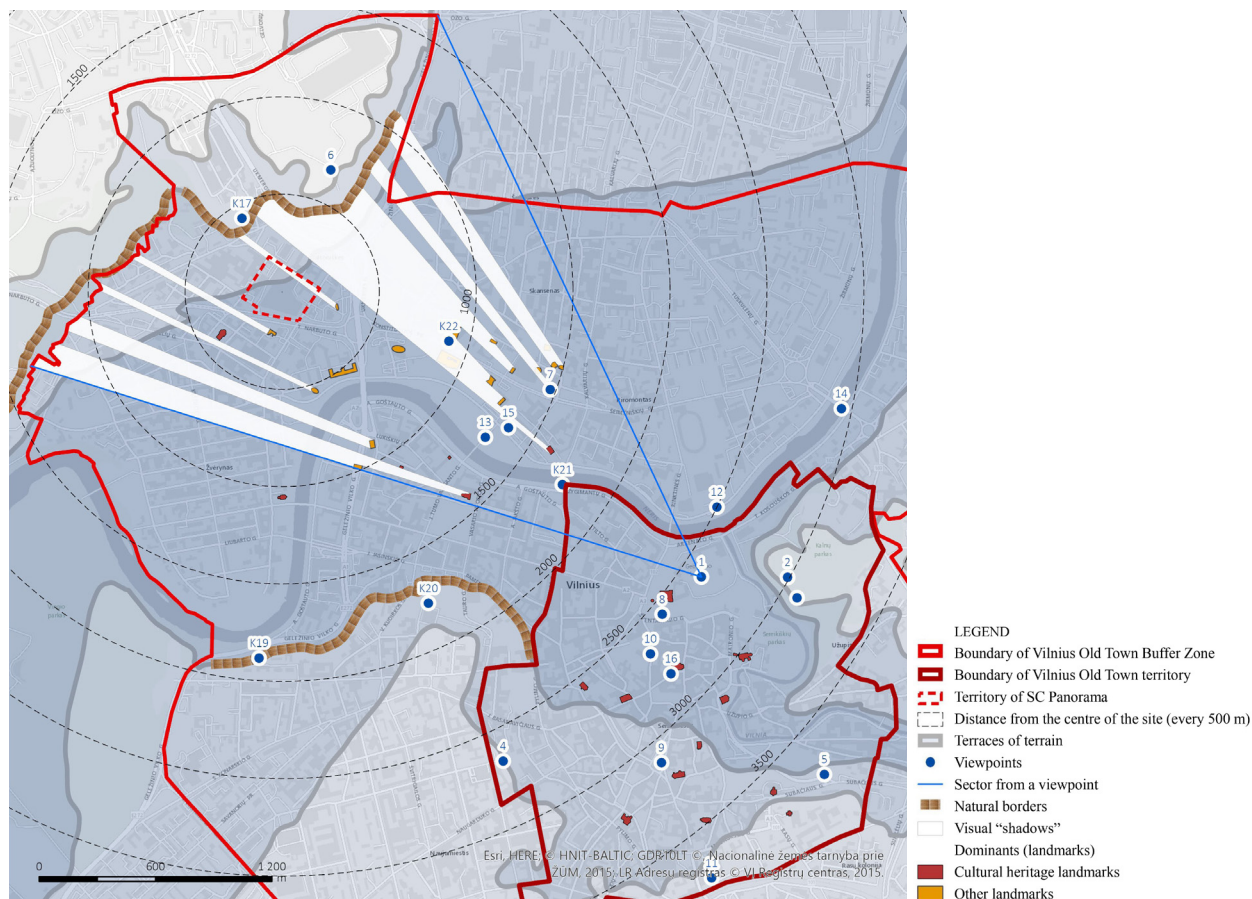

Fig. 3. Description of the panoramic view sector visible from the viewpoint on the Upper Castle (Gediminas) Hill (created by the authors using GIS)

of SC Panorama territory from the viewpoint; visual barriers that obstruct the view and objects creating visual "shadows"; visible valuable and other dominants. By way of example, in this article the authors present the graphical scheme of the panoramic view sector visible from the viewpoint on the Upper Castle (Gediminas) Hill (see Fig. 3) and the relevant description:

- the viewpoint is 2.5 km away from SC Panorama territory;
- visual barriers are created by Šeškinė, Karoliniškės hills and Pamėnkalnis plateau;
- visual "shadows" are cast by high-rise buildings located in the Architectural Hill (the Architectural Hill in Vilnius means the high-rise buildings concentration zone in the central part of the city, on the right bank of the Neris), churches located outside the Old Town;
- valuable dominants of the centre outside the Old Town territory are visible;
- the entire SC Panorama territory is well observable

Analysis of relevant panoramas

The selected 4 most characteristic panoramas were assessed following the above-described view analysis and assessment methodology. Graphic material was prepared and the following was discussed: distinctness of the foreground and background of the visible view and their elements, the scale of the natural element background that is dominant in the panorama, the relationship between the natural element and urbanised structure in the panoramic fragment of the territory in question, mutual visual links and the impact of the object in question on them. The analysis of the panoramas revealed that all the 4 points allow for good observation of valuable territories and the distance often turns their valuable elements into the background surrounded with green body in the most distant part of the visible panorama. The existing volume of SC Panorama does not have any effect on these elements whatsoever. The viewpoint on the Žvėrynas Hill is a potential Vilnius Old Town observation point, exposing a wide view of the entire Old Town with its dominants. The most distinctive dominant valuable cultural heritage objects are, therefore, visible from the Žvėrynas Hill (by Paribio street), whereas the panoramic view from the Gediminas Hill and M.K. Čiurlionio St. 27 exposes somewhat less of them, and the view visible from the White Bridge is influenced by the architectural objects that emerged in the 20th and 21st centuries. Assessing the panoramic fragment view only by SC Panorama territory in question in terms of the relationship between the natural element and urbanised structure, the urbanised structure dominates in 3 views and it is only from the Gediminas Hill that the domination of the natural element is more significant. All these viewpoints have a direct visual link, the background of which is dominated by green body, whereas the territory in question as such has no impact on these links.

The schemes of the analysis of the panorama from the Upper Castle (Gediminas) Hill are again provided as an example (see Fig. 4) and the following peculiarities of this view are pointed out:

- several valuable dominants are visible (Vilnius Church of Apostles St. Philip and St. Jacob and Church of St. Archangel Raphael) as elements and their details (as the distance to them is 1.0–1.2 km), whereas the northern part of Žvėrynas, including SC Panorama and the buildings in the approaches to it, turn into the background that merges with the natural massif of Šeškinė hills behind it (as the distance to them is 2.5–3.5 km);
- cultural heritage objects and valuable natural elements in the panoramic view are visible and dominant. The

entire territory of SC Panorama becomes a part of the continuous uninterrupted natural line of the massif of Šeškinė and Karoliniškės hills;

- the relationship between natural elements and built environment is 59% and 41% and the proportion is 1.4 to 1, the natural elements being dominant;
- there is a direct visual link between the Paribio street hill and the Gediminas Hill; SC Panorama territory is in the background of the Paribio street hill and in the background of the northern part of Žvėrynas and does not obstruct the existing mutual visual link between the two hills.

Predicted change in the relationship between nature and built environment

The evaluation of the conditions for observation from the selected viewpoints and the analysis of the existing views of the relevant panoramas led to the formulation of criteria that may help to assess the impact on the identified groups of valuable features of Vilnius views to be protected: I) mutual visual links between individual protected territories, II) the relationship between nature and built environment in panoramas and silhouettes, III) domination of cultural heritage objects and valuable natural elements in the view.

The research paper produces the following assessment criteria, which should ensure the conditions for preservation of the specified groups of valuable features:

A. Presence/absence and preservation of visual links (group I of valuable features).

B. Preservation of characteristic features / peculiarities of the view:

B.1. Impact on the relationship between nature and built environment (group II of valuable features);

B.2. Impact on the domination of heritage objects and valuable natural elements (group III of valuable features).

To specify the scope of the impact, one can refer to the 2011 Guidance on Heritage Impact Assessment for Cultural World Heritage Properties of the International Council on Monuments and Sites (ICOMOS) (hereinafter referred to as the Guidance). According to the Guidance, scale or severity of impacts or changes can be judged taking into account their direct and indirect effects and whether they are temporary or permanent, reversible or irreversible. The cumulative effect of separate impacts should also be considered. The scale or severity of impact can be ranked, without regard to the affected element of the object and the value of the element, as: (1) no change; (2) negligible change; (3) minor change; (4) moderate change; (5) major change (ICOMOS, 2011).

According to the Guidance, the general impact on an attribute of an object is determined by comparing the scale of the impact and what element of the object is affected, as well as the purpose and importance of that element. This can be summarized for each attribute described using the following descriptors. As change or impacts may be adverse or beneficial, there is a nine-point scale with "neutral" as its centre point: (1) major beneficial; (2) moderate beneficial; (3) minor beneficial; (4) negligible beneficial; (5) neutral; (6) negligible adverse; (7) minor adverse; (8) moderate adverse; (9) major adverse (ICOMOS, 2011).

In the assessment stage, the impact of the intended increase of SC Panorama building maximum height (35 m) and of the arrangement of additional parts of the building on the listed valuable features was assessed. If the maximum height had no adverse impact, nor would any lower height. If the maximum height had an adverse impact, two more alternatives of lower height were further assessed. The predicted change in the proportion of nature and built environment is

A

B
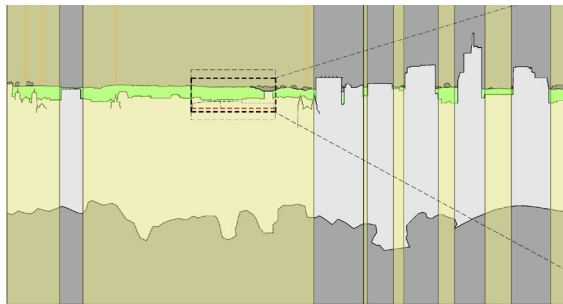
C
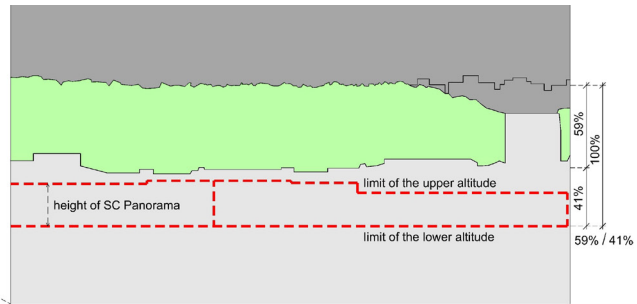
D
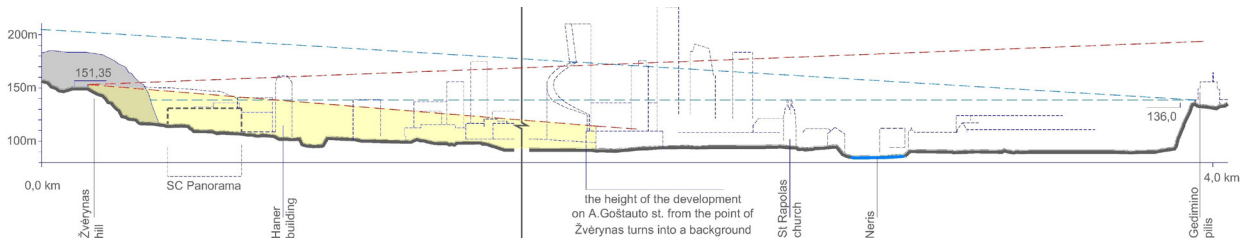
Marking:

In figures A, B, C:

- The yellow arrow by a dominant is for cultural heritage objects.
- The yellow dotted line marks A. Goštauto street building cornices, which are deemed to be the limit of visible valuable territory.
- The pink background is for visible valuable territory.
- The greenish background is for green body and the last visible background in the captured panorama.
- The white dashed line is for SC Panorama fragment, near which the valuable territory is visible.
- The red dashed line for SC Panorama roof contour.

In figure D:

- The red and blue dashed lines mark visual links.
- The yellow background marks the zone, in the territory of which the height of the built environment may increase.

Fig. 4. Panorama from the Upper Castle (Gediminas) Hill: A – distinctness of the foreground and (last) background of the visible view and their elements; B – the scale of the natural element background that is dominant in the panorama; C – the relationship between the natural element and urbanised structure in the fragment of the territory in question; D – mutual visual links between the Gediminas Hill and the Žvėrynas Hill (by Paribio street) and the impact of the object in question on them (source: created by the authors)

illustrated in Table 2.
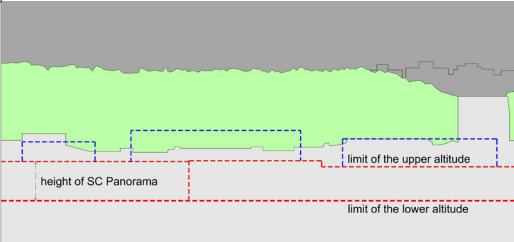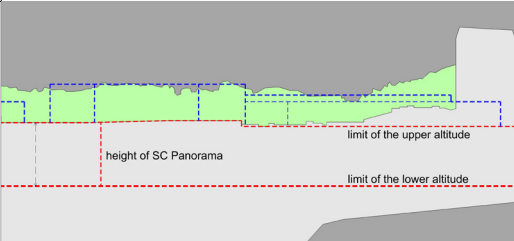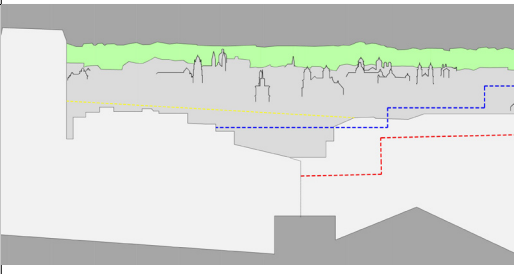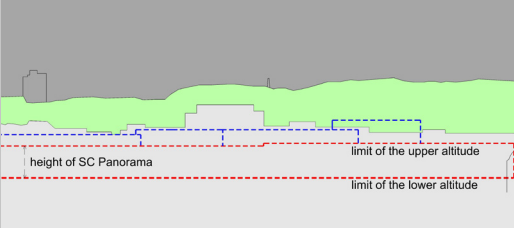
The assessment revealed that all the 4 viewpoints had visual links from/to the Old Town and from/to the hills (assessment criterion A). The increase in the height of SC Panorama buildings has no adverse impact on the preservation of these links looking from distant viewpoints. As distant viewpoints are significant for the city as a whole and expose views to protected cultural heritage sites and objects, their assessment is prioritised. The increase in the height of SC Panorama buildings has an adverse impact on the preservation of visual links looking from close viewpoints. Although viewpoints of this category are less significant, they are located in public places where people tend to gather and they provide exposure for local observation.

The increase in the height of SC Panorama buildings changes the proportion between nature and built environment visible in panoramas (assessment criterion B1), which is clearly illustrated by Table 2. However, in the views from distant viewpoints this proportion changes just slightly and the impact on it could be called insignificant as it ranges from

TABLE 2

Expected change in the proportion of nature and built environment (created by the authors)

Viewpoint	Panoramic view fragment*	Existing and predicted proportion of nature and built environment
Upper Castle (Gediminas) Hill		Proportion of nature and built environment: ▪ existing: 59% and 41% (1.4:1) ▪ predicted: 46% and 54% (1:1.2)
From the White Bridge		Proportion of nature and built environment: ▪ existing: 31% and 69% (1:2.2); ▪ the predicted 35 m building-up will block natural elements and will exceed the present background by 14%; the predicted 28 m building-up will result in the proportion of 9% and 91% (1:10)
Žvėrynas Hill (by Paribio street)		Proportion of nature and built environment: ▪ existing: 29% and 71% (1:2.5); ▪ predicted: 29% and 71% (1:2.5)
M. K. Čiurlionio St. 27 (Vilnius University parking lot)		Proportion of nature and built environment: ▪ existing: 43% and 57% (1:1.3); ▪ predicted: 41% and 59% (1:1.4)

*Note: the blue dashed line – intended increase of SC Panorama building height (35 m); the red dashed line – existing height.

2 to 13%. The panorama from a close viewpoint on the White Bridge is dominated by the built environment already now and the proportion of nature and built environment is 29% and 71%. The predicted 35 m building-up will block natural elements and will exceed the present background by 14%, the predicted 28 m building-up will result in the proportion of 9% and 91%.

In terms of the impact on the domination of heritage objects and valuable natural elements (assessment criterion B2), it should be noted that there is no adverse impact on the domination of cultural heritage objects. The impact on the domination of valuable natural elements ranges from no impact to significant adverse impact. But here again it should be noted that there is no adverse impact or it is insignificant on views from prioritised distant viewpoints significant for the city as a whole – the adverse impact is felt on views visible from close viewpoints.

Discussions and Conclusions

As said at the beginning of the article, with rare exceptions, cities are established in captivating natural environments and it was the natural basis and anthropogenic activity that formed the urbanised landscape characteristic of the cities. There is no more doubt in the 21st century that the urbanised landscape of cities is our identity and considered valuable.

The relationship between nature and anthropogenic elements in urbanised landscape is probably most clearly perceived in the panoramic views and silhouettes of cities. For the existing views not to change in essence, it is not only necessary to announce them as valuable and protected, but also to develop methodology which would allow for modelling possible changes in panoramic views. This article illustrates the assumptions for such methodology and its practical application.

Upon using Vilnius as an example and specifying the key features of valuable views in observation of the Vilnius Old Town and the legal basis for protection of these views, upon overview of methodologies of analysis and assessment of a view, it was possible to formulate key assertions that came up as the result of the study and could be used as methodological guidelines for similar research in other cities:

▪ The valuable panoramas and silhouettes of the historic centre of the city of Vilnius are created by the natural and anthropogenic environment. The elements of the natural structure, forming boundaries of the city centre, are closely interrelated, forming a single visual pool of the Neris valley, whereas the expressive terrain creates favourable conditions for wide observation of the Old Town and its views are projected not as silhouettes against the sky but as panoramas in the background of

green hills. Any changes in the spatial structure will affect the entire visual space of the valley. Newly emerging structures should not be destructive in this complex natural-urban system and should not radically change the visual volumetric and spatial structure of the Vilnius centre urbanscape.

- The valuable viewpoints for the observation of the Vilnius Old Town (panoramas, silhouettes) are specified in the statement of determining the valuable features of the Old Town of Vilnius and their protection is legally stipulated in territory planning documents and protection regulations applicable both to the Old Town as such and to its closest environment – its visual protection sub-zone. Provisions of documents relevant for the implementation of the heritage protection are aimed at legal stipulation of the protection of cultural landscape as the main manifestation of the urban identity of Vilnius city. The following groups of valuable features are identified: mutual visual links between individual protected territories, valuable panoramic views and silhouettes, the relationship between nature and built environment silhouette, domination of cultural heritage objects and valuable natural elements in the view.

- To assess the predicted change in a valuable view, the view should, first of all, be analysed and it should be stated what specifically is valuable in that view. One, therefore, should discuss conditions of viewing the area in question from specific viewpoints and define the sector observed and describe the visual barriers. The distinctness of elements visible in the view, domination and obscuring of objects, the existing relationship/proportion between natural and anthropogenic elements, also possibilities and peculiarities of visual links between objects/areas should also be discussed.

- Upon evaluation of conditions for observation from the selected viewpoints and the analysis of the existing views of the relevant panoramas, criteria must be developed to assist in the assessment of the impact of a planned new building-up on the valuable features of panoramic views to be protected.

- Finally, reasoned decisions can be made on the integration/non-integration of a new building-up in the already established valuable urbanised landscape.

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THE DISSOLUTION OF BOUNDARIES:
LANDSCAPE STRATEGIES APPLIED TO THE DIPOLI CASE

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Abstract. The relationship between architecture and nature has always been one of the key topics of interest in architectural debate, even more so in the present day. Among the architectural approaches commonly described as "natural" and "landscape-oriented," the work of Raili and Reima Pietilä stands out for the radical nature of its proposals in pursuit of an architecture that could be understood as inspired by natural forms in a specifically balanced manner, avoiding both the mere imitation of natural shapes, bordering on caricature, and illegible abstract interpretations. This article is based on the analysis of the design and construction of the Dipoli Centre (1961–66) as a paradigmatic example of this way of generating architecture inspired by the landscape or, in the words of the architects themselves, as an "extension of the landscape". Through a detailed exploration of the graphic documents produced by the architects during the design and construction process of Dipoli, preserved in the archives of Arkkitehtuurimuseum, Museum of Finnish Architecture (MFA), as well as their conceptual descriptions and project reports, and an analysis of the built work itself, this article reveals the strategies and formal mechanisms through which the architects manage to present their architecture as a clear 'continuation' of nature, as a cultured extension of the Finnish landscape. These strategies can be encompassed within the concept of "dissolution of boundaries," which manifests both in the architects' metaphorical descriptions of the project and in the morphology of the building itself. The building is presented in such a way that no clear perimeter can be defined, but rather a diffuse, ambiguous territory of fragmented exchanges between exterior and interior. This idea is also reflected in the selection of construction components and basic materials - stone, concrete, wood, and copper - arranged in an innovative manner for its time, still unmatched today. In this approach, it becomes difficult to clearly define the boundary between the natural and the artificial, the preexisting and the superimposed, the interior and the exterior, and between the environment and the architectural artefact.
Keywords: Pietilä, landscape design, nature, materiality, Finland

Introduction

One of the most significant challenges faced by architects in recent decades has been the pursuit of a dissolution of the physical limits of landscape architecture in relation to its site. On numerous occasions, these architectural designs have based their design strategies on achieving the dissolution of their limits through the disappearance of their envelope. This has involved resorting to the condition of the absolute transparency of the material (Maruenda et al., 2024), as well as camouflage techniques that accurately reproduce the surroundings or even reflect them through games of fictitious dualities.

The research presented here is based on the premise that the layout and geometry are no longer sufficient to complete the visual metaphor of nature. It is essential to conduct a more thorough investigation into the material composition of the constructed elements. By employing a precise alchemy of available construction materials, it is possible to achieve a balance between accurately reproducing the natural environment and avoiding the pitfalls of either a simplistic caricature or an illegible abstraction. At this juncture that the selection of materials and the oversight of the construction methodology are of paramount importance. This is a process in which the geological substratum or the forest is transformed into a building with discernible precision.

Therefore, the article looks for previous architectural experiences in which the strategy used to achieve this dissolution of boundaries in the landscape has its origin in a reinterpretation of the landscape, and not in a mere immediate camouflage. In this context, the article draws on the work of Finnish architects Raili and Reima Pietilä, who made a unique contribution to the dissolution of the boundary between landscape and architecture. They transformed the latter into a "continuation" of the former (Pietilä, 1966). The position that Pietiläs adopted in the development and execution of the Dipoli project (1961-1966) differs from what had been

attempted to date. In this context, the article considers the notion of an architectural approach that is inextricably linked to the surrounding landscape, presenting itself as an extension of the natural environment. The metaphor is not merely a diffuse representation of geometry; rather, it involves the recreation of the landscape of caves and forests on the site through architectural means, thus creating a new element within the existing Finnish landscape, which is characterised by birch and pine forests and granite efflorescences (Fig. 1).

It is difficult to find contemporary architects of the Pietiläs who, under these conditions, have worked on the dissolution of boundaries in the landscape. For example, the window in Louis Kahn's Fisher House (1960-1967) creates a unique space within the living area from which to view the outside, but It does not attempt to recreate nature through architecture. By contrast, some twenty years later, in the 1980s, Alison

Fig. 1. Aerial photograph of Dipoli, ca. 1966. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

and Peter Smithson designed the Hexenhaus extension (1985-2001) with a sensibility similar to that defined by Pietilä in Dipoli. In particular, the intervention known as Axel's Porch (1986) incorporated an intermediate space that reinterpreted natural geometries in its carpentry (Fernández Villalobos & Jiménez Sanz, 2020), demonstrating a similar intention of integration with the landscape.

The implementation strategy of the building in Otaniemi (Finland) has been the subject of general analysis in previous research, which has identified the particular cavernous character of the building. This character, which Raili and Reima Pietilä explicitly referenced, conceptualises the building as a raised incision into the rocky mound on which it is situated. In his studies on excavated architecture, researcher Mario Algarín highlights the unusual condition of the project (Algarín Comino, 2006). However, this cavernous condition contains nothing beyond the underlying idea of understanding Dipoli, in the words of Reima Pietilä himself, as an "extension of the landscape" (Pietilä & Norri, 1985).

It is therefore imperative to consider not only its status as a cavern but also the definition of its envelope, which supports this identification. The dissolution of boundaries that arises from the reinterpretation of the concept of the 'building as a continuation of the landscape' has not been sufficiently explored, despite its significance as a pivotal aspect of the work. This highlights a gap in research that has primarily focused on the strategies shaping the envelope. The objective of this article is to examine this issue in greater detail and to determine how this transformation of the theory of boundaries into a constructed reality takes place. Therefore, the question that must be addressed is: How should the envelope enclosing a space intended as an extension of the surrounding landscape be materialised? The answer to this question will provide the foundation for the building design, which is the focus of this research.

To answer the research question, it was essential to devise a customised methodology that would guide the direction of the research. The methodology used to identify the design components that result in the unique relationship between architecture and nature achieved by the Pietiläs is based on the simultaneous analysis of three sources: the compilation of the authors' own descriptions of the work - largely metaphorical in nature - the systematic and chronological analysis of the graphic documents produced during the design and construction process (drawing on the extensive collection of drawings and plans held at the Arkkitehtuurimuseum - Museum of Finnish Architecture (MFA), examined for the first time for this purpose by the authors of this article during their research stay at Aalto University in 2024), and finally, the detailed exploration of the construction systems and materials used in the building, investigating how their arrangement aligns with the intentions anticipated in the prior literature and graphic documentation.

Context and Approach to the Otaniemi landscape

The equipped landscape status of the Otaniemi peninsula did not begin to develop until the second half of the twentieth century. Before the construction of the university campus, the land surrounding the area was mainly used for agriculture. The thawing process during the glacial period, thousands of years ago, shaped a landscape characterised by a combination of water-eroded rocky outcrops, bay inlets and ancient river valleys, which have since been used as fertile farmland. For a long time, cereal fields, especially, stretched across numerous hectares, building the image of Otaniemi's cultural landscape for a long time (Livady OY & Maisema-arkkitehtuuri MM, 2014). In contrast, extensive coniferous

Fig. 2. Photograph of the Otaniemi site area. Documentation provided to the architects during the competition. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

forest patches emerged from areas with larger topographic features, where the rock guaranteed the character of unexplored space (Nikula & Binham, 1993) (Fig. 2).

The earliest known occupation of the Otaniemi area dates back to the 13th century, when small Swedish colonies settled the region. The location of the historic village of Hakalehdo coincides with the large open space adjacent to the main building of the Helsinki University of Technology, designed by Alvar Aalto. The archaeological character of the site has been elucidated through research, which has also shown that it is inventoried by the National Board of Antiquities and protected by the Archaeological Heritage Act. It has been posited that the area around Dipoli, which was not exploited by cultivation due to its rocky and wooded condition, may have preserved layers and sediments associated with settlement (Livady OY & Maisema-arkkitehtuuri MM, 2014). Otaniemi's agricultural past dates back to the 16th century, but it did not undergo major urban transformation until the 20th century, when land was purchased for the new campus of the University of Technology (TKK) and the State Institute of Technological Research (VTT).

The extensive damage to the principal edifices of the Finnish University of Technology at its original location in Hietaniemi during the bombings of the Winter War in 1939 and the Continuation War in 1944 gave rise to a debate on the necessity of relocating the headquarters (Liesto, 1988). In the period between 1939 and 1948, the decision was taken to relocate the University of Technology (TKK) and the State Research Institute of Technology (VTT) to a site in the vicinity of Helsinki. The priority was to find a location offering a natural and spacious environment, given the perception that urban centres were unhealthy after the war. The relationship with nature became the primary tenet upon which the new ideal of the university campus was established. Following an evaluation of potential locations, including Vartiokylä, Munkkiniemi, and Otaniemi, a committee chaired by Professor Otto-livari Meurman recommended the purchase of the Otaniemi estate in 1948. This site offered 108.5 hectares of land in close proximity to the original location in Hietaniemi, facilitating proximity to the original campus while maintaining contact with nature. The proposal was approved by parliament in December of the same year (Harki, 1977) (Harki, 1977; Liesto, 1988).

In 1949, following the acquisition of the Otaniemi area, an architectural competition was organised with the objective of developing a detailed master plan for the Technical University campus and research centre. The competition was open to all members of the Finnish Association of Architects and required

detailed proposals for the location of buildings, roads, and open spaces, as well as a substantial number of housing units for both workers and students. Ultimately, ten proposals were submitted, and the winning entry was Aino and Alvar Aalto's "Ave Alma Mater, morituri te salutant', which was selected on the basis of its comprehensive design and its suitability for the development of the area. The competition committee issued the judging report on 6 September 1949, in which they set forth their vision of the search for an appropriate design for the Otaniemi area. It was emphasised that the natural landscape should be integrated into the project, with the university and research buildings located to the south, and the residential areas located to the north and east. The committee underscored the necessity of preserving the natural beauty of the landscape, emphasising the protection of the distinctive linden path and landforms as essential elements for the winning proposal. The winning design was commended for its effective integration of landscape features, which facilitated the segregation of pedestrian and motorised traffic. Additionally, the valley and lime paths were lauded for their seamless integration with the main buildings and residential areas, thus creating a substantial central green space. Conversely, the other non-winning entries were critiqued for their failure to capitalise on the natural opportunities presented by the area, the superfluous road design, and the positioning of the main building in a manner that deviated from the natural centre of the area ("Otaniemen Asemakaavakilpailu," 1949) (Fig. 3).

In the words of Elissa Aalto, Alvar Aalto's second wife and architectural partner, the architect considered that his primary objective throughout his career was to integrate vegetation in a natural manner into his designs, eschewing the construction of such elements artificially. Instead, his approach was to integrate the city into the natural environment, taking into account the existing topography, trees, and light (Livady OY & Maisema-arkkitehtuuri MM, 2014). In this regard, Aalto's proposal is based on this premise, comprising a series of dispersed volumes on the site. The primary interaction with nature is achieved through the low density of the proposal and the formal arrangement of the volumes, which create a series of courtyards that open up to the natural environment and 'embrace' it. Antón Capitel emphasises this perspective through his description of the implementation of the general campus building as a constructed ensemble, whose layout is articulated in such a way that each of its component parts seems to embrace the exterior space in a kind of courtyard sequence (Capitel, 1999).

In the layout proposed by Aalto, both the original design that won the competition and the subsequent modifications, there is a volumetric proposal for the Student Union building, the future Dipoli. Aalto had taken into account the geographical characteristics of the peninsula. Despite the absence of significant constraints, the duality between the flatness of the crops and the mounds resulting from the rocky flora populated by trees, which had been previously present, helped to define and situate the buildings on the university campus.

Aalto decided to locate the trade union building on one of the main mounds on the site, on the other side of a major motorway. It was a large volume consisting of four parts, two of which, arranged in an elongated form, formed the arms that generated an asymmetric U-shape. In this case, one can recognise how the open courtyard sequence, characteristic of the plan, which opens up and incorporates outside nature with an orientation towards the main building of the TKK, was used once again. It is worth noting that there are numerous pedestrian paths that connect campus buildings, in contrast
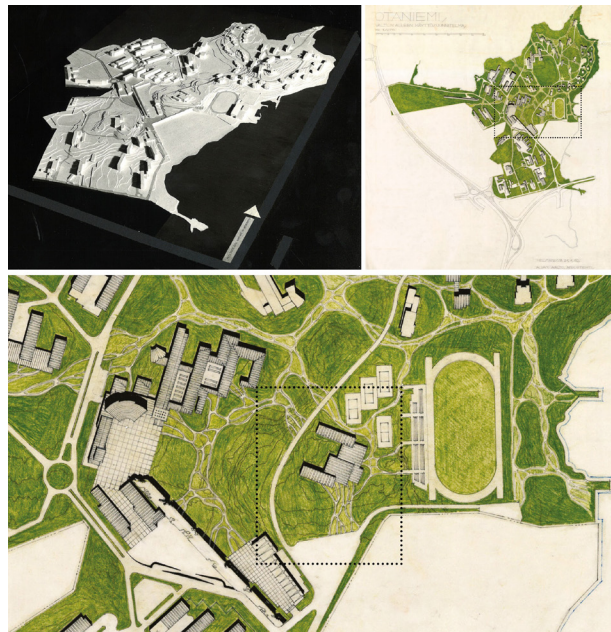
Fig. 3. Top left: Photograph of the model of Aalto's proposal for the campus, 1949. Above right and below: Aalto's plan of the university campus during the development phase, 1960. Suomen rakennustaiteen museo - Museum of Finnish Architecture - MFA and Aalvar Aalto Museum

to the limited presence of motorised roads. Aalto wanted to promote pedestrian routes that would bring people closer to nature. There are no other buildings in the vicinity of the building, but open sports areas.

The landscape reality of the reserved plot was significantly characterised by the presence of dense vegetation and topographical features, which posed a considerable challenge to intervention. However, these conditions, along with the existence of these elements, transformed the complexity of the site into a valuable asset (Fig. 4).

Topographical Transmutations

as design strategies: Dipoli

In 1961, a competition was held for the design of a building to house the Helsinki University of Technology Student Union. After a long process, as the first prize was not awarded in the first round, the project was finally awarded in May 1962 to the architectural couple Raili and Reima Pietilä with the proposal entitled: "Wedding march of the cavemen". (Connah, 1998; Royo Márquez, 2018).

The Pietiläs proposal proposed a completely different design strategy from that of the other participants. Raili and Reima Pietilä opted for a morphological study based on the recognition of forms in the local landscape of the site, which coincided with the top of a large granite hill. In contrast, the other proposals were guided by the rationalist and functionalist principles prevalent at the time (Kari & Fager, 1961). The programme did not specify the explicit character of the future building. However, it did indicate that it should be designed in accordance with the TKK's main building, designed by Aalto. This fact was curious, as the higher elevation of the embankment determined the maximum height of the new design, which could not exceed that of the main building (Vesikansa, 2014). In the documentation submitted by the Pietiläs for the competition, a general section can be seen in which both buildings are shown with an elevation line at roof level, indicating that this altimetric respect was considered. It is noteworthy that despite the relationship to the TKK imposed by the committee, it is known, according to Reima Pietilä himself (Pietilä, 1976)- that Aalto, who was on the jury, asked him why he had not designed

the whole building with the free form that characterises the organic wing. This is paradoxical, since it is precisely the rationalist area that is in dialogue with the TKK and shows its respect for it architecturally, taking its very orientation as a reference (Fig. 1).

The project did not leave anyone indifferent and its effects were very well publicised. Many national and international magazines took up the work, accompanied by critical texts about it, which gave rise to many theories explaining the position taken by Raili and Reima Pietilä. However, the work was not well received or even understood by the rest of their colleagues. Reima Pietilä was very active in this debate, using these interventions to discuss the character of the building and to reveal the interests that had motivated this different and in many ways dissident architecture (Connah, 1994).

Reima Pietilä himself stated that "Dipoli is a "facsimile part", a fragment of the nature-complex of its site" (Pietilä & Norri, 1985). In a way, this was an approach that reflected an interest in conceiving an architecture that would function as a continuation of nature. In an interview with Marja-Riita Norri published in 1985, he explained his position on this matter as follows: "When nature "continues as architecture" it means that natural forms, or more correctly; their morphology, the metamorphoses caused by natural forces, etc. are incorporated into our architectural idiom, parallel to Euclidean form language, or even as a replacement for it." (Pietilä & Norri, 1985). It is not surprising, therefore, that Pietilä took the rocky reality of the site as their starting point, describing Dipoli as the space created by the elevation of a large cut in the terrain, similar to the bedrock characteristic of the site. In the drawings made for this purpose, the 'Euclidean language' is clearly replaced by that of the metamorphoses of natural norms (Fig. 5).

Annotations such as 'luonnonkivi', meaning 'natural stone', can be found in these initial sketches (Fig. 6). Whereas at Suvikumpu (1962-1969) it was the reinterpretation of the surrounding forest that largely determined the character of the building, at Dipoli it was the geological conditions of the site that were most important. Dipoli is the result of a kind of artificial cave, a cavernous space in the middle of the forest. The Finnish cultural concept of forest establishes a relationship between man and nature, in which architecture becomes a catalyst for this relationship (Cortés Sánchez et al., 2024).

From the inside, the cave overlooks the surrounding forest, whereas from the outside the forest seems to be integrated into the façades, which reproduces the density and texture of the forest mass of the landscape. The interaction and definition of these boundaries is therefore one of the fundamental keys to the architectural project: "It is a house that cannot be seen from the air, because it looks as if the rock wall has risen six metres in relief, and because the sides of the house, curved at right angles and tapering to a point, slightly resemble the shape of the rock" (Pietilä, 1966).

From the forest, that is, from outside the cave, it is not easy to see the cave because it wants to stay hidden. As Pietilä put it, "it is a building that cannot be seen": Dipoli is a house on a wooded hill; it is a house that cannot be seen from the sides (Pietilä, 1966). Therefore, the envelope reproduces the forest that hides it. To achieve this, the first point on which this strategy is based is to transfer the material qualities of the forest to the constructive materiality of the building.

The granite of the hillside is transmuted into concrete, and in some cases the granite itself is used directly as a building material. The wood of the tree trunks is reflected in the thick woodwork of the large windows, while the large ridge of the raised roof is clad in copper, alluding to the mass of trees on

Fig. 4. Top: Model of the topography of the Otaniemi peninsula. Bottom: Model of the topography of the site mound with the footprint of the building. 2024. Own elaboration
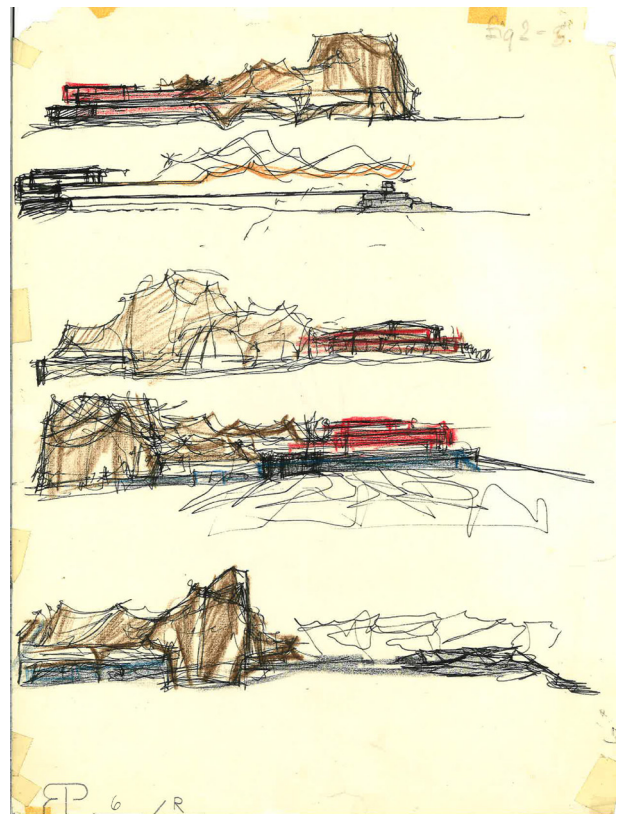
Fig. 5. Sketch of the general volume of the proposal, ca. 1962. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

the upper levels. Concrete, wood and copper, three materials whose ageing has a certain natural character. Julio Cano Lasso reflects on this issue, which directly links architecture and nature, in his text 'The humble details': 'The relationship between architecture and nature, at its most everyday and humble level, is manifested in the action of natural agents on the building materials. [This is a very important aspect of architecture: the behaviour of materials over time, their ageing. [...] There are materials that become more refined as they age. [...] This is also architecture; the architect cannot
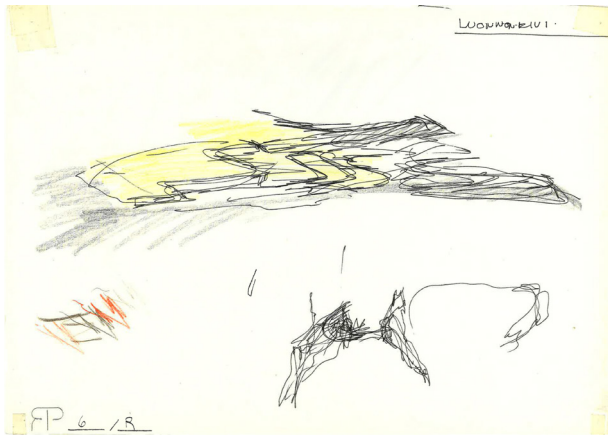
Fig. 6. Early scketch "Luonnonkivi" (Natural stone), ca. 1961. Suomen raken-nustaiteen museo - Museum of Finnish Architecture - MFA

Fig. 10. Top: Section by stairs. Below: Access gallery on the first level. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

Fig. 7. South elevation and ground floor, proposal 31/06/1962. Suomen raken-nustaiteen museo - Museum of Finnish Architecture – MFA
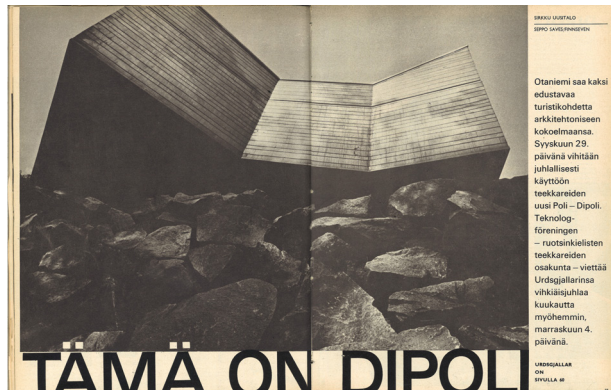
Fig. 11. Photograph of Dipoli published in Suomen Kuvalehti magazine, no. 39 (1966). Author: Seppo Saves - Ffinnseven. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

Fig. 8. Plan of the wooden roofs of the eaves of the organic sector. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

Fig. 12. Plan of the executed proposal, 1966. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

Fig. 9. Floor detail entrance hall. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

neglect these modest details, he must be observant, attentive and sensitive to this small living world and take it into account when imagining his projects' (Cano Lasso, 2021).

In the case of copper, its natural oxidation produces a changing and uneven greenish tone that allows deeper visual integration into the environment. The use of concrete as a kind of new-born stone in architecture is not new; there have been precedents for this strategy in the modernism (Forty, 2012). However, Pietilä take this concept further by combining it with what could be interpreted as a representation of the different states of matter of the rock. The raw material would correspond to the natural state of the mound and the rest of
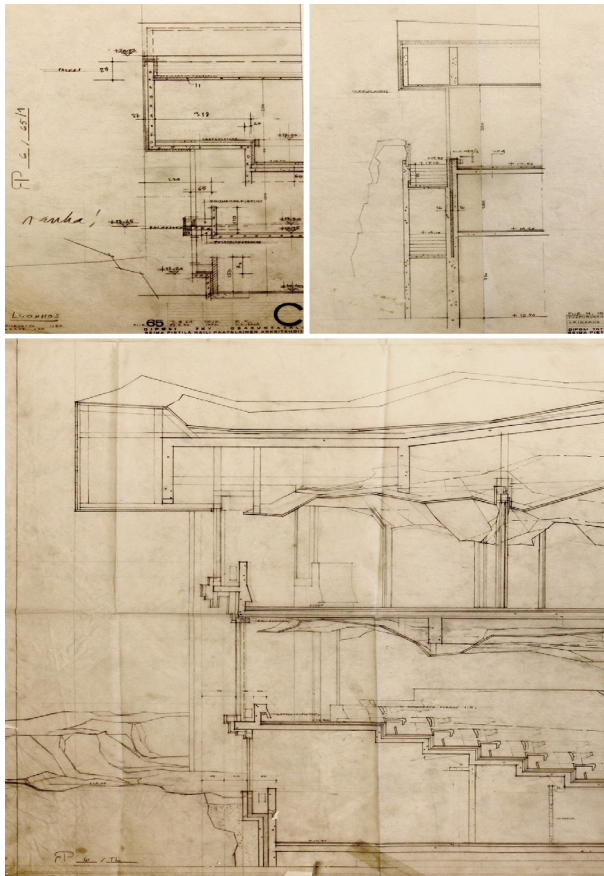
Fig. 13. Detail of the recessing of the vertical wall of the ground floor together with the rocks. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

the preexisting large rock sediments in the landscape. The second state, the result of a transformation process, would be associated with the material broken down into smaller elements during the excavation of the building, which would then be reused as cladding and finishes. Finally, concrete, as the third state, is used in both in its structural function and visible finishes of the building. This interplay between the 'three states' of the stone produces a visual result that enhances the continuity of the landscape. Finally, wood is used as a direct translation of the setting of the trunks of the pine, spruce, and birch trees characteristic of the Otaniemi environment. The designers took this approach to the extreme, translating the rhythmic, modular, and dimensional pattern of the trees into the design of the building envelope. To facilitate this association, the window frames were designed with dimensions visually similar to those of the trunks. Furthermore, modulation based on uniform dimensions was avoided in favour of variability to reproduce the organic richness of the forest.

This is the starting point from which Raili and Reima Pietilä blur the boundaries of the project. The reinterpretation of the forest's own materials becomes a constructive palette that allows them to begin to define the architectural envelope. The architects themselves describe this reinterpretation of the materiality of the forest as follows: "The dark copper of the broad upper part combines perfectly with the height of the pine and spruce branches. The freestanding vertical window frames follow the rhythm of the pine trunks. On the ground floor, the natural stone of the plinth walls gradually grows towards the bedrock that surrounds the house. The building is an integral part of its site" (Pietilä, 1966).

Pietilä associated this position with an understanding of Otaniemi's genius loci: "Nature-architecture is a concept of multiple ideas still unknown in our language. I myself use it now for the first time to signify the way in which nature and architecture interact as elements of genius loci. The peaceful and even mutually beneficial coexistence of nature and architecture in a state of existence, is genius loci approach. Buildings should, with their whole "being", announce this status quo as the principle. The form language of Dipoli essentially expresses this consensus and context. Otaniemi itself was born in the early '50s in the spirit of this forest-urbanism" (Pietilä & Norri, 1985).

The Dissolution of Boundaries

The concern to achieve the desired extension of the exterior landscape of the forest into the interior of the building is present in the very first drawings of the project, in which the importance of materiality is evident in its graphic representation. However, this was not the only way of relating to the landscape. Both the plans and the elevations show a building deeply rooted in the site, the topography, and the forest (Fig. 7). Although the project underwent many variations throughout its development, this characteristic remained constant until the end. The total volume of the project is structured around a large diagonal that divides the building into two areas with different characters. On the one hand, the rational area (to the north-west) houses the more fragmented programme, made up of offices and small rooms. On the other hand, the organic area (to the south-east) contains the uses that allowed for freer forms, such as the main assembly halls and the large foyers. The floor plans of the proposal show how a constant perimeter is avoided, clearly marking the separation between inside and outside. This approach allows the user to experience a gradual transition from the interior of the forest to the depths of the cavern along the route. The authors took great care in defining the boundaries that would allow for this sense of continuity and connection.

Raili and Reima Pietilä used the play of depths in the composition of the building envelope. In this way, through a series of displacements and recesses, they succeeded in creating a greater sense of ambiguity, in which it was uncertain which reality the spaces around the perimeter belonged to: the inner reality of the cave or the outer reality of the birch forest.

The Decomposition of the Façade

The analysis of the various proposals drawn up by the couple has revealed a series of "rules" or "keys" that organise the composition of the building envelope. Firstly, the roof overhang: the eaves; secondly, the rocky extensions: the rocks; and thirdly, the recessing and displacement of the vertical walls: the walls and joinery.

Among these is the important presence of the eaves, an aspect that Pietilä has already highlighted, which the couple use to extend the building's boundary beyond that defined by the vertical walls alone (Fig. 8). The difference between the limit of the roof and the vertical walls, set back towards the interior, creates these eaves, whose variable extension contributes to blurring what could be perceived as a fixed threshold, in favour of unexpected sequential rhythms that evoke the intrinsic variability of nature. The state of a protected space, sheltered and protected from the outside - an idea to which Pietilä himself alludes - contributes to this state of the project, both conceptually and functionally: "In Dipoli the strongly protruding copper eaves that open out in bay-like forms represent cliffs under which the Caveman builds his abode. ' (Pietilä & Palacios, 1995).

In plan 6.655 (Fig. 8), drawn up during the drafting of the execution project, it can be observed that the lines of the
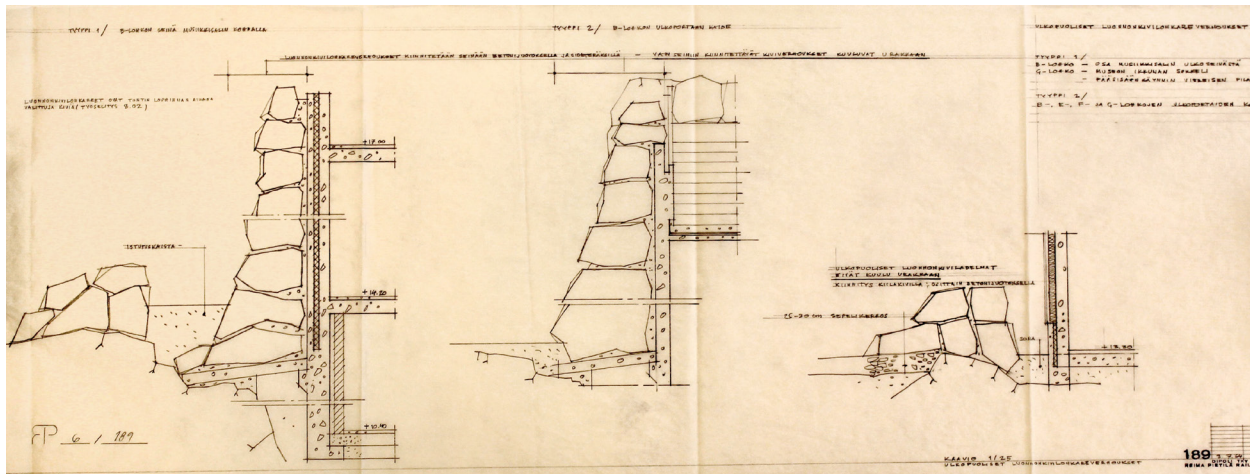
Fig. 14. Detail of the cutting and layout of the rocky covering of the lower walls. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA


Fig. 15. Photograph of the interior space with the large glass windows in the background. 2024. Own elaboration

Fig. 16. Above left: Rationalist area elevation detail. Below and left: Photographs of the exterior. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

vertical walls and the perimeter of the roof are not equidistant, but rather the aim is to create a series of distortions that favour the creation of intermediate spaces, semi-exterior sheltered spaces. The Pietiläs used these spaces, which are somewhat indeterminate, to contribute to the play of the envelope. They acquire the category of 'transitional spaces,' through which the approach to the building implies a journey, not an immediate one. In fact, materiality, which is also reflected in the previous plan, takes on such importance in these spaces that it recreates the shelter that a tree could provide. The underside of the concrete eaves is also clad, but not in copper as on the front, but in wood, in wooden slats that do nothing more than reproduce the branches of the

canopy of the tree that protects us.

Plan 6.456 (Fig. 9) shows how the ground floor entrances were designed under the conceptual premise of the cavern. For example, Figure 10, which corresponds to the entrance on the south façade, shows the application of the compositional rules in these spaces. The entrance halls, conceived as transitional spaces, are made up of breaks and irregularities on the walls. In addition, functional elements stand out, such as the steel platforms - marked with striped shading - designed to remove snow and ice from shoes in winter.

The flexibility of use and the variety of spaces required a proposal with carefully designed circulation and multiple accesses that would allow the building to be used in a variety of ways. To this purpose, access was provided not only on the ground floor, but also on the first floor through external porches protected by the roof overhang. These galleries occupied these intermediate spaces and were located only in the organic area of the building, specifically on the south façade. Plan 6.443 (Fig. 10) shows this multiplicity of routes, through the staircases of the external perimeter galleries and the large internal staircase of the vestibule, which gave access to the main rooms on the upper floor.

The large expanse of the eaves, together with the setback of the vertical surfaces, reinforces the perception that the building is perched on the rock (Fig. 11). This design deliberately integrates the rock formations beneath the overhangs, contributing to the sense of "the landscape continuing into the building". The ground floor plans show how the rocks are drawn into the spaces between them (Fig. 12). Furthermore, the fact that there is a difference in height, which decreases toward the interior, means that the view from these spaces to the exterior is dominated by the rock. This technique is used repeatedly (Fig. 13). The rock excavated during the construction of the building was reused in these spaces. Local material was also used to clad the concrete walls that emerged from the ground. Their arrangement was not arbitrary; specific details were worked out for the cutting and layout of their placement. Although these stones did not have structural function, in some cases, they extended to the upper level, where they were used as parapets or cladding to prevent falls from the galleries on the façade (Fig. 14).

The design of the recessed vertical surfaces was intended to help recreate the surrounding tree mass. Most of the windows are large and require special attention in the design of the joinery to not to detract from the variable character of the building. To achieve this, specific details and junctions were designed to allow the geometries proposed by the architects. The graphic documentation of the project shows the trial and

error of the various solutions that evolved until they were incorporated into the final design.

Large windows are combined with blank concrete walls, sometimes left exposed and sometimes covered with copper or wooden slats. The use of exposed concrete is due to the choice of this material as the main structural component, but also reinforces the conceptual appreciation of concrete as an extension of the rock.

In the rationalist area, joinery also plays a fundamental role. The compositional design of the elevations is achieved mainly through structural choices. In most of the panels, the beams are moved inward to finish the panel with an overhang similar to that in the organic area, so that the joinery can be arranged from panel to panel, maximising its size. In the intermediate panels, the beam is also moved inwards, but it is also partially lowered to create the parapet (140 cm), which creates a hidden space behind it and again allows the glazed area to be increased. These shifts in the arrangement of the structural elements free up the composition of the façade, resulting in large windows and different positions for the internal and external joinery. Each section of the façade is resolved in a specific way, giving rise to a wide variety of solutions and geometric compositions, which are reflected in a large graphic production, essential for the materialisation of these designs on the building site (Fig. 16).

In the case of the organic area, the straight and aligned arrangement of the vertical walls is modified in favour of several breaks with different inclinations, which gives a singularity to the design and the constructive solutions used, although they are based on the same conceptual foundation. The southern façade of the building is characterised by an almost entirely glazed envelope on the first floor.

The interest in incorporating the reinterpretation of the natural forms of the forest into the structural elements of the building was such that, during the development of the proposal, carpentry details were proposed in which the frames were fitted with pieces of wood designed from broken contours (Fig. 17). However, this solution was not used in the final design because of the simplification required by the Works Committee, as it was too costly to produce structural solutions that were not standardised in some way.

The study of the design of the vertical surfaces is interesting in any area of the façade, but the south-east corner, where the staircase leading to the foyer on the first floor is located, is particularly unique. This point connects to the main halls and acquires a unique character through its connection to the outside space. This staircase materialises the theoretical reflection on the interior of the cave overlooking the forest outside. The three strategies mentioned above can be seen in it: the overhang of the roof, the extension of the rocks, and the recessing of the vertical walls and their design (Fig. 18).

The double-height space created by the staircase in the vestibule becomes a large window onto the forest, which opens and looks out. The path that invites us to follow it reveals this wooded exterior, which sheds light on the interior of the cave, a space where there is hardly any light due to its location behind the rock. However, as we progress and climb the first stairs, the sky begins to open up above us, revealing the tops and trunks of the trees. The first trunks we see are the artificial ones, those built by the Pietiläs, which form the vertical framework of their carpentry. The flight of stairs, suspended above the outdoor space, brings us closer and deeper into the forest. The continuity of the landscape extending outwards floods the entire interior of the foyer on the first floor. To emphasise this sense of openness and capture even more of the outdoors, the cantilever opens to create a new, even more dramatic slope,
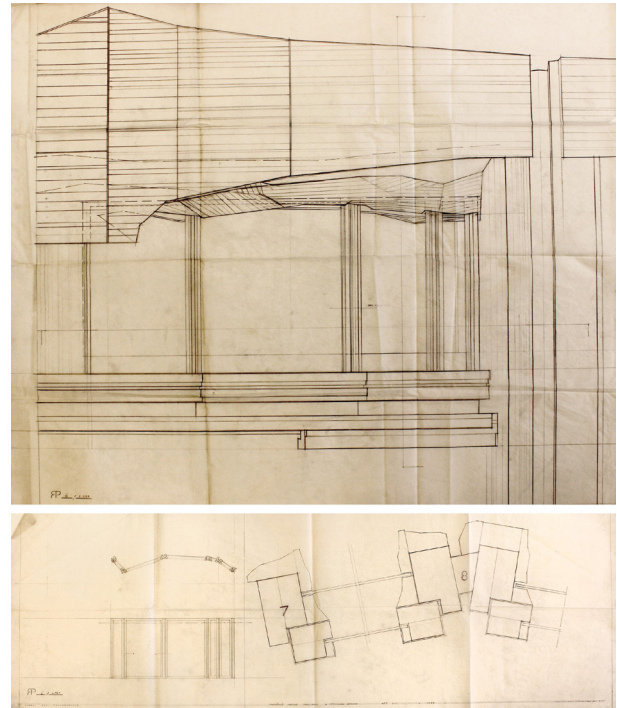
Fig. 17. Detail of the window frames. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA
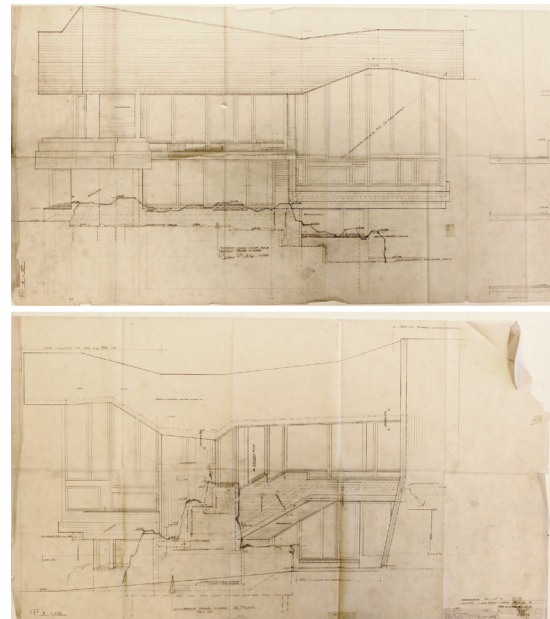
Fig. 18. Southeast corner elevations, 1966. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

Fig. 19. Left: Staircase leading to the foyer of the main halls on the first level. 2024. Own elaboration. Right: Section through the intermediate plateau of the staircase leading to the foyer on the first level. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

Fig. 23. Photograph of the exterior of the building with the shadows of the trees cast on it. 2024. Own elaboration

as shown in Figure 19.

The floor plans that define this area of the building show the different treatment of the two levels (Fig. 20). On the one hand, on the ground floor, the corner is broken up with an intermediate step and an overhang that protrudes over the rocky sediments outside. In addition, the concrete walls are covered with irregular and variable stone masonry. On the upper level, the massiveness of the rock disappears and is replaced by the lightness of the large window frames that support the large panes of glass that provide protection from the outside. In the exploded view of each glass panel, the individuality of the dimensions can be seen, and not a single one is repeated (Fig. 21).

Conclusions

The study of architectures whose strategy of insertion into the landscape goes beyond simple conventional strategies based on immediate camouflage or formalism has been the focus of this research, centred on the case of Dipoli. This analysis has revealed an architecture whose design strategy is based on the dissolution of boundaries, based on principles that avoid traditional solutions and seek a balance between the extreme pole of recreating the natural environment through simple caricature and the opposite pole of illegible abstraction. To achieve this, the Pietiläs relied on a reinterpretation of the geological and arboreal materiality of the site to become that of the architecture, which in turn gave it meaning and whose success was achieved by controlling the construction process, in which the geological and arboreal condition of the site was taken into account.

Dipoli, defined by its authors as a continuation of the landscape, materialises this interest in the process of developing and constructing the building. In a context where the rationalisation and systematisation of architectural processes predominated, Raili and Reima Pietilä presented themselves as a counterpoint to the general Finnish scene. The competition and subsequent realisation of Dipoli allowed them to experiment with previously developed theories of landscape, proposing an experimental work that corresponded to their aim of integrating architecture and nature. A feeling of finding refuge in the forest, which is closely linked to Finnish culture and finds its application in this type of architecture that seeks to return to these environments (Cuellar Jaramillo, 2017; Fernández Villalobos & Jiménez Sanz, 2021). The strong geological condition of the site, together with its forested nature, were the starting points of the project, marking the beginning of a process of reinterpreting these elements in an architectural volume. Conceiving the project as a section of the raised granite hill meant creating an architecture strongly rooted in the site. However, while the idea of continuity with the landscape was clear in theory, the challenge lay in how to materialise this connection with the surrounding landscape, blurring the boundaries between exterior and interior to reinforce this sense of continuity.

Fig. 20. Planta baja y alta en detalle de la esquina sureste y fotografía exterior. 2024. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA and own elaboration

Fig. 21. Above: Photograph of the interior space with the large windows in the background. 2024, Own elaboration. Below: elevation of the window frames. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

Fig. 22. Photographs of the exterior of the building with the shadows of the trees cast on it. 2024. Own elaboration

The facades play a fundamental role in this strategy. On the one hand, it seeks to reinterpret the coniferous forest by integrating with it from the outside; on the other hand, from the inside, it simulates the experience of observing the forest from inside the proposed artificial cave. The materiality is crucial to achieve this effect: the mass of trees, trunks and rocks is transformed into copper, wood, and concrete, materials treated in great detail that reflect this relationship with nature. These materials, alive and worked in detail, can be seen in the structural solutions, where the architects have designed each of these elements with precision.

In addition, the Pietiläs adopted a complementary strategy to materiality, based on three key actions. Firstly, the presence of significant eaves that protru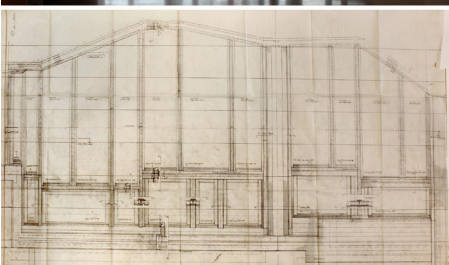de beyond the limits of the walls, irregularly blurring the internal perimeter and creating semi-outdoor sheltered spaces where, secondly, the rocks of the landscape are extended and reused as cladding for the building. Finally, the recessing of the vertical walls under these eaves allowed the incorporation of large windows whose thick frames reproduce the rhythmic and formal patterns of the external trunks. In this way, the architects succeeded in creating a building that resembles a concreted mass of forest, where the play of shadows and reflections between the landscape and the artifice is such that they merge until they coincide in natural dimensions and rhythms (Fig. 22).

The originality shown by Raili and Reima Pietilä in the 1960s with the Dipoli project only adds to the interest and value of this work. In this project, they developed a way of designing in harmony with nature that has few precedents on this scale and with this intensity (Fig. 23). This is undoubtedly a building that transcends its architectural state to become an element of the Otaniemi landscape.

Acknowledgements

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Kopsavilkums

Arhitektūras un dabas attiecības vienmēr ir bijušas viena no galvenajām arhitektūras diskusiju tēmām, vēl jo vairāk mūsdienās. Starp arhitektūras pieejām, ko parasti raksturo kā "dabiskas" un "uz ainavu orientētas", *Raili un Reima Pietilä* darbs izceļas ar savu priekšlikumu radikālo raksturu, tiecoties pēc arhitektūras, ko varētu saprast kā iedvesmotu no dabas formām īpaši līdzsvarotā veidā, izvairoties gan no vienkāršas dabas formu imitācijas, kas robežojas ar karikatūru, gan no nesalasāmām abstraktām interpretācijām.

Pētījums ir balstīts uz Dipoli centra (1961–1966) projektēšanas un būvniecības analīzi kā paradigmatisku piemēru šāda veida arhitektūras radīšanai, kas iedvesmota no ainavas. Izpētes procesā detalizēti izpētīti grafiskie dokumenti, ko arhitekti izveidojuši Dipoli projektēšanas un būvniecības procesā. Izvērtēti materiāli, kas saglabājušies Somijas Arhitektūras muzeja *Arkkitehtuurimuseum* arhīvos, kā arī to konceptuālie apraksti.

Ēka ir attēlota tā, ka nevar definēt skaidru perimetru, bet gan izkliedētu, neskaidru teritoriju ar fragmentētām apmaiņām starp eksterjeru un interjeru. Konkrētā ideja atspoguļojas arī būvniecības komponentu un pamatmateriālu — akmens, betona, koka un vara — izvēlē, kas izvietoti savam laikam inovatīvā veidā, kas mūsdienās joprojām nav salīdzināms. Izmantojot šo pieeju, kļūst grūti skaidri noteikt robežu starp dabisko un mākslīgo, iepriekš pastāvošo un uzlikto, iekšējo un ārējo, kā arī starp vidi un arhitektūras artefaktu.

EXPERIENCE OF URBAN FOREST MANAGEMENT IN LATVIA FROM THE PERSPECTIVE OF EXPERTS AND SITES' MANAGERS

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**Abstract. With the expansion of urbanization, urban structures are changing. In recent decades, increasing attention has been paid to the maintenance and expansion of green spaces. Urban forests, as highly natural multifunctional structures, effectively meet human needs for environmental and social ecosystem services while requiring significantly fewer resources for maintenance compared to parks and landscaped areas. Latvia is rich in forests that have been historically preserved in urban and suburban areas. To assess the management situation of urban forests, six cities rich in urban forests were selected: Riga, Jurmala, Daugavpils, Jelgava, Liepaja, and Ogre. According to European experience, urban forest management is characterized by integration, long-term management strategies, multidisciplinary approaches that go beyond forestry activities, and the involvement of various stakeholders. The authors propose a definition of urban forests specific to Latvia and outline their main functions— social, environmental, educational, nature conservation, aesthetic, and economic. In addition, key challenges and problems were identified based on the opinions of ten experts in urban forest management. The aim of this article is to evaluate approaches to urban forest management in Latvia and to provide recommendations for improving urban forest management. Field studies of forest areas in six cities were conducted, meetings with experts were held, available statistical data on forest areas were analyzed, and municipal and management company strategies, forest management plans, and other relevant information were reviewed. The study compiled and analyzed urban forest areas, their distribution within cities, specially protected areas, forest parks, dominant tree species, forest landscape characteristics, and the potential of natural resources for recreation Recommendations were made: to develop an understanding of urban forest functions, to define and identify areas critical to these functions, and to recognize them in the field. Urban forest managers should consider a wide range of knowledge, not limited to forestry, encourage collaboration between stakeholders, and educate the public. It is important to improve recreational areas, implement zoning of maintenance intensity to reduce anthropogenic pressure, ensure accessibility, preserve natural values, and enhance resilience to climate change. It is also essential to update legislation on urban forest management to reflect current conditions.
Keywords: urban forests, management of urban forests, strategic planning**

Introduction

Over the last 100 years, significant changes have occurred in human society worldwide. Urbanization processes create challenges that manifest in the interaction between the city and its surrounding areas (Carreiro et al., 2008). Cities and their vicinities experience a high concentration of population within small areas, leading to the expression of diverse interests. Forests provide residents with a wide range of goods and services (Seidler & Bawa, 2013). Intensive balancing and fulfillment of needs are required, which can only be effectively achieved through a modern spatial planning approach— integrating environmental, economic, and social aspects such as sustainable resource use, pollution reduction, landscape planning, and consideration of societal interests (Konijnendijk et al., 2006).

Urban forests play a crucial role in creating a favorable living environment within urbanized city spaces. Urban forests are a multifunctional component of the urban environment.

To understand the state of urban forests in Latvia, this article examines the major cities of Latvia: Riga, Jurmala, Daugavpils, Jelgava, Liepaja, and Ogre, which are rich in urban forests. Since urban forests serve as public open space and are rarely owned by private entities, the article focuses mainly onmunicipal and state-owned forests.

According to the authors, an urban forest is a natural, semi-natural, or artificially created ecosystem in all its developmental stages. It is dominated by trees, which in the given location can reach a height of at least five meters, with their current or potential crown projection covering at least 20 percent of the forest stand area (Meža Likums. Latvija Republikas Saeima, 2000). In urban forests, the primary functions are social and environmental. Urban forests serve as public outdoor spaces

within the administrative boundaries of cities and in the surrounding urban environment.

Based on theory, previous experiences, and field studies, the authors identify six key functions of urban forests: social, environmental, environmental education, nature conservation, aesthetic, and economic. These functions are further explored in the article "The Ogres Zilie kalni park urban forest management." Authors: Ieva Kraukle, Ilze Stokmane, Kristine Vugule (Kraukle et al., 2022).

The management of urban and periurban forests as scientific concept emerged in Western Europe in the early 1960s, with the first concepts dating back to the 1890s. However, deeper interest began in Great Britain, later spreading to the Netherlands and Ireland, and since the mid-1990s, throughout Western Europe (Akmar et al., 2011).

Unlike the planning of commercial forests, urban forest planning and management emphasize specific characteristics, as highlighted by C. Konijnendijk and other authors (Akmar et al., 2011; Selman, 2010):

- Integration – A comprehensive approach that includes all urban tree resources, including parks and landscaped areas, requiring coordinated planning and management.
- Strategy – A long-term management vision with diverse uses.
- Multidisciplinary nature – Encompassing a wide range of management fields.
- Participation – Involvement of various stakeholder groups in management processes.

Today, in the context of urban forests, we can no longer speak of traditional forestry but rather of social forestry, where the primary tasks are related to providing social functions and

services (Konijnendijk et al., 2006) and ensuring environmental education (Akmar et al., 2011).

Forests are long-lasting and self-sustaining structures, provided there is no significant human intervention in their natural processes. In urban environments, humans influence forests even without intensive logging—through constant presence, recreational activities, and the emissions from vehicles, heating systems, and industrial production.

Like any natural system, forests have a certain threshold of tolerance for anthropogenic pressures (Emsis & Tuktens, 1988; Seidler & Bawa, 2013) . If the recreational process is not controlled or purposefully managed, it can lead to significant changes in heavily visited areas of the natural forest environment, causing its degradation.

Anthropogenic pressure is mostly defined as pollution resulting from human activity, but this is only part of the anthropogenic load, which encompasses the broader human impact on the environment and nature (Bisht et al., 2024).

Forest managers require a comprehensive scientific understanding of natural processes in forest stand development, integrating ecological and economic goals into planning (Donis, 2003; Franklin et al., 2002). While preserving the best of ancient traditions, cities must be planned to be ecologically sustainable and resilient to internal and external environmental fluctuations. It is essential to ensure a living environment of sufficient quality for people to not only exist but also develop comprehensively. To achieve this, the importance of green spaces, particularly urban forests, in urban planning and development processes is growing.

The typical urban environment surrounds forests in cities and suburbs. Forests are an essential component of the spatial structure. Over centuries, unique cultural landscapes have formed in each city, including characteristic urban forest landscapes that display both common and distinct features. Forest landscapes are visually enclosed, and their formation, management, and functions are highly specific. Urban forests have sufficient size and quality to ensure stable natural environmental conditions and continued development. They are resilient to the elevated demands posed by urban environments—adverse growing conditions created by humans, vandalism, mechanical damage, excessive use of areas, and environmental pollution.

Urban forest landscapes face threats from urban sprawl. Larger forest areas are fragmented, significantly affecting their viability. Habitat fragmentation, including urban forest fragmentation, is a physical process in which large, continuous habitat areas are divided into smaller and/or more numerous fragments (Franklin et al., 2002). It is essential to preserve forest masses as intact and unfragmented as possible, as ten fragments with an average size of 1 km² tend to support less biodiversity than a single fragment of 10 km² (Ehrlich & Kremen, 2001; Seidler, 2017; Seidler & Bawa, 2001).

A significant problem is soil erosion and compaction in intensively used urban forest plots. Urban natural heritage is being depleted, and biologically valuable landscapes are being replaced with ruderal landscapes of low species diversity. City parks and public green spaces require regular maintenance and improvements (Straupe et al., 2012, 2014).

Materials and Methods

The study focuses on distinctly forested Latvian cities across all statistical regions (Statistical regions (NUTS 3) of Latvia): Riga, Jurmala, Jelgava, and Ogre, located in close proximity to the capital city Riga (LV006), within the Pieriga (LV007), Zemgale (LV009), and Vidzeme (LV008) statistical regions, as well as Daugavpils and Liepaja, situated far from the capital, in the Latgale (LV005) and Kurzeme (LV003) statistical regions.

The article aims to 1) evaluate urban forest management approaches in Latvia using the established principles of integrity, strategy, multidisciplinary management, and participation, and 2) provide recommendations for improving urban forest management.

Field studies of forest territories were conducted, available statistical data on forest areas were analyzed, as well as strategies of municipalities and management companies, forest management plans, and other relevant planning documents. This approach aimed to assess whether urban forest management exhibits characteristics distinct from traditional forestry, which predominantly focuses on timber production.

Interviews were conducted with experts from management institutions, discussing the implementation of management principles and gathering opinions on the authors' proposed definition of urban forests and their main functions (social, environmental, environmental education, nature conservation, aesthetic, and economic). Opinions were also sought on the integration of these functions into spatial or thematic planning documents. A key aspect of the research is identifying necessary legislative changes and the main challenges in urban forest management.

The article evaluates the following aspects related to the selected urban forests:

- City area, forest, and green space areas, considering that forest land includes land covered by forests, land under forest infrastructure, as well as floodplains, marshes, glades, and adjacent swamps (Meža Likums. Latvija Republikas Saeima, 2000).

- Property rights (municipal, state, private forests) – since cities are the focus, greater attention is paid to the volume of forests owned by municipalities. The information available in planning documents, municipal and company websites is prepared in different time periods and varies in content. This article uses data compiled by the Latvian Association of Local and Regional Governments on city forest areas and property rights in 2021 (Latvijas Pašvaldību savieniba & Upenieks, 2021) and city areas as per the Latvian Official Statistics Portal (Oficiālās Statistikas Portāls, n.d.).

- Specially protected areas in urban forests (Meža ĪADT) as essential for ensuring environmental and natural functions of urban forests. Data were verified through the Nature Conservation Agency's Nature Data Management System Ozols (Dabas Datu Pārvaldības Sistēma Ozols, n.d.).

- Forest parks as special structures within the urban forest network – defined as forest territories of public or cultural-historical significance, equipped with facilities and used by the public for recreation (Meža Likums. Latvija Republikas Saeima, 2000). These are established following Cabinet of Ministers Regulations on the creation and management of parks and forest parks (Noteikumi Par Parku Un Mežaparku Izveidošanu Mežā Un to Apsaimniekošanu, 2013).

- Significant forest masses – the primary structural components of urban forests. Information was obtained from planning documents and expert interviews.

- Main tree species characteristic of Latvian urban forests. Data were gathered through expert interviews, planning documents, or company websites.

- Forest landscape characteristics, influenced by biotic and abiotic growth conditions and the nature of urban development. Data were obtained from expert interviews and field surveys.

- Management institutions, primarily municipalities, responsible for managing the main parts of urban forests in each city.
- Integrity – whether all urban tree resources requiring planning and management (forests, parks, and greenery) are accounted for.
- Strategy – whether a long-term management vision and plan have been developed.
- Multidisciplinary management – the scope of diverse management areas.
- Participation – involving various stakeholder groups in management and communication with the public (Beckley et al., 2006; Wolf & Kruger, 2010).
- City resort status – according to the Cabinet of Ministers regulations on resort status (Kūrorta Statusa Piešķiršanas Un Anulēšanas Kārtība, 2012).

Results and Discussion

Based on municipal planning documents, official statistical data, and expert interviews, information has been compiled on the key indicators of the selected cities, emphasizing the role and significance of urban forests at both the local and national levels. The study has yielded the following data and results.

As shown in Figure 1, Riga, Jurmala, and Liepaja are located along the Baltic Sea, while Jelgava, Ogre, and Daugavpils are situated further inland within the territory of Latvia.

Table 1 summarizes information on the total area of six Latvian state cities, the forested areas within them, and their ownership distribution. The data compiled in Table 1 are visually represented in the first and second diagrams.

Riga, as the capital of Latvia, is more than twice the size of other cities and has the largest urban forest area. Jurmala stands out as the second-largest city with a significant urban forest area. Daugavpils, Liepaja, and Jelgava are similar in terms of city size and the extent of urban forests. Ogre, although the smallest of the examined cities, has a comparable proportion of urban forests.

Analyzing the data for the six cities (Figure 2), the highest proportion of forests is in Jurmala, at 37%, while the lowest is in Ogre, at 13%. In the other cities, the forest coverage is similar, ranging between 18% and 22%. Publicly accessible municipal and state-owned forests dominate in all cities. The share of municipal urban forests is highest in Liepaja (96%) and Riga (89%), followed by Daugavpils, Jelgava, and Ogre (58–71%), and lowest in Jurmala (43%). A relatively high proportion of state-owned forests is observed in Jurmala (51%) and Jelgava (38%), compared to 3–8% in the other cities. Forests owned by private individuals are the least represented, ranging from 0–7%, with higher proportions in Daugavpils (21%) and Ogre (38%).

The forested areas designated as Specially Protected Nature Territories (ĪADT) occupy particularly large areas in Jurmala, with smaller areas in Riga, Liepaja, and Ogre, while such areas have not been designated in Daugavpils and Jelgava. According to the Cabinet of Ministers' regulations (Noteikumi Par Parku Un Mežaparku Izveidošanu Mežā Un to Apsaimniekošanu, 2013), forest parks have been established only in Riga and Jurmala.

Large forest masses (forest tracts or continuous forest cover areas) are a key component of the urban forest structure, possessing distinct cultural-historical, environmental, and landscape characteristics. Unlike the designations of forest compartments and sections, forest mass names are commonly used not only by foresters but also by local residents.

In the cities examined in the study, pine trees dominate, except in Jelgava, where birch trees are the most common.
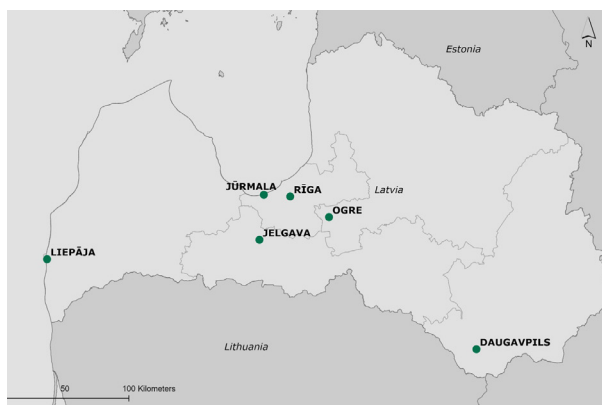
Fig.1. Case study areas (cities) selected for the research (created by authors)

TABLE 1

Urban forest areas and ownership
(2021 data, created by the authors)

Area ha	Riga	Jurmala	Daugavpils	Jelgava	Liepaja	Ogre
City *	30400	10123	7237	6056	6802	1618
Forest area**	5494	4801.68	1592.1	1121.35	1191.53	209.35

*(Oficiālās Statistikas Portāls, n.d.)

**(Latvijas Pašvaldību savieniba & Upenieks, 2021)
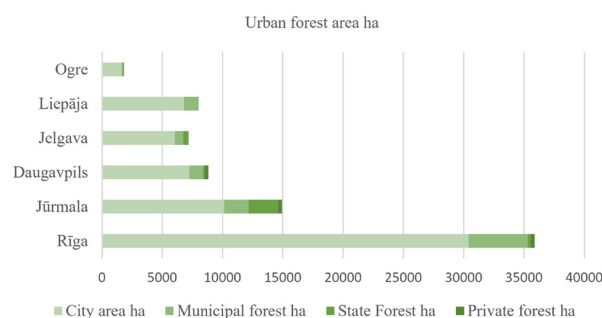
Fig. 2. Urban Forest Areas and Ownership Distribution
(2021 data, created by authors)
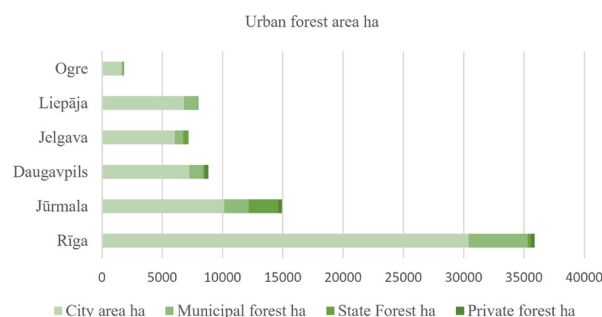
Fig. 3. Urban Forest Areas and Ownership Distribution in Percentages
(2021 data, created by authors)

The main tree species influence the character of the forest landscape and its resilience to anthropogenic pressures (Kalnins et al., 2017; Straupe et al., 2012, 2014).

The larger forest masses predominantly form a continuous, closed forest landscape. In Jurmala, Ogre, and in some areas, smaller forest masses are located close to the city center. In

TABLE 2

Urban forest structures in case study areas (created by the authors)

#	Riga	Jurmala	Daugavpils	Jelgava	Liepaja	Ogre
Specially Protected Nature Territories	Nature Park Piejūra Nature Reserve Jaunciems	Ķemeri National Park Nature Park Ragakāpa Nature Reserve Darmštates priežu audze	Not established	Not established	Nature Park Tosmare	Nature Park Ogres Zilie kalni
Forest parks	Mežaparks Mārupītes Aniņmuižas	Dzintaru	Not established	Not established	Not established	Not established
Forest tracts	Mežaparks Biķernieku mežs Šmerļa mežs Mangaļsala Buļļusala Kleistu mežs Anniņmuižas mežs etc.	Jaunķemeru Kaugurciema Slokas Krauķļu kalnu Krastciema Valteriema Mellužu Druvciema Jaundubultu Dzintaru viadukta Stirnu raga Lielupes Ragakāpas	Mežciema Stropu Križu Ruģeļu Čerepovas	Langervaldes RAF Ozolnieku Siliņu-Viskaļu Šūmaņu Lediņu Kārniņu Strautnieku	Karostas mežs Pie Liepājas slimnīcas Dienvidrietumu Zaļās birzes	Ķenteskalna Turkalnes ielas Pie vecajiem Ogres kapiem Ziliekalni
Main tree species	*Pinus Sylvestris* 88 % *Betula pubescens, Betula pendula* 8 % *Alnus glutinosa* 2 %	*Pinus Sylvestris Betula pubescens, Betula pendula Alnus glutinosa*	*Pinus Sylvestris* 91 % *Betula pubescens, Betula pendula* 5 % *Alnus glutinosa* 3 %	*Betula pubescens, Betula pendula* 43 % *Pinus Sylvestris* 30 % *Picea abies* 8 %	*Pinus Sylvestris* 49 %, *Betula pubescens, Betula pendula* 29 %, *Alnus glutinosa* 19 %	*Pinus Sylvestris* 37 % *Picea abies* 29 % *Betula pubescens, Betula pendula* 20 %

*(Regulations on the Establishment and Management of Parks and Forest Parks in Forest Areas, 2013)

all cities, urban forests on the periphery connect with large suburban forest masses (Figures 4, 5, and 6).

In all of the examined forested areas, the forest masses directly adjoin urban development, particularly in highly urbanized areas. In some locations, private houses are built within the forested areas, creating a seamless transition to the forest, while in other places, forests directly connect to multi-story residential buildings, as seen in Ogre, Jurmala, and Riga (photographs from Table 3).

All of the cities feature relatively flat terrain, with distinct articulated relief features preserved specifically within the forested areas. In Jurmala, Liepaja, and partially in Riga, the distinctive coastal dune relief with pine forests is preserved. In Liepaja, wet valleys between the dunes, predominantly with alder stands, are also maintained. Jelgava is dominated by the Zemgale plain, which lacks notable relief. In Riga, Jurmala, and Liepaja, urban forest areas connect to the expansive water landscapes of the Baltic Sea or other major water bodies (photographs from Table 3).

Management Authority: In all cities, the leading management authority is linked to the local municipality (Table 5). State-owned urban forest areas are managed by the joint-stock company "Latvian State Forests" (Latvijas valsts meži), while in some areas of Jurmala, the management is handled by the Nature Conservation Agency. In Jelgava, part of the state-owned urban forests is managed by the Latvian State Forest Science Institute Silava and the Forest Management Agency Forest Research Station of the Latvian University of Agriculture at the Jelgava Information Center (Visit Jelgava, n.d.). Jurmala (Stratēģiskā Ietekmes Uz Vidi Novērtējuma Vides Pārskats Jūrmalas Valstspilsētas Attīstības Stratēģijai

2010.-2030.Gadam – Aktualizācijai, 2023; Jūrmalas pilsētas pašvaldība, 2010). Liepaja (Liepaja.Lv, n.d.). A special mention should be made of SIA Rīgas meži. which is the leading urban forest manager in Latvia with extensive experience, significant financial resources, and a large workforce. As of 2024, SIA Rīgas meži operates four forest districts - Riga, Jugla, Tīreļi, and Katrīna - that manage the forests, gardens, and parks owned by the Riga municipality. Their jurisdiction includes approximately 63,000 hectares of forest, including 4,893 hectares within Riga itself, as well as areas within a 50 km radius of the capital and the Katrīna forest district in the Limbaži region (Rigas Meži, n.d.).

Integrity: In all the cities examined, all urban tree resources that require planning and management have been compiled - municipal forests, parks, and green spaces.

Strategy: Municipal planning documents outline the general directions for the development of forests and green areas. In all cities, a long-term management vision has been established, which may be either simple or complex. Each forest property has undergone forest inventory and has a forest management plan. A forest owner is obligated to develop a plan if the total managed forest area exceeds 10,000 hectares (Noteikumi Par Meža Apsaimniekošanas Plānu, 2014). Among the forest owners examined, only SIA Rīgas meži is required to develop a Forest Management Plan, which is created starting from the long-term, landscape level, down to an annual, detailed perspective. The plan is based on the Forest Management Plan (MAP) for 2017–2026 (Rigas Meži, n.d.), which is built on the ecological landscape planning (AEP) at the landscape level, specifying the volumes of forest management and determining the maximum
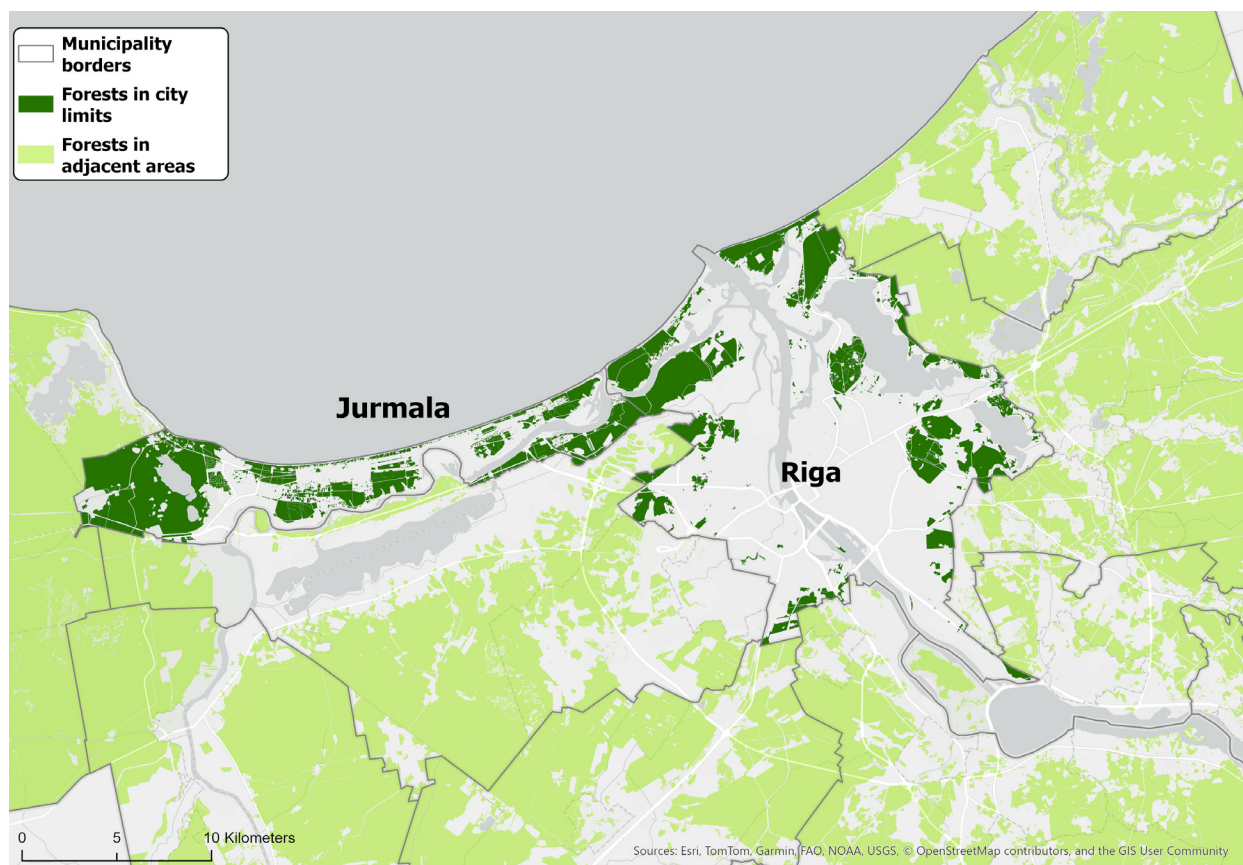
Fig. 4. Illustration of Urban forest coverage in Riga and Jurmala (created by authors)

allowable cutting volumes for each forest district and forest compartment (Rigas Meži, n.d.). At the end of the year, a "Forest Management Monitoring Report" is prepared.

Based on the nature and recreational value zoning obtained through the landscape ecological planning process, the following zones are distinguished in the forests managed by Rīgas Meži: nature zones, recreation zones, nature and recreation zones (where they overlap), and forest management zones (Rigas Meži, n.d.).

Multifunctional management

There are primarily explanatory publications, surveys, and community events organized by other municipal structures. In the Rīgas meži forest areas, numerous uses are maintained, including economic activities such as selling standing timber and growing seedlings for forest regeneration. In 2012, SIA Rīgas meži began forestry operations, including the improvement of recreational areas, forest undergrowth maintenance, and waste collection.

SIA Rīgas meži organizes various environmental education activities both independently and in collaboration with other sector participants. These include Forest Days, thematic exhibitions, sports events, waste collection and tree planting campaigns, educational excursions, as well as the publication of books and other printed materials. Expanding on the initially established Green Classroom, SIA Rīgas meži has created the EKVIDO environmental education center, which aims to raise public awareness of forest management and the significant role of the forestry sector in Latvia.

Participation: In most cities, explanatory publications, surveys, and community events are organized, often by other municipal structures. The involvement of stakeholders is most extensive in SIA Rīgas meži. In the nature and recreation zones designated by the Landscape Ecological Planning, within urban areas, local landscape design plans are developed

based on the zoning of the Forest Management Plan and Landscape ecological plan, considering natural and other values. These plans are made available for public consultation or information through the company's website. Suggestions from the public are evaluated, and if necessary, the planned forestry activities are adjusted based on feedback.

Resort designation: Several of the cities have resort potential. The most significant resort natural therapeutic resources, as defined by the Tourism Law, 1998 (Tūrisma Likums, 1998) include fresh air, waters, therapeutic muds, forests, and others. To obtain official resort status, compliance with regulatory acts is required (Procedure for Granting and Revoking Resort Status, 2012; Kūrorta Statusa Piešķiršanas un Anulēšanas Kārtība, 2012). In Latvia, two resorts have been officially designated: Jurmala and Liepaja.

Additional Management Restrictions: The strictest regulations for urban forest management are in Jurmala and Liepaja, with certain areas of Riga also subject to specific regulations - particularly for coastal forests and specially protected nature reserves. In Jurmala, due to these restrictions, forestry management activities are effectively not carried out in urban forests. Only dangerous trees are felled and left in the forest, and in certain areas, undergrowth shrubs are cleared. In Ogre, there are additional restrictions for managing protected nature reserve forests. In Jelgava and Daugavpils, there are no additional restrictions for the maintenance of urban forests.

The expert survey was carried out in May-November 2024 with 10 experienced professionals from institutions involved in urban forest management. The experts agreed with the authors' definition of urban forests, the identified functions of urban forests, the stakeholders, the need for legislative changes. 7 experts supported the urban forest classification groups, 3 recommended simplifying the classification. The
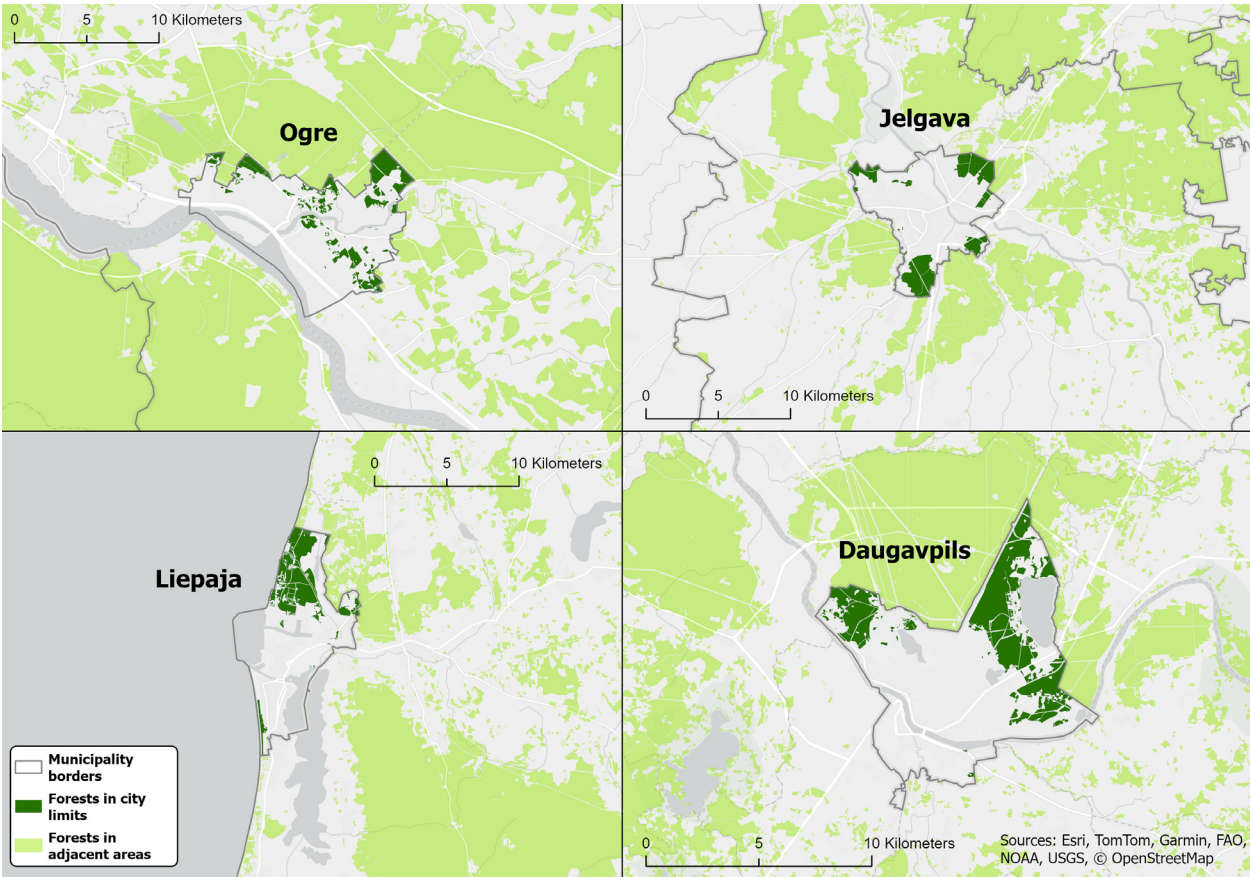
Fig. 5. Illustration of Urban forest coverage of Ogre, Jelgava, Liepaja and Daugavpils (created by authors)

TABLE 3

Photographs from the research areas. Landscape character (created by the authors)

Town	Forest areas directly adjoin built-up areas, distinctly urbanized territories.	Forest areas directly adjoin built-up areas, distinctly urbanized territories.
Riga	Ancient seaside dunes along the Daugava.	High-rise buildings bordering with forest.
Jūrmala	Baltic Sea Gulf of Riga coastal dunes.	High-rise buildings. Fragmented forest mass. Significant storm damage.

Town	Forest areas directly adjoin built-up areas, distinctly urbanized territories.		Forest areas directly adjoin built-up areas, distinctly urbanized territories.
Daugavpils			
	Near the Lielais Stropu Lake, flat terrain.		Residential housing development bordering forest.
Liepāja			
	Baltic sea coastal dunes.		High-rise buildings (not visible in the photo) directly behind the forest. Due to restrictions, the visually unappealing poplars cannot be cleared.
Jelgava			
	In Jelgava, the urban forest masses do not connect to water bodies, with a distinctly flat relief.		Residential housing development bordering forest.
Ogre			
	Dune ridges, Dubkalni water body in the area of the former gravel quarry.		High-rise buildings.

TABLE 4

Characteristics of forest landscapes (created by the authors)

Forest Landscape Characteristics	Rīga	Jūrmala	Daugavpils	Liepāja	Jelgava	Ogre
Forests form a relatively continuous, closed forest landscape.	Yes	Yes	Yes	Yes	Yes	-
Smaller forest tracts have been preserved closer to the center.	-	Yes	-	-	-	Yes
There are no large forest masses in the center.	Yes	-	Yes	Yes	Yes	-
On the city periphery, forests connect with large suburban forest masses.	Yes	Yes	Yes	Yes	Yes	Yes
Forest masses directly adjoin built-up areas and highly urbanized regions.	Yes	Yes	Yes	Yes	Yes	Yes
Flat terrain.	-	-	-	-	Yes	-
Relatively flat terrain with isolated articulated sections of the landscape preserved within forest areas.	Yes	Yes	Yes	Yes	-	Yes
Forest masses border larger water bodies.	Yes	Yes	Yes	Yes	-	-

TABLE 5

Urban forest management and governance (created by the authors)

#	Rīga	Jūrmala	Daugavpils	Jelgava	Liepāja	Ogre
Managed by	Riga Forests Municipal Ltd Riga Forestry	Jurmala City Council Forestry Department	Daugavpils City Municipal Institution "Communal Utilities Department"	Jelgava City Municipal Institution "Urban Management"	Liepaja Municipal Administration	Ogre County Municipal Agency Tourism, Sports and Recreation Complex Zilie kalni Development Agency
Integrity	Fully	Fully	Fully	Fully	Fully	Partly
Strategy	Medium-term strategy for 2019-2025 Forest management plan (FMP) for 2017-2026 Landscape ecological planning (LEP)	Jurmala Development Strategy for 2010-2030	Sustainable Development Strategy of Daugavpils City and Augsdaugava Region until 2023 Forest Inventory	Forest Management Plan Forest Inventory	Forest Management Plan Forest Inventory	Agency Strategy 2023-2026 Forest Management Plan 2023-2026 Forest Inventory
Multidisciplinary management	Environmental education events, EKVIDO hikes, clean-ups. Recreation area landscaping, undergrowth maintenance, waste collection. Growing of forest planting material Sale of standing timber Logging works	Clean-up Small-scale landscaping of recreation areas, undergrowth maintenance, hazardous tree felling, waste collection	Environmental education events, clean-ups Improvement of recreational areas, undergrowth maintenance, waste collection. Sale of standing timber	Clean-up Sale of standing timber Small-scale landscaping of recreational areas, undergrowth maintenance, waste collection	Clean-up Sale of standing timber. Small-scale landscaping of recreation areas, undergrowth maintenance, waste collection	Environmental education, hiking, clean-ups Improvement of recreation areas, undergrowth management, waste collection. Sale of standing timber
Participation - the involvement of different interest groups in management	Active, explanatory publications, surveys, clean-ups, public consultation on planned works	There are mainly explanatory publications, surveys, clean-ups organised by other municipal bodies	There are mainly explanatory publications, surveys, clean-ups	There are mainly explanatory publications, surveys, clean-ups	There are mainly explanatory publications, surveys, clean-ups	There are mainly explanatory publications, surveys, clean-ups
Resort	No	Yes	No	No	Yes	No
Additional restrictions for management	Partly Special rules for the management of coastal, special protection areas forests	Special rules for the management of forests in coastal, special protection areas	No	No	Special rules for the management of forests in coastal, special protection areas	Partly Special rules for the management of coastal, special protection areas forests

biggest debate was the inclusion of urban forest functions in the municipal spatial plans (local law) - only 2 experts fully supported it, 6 considered that it could complicate the actual planning and management process, there was more support (5) for showing urban forests in thematic spatial plans, 2 had no experience with municipal spatial plans.

Main conclusions summarized from the open-ended questions: When evaluating the challenges of urban forest management and stakeholder cooperation, all experts agree that it is necessary to educate the public in order to reduce drastically differing opinions, explain the need for forest management, and the limited placement of waste bins. Communication with all stakeholders is crucial, as well as exchanging experiences among professionals.

The main urban forest problems, particularly aggravated in coastal areas, are the contradictions between the natural and recreational functions – valuable natural areas attract many tourists and residents, resulting in differing opinions and interests. It is important to organize human traffic and reduce waste problems.

For forest owners, it is important to build understanding of society's needs. The value of forests is not just about timber, other benefits are of greater value, though difficult to demonstrate monetarily. The integration of urban forests' social and ecological functions and finding compromises between these concepts is important.

A challenge in urban forest management is also climate change – storms, insects, invasive species, etc. Due to climate change, it is crucial to prevent the ecological condition of urban forests from deteriorating while maintaining an attractive environment for recreation, which requires strong cooperation with nature conservation authorities.

All experts agree that the most important factor for quality forest management is sufficient funding – according to modern legislation, professionally managing forest stands/landscapes, infrastructure, ensuring accessibility, transparency/safety, waste collection, and zoning of maintenance intensity. In the allocation of funding and strategy setting, political influence is crucial, with opinions sometimes being influenced/defined by specific individuals.

Foresters have gradually adapted to the existing legislation, one option being to obtain park status, which is a bureaucratic and costly process but allows landscape cuts in urban forests. However, most experts believe that changes in the legislation are necessary, particularly in reviewing the allowable clear-cut areas in cities to ensure the natural regeneration of sun-loving species, prevent the spread of invasive species, and avoid overgrowth. All experts involved in coastal urban forest planning and management acknowledge that there are legal restrictions that significantly limit forest management – coastal forests are subject to restrictions in urban areas, especially conservation area restrictions and dune protection zone limitations. Clear-cuts are not allowed, only thinning, maintenance, and sometimes only dangerous trees can be removed, either left on the ground or used to reinforce dunes. Nature protection limits the forest management function. In nature parks, intensively used recreational areas – large numbers of trees are dead, posing a danger and being visually unappealing. It is important that one set of rules does not prevent the proper realization of another function – there should be an option to address specific situations on an exceptional basis.

Conclusions

Summary of findings and recommendations for urban forest management and governance in Latvia:

Urban Forest Definition and Functions:

- The proposed definition of urban forests does not require significant changes based on expert surveys and feedback.
- A broader discussion is needed on the classification of urban forest functions and their inclusion in planning documents. It may not be necessary to reinforce them in Territorial Planning as binding regulations, but this information should be included in thematic plans and descriptive sections, creating various maintenance intensity zones according to the environmental load, which may change over time. The benefits should include not only forest growth but also social and environmental aspects.
- The experience from Riga's forests is notable, with the categorization of zones based on natural, recreational, and forestry values. In the nature and recreation zones, tree felling is carried out according to landscape planning guidelines.
- The definition and use of urban forests should be promoted, particularly by identifying and planning the management of valuable nature, recreation, and cultural-historical areas to assess whether they should be reinforced in municipal regulations.

Planning and Governance:

- Broad public education on nature conservation and landscape management processes is necessary to minimize societal disagreements.
- The participation of all stakeholders is essential, involving various interest groups in planning and managing urban forest processes.
- Communication is key at all stakeholder levels, fostering collaboration between managers, legislators, and involved institutions. Effective communication encourages responsibility, responsiveness to citizen needs, resource conservation, and constructive attitudes focused on solving problems.
- Urban forest managers should have knowledge in forestry, environmental science, public administration, psychology, spatial planning and landscape architecture as the problems primarily concern these fields and their interconnections. Planning at both strategic and operational levels should be more emphasized, especially in social and landscapes issues. Greater public education and involvement are crucial for successful governance.
- Several municipal companies manage urban forests, and their operation depends on local government policies, which may influence governance priorities and funding.
- Adequate funding for infrastructure, such as organizing visitor flows and conducting maintenance tasks (e.g., waste collection, undergrowth management, grass mowing), is essential.

Mitigating Human Impact and Enhancing Resilience:

- Further urbanization and forest fragmentation should be prevented. Forested areas, both large and small but biologically significant, form the core of the urban structure. Valuable natural areas should be carefully managed, preserving their added value to the city's overall offerings.
- To reduce urban sprawl and fragmentation, tougher restrictions on new construction in urban forest areas should be implemented in planning documents, except for buildings necessary for recreation.
- It is important to improve resilience to human-induced pressures, soil compaction, and erosion. In the planning of urban development, tourism and recreation infrastructure should be enhanced to

ensure the sustainable and balanced use of nature, especially urban forests.

- Public infrastructure should be accessible to all residents and visitors, incorporating universal design principles.
- Many urban forest stands are heavily overgrown with low-value trees and shrubs and are almost inaccessible for recreational use. By planning works that will increase the scenic value of forest stands and recreational opportunities for citizens, these forest areas will become more accessible for walking, sports, recreation and nature exploration.
- Natural areas and urban public spaces should be accessible and their infrastructure should be designed to be accessible and usable by all groups of people and visitors (universal design principles).
- Coastal resorts in Latvia, like Jurmala and Liepaja, experience high levels of anthropogenic pressure from visitors, especially in summer. These cities should focus on ensuring the sustainable preservation of natural therapeutic resources, such as clean air, water, medicinal mud, and forests, ensuring public access while maintaining their integrity for future generations.
- Protection of natural assets to ensure the preservation and further development of the resort's potential so that the resort's infrastructure can be improved to enable it to obtain official resort status: Keep dune/eskers ecosystems and large forest masses intact.
- It is essential to enhance resilience to climate change, particularly in regard to storms, diseases, and insect invasions.
- A modern, multi-purpose green infrastructure approach should be developed in close cooperation with stakeholders to increase urban forests' sustainability and resilience to climate change.

Legislation:
- The existing regulatory framework for urban forest management needs to be reviewed and revised, particularly concerning the management of protected areas.
- Municipal regulations cannot mitigate the state's forestry management rules but can clarify them.
- Currently, the law does not allow for timely intervention to prevent damage from bark beetles in urban areas that are part of protected zones.
- Clearer guidelines are needed for managing urban forest land, especially in coastal cities like Liepaja and Jurmala, where forest management is often inadequate or economically unjustified due to public opposition.
- Tree maintenance in urban forests often involves removing all felling residues for aesthetic, safety, and fire prevention reasons. This process facilitates faster tree growth by clearing space and improving light conditions.
- Strict restrictions on clear-cutting in urban areas have hindered the restoration of certain tree species, especially pines in urban forests.
- The creation of forest parks can help reduce maintenance restrictions in cities and promote recreation, but the process is bureaucratically complex, time-consuming, and costly, requiring significant municipal investment.

Urban forest management is a separate branch of forestry, significantly different from classical forestry. There is a need for more support from both the state and local governments in organizing legislation, in accordance with the current situation, to specifically regulate urban forest governance. It is essential to provide the possibility to manage areas within specially protected natural territories, such as coastal protection zones, that are located within urban areas. One solution could be to establish special regulations that allow exceptions from general rules for solving specific issues.

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Kopsavilkums
Pilsētmeži kā maksimāli dabiska multifunkcionāla struktūra, kas efektīvi nodrošina cilvēku vajadzības pēc vides un sociālajiem ekosistēmu pakalpojumiem, vienlaikus uzturēšanai patērējot būtiski mazākus līdzekļus kā parku un apstādījumu uzturēšanai. Latvija ir bagāta ar mežiem, kas vēsturiski saglabājušies arī pilsētu un piepilsētu teritorijās. Lai novērtētu pilsētmežu apsaimniekošanas situāciju izvēlētas 6 ar pilsētmežiem bagātas pilsētas: Rīga, Jūrmala, Daugavpils, Jelgava, Liepāja, Ogre. Autori izvirza Latvijai raksturīgu pilsētmežu definīciju un galvenās pilsētmežu funkcijas - sociālā, vides, vides izglītības, dabas aizsardzības, estētiskās un ekonomiskās, kā arī galvenās problēmas un izaicinājumos, par ko tika noskaidrots desmit pilsētmežu apsaimniekošanas ekspertu viedoklis.
Raksta mērķis izvērtēt pilsētmežu pārvaldības pieejas Latvijā un sagatavot ieteikumus pilsētmežu pārvaldības uzlabošanai.
Apkopotas un analizētas pilsētmežu teritorijas, to izvietojums pilsētā, īpaši aizsargājamās teritorijas, mežaparki, galvenās koku sugas, meža ainavas raksturs, kūrorta dabas resursu potenciāls.
Sniegti ieteikumi: Attīstīt pilsētmežu funkciju izpratni, funkcijām nozīmīgu teritoriju definēšanu un identificēšanu dabā. Pilsētmežu pārvaldniekam jāņem vērā plašs zināšanu spektrs, ne tikai mežsaimniecība, jāveido ieinteresēto pušu sadarbība un iedzīvotāju izglītošana. Svarīga ir rekreācijas vietu labiekārtošana, kopšanas intensitātes zonēšana, lai mazinātu antropoloģisko slodzi, nodrošinātu pieejamību, saglabātu dabas vērtības un palielinātu noturību pret klimata izmaiņām. Būtiski aktualizēt ar pilsētmežu apsaimniekošanu saistīto likumdošanu atbilstoši aktuālajai situācijai.

TRENDS IN THE DIVERSITY OF WOOD-BASED PUBLIC AMENITIES

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**Abstract. Research in various fields emphasises the benefits of nature and its positive impact on people's mental and spiritual health, and increasingly mentions its regenerative properties, helping people to regain strength and peace. Over time, especially after the COVID 19 pandemic, people have learned to appreciate the value of nature and are willing to take the opportunity to go to nature. This makes it all the more important to create opportunities to enjoy nature in the urban environment by creating quality outdoor spaces, which also means using nature-friendly materials in landscaping. Scandinavian cities have long been known as places that integrate wood into the built environment in a variety of ways, aiming to use these natural materials as much and as diversely as possible. This is evident in contemporary buildings and outdoor design, such as in the Danish capital Copenhagen. The aim of this paper is to analyse the contemporary trends and diversity in the use of wood in the design of public outdoor spaces, and to contribute to the promotion of sustainable practices in the urban environment, using the city of Copenhagen as an example.
Keywords: sustainable public realm, landscape outdoor elements, site furniture, wooden amenities**

Introduction

One of the current global trends is that people are increasingly choosing to live in cities, and by 2050 the number of people living in cities and peri-urban areas will increase significantly. This change will have a significant impact on cities around the world, and cities need to prepare for both the challenges and opportunities it will bring (ARUP, 2019; Stokmane, 2022). With these changes, urban public open spaces must be able to provide people with both functional and aesthetic environments, while considering the challenges and sustainability dimensions of climate change.

We see how fashion, style and design change over time. This is also the case in outdoor design, as trends in outdoor amenity elements change over time. They reflect the current demand for the use of a given space (site), creating places to gather, relax, play, enjoy the seasons and memorable moments of life. This creates places that create memories, thanks to the design and usability of outdoor spaces.

Local authorities often develop long-term landscaping guidelines for their areas, which include information on the main product categories: seating, litter bins, lighting, cycle racks, billboards, etc., as well as information on how they should be located, oriented and installed, thus ensuring the preservation of local identity and providing guidance for urban planners and designers to improve the built environment within a coherent style. When redeveloping or renovating an outdoor public space in a community, the outdoor furniture elements selected may consist of a family of related products from a single manufacturer, a set of furniture elements from several manufacturers with complementary features, or a combination of standard and bespoke elements. Although not ubiquitous, designers are interested in creating and maintaining a common design language in the urban environment, which is expressed in the consistency of form and colour across the spectrum of furniture elements used in urban public spaces (Main, B., & Hannah, G. G., 2010).

As design trends change, so does the range of materials used in outdoor landscaping. Such changes may be related to the specificity of the materials used or their durability, but these are not the only factors influencing the choice of outdoor elements. Over time, people have adapted their outdoor spaces to suit their needs, as a place to live and spend quality time. The choice of materials is an important aspect in the design of outdoor spaces and it has been observed that the more traditional materials are used, the more the outdoor space is used. Conversely, materials that have already proven themselves locally through people's choices are more likely to be used. Nowadays we are all the more aware that outdoor elements not only serve the daily needs of citizens, but also help to mitigate or combat climate change, so both the materials used and their spatial arrangement are being adapted.

Sustainability and the use of natural materials, such as wood, in public areas are prioritized in Copenhagen's architectural and urban planning regulations. According to the city's Architecture Policy for 2017–2025, new constructions should reinterpret and transform existing environments in order to reflect Copenhagen's unique character. This approach often involves incorporating natural materials like wood to maintain a connection with the city's heritage (Technology and Environment Department, 2017). Additionally, the Nordic Wood in Construction initiative highlights the environmental benefits of using wood, noting its potential to reduce carbon emissions in the construction industry. This report presents various cases of innovative wooden constructions in the Nordic countries, including Denmark, underscoring the material's role in sustainable urban development (Jensen & Craig, 2019). Although these initiatives and policies encourage the use of sustainable materials, such as wood, they do not specifically require their use in all outdoor public spaces. Rather, the emphasis is on promoting designs that complement Copenhagen's historical and environmental context, allowing for material selection flexibility according to particular project needs and objectives.

Methods

Based on the authors' research and teaching experience, surveys of public outdoor spaces in Copenhagen were carried out in the autumn of 2024, with sites selected in different functional areas of the city. The sites were selected for the surveys where the dominant material of the landscape elements is wood, in order to learn about its multiple uses and to assess the integration of such objects into the surrounding landscape, as well as their long-term sustainability over time. The survey data were recorded, processed, analysed and visualised using ArcGIS software (spatial analysis module), and walkability distances to selected urban amenities were calculated, thus showing the possible range of users of such places.

Results

Outdoor space has changed over time under the influence of different political and power structures, and continues to change today. We can conditionally distinguish several

TABLE 1

Characteristics of amenities in the public realm (created by the authors)

Functional areas of public realm	Type of amenities used most often on site	Specific requirements, site usage and conditions
Courtyards	Benches, tables, pergolas or shade structures, shelters, play equipment, bike racks or lockers, planters, lighting	Most often used areas by neighbourhood citizens pleased also from indoors
Public building front yards	Benches, litter receptacles, drinking water cranes, fountains, shelters, bike lockers, planters, lighting	Large hard pavement coverage areas mixed with city furniture. Places offering not just variety of activities but public amenities also should provide variety of usage options
Campuses	Benches, tables, litter receptacles, pergolas or shade structures, shelters, sport equipment, bike racks or lockers, planters, lighting	Despite most often used by campus people it is important place also for nearby inhabitants. Important to create small patches or separate gathering places
Parks	Benches, tables, litter receptacles, pergolas, arbours, lighting, sport equipment, fountains, sculptures	Long-term active and passive recreation options should be provided, walking trails, several functional zones should be created; if possible to provide waterbody
Squares	Benches, tables, litter receptacles, lighting, drinking water cranes, bike racks or lockers, planters	Short-time stops or cross-by areas; site can be used as local orienteer if local identity elements are included
Streets	Benches, litter receptacles, lighting, drinking water cranes, bike racks or lockers, planters	Besides walking and cycling routes streets have to coupe with bus stations and small businesses. The more people-friendly street sites will be developed, the more liveable city become
Waterfronts	Benches, bike lockers, planters	Magnetic places dealing with erosion and flood risks, multifunctionality of place is key element
Playgrounds	Benches, litter receptacles, bike lockers, play equipment	Variety and safe pavement for specific group of users should be provided besides siting places for parents and grandparents
Parking lots	Lighting, bike lockers, planters	More frequently combined with playgrounds nearby thus solving problem for those driving to playgrounds

functional areas (see Table 1.) in the urban environment, where we can speak of uniformity or diversity of use, depending on the intensity of use.

Although open courtyards are also public spaces by nature, their users are more likely to be local residents who pass through or use the space on a daily basis, or enjoy it from the windows of their homes. Courtyards serve as meeting and leisure spaces and are therefore dominated by the needs of local residents. The generational change that takes place in a particular place will inevitably influence its ability to change and adapt to the times. Some residents will choose a particular place as their long-term home, while others will change it due to different circumstances, thus also influencing the prevailing changes in the population of the place. And while it might be assumed that the unchanging composition of a place's population does not necessitate changes in its open space, this is a misconception, as long-term residents of a place age and their priorities, especially for the use of open space, change along with them. Changes to a particular place are necessary and inevitable because of the changing nature of cities, but the need for change is also influenced by its users, the inhabitants of a particular neighbourhood or courtyard.

As mentioned above, the age of the population plays an important role in the adaptation of courtyard activities, but changing habits can also influence these changes, especially last decade with the emergence of teleworking opportunities, which allow a freer schedule and more use of urban open space, especially the outdoor space close to the home, for various activities and recreation in everyday life. The variety of landscape elements in such places is therefore of great importance when organising courtyards into relative functional spaces (Fig.1., 2.).

Office buildings and their entrances are also changing, as offices are increasingly built in mixed-use neighbourhoods, where workplaces and homes are co-located within a neighbourhood, and public space is often shared with different users. The design of such outdoor spaces is therefore often not only concerned with the representative features of the place, but can also integrate the needs of other user groups who pass through the urban space on a daily basis, in addition to office workers. Often such spaces can be used as meeting places or playgrounds (Fig.3.), which can also be used by the children of office workers, who in the modern world spend their free time at their parents' workplaces. Modern trends also suggest that temporary installations or other temporary solutions can be installed in such places, which can be transformed when necessary to make room for larger events.

A similar approach to creating transformable spaces can be seen in campus areas, which are often used as temporary exhibition spaces, including for the deployment or testing of new outdoor amenities, such as outdoor elements with integrated charging capabilities (Fig. 4.).

Parks are undoubtedly larger and more varied areas in terms of outdoor elements, serving the recreation and leisure needs of the population, where separate areas can be created for active and passive recreation, combining opportunities to enjoy nature and relax at a relaxed or more leisurely pace. Parks are undoubtedly people's first choice for leisure activities, so improving them is particularly important. It offers many opportunities for designers and urban planners,
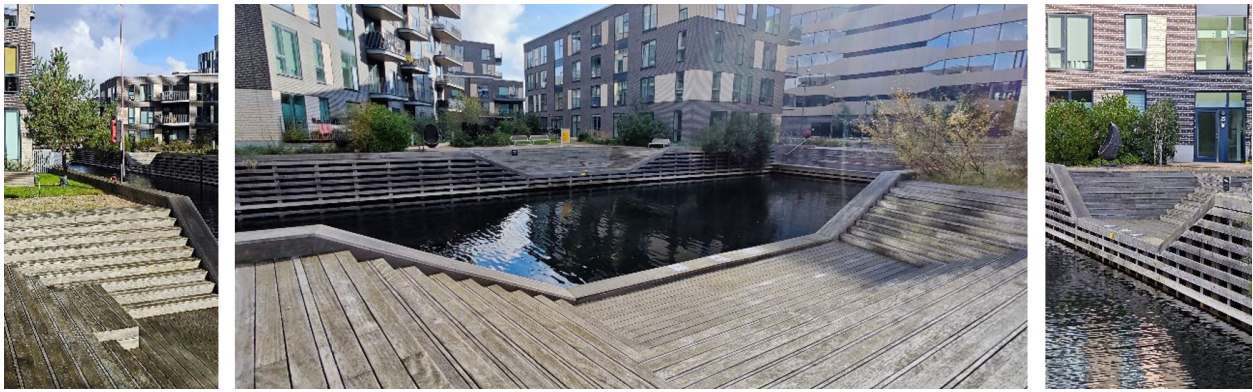
Fig. 1. Courtyard (Marble City, Copenhagen) multifunctionality – the variety of wooden structures offers opportunities for active and passive recreation, including relaxation and neighbourly conversations, fishing and mini-concerts.

Fig. 2. Residential courtyards semi-public (Grønningen and Ørestad Nord, Copenhagen)
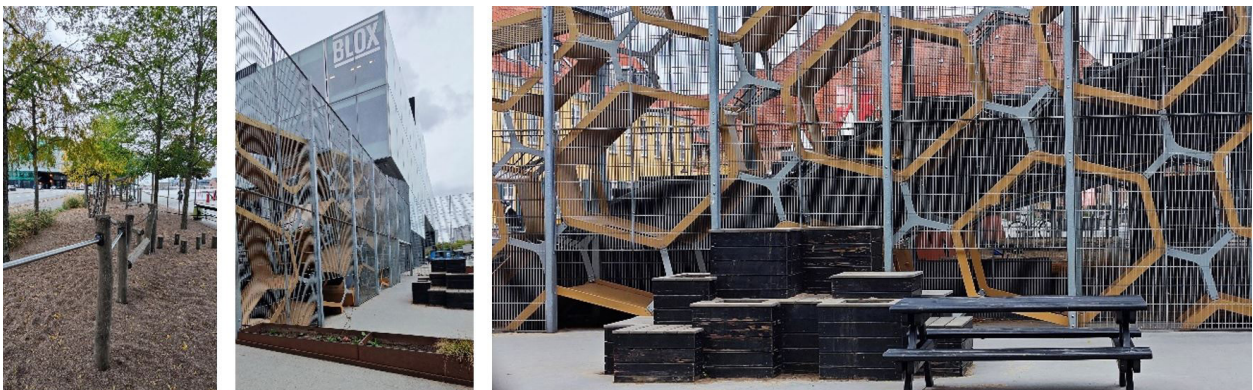
Fig. 3. Playgrounds on public entity front yard (BLOX, Danish Architecture Centre, Copenhagen)

Fig. 4. Innovative bench with charging opportunities for small devices situated in campus area (Universitetsparken, Københavns Universitet, Copenhagen)

considering the natural features of a particular site and the structure of nearby buildings, which will also largely determine the user group.

In urban areas, squares are a special place, often transformed seasonally into a local meeting place with comfortable seating (Fig.5., 6.) and meaningful leisure opportunities, and it is therefore possible to create unconventional landscape elements in such places that serve as both a landmark and a convenient short stop. Although it may seem that such places are most often used for short periods of time, they often have a more local function as people increasingly associate them with meeting or gathering places for local communities.

The blue-green structure of cities is often complemented by watercourses, access to which has always been an issue for their inhabitants, who want to enjoy the presence of water, often simply by being close to it. The sustainability of a place is based on providing access to such places, making urban waterfronts multifunctional and respecting
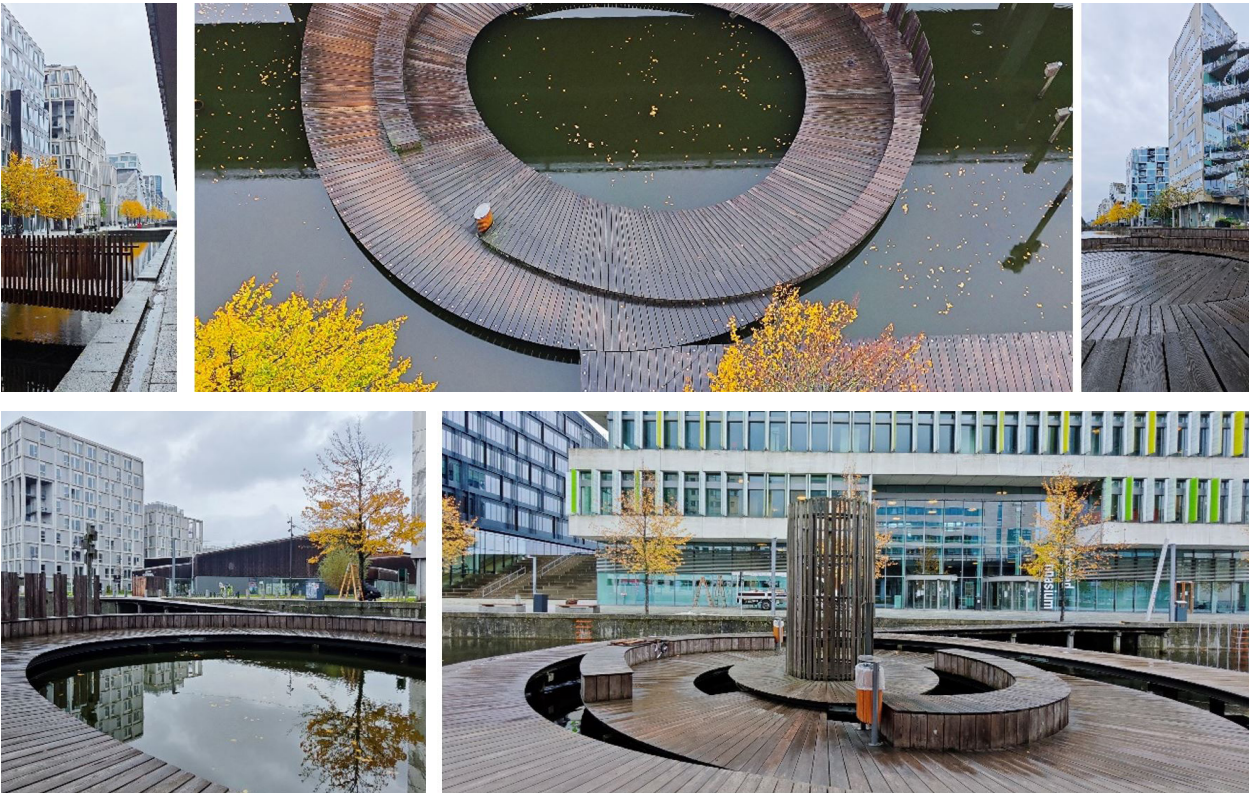
Fig. 5. Gathering places with integrated lighting suitable for use all the long including relaxation, friendly conversations, local festivities and other neighbourhood activities (Ørestad, Copenhagen)

Fig. 6. Landscaping of public square (Opposite of Park and Play, Copenhagen
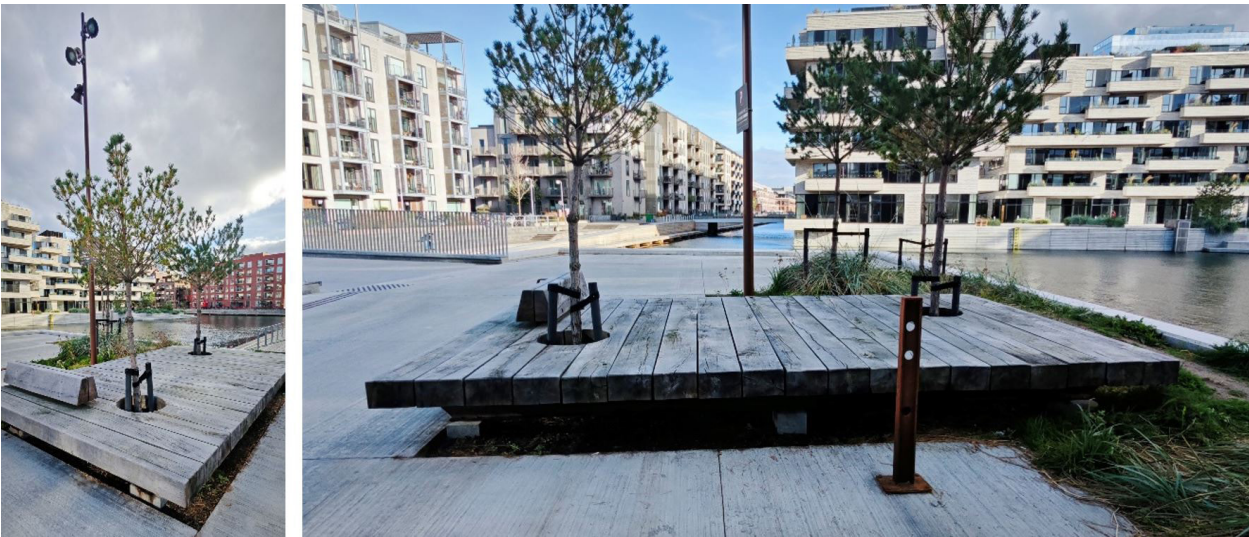
Fig. 7. Multifunctional platform (Nordhavn, Copenhagen)

Fig. 8. Waterfront solutions (Sundkaj promenade, Copenhagen)

Fig. 9. Structures near the coast of the river (Havnebadet Sluseholmen and Nordhavn, Copenhagen)
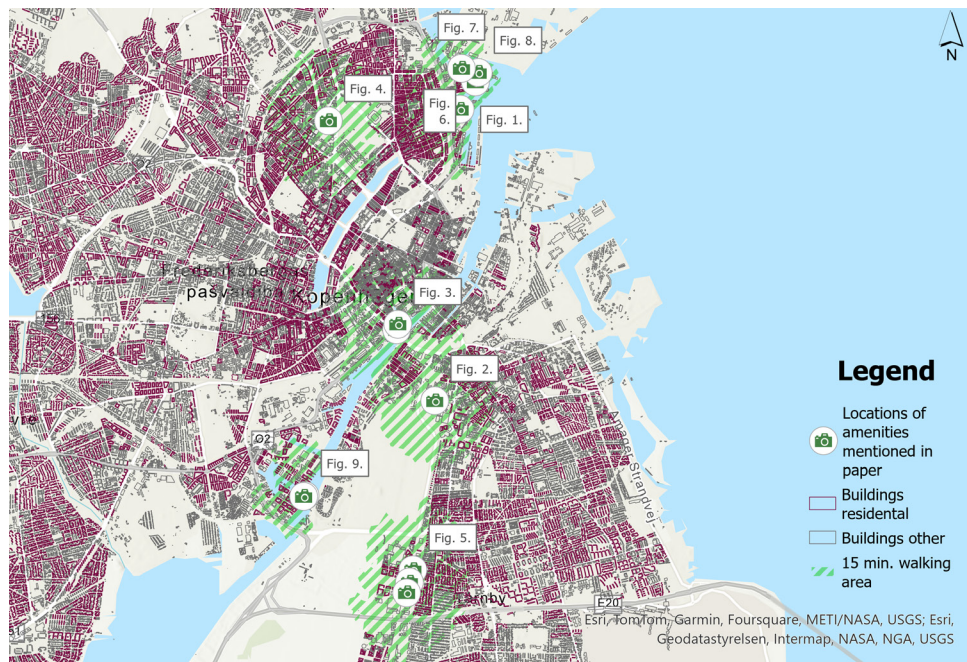
Fig. 10. Map of visited sites in Copenhagen generated in ArcGIS software, ESRI

the desire of local people to be close to the water. The waterfront should not be seen simply as a line, but rather as a network of places, functions, complements and interfaces between the waterfront and the city, between the port and the urban environment with its activities. The waterfront should be seen as a concentration of different functions, which can be economic, cultural, recreational, residential and public. It is not a closed and protected area, but an inspiring place with a permeable perimeter where the density of development varies.

One of the trends in Scandinavian urban planning best practice is to open up the built waterfront to the public, using wood as the surface material for such areas. This is

a rewarding and sustainable material, not only because of its weather resistance, but also because it integrates well with the overall public realm, where outdoor landscaping elements in Scandinavian cities are also predominantly made of wood (Fig. 7., 8., 9.). This creates a good overall visual impression and forms a harmonious vertical space.

Sites visited in Copenhagen to investigate the use of outdoor wooden elements in the urban environment are shown in Figure 10, which characterises the availability of nearby places and amenities for residents.

Nevertheless, we enjoy to use wood-based amenities sustainably integrating them into urban environment, there are some important considerations we need to consider –

wooden amenities, like outdoor furniture, wooden decks, and other structures, require regular maintenance to ensure their longevity. Typically, wooden benches and other furniture may need to be renewed or replaced every decade or less, depending on the type of wood used and the level of exposure to the elements, wooden decks and structures like pergolas often last longer, around two decades, but, to ensure safety and durability, some may need attention or renewal sooner, depending on foot traffic and weather exposure. The frequency and cost of maintenance depend on several factors, including the quality of the wood (hardwoods are more resistant to rot and damage than softwoods), environmental conditions (wood exposed to harsh weather conditions, like high moisture or intense sunlight, may deteriorate faster, and areas near saltwater or with high humidity might need more frequent treatments), and the level of use (amenities exposed to heavy use will wear out faster and may require more frequent attention).

Conclusions

Many urban outdoor spaces are multifunctional, as the urban built fabric today tends to be diverse, with homes, offices and leisure facilities all in one place, so the design of such outdoor spaces needs to be approached responsibly and creatively.

When designing outdoor public spaces, it is important to make them coherent with the built fabric, to form a single stylistic ensemble for the site, and to integrate a harmony of forms and materials. Copenhagen's public realm is characterised by both standardised products and site-specific solutions.

The integration of wood in the design of outdoor amenities is an integral part of the contemporary trend, thanks to the material's good properties and its sustainable sourcing and processing. Its diversity of use can be seen in the design of different functional areas of the urban environment, creating multifunctional spaces to meet the needs of different users.

Sometimes the outdoor space serves only a specific target group, the direct users, while more often it serves many user groups, so it is important to find a solution that both benefits multiple users and creates an attractive aesthetic and visual image of the outdoor space, integrating and adapting to the surrounding and built environment. The correct integration of outdoor elements into the site provides the opportunity to use it as a landmark for the site.

It is important to create an environment that invites people to linger, to get outdoors, to be in nature, to allow as many people as possible to regenerate naturally and improve their mental health.

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Kopsavilkums

Pētījumos dažādās jomās tiek akcentētas dabas sniegtās priekšrocības un tās pozitīvā ietekme uz cilvēku garīgo un garīgo veselību, kā arī arvien biežāk pieminētas tās atjaunojošās īpašības, palīdzot atgūt spēkus un mieru. Laika gaitā, īpaši pēc Covid-19 pandēmijas, cilvēki ir iemācījušies novērtēt dabas vērtību un ir gatavi izmantot iespēju doties pie dabas. Tas padara vēl svarīgāku dabas baudīšanas iespēju radīšanu pilsētvidē, veidojot kvalitatīvas ārtelpas, kas nozīmē arī dabai draudzīgu materiālu izmantošanu ainavu veidošanā. Skandināvijas pilsētas jau izsenis ir pazīstamas kā vietas, kas visdažādākajos veidos integrē koksni apbūvētajā vidē, cenšoties pēc iespējas vairāk un daudzveidīgāk izmantot šos dabiskos materiālus. Tas ir acīmredzams mūsdienu ēkās un āra dizainā, piemēram, Dānijas galvaspilsētā Kopenhāgenā. Pētījuma darba mērķis ir analizēt mūsdienu tendences un daudzveidību koka izmantošanā publisko ārtelpu projektēšanā un dot ieguldījumu ilgtspējīgas prakses veicināšanā pilsētvidē, par piemēru izmantojot Kopenhāgenas pilsētu.

CONVERSION AND INTEGRATION INTO GREEN INFRASTRUCTURE OF FORMER INDUSTRIAL URBAN QUARTER: THEORETICAL MODEL AND EXPERIMENTAL DESIGN SOLUTIONS

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Abstract. The regeneration of former industrial sites has become increasingly relevant in the context of urban regeneration and sustainable urban development in general. Industrial structures in urban environments, shaped by the socioeconomic conditions of their time, often fall into disuse, posing significant challenges for urban planners and developers. Such neglected sites not only deteriorate physically but also fragment urban areas, disrupting social and ecological networks. This research raises the hypothesis that by converting abandoned industrial areas into ecologically integrated urban spaces, cities can enhance public access to nature, reduce their environmental footprint, and revitalize fragmented neighborhoods. The paper includes the analysis of relevant literature on the topics of urban regeneration, building conversion, and green infrastructure, existing conversion projects, and proposes a theoretical model that guides the transformation of former industrial sites into viable, sustainable urban spaces. The formulated theoretical model was applied to experimental design of a former industrial site in Kaunas (Lithuania). The findings of the research emphasize the significance of re-establishing human interaction with nature through adaptive reuse and underline the potential social, economic, and ecological benefits of integrating formerly abandoned areas into the urban fabric.
Keywords: industrial site regeneration, conversion of industrial buildings, sustainable urban development

Introduction

The concept of "site and building resurrection" has historical roots extending further than commonly anticipated, tracing back to Roman times (Stratton, 2000). In the present day, many countries face a similar challenge - abandoned buildings and territories that seem to recede into the background, overshadowed by contemporary urban and architectural developments. However, these structures remain significant for various reasons. For example, factories, workshops, warehouses, and similar facilities were shaped by the socioeconomic and political conditions of their respective historical periods, with their design and placement influenced by the economic and governance systems of the time (Jackson et al., 2010) and thus are important formants of local identity and have historical significance. Moreover, in contemporary highly urbanized areas, the disconnection from nature becomes more pronounced as developers prioritize rapid high-rise construction. These new developments often create barriers between individuals and natural environments, limiting access to recreational spaces and diminishing opportunities for engagement with nature. At the same time abandoned industrial sites with limited human activities provide the possibilities for spontaneous emergence of urban nature. The hypothesis can be raised that regeneration of abandoned industrial sites in urban environments taking into account urban nature at the same time, can contribute to social, economic, and ecological revival of the area as well as integration of formerly fragmented areas into urban fabric and ecological networks. Italian architect S. Boeri states that nature and buildings should not be viewed as separate entities as they belong to the same ecosystem and must help each other to live (Harrouk, 2021).

This study aims to explore the concept of "resurrecting" former industrial buildings or areas in the urban environment and analyze how this process can be effectively implemented in order to achieve the integration of these areas both into urban fabric and ecological networks. It investigates the potential for the re-establishment of human interaction with nature through conversion of former industrial sites and the significance of these efforts not only for individuals but also for the city, focusing on the enhancement of its natural framework. The study includes a review and analysis of literature, discussion of relevant concepts, analysis of existing projects and their outcomes, and the development

of a theoretical model grounded in the research findings. The theoretical model is applied to the experimental design of conversion proposals of an industrial territory in Kaunas, Lithuania, located between the Karaliaus Mindaugo embankment and Kaunakiemio Street, demonstrating how the territory can be revitalized to provide renewed social, cultural, economic, and ecological value.

Theory: interaction between urban regeneration, building conversion and green infrastructure

Urban regeneration. As defined in the Report of the expert group meeting of UN Habitat "Urban regeneration as a tool for inclusive and sustainable recovery" (Un-Habitat, 2021), urban regeneration represents an integrative and inclusive process and essential city planning instrument that combines physical, environmental, and socio-economic measures. This process (and instrument) aims to transform urban areas into more diverse and vibrant, more inclusive, resilient, safer, and sustainable neighborhoods and extend those positive impacts into the wider city-scale (Un-Habitat, 2021). This connects to the definition of regeneration by Roberts et al. (Rudvalytė, 2011) as a holistic and multi-stranded set of interventions: "a comprehensive and integrated vision and action which leads to the resolution of urban problems and which seeks to bring about a lasting improvement in the economic, physical, social, and environmental condition of an area that has been subject to change."

Central to the process of urban regeneration is the concept of building conversion: converting abandoned or underutilized buildings into functional spaces not only preserves architectural heritage but also contributes to wider revitalization of urban environments and thus becomes a vital mechanism within the larger framework of urban regeneration, creating opportunities to reconnect fragmented urban spaces and ecological networks, and enhance the quality of life in neighborhoods.

Building conversion. Conversion refers to the process of change. In architectural terms, it primarily involves the reconstruction of a building or its spaces by altering their original function (Roberts et al., 2017). Conversion is not limited to individual buildings only, it can also apply to areas or quarters containing building complexes whose original purposes have become obsolete in modern days. In such

cases, it is crucial not only to change the functionality of these spaces but also to enhance the overall quality of the urban environment through the process of conversion (Leitanaitė, 2007). Preserving significant existing buildings within an area contributes to maintaining the authenticity of the place. For both residents and tourists, these sites are valuable as they convey unique stories and possess distinct identities. Their functionality can provide experiences and qualities that no other part of the city, region, or building can offer (Žmėjauskaitė, 2022).

Successful conversion of industrial areas can be approached through various methodologies, all aimed at a common objective. There are several author's works that have been analyzed, in one of them it is mentioned that the primary focus must be on designing projects sustainably to mitigate the current environmental impact (Sibilla et al., 2023), while facilitating economic growth. Additionally, these initiatives should enhance the landscape's character by honoring the site's inherent qualities - genius loci - and incorporating elements of its pre-industrial and industrial heritage into the new design, thereby fostering sustainable development (Loures, 2008). Others mention more specific ways to start the conversion process.

V. W. Tam and J. J. Hao (2019) discuss a comprehensive understanding of conversion, outlining the four methods:

- New exterior - old interior: this method involves preserving a well-maintained internal structure while improving the facade, suitable for modern architecture but not applicable to heritage buildings due to strict preservation requirements.
- New interior - old exterior: this approach focuses on reconstructing internal spaces to meet contemporary needs while maintaining historical facades.
- Supplement: this method adapts the building's exterior to blend harmoniously with the urban fabric, balancing old and new elements.
- Filling: recognized as one of the safest methods, this approach preserves the original structure while making minimal changes to the interior.

The analysis of literature has revealed that there is no consensus on the best approach to revitalize buildings. Focusing solely on the structure, whether interior or exterior, fails to consider the local context. Each situation is distinct, and sometimes a straightforward solution, like restoring the facade, may suffice. In sensitive urban areas, such as historic districts, proposed design solutions must align with community values to gain acceptance from citizens.

Green infrastructure. Urban green infrastructure is one of the possible answers to this challenge and can become an integral part of successful conversion of abandoned or underutilized industrial areas. Urban green infrastructure refers to a strategically planned network of natural and semi-natural areas, designed to deliver a range of ecosystem services within urban environments. According to E. Hanna and F. A. Comin (2021), the essential components of urban green infrastructure are natural elements (plants, animals, water, soil and microorganisms etc.) structured in a variety of forms including but not limited to urban squares, street tree lines, parks and horticultural gardens. These are the same components structuring natural ecosystems and making them perform ecological functions, and thus provide ecosystem services: improving air and water quality, reducing the urban heat island effect, and providing recreational spaces, contributing to overall urban resilience and sustainability. Green infrastructure multifunctionality supports both ecological and social well-being, making it a vital component of sustainable city planning. However,

recently green infrastructure has increasingly started to be viewed and promoted as part of the wider concept of nature-based solutions (Jones et al., 2022). In 2015 nature-based solutions were officially defined by the European Commission as actions and means that address "environmental, social and economic challenges simultaneously by maximizing the benefits provided by nature (...) inspired by, supported by, or copied from nature". The European Commission states that the "concept of nature-based solutions embodies new ways to approach socio-ecological adaptation and resilience, with equal reliance upon social, environmental and economic domains" (Sowinska-Swierkosz and Garcia, 2022). As it was mentioned above, nature-based solutions are a comprehensive concept for other green concepts. The relationship between these green concepts can be explained by the role of nature in different processes: for example, nature-based solutions promote the use of nature as a way of providing solutions; green infrastructure is a strategically planned network for a multifunctional landscape that delivers ecosystem services; and in turn, ecosystem services refers to the simultaneous provision of benefits and services of nature for various beneficiaries, including non-human (Ramirez-Agudelo, 2022). Literature identifies nature based solutions concept as an "umbrella" term encompassing the following green concepts: ecosystem based adaptation, ecosystem-based disaster risk reduction, green infrastructure, blue infrastructure, green-blue infrastructure, urban forestry, sustainable urban drainage systems, ecological engineering, best management practices, low-impact design, water-sensitive urban design, ecosystem services (Dumitru and Wendling, 2021).

Examples of conversion of former industrial territories and buildings. The analysis of implemented relevant projects is an important part of formulation of theoretical principles for industrial areas and building conversion. Thus a comparative analysis of three significant projects implemented in Europe - Parc des Chantiers (Nantes, France), Frenkel Factory (Šiauliai, Lithuania), and King's Cross (London, England) - each selected for its transformative approach to industrial building conversion, urban regeneration, and integration of green infrastructure was performed (Fig. 1.). These cases illustrate the diversity in strategies for revitalizing abandoned or underutilized industrial sites, while addressing economic, cultural, and environmental challenges. The selection of these cases is based on their shared focus on reusing industrial heritage while contributing to sustainable urban development, yet each example operates within different national, social, and environmental contexts.

Parc des Chantiers project revitalized a former shipyard on the Île de Nantes, transforming it from an industrial site into a vibrant cultural and public space. Initiated in 2005 and completed in 2009, the project preserved key structures from the shipbuilding era and integrated green infrastructure, including walkways, gardens, and sustainable water management systems. The area became a major cultural and tourist destination, home to the renowned "Machines of the Isle," while also promoting urban ecological balance (Parc des Chantiers, 2024). Frenkel Factory, once a significant industrial hub for leather production in Šiauliai, fell into decline during the 20th century, eventually closing in 1998. In the early 2000s, the site was transformed into a cultural heritage center, preserving the architectural integrity of the industrial buildings. The renovated site now includes a museum and cultural venues, drawing tourism and revitalizing the local economy while maintaining a link to the city's industrial past (Meškys, 2017). King's Cross, once an essential industrial and transport hub, experienced a period of decline by the late
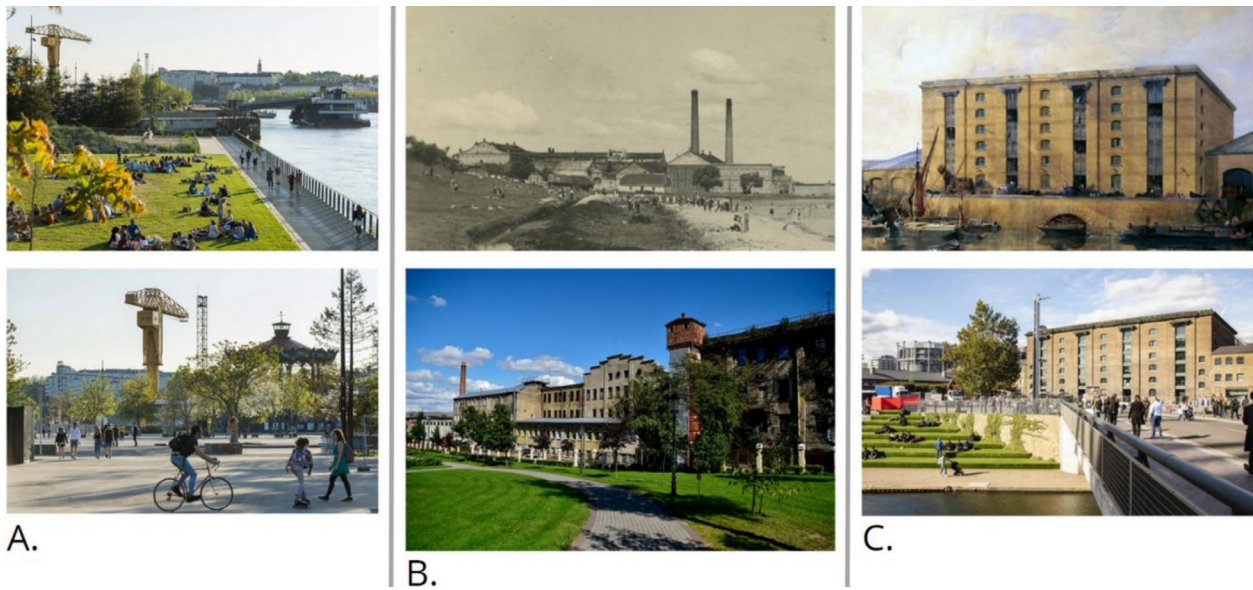
Fig. 1. Examples of conversion projects: A. Parc des Chantiers project, Nantes, France. Photographs by V. Joncheray (Parc des Chantiers, 2024); B. Frenkel factory project, Šiauliai, Lithuania: top - the Frenkel factory was built on the bank of lake Talkša, photograph provided by Aušra museum archive, bottom - developed park in the factory's territory, photograph by V. Ščiavinskas (Meškys, 2017); C. King's Cross" project, London, England: top - Granary Square before conversion, image from Science & Society Picture Library (King's Cross, 2018), bottom - current view of Granary Square now, photograph by A. Parsons (King's Cross, 2018)

1800s. A regeneration plan initiated in the late 1990s focused on transforming the area through mixed-use development, combining residential, commercial, and cultural spaces. The revitalization of King's Cross has turned it into a dynamic urban district with public squares, parks, and restored historic buildings, contributing to improved urban connectivity and economic growth (King's Cross, 2024). Selected projects were analyzed and compared from urban regeneration, building conversion, and green infrastructure development points of view.

In terms of building conversion, all three projects prioritize the preservation of historical structures, although the scope and scale of intervention vary. Parc des Chantiers adopted a minimal demolition approach, preserving key structures of the former shipyard while converting the area into a multifunctional cultural and public space. By retaining its industrial character, the project managed to blend historical preservation with contemporary urban needs. Frenkel Factory, while smaller in scale, focused on converting its historical tannery into a cultural heritage site. The main buildings were restored and repurposed for museum use, revitalizing the space for cultural and economic purposes. In contrast, King's Cross combined preservation with extensive new development, resulting in a mixed-use community that balances historical character with modern functionality. This project involved repurposing warehouses and factories while integrating new residential, commercial, and cultural spaces.

From the perspective of urban regeneration, all three projects successfully revitalized neglected areas, but their impacts varied in scale. Parc des Chantiers transformed the Île de Nantes into a viable cultural and tourist hub, contributing significantly to the local economy and social fabric. The project's success lies in its ability to blend adaptive reuse with green infrastructure, making the area more accessible and attractive to both locals and visitors. Frenkel Factory contributed to the local economy by boosting cultural tourism, although its regeneration was more localized, with cultural events and small business activity revitalizing the surrounding community. King's Cross, however, represents one of the most comprehensive urban regeneration efforts, turning a decayed industrial area into a thriving urban district. Its integration of commercial, residential, and public spaces

created a dynamic environment that attracted businesses, artists, and residents, enhancing overall urban connectivity and quality of life.

Green infrastructure played an important role in two of the analyzed projects. Parc des Chantiers not only revitalized the former shipyard but also incorporated ecological design elements, such as green spaces, biodiversity-promoting gardens, and water management systems. King's Cross also introduced green infrastructure by creating parks and public squares that offer residents and visitors recreational spaces while contributing to environmental sustainability. In contrast, the Frenkel Factory project did not place as much emphasis on green infrastructure development. Its focus was more on cultural regeneration, with less integration of ecological design in comparison to the other two projects.

It is possible to conclude that while Parc des Chantiers and King's Cross emphasize a balanced approach that integrates historical preservation with green infrastructure and mixed-use development, the Frenkel Factory project focuses more on cultural and economic regeneration.

Theoretical model of former industrial site conversion and integration. Theoretical model of former industrial site and buildings conversion and integration into urban fabric and ecological networks were formulated by extracting relevant principles from the analyzed themes - urban regeneration, building conversion, and green infrastructure - and from analyzed examples.

The component of ***urban regeneration*** includes holistic and inclusive transformation, sustainable reuse of resources and enhancing urban connectivity. Holistic and inclusive transformation means that conversion of the site should be comprehensive, addressing not only physical redevelopment but also socioeconomic aspects, such as improving local economies, creating resilient and vibrant communities, and preserving cultural heritage (UN-Habitat, 2021). Sustainable reuse of resources means that the conversion of the site should focus on adaptive reuse of existing buildings and materials, helping to reduce environmental impacts and enhance sustainability by transforming abandoned or underused areas into functional urban spaces. Enhancing urban connectivity means that conversion projects should reintegrate fragmented areas, both physically and socially,

fostering connections between neighborhoods and improving access to services, public spaces, and transportation.

The component of *building conversion* includes adaptive reuse with preservation of cultural heritage, context-sensitive design, and functional and flexible spaces. Adaptive reuse with preservation of cultural heritage means that conversion should prioritize maintaining the historical and cultural significance of industrial buildings, allowing their reuse for modern purposes while retaining their architectural integrity. This enhances the value of the building and preserves the identity of the urban area. Context-sensitive design means that each conversion project should be adapted to its local context, respecting the historical, social, and environmental characteristics of the site and surrounding urban fabric. Solutions must align with community values to gain local acceptance. Functional and flexible spaces mean that converted buildings should be designed to accommodate a variety of uses, including residential, cultural, and commercial functions; flexibility ensures that spaces remain adaptable to future urban needs.

The component of *green infrastructure* includes integration of nature-based solutions, enhancing ecological connectivity, and public accessibility and well-being. Integration of nature-based solutions means that green infrastructure should be integrated into building conversion projects, focusing on the creation of parks, green roofs, urban gardens etc. These elements enhance biodiversity, manage stormwater, and mitigate the urban heat island effect. Enhancing ecological connectivity means that green infrastructure within converted industrial sites should promote ecological corridors that connect to existing natural areas, helping to enhance the city's overall green network. Public accessibility and well-being means that green spaces within these projects should be designed to provide recreational and health benefits to the community, offering accessible green areas that improve the quality of life for urban residents.

The analyzed examples also provided valuable insights. For example, Parc des Chantiers demonstrates the importances of minimal demolition and adaptive reuse of industrial structures, while integrating green infrastructure (e.g., walkways, gardens) to balance historical preservation with ecological sustainability. Frenkel Factory exemplifies the focus on cultural and economic regeneration through the preservation of architectural heritage and the transformation of industrial spaces into cultural venues. King's Cross exemplifies combining historical preservation with comprehensive redevelopment, creating a mixed-use urban district where green infrastructure plays a crucial role in public spaces, enhancing both environmental sustainability and urban connectivity.

Conversion and application of green infrastructure in the former industrial area between the Karaliaus Mindaugas embankment and Kaunakiemis Street in Kaunas

The former industrial quarter with the unique location in Kaunas city between Karalius Mindaugas embankment and Kaunakiemis Street, limited with Nemunas river and bussy city center quarters (Fig. 3. A., Fig. 5. A.), a part of historically known Karmelitai district (Saltonaitė, 2023), was selected for experimental design. This currently underused and derelict territory has strong social, cultural, symbolic, and economic potential as well as provides possibilities for green infrastructure integration. This territory together with surrounding areas in 2012 was annexed to the protected area of the historical part of Kaunas called Naujamiestis

(Saltonaitė, 2023), this raises new questions of rehabilitation and actualization of this site. This territory previously was analyzed by V. Petrušonis (1993), A. Miškinis (2009), and more recently by R. Saltonaitė (2019, 2023). Industrial buildings located in the area were analyzed by N. Lukšionytė-Tolvaišienė (2001) and M. Drėmaitė (2016).

Brief history. Geographically the territory under analysis was favorable for development of industrial facilities (Saltonaitė, 2023). The existing complex of buildings, constructed in the 19th century, was established by the Tilmans family of German origin. The pioneering member of the family, Ričardas Tilmans, initiated the enterprise, subsequently bringing other family members to Kaunas. The Tilmans factory specialized in the production of screws, bolts, wire, and other metal products (Vaškevičius, 2019). However, the industrial block was designed with purposes beyond mere manufacturing. The site also included a workers' club, a canteen, a theater, and a school aimed at educating workers and their children (Drėmaitė, 2016). These facilities were important in facilitating the integration of the working class into the broader societal fabric of Kaunas. According to R. Saltonaitė (2019, 2023), the construction activities of the second half of the twentieth century together with the closing of industrial facilities, further negatively affected the territory. The building complex still exists today, though not all of its structures have been preserved due to the frequent changes in ownership. As a result, the original appearance of the complex, dating back to the 19th century, has significantly altered. However, over the past thirty years, the territory has remained largely unchanged. R. Saltonaitė (2019, 2023) had identified buildings of four historical periods and styles in the broader area of Karmelitai district: 19th century historicism, inter-war modernism, socialist realism, post-war modernism. Buildings of 19th century historicism, socialist realism, and some structures of post-war modernism are the most clearly visible in the industrial territory under analysis. Some structures, most often of low aesthetic value, were constructed after 1990. Given its location in the city center, the industrial quarter has become a source of concern, not only as an aesthetic problem but also as an economic burden and a contributing factor to the deterioration of urban environment quality. Once a well-known factory that represented Kaunas through its production and associated activities, the site has been ravaged by time and neglect. The absence of efforts to preserve the territory has meant that the memories and historical significance of this once valuable location have faded. Its failure to adapt to contemporary needs has led to its inevitable decline (Fig. 2 B., Fig. 3. A.).

Territory's context. According to the general plan of the Kaunas city municipality, the analyzed area falls within a mixed-use zone, encompassing both the Old Town and New Town. This location is subject to specific requirements for the protection of cultural heritage, public spaces, buildings, and architectural quality. The area may be utilized for a variety of purposes, including residential, public, administrative, and commercial activities. Among the structures within this zone, only two buildings are recognized as having significant value due to their historical importance: the manufacturing building and the theater's wall (Kauno…, 2024) (Fig. 3).

Main focus of the area is to ensure comfortable car movement, the area is not safe for visitors due to many dangerous constructions which are not fenced off. The narrow streets between the building's are blocked by various structures. There are few places where nature spreads freely without any human intervention in the area under analysis.

Challenges. Prior to any intervention in the sensitive area of the city center, it is essential to thoroughly assess the potential

Fig. 2. Decline of heritage building in the territory under analysis: A. - Tilmans theater building in 1985 (Kaunas…, 2019);
B. - Current remains of Tilmans theater wall. Photograph by D. Žmėjauskaitė

Fig. 3. Territory under analysis: A. - General view from top of Karalius Mindaugas street, on the tight side Nemunas river is visible,
on the left side extends the analyzed territory; B. - "Pergalė" factory administrative building. Photographs by D. Žmėjauskaitė

TABLE 1

Criteria for building evaluation. Table by D. Žmėjauskaitė (created by the authors)

Criteria	Description
Heritage	A structure or building included in the Lithuanian Cultural Heritage Register as valuable and protected.
Historical value	A structure or building mentioned in historical sources as a unique architectural, urban object and/or historically containing innovative technological solutions.
Existing physical condition	The current state of the building or structure, determining whether it can be used immediately.
Possibilities of use	The potential to retain the structure or building because it contributes to the identity of the place.
Aesthetic condition	A subjective evaluation based on the presence of rarely seen architectural elements or the structure's connection with the environment.
Relevance in urban structure	The role of the building or structure in shaping the urban layout and its connection with the surrounding infrastructure.

outcomes. The identity of the site, as well as its historical significance to the city, must be considered. A comprehensive evaluation of the existing buildings is necessary, focusing on their historical and architectural importance, while also exploring possibilities to enhance their functionality, ecosystem services, and infrastructural capacity to benefit local residents. Demolition should only be considered once all alternatives have been evaluated to ensure sustainability. In this analysis, six criteria were established to guide decision-making regarding the preservation or demolition of existing structures (Table 1).

The analysis of existing buildings in the territory under analysis is presented below and in Fig. 4. The locations of the buildings are identified in Fig. 5. A.

A.   Tilmans theater. The site retains historical significance due to its unique architectural openings and the remaining protected wall. Located between important roads, it once served multiple community functions, including a school and theater. Despite its poor condition, its historical value and contribution to the area's identity justify preserving the remaining wall.

B.   Buildings and structures. Structures such as garages, residential houses, and shops hold no significant architectural or cultural value for the area or city. These buildings can be demolished.

C.   Building complex. Though not part of the cultural heritage, this complex is historically significant, notably for housing the first innovative furnace in Kaunas. Positioned between Kaunakiemis St. and K. Mindaugas St., it is in fair condition. Insignificant buildings within the complex will be removed.

D.   Buildings and structures 1. This group, which includes a gas station and warehouses, lacks historical or architectural value and will be demolished.

E.   Reinforced concrete cranes. As the first reinforced concrete structures in Kaunas, they connect Kaunakiemio St. and King Mindaugas Ave., offering views of Kaunas' natural landscape and the Nemunas River. Their retention is under consideration due to their potential interest as industrial heritage.

F.   Building complex 2. The complex showcases historical architecture on its northeastern facade, while its western facade highlights connectivity with Karalius Mindaugas Ave. Insignificant sections of the complex will be
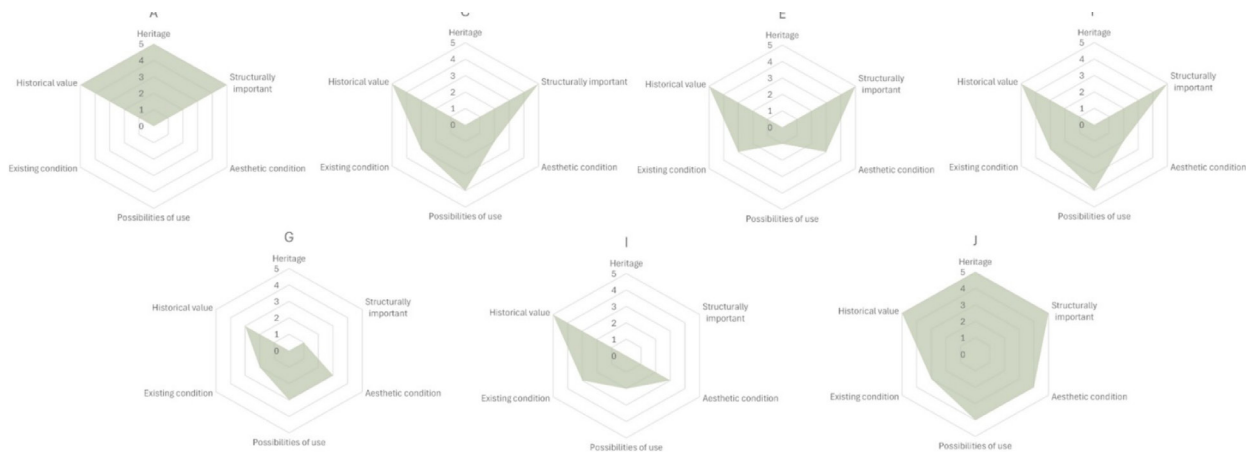
Fig. 4. The example of evaluation of selected buildings according to the set of predefined criteria. Schemes by D. Žmėjauskaitė
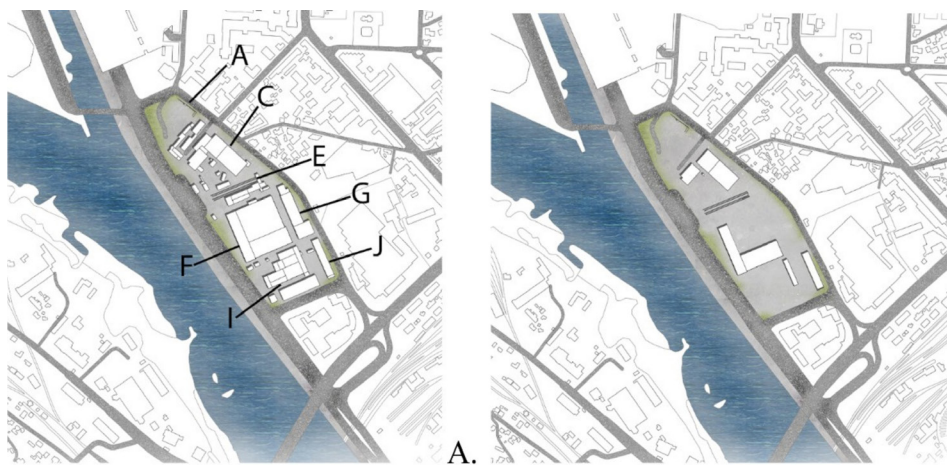
Fig. 5. Territory under analysis:
A. - current situation with identified main buildings
(A - remains of Tilmans theater,
C - building complex,
E - reinforced concrete cranes,
F - building complex 2,
G - detached buildings,
I - service and storage block,
J - "Pergalė" factory administrative building);
B. - proposed demolition of buildings.
Schemes by D. Žmėjauskaitė

demolished to emphasize its key features.

G. Detached buildings. The administrative building and storage facilities, despite their distinct orientation towards Kaunakiemis St., lack significant identity-forming characteristics. These buildings will be demolished.

H. Temporary structures and sports arena. These buildings do not align with the historical architectural intent for the area and will be demolished.

I. Service and storage block. The administrative building, constructed in 1867, and other connected red-brick structures have historical ties to the area. However, these blocked buildings will be demolished due to the decision that the historical parts of this block have been changed multiple times thus making it impossible to implement them into the new site design.

J. "Pergalė" factory administrative building (Fig. 3. B.). This exceptional structure, with distinct architectural elements and in good condition, an example of socialist realism architecture, is historically significant and protected as heritage and will be preserved.

Fig. 5. B shows the territory with preserved buildings after demolition of structures of low value.

Following a comprehensive assessment of the existing buildings and their significance, a detailed analysis of the site revealed the presence of an underground Nemunas tributary known as Girstupis. The Girstupis stream flowing through this valley of the Nemunas was one of the reasons why first residents, and later industrial facilities, were established here. As the number of cars and train traffic through Girstupis increased, bridges were built. Thus, gradually, the whole part of the stream that flowed through the valley was sewered during the Soviet era (part of the stream is still visible in

the Kaunas city plan of 1967, while Girstupis is no longer marked in the 1986 map) (Saltonaitė, 2019). Given that this area has experienced ecological degradation as a result of industrial development, daylighting of Girstupis holds the potential of ecological and aesthetic regeneration of the area and connecting it to a wider ecological framework. The city of Kaunas is characterized by a diverse natural framework, featuring variable topographies that enhance the aesthetic quality of the environment, along with two intersecting rivers that give rise to natural islands and public spaces for recreational use, seasonal events, and community engagement. Despite ongoing discussions regarding sustainable urban development and the importance of accessible natural spaces, many of these areas remain isolated and underutilized.

Solutions. The area under consideration is planned to accommodate mixed-use functions, with the goal of achieving territorial autonomy - specifically, the ability to sustain itself and meet the needs of its various functions. The current distribution of functions in the territory is chaotic and difficult to comprehend. The division of the territory into five distinct zones is envisioned (Fig. 6., Fig. 7.). The zoning concept for the territory involves each zone incorporating an existing building or structure, with interventions implemented to ensure seamless functionality and mutual enhancement between the existing and new constructions. The description of functional zones is presented below.

▪ Elevate zone is a mix of commercial and residential purposes. The goal is to restore the existing structures and integrate them with new architecture in a way that highlights cultural heritage while respecting the surrounding scale. The project achieves a total of

Fig. 6. Proposed zoning of the territory. Schemes by D. Žmėjauskaitė
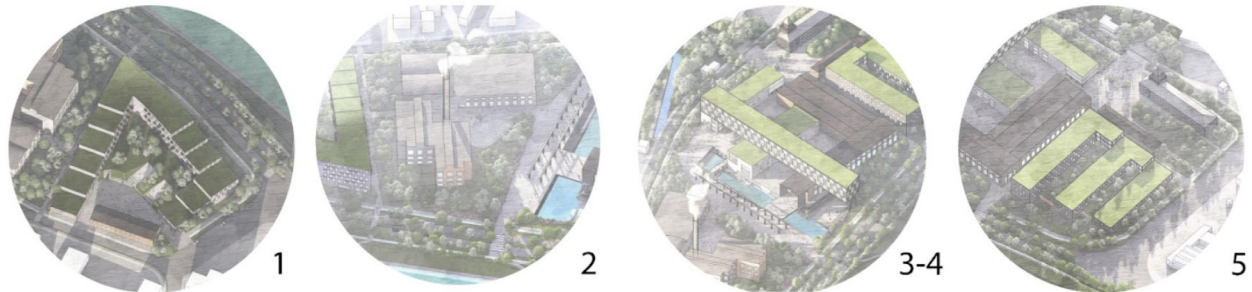
Fig. 7. Visualizations of the proposed zones. Schemes by D. Žmėjauskaitė

164 residential units and commercial spaces, with a concealed parking area beneath a green roof. The design also incorporates public green spaces between the buildings, accessible via steps that serve both functional and recreational purposes.

- Twinning zone combines cultural and hospitality uses, including a museum, gallery, restaurant, and hostel. The goal is to create a harmonious architectural blend by duplicating an existing building while altering its texture to respect the original design. The project achieves an integrated space where different functions support one another, promoting interaction between visitors. The zone is densely landscaped to enhance privacy and preserve the area's natural identity, with technical facilities covering all infrastructure needs.

- Wealth and Arcade zones have distinct ideas but function together in a complementary manner. The first zone, focused on water accessibility and called Wealth, aims to create a direct connection between key streets while making a water source easily reachable through a system of steps. The second zone, named Arcade, features interlocking building volumes that form different spaces, but operate as a cohesive complex, designed to create visual contrast and attract attention.

- Matrix zone focuses on residential buildings with varying heights to optimize natural lighting. The tallest structure has four floors, with the height decreasing by one floor to allow better sunlight access. The design conceals ground-floor parking for residents and visitors, with a total of 125 apartments and 400 parking spaces. Inner courtyards are formed through recessed volumes, accessible from shared corridors. Additionally, a nearby building will be repurposed as the headquarters for Kaunas StartUp center, supporting new businesses, while commercial spaces will be integrated within the complex.

The proposed experimental project involves not only the analyzed area, but also its surroundings. The proposed general plan incorporates the analyzed area, the Nemunas riverbank, Karaliaus Mindaugo Avenue, and newly established connections to Vytauto Avenue (Fig. 8). Currently, the area is closed off, inaccessible to the public, and visually unappealing, detracting from the charm of Kaunas' city center. The conversion of this area transforms it from a bleak industrial complex into a key connection between the city and the Nemunas River.

Residential buildings and a StartUp center are strategically placed at the intersection of Kaunakiemio Street for visibility
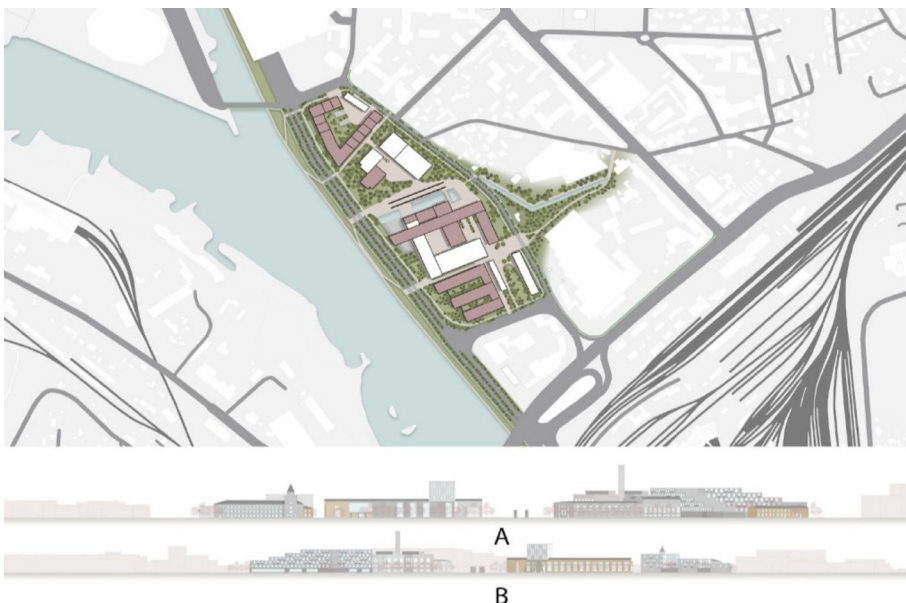
Fig 8. Proposed general plan of the territory and street views.
A. - street view from Kaunakiemis street;
B. - street view from K. Mindaugas street.
Schemes by D. Žmėjauskaitė
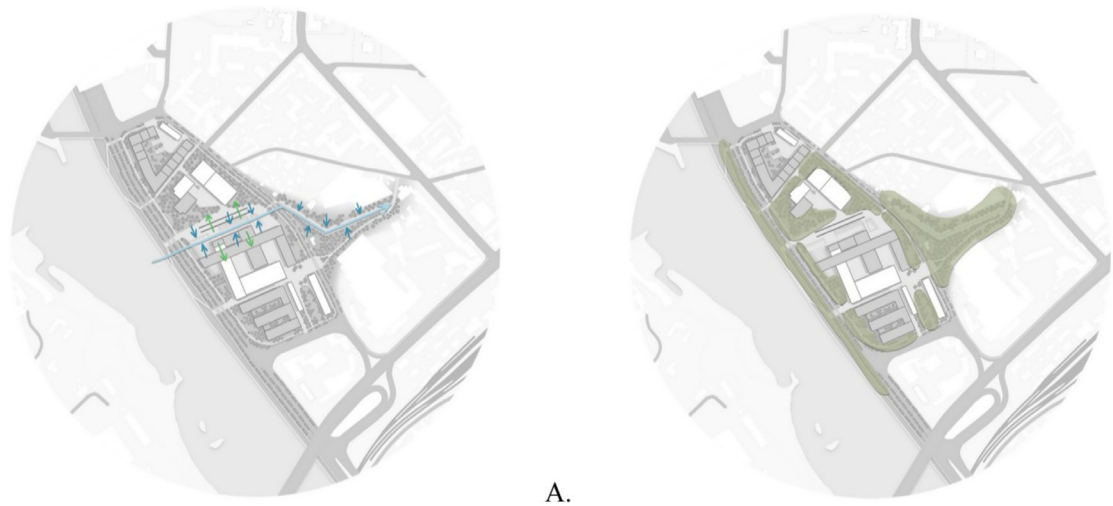
Fig 9. Schemes of natural water collecting system (A) and green infrastructure (B). Schemes by D. Žmėjauskaitė

TABLE 2

Correspondence of experimental design solutions to the theoretical model of former industrial site
and buildings conversion and integration into urban fabric and ecological networks (created by the authors)

| Theoretical model component	Principles	Project evaluation
Urban regeneration	Holistic and inclusive Transformation	The project reconnects the industrial site to the city, supporting a variety of uses (residential, cultural, commercial) and fostering community engagement near the Nemunas River.
	Sustainable reuse of resources	Adaptive reuse of heritage buildings reduces environmental impacts and revitalizes existing structures for new functions.
	Enhancing urban connectivity	The project improves pedestrian flow and access to the city center and Nemunas River, aligning with goals to reduce automobile dependency and improve public access.
Building conversion	Adaptive reuse with cultural heritage preservation	The preserved heritage buildings, including the "Pergalė" administrative building, enhance the area's historical character while repurposing them for modern uses.
	Context-sensitive design	Design solutions respect the local historical and cultural context, ensuring alignment with Kaunas' architectural heritage.
	Functional and flexible spaces	New spaces accommodate various functions (residential, commercial, cultural), allowing adaptability to future urban needs.
Green infrastructure	Integration of nature-based solutions	The daylighting of the Girstupis stream, green roofs, and the addition of tree-lined streets contribute to biodiversity and improve ecological resilience.
	Enhancing ecological connectivity	Reopening the Girstupis stream restores hydrological connections, linking the area to Kaunas' wider green network and enhancing ecological corridors.
	Public accessibility and well-being	Public green spaces are integrated, improving recreational and aesthetic value for residents and visitors, and developing pedestrian-friendly environments around the river and city center.

and easy access. To avoid cluttering the area with parking spaces, parking is located in the ground floors of residential buildings, as underground parking is risky due to proximity to the Nemunas River and the newly opened stream.

The project proposes to uncover and extend Girstupis stream within the adjacent vicinity of the site. This intervention aims to mitigate the image of densely built-up urban areas, while facilitating the restoration of natural hydrological connections. Opening the Girstupis stream creates new urban connections, restores the surrounding ecosystem, and lays the foundation for the expansion of green infrastructure, allowing the city's ecosystem to regenerate naturally. Additionally, the redevelopment of Kaunakiemis Street will reestablish vital linkages within the urban fabric, fostering the development of an independent ecosystem in the city center. The newly opened water sources function as a natural collection system for runoff water from adjacent buildings and surfaces, with potential use for local residents' domestic needs.

The diversity of volumetric forms enriches the architectural landscape, as observed in the street elevations (Fig. 8 A. and B.). This variety, along with new architectural forms, functions, and public spaces, is intended to attract people to the area. By integrating existing buildings into the complexes, a new identity is established, while maintaining and highlighting their significance to the overall site.

High concrete fences in the city center obstruct passage, so a key goal is to make the area more accessible and permeable by analyzing pedestrian flow and extending connections to improve infrastructure between the city center and the river. Automobile traffic is deprioritized in the city center to improve access to the water. Instead of eight traffic lanes in Karaliaus Mindaugo Avenue, four are preserved, with green

zones dividing them. Planting of trees is envisioned on both sides of this street to reduce pollution and provide shade for pedestrians in summer (Fig. 9). This approach also extends to green roofs on buildings, preventing overheating in large complexes exposed to intensive southern sunlight.

The project aims to create a shift in Kaunas' urban infrastructure towards greening and nature-based solutions. The evaluation of experimental design solutions correspondence to the theoretical model developed in the previous section is presented below (Table 2). The analyzed area would serve as a starting point, encouraging industrial buildings to either relocate from the city center or be repurposed with new functions. These regeneration and conversion methods could radically change the city's landscape, transforming the area from a bleak, abandoned district into a welcoming part of the city where residents and visitors would want to stay.

Conclusions

Urban regeneration is a multifaceted process that incorporates physical, environmental, and socioeconomic measures to create sustainable, resilient, and inclusive neighborhoods. Building conversion plays a crucial role in this process by preserving historical structures while adapting them to modern needs, contributing to the revitalization of urban environments. Integrating green infrastructure and nature-based solutions further enhances this transformation by improving ecological connectivity, enhancing public well-being, and promoting sustainable urban development. The comparative analysis of Parc des Chantiers, Frenkel Factory, and King's Cross highlights diverse strategies for industrial building conversion within the context of urban regeneration. Parc des Chantiers and King's Cross effectively integrated historical preservation with green infrastructure and mixed-use development, promoting both cultural and environmental sustainability. In contrast, Frenkel Factory focused primarily on cultural and economic regeneration, with less emphasis on green infrastructure, demonstrating that different approaches can address unique urban challenges. The theoretical model for converting former industrial sites integrates principles from urban regeneration, building conversion, and green infrastructure to create a comprehensive and sustainable framework. It emphasizes holistic transformation, adaptive reuse, and the integration of nature-based solutions to address both physical and socioeconomic aspects, while enhancing ecological and urban connectivity.

The experimental project of the former industrial site in Kaunas aligns well with the proposed theoretical model by incorporating principles from urban regeneration, building conversion, and green infrastructure. The urban regeneration component is fulfilled through a comprehensive transformation, aiming to reconnect the site to the city and enhance public access to the Nemunas River, fostering urban connectivity. Building conversion is sensitively approached, with adaptive reuse of culturally significant structures and context-sensitive design, providing both residential and commercial functions within restored heritage buildings. The green infrastructure component is achieved through the daylighting of the Girstupis stream and creation of green zones, including green roofs and public green spaces, to support biodiversity and enhance ecological connectivity.

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Kopsavilkums

Bijušo industriālo vietu atjaunošana ir kļuvusi arvien aktuālāka ilgtspējīgas pilsētvides attīstības kontekstā kopumā. Rūpnieciskās struktūras pilsētvidē, ko veido sava laika sociāli ekonomiskie apstākļi, bieži vien vairs netiek izmantotas, radot ievērojamas problēmas pilsētplānotājiem un attīstītājiem. Šādas novārtā atstātas vietas ne tikai fiziski nolietojas, bet arī sadrumstalo pilsētu teritorijas, izjaucot sociālos un ekoloģiskos tīklus. Šis pētījums izvirza hipotēzi, ka, pārvēršot pamestas industriālās teritorijas ekoloģiski integrētās pilsēttelpās, pilsētas var uzlabot sabiedrības piekļuvi dabai, samazināt to ietekmi uz vidi un atdzīvināt sadrumstalotās apkaimes. Darbā iekļauta atbilstošas literatūras analīze par pilsētvides reģenerācijas, ēku pārveidošanas un zaļās infrastruktūras tēmām, esošajiem pārbūves projektiem, kā arī piedāvāts teorētiskais modelis, kas virza bijušo industriālo objektu pārveidi dzīvotspējīgās, ilgtspējīgās pilsēttelpās. Formulētais teorētiskais modelis tika izmantots Kaunā, Lietuvā. Pētījuma atklājumi uzsver cilvēka mijiedarbības ar dabu atjaunošanas nozīmi, izmantojot adaptīvu atkārtotu izmantošanu, un uzsver iespējamos sociālos, ekonomiskos un ekoloģiskos ieguvumus no agrāk pamestu teritoriju integrēšanas pilsētas struktūrā.

GEOMORPHOLOGICAL FEATURES IN THE COMPOSITIONAL CONSTRUCTION OF MANOR PARKS. UPPER LIELUPE RIVER REGION

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**Abstract. Cultural heritage is one of the assets that shape a country's image. Latvia's cultural heritage exists regardless of the ambitions of the political powers that have swept over Latvia - the Bolsheviks, the Red Revolution, the two wars and the refugee exodus, collectivisation, land reclamation, biogas plants, wind farms, solar panel fields, etc. Cultural heritage continues to be threatened by the trends of globalisation and each individual's perception of the comfort of their own living space. The challenge for cultural heritage in the future is to be able to live with the multiplicity of horizontal and vertical legislation at different levels, different hierarchies, without losing the essence of the heritage. The main hope and ambition is that the heritage itself will not be lost behind bureaucratic actions and texts (Dambis). Heritage is everywhere. Seeing it requires professional knowledge and experience. We cannot privatise heritage by planting trees and building where we want. The property may be only a few metres outside the legal protection zone. The visual expression of the rural landscape is very strong, but also fragile. The poorly designed farmstead with its apple orchard, outbuildings, huge sheds, etc. can obscure iconic views to the natural substrate. It is worth mentioning the interdisciplinary assessment involving several specialists. The development of the site in time and space also creates new infrastructure with new functional pressures - traffic, emissions, biological treatment plants, noise, service areas, etc. The focus should therefore be on the cultural landscape as a whole rather than on the individual site. .
Keywords: manor parks, Lielupe river region, cultural heritage**

Introduction

The European Landscape Convention identifies landscape as an essential part of human life and as an element of social well-being (Eiropas Paodme, 2012). The formation of values as constructed identities in the perspective of cultural transmission, especially in relation to the role and importance of German-Balts in the culture as a whole (Miķelsone, 2017).

The historian and folklorist J. Kursīte (Kundziņš, 1974) and the architect Professor P. Kundziņš (Kursīte, 2014) touch upon the Latvian ethnographic environment, the viewpoints of architects and historians, and explore folk construction - "not only as a way of assembling materials and order, but also as a world-creating activity, viewed through the prism of folklore, mythology and symbolism. Here, several historical layers are synthesised - the Latvian ethnographic and the one generated by the German-Baltic culture (Miķelsone, 2017). In the rural landscape, the scale and compositional style of the buildings in the manor centre are particularly striking, as is the farmstead a few kilometres away, with its different functional and proportional structure of buildings, cattle paddock, root garden and thatched fence.

A cultural landscape based on nature ensures the quality of human habitat. It is based on dialogue between professionals and society. Professionals must be able to apply legislation that creates a positive dialogue with society.

"In the Handbook for the Protection of Monuments published at 1911, Wilhelm Neumann's proposed work programme for the protection of Baltic cultural monuments fully reiterates the objectives of the German Association for the Study of the Homeland (Bund Heimatschutz), founded in Dresden in 1904: to promote the protection and care of monuments, the preservation of historical building traditions in rural and urban areas, the protection of landscapes and urban ruins; the protection of local flora and fauna and geological treasures ..." (Mintaurs, 2016).

The nineteenth century became the "century of history" in more ways than one: it was the time when the science of history was established, but also the time when the cultural presence of Europe's past was felt everywhere; in art, literature, the design of household objects, architecture. The development of the historical consciousness of European peoples and the construction of national cultural identities

Linked to this consciousness was a sentimental, nostalgic attitude towards the individual and collective past, which was embodied in heritage objects.... as tangible evidence of the past (Lowenthal, 2011).. The cultural landscape consists of a set of accumulated resources, inherited from the past, which, regardless of affiliation, are considered to reflect and express values, beliefs, knowledge, traditions, and the environment that has evolved through the interaction of people and places over time (Eiropas padomes ..., 2005). The Latvian Cultural Canon was created as a political project with reference to the National Cultural Policy Guidelines for 2006-2015. The strategic goal is to strengthen national identity and the cohesion of Latvian civil society (Eiropas Padomes ..., 2005). The Latvian Cultural Canon comprises 8 sectors, including architecture and landscape. The canon mentions 7 Latvian landscapes, including the landscape of the Zemgale Plain. The study examines the landscape of the upper Lielupe in more detail, looking at the context of the plain, the valley and the compositional subordination of the manor ensembles to the natural substrate. The study looks at the interaction of cultural and historical values with the characteristics of the natural substrate, which together form a strong image of compositional expression that is easily perceived in the landscape. The study covers 7 landscape areas in the upper Lielupe River valley from Bauska to Tetelminde near Jelgava. In total, about 36 km of the upper Lielupe River valley landscape areas were surveyed. The length of each landscape area varies along the lines of sight from both banks. The geomorphological material used in the study is derived from digital surveys.

The aim of the study is to identify the compositional relationship between the buildings of the historic manor centres and the character of the natural substrate.

Research objectives:
- To identify the geomorphological features and geodetic measurement ramifications of the Lielupe valley landscape;
- To find the context of the compositional structure of the historical buildings with the expression of the Lielupe valley in the main view lines;
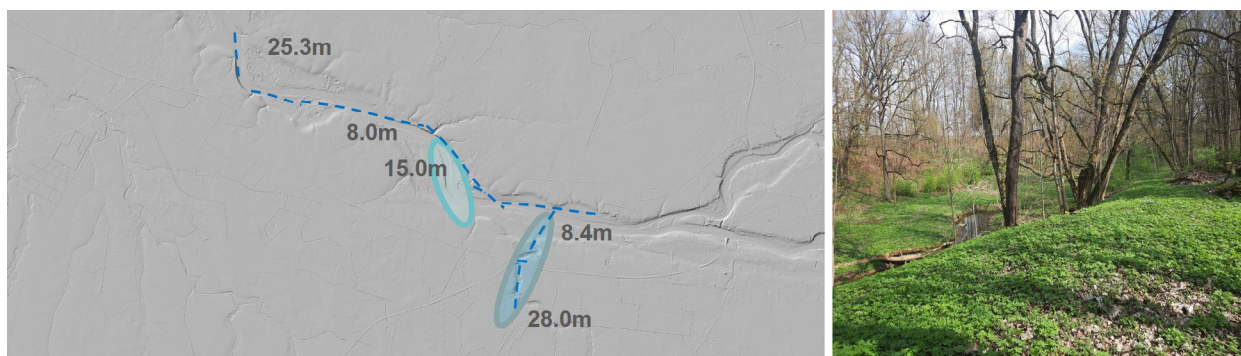- To assess the amount of agricultural landscape or bank

Fig. 1, 2. Elevation marks on the relief at the mouth of the Kauce River. Compositional   contexts of nature and space (author's map, 2024)

Fig. 3, 4. Kaucminde Manor by the Kauce River. Parade Yard at the castle (Lancmanis, 1994; photo by the author, 2024)

vegetation in the valley.

Methods used in the study:

- Visual comparison method;
- Secondary analysis of previous studies;
- Graphical processing of the data obtained in the study.

The novelty of the research results - the collected material contributes to the focus on the preservation of the cultural and historical landscape in the development plan of the district. By evaluating the compositional subordination of rural manor ensembles to the expression of the elements of the natural substrate in the 18th/19th centuries, a close connection between architectural values and the values of the natural substrate was established. In the course of the 20th and 21st centuries, the elements of the visual expression of the cultural space were increasingly suppressed and disappeared.

Results and Discussions

The Bauska Nature Park, established 20 years ago, makes an important contribution to the conservation of the landscape of the upper Lielupe valley. The material contained in the study complements a more detailed assessment of the Nature Park area, taking into account the geomorphological features of the valley.The study examines 7 landscape spaces of the Lielupe valley, reflecting the character of the natural base of the Lielupe River and the adjacent manor buildings, which form a compositionally harmonious whole. The landscape spaces are spatially layered one behind the other, starting from the upper reaches of the Lielupe River down both banks:

- The area where the river Kauce flows into the Lielupe;
- The landscape area Bornsminde-Jumpravmuiža
- The context of Mezotne - Mazmežotne - Church Hill;
- The cultural landscape of the Ciemalde estate - Vedgi settlement;
- Īslīce estuary - Salgale church;
- Emburga - Stalgene river valley;
- Tetelminde - Dandale Manor landscape.

One of the most visually striking elements of the natural substrate is the topography and the water edge. In the case of the Zemgale Plain, mentioned in the Latvian Canon, a few metres of elevation create a visually powerful impression. This is also true of the steep bank at the mouth of the Kauce River, which forms a ravine with a zigzag course.

The bed of the Kauce River from Kaucminde Manor Park to the mouth of the Lielupe River is a steep slope with meadows and trees for about 2 km. The river bed is 28 metres above sea level in the upper reaches near the manor park and 8.4 metres above sea level at the mouth of the Lielupe River. The difference in level in the middle reaches of the river forms a small waterfall zone in this section. The compositional structure of the Manor Park is subordinate to the expression of the relief, seeking a connection with the river gorge.

Bornsminde Manor and Jumpravmuiža.

The courtyard of the manor forms a parallel to the gorge. The lower transverse axis is connected to the gorge. One of the axes of the courtyard culminates in the river to the east and in the outbuilding to the west. The other cross axis is in the park, connecting the central bay to the river. Both axes lead to a ravine on the river bank (Lancmanis, 1994).

The southern part of Borsnminde Manor Park begins 2 km downstream from the mouth of the Kauce River (8.4 m above sea level). The edge of the valley slope (25.0 m above sea level) is about 200 m from the western edge of the park (15.0 m above sea level). The park is situated on a terraced slope leading down to the river, with outcrops of dolomite. The edge of the escarpment, at 8.0 m above sea level, forms a visually spectacular and atypical line of sight for the Zemgale plain to the opposite side of the river, which has an analogous dolomite outcrop on the escarpment. Jumpravmuiža Park (25.3 m above sea level) is located here. The park of Bornsminde Manor is compositionally subordinate to the dolomite escarpment (Bruģis, 2005). The central axis of the park is formed by an avenue of lime trees. It is situated on a wedge-shaped slope towards the shore. The axis coincides with the upper reaches of the Lielupe riverbed, so that the view from the park avenue to the south allows one to observe the course of the river in the valley. The park paths along the riverbank were historically arranged in three terraces …. Part of the bank has been eroded away over the last hundred years, with the loss of these interesting multi-step paths (Bruģis, 1994). The escarpment has become

Fig. 5. The compositional structure
of Kauces river ravine and
Kaucminde manor
(author's scheme 2024)

Fig. 6. The architectural composicional structure of Kaucminde Manor.compositional structure of Kauces river ravine and Kaucminde manor positional contexts of nature and space (from A. Ziemeļniece private archive)
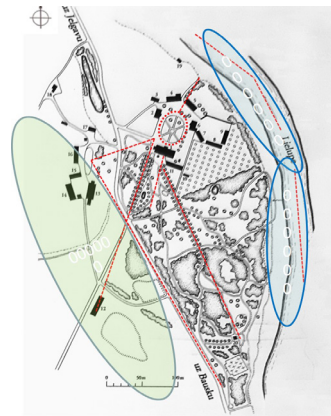
Fig. 7, 8, 9. The Lielupe River valley between Bornsminde Manor and Jumpravmuiža (created by the author)

overgrown with giant trees, forming an impressive canopy and strong root system. The canopy is subject to wind loads and the root system is difficult to maintain in the dolomite layers. This has contributed to the steepness of the coast over the centuries. Impact loads are also generated during the spring ice advance when icebergs move through the tunnel-like dolomite banks.

As the river meanders, the park narrows in the southern part and the paths converge at one point. At this point, the park forms a slope along the historic dirt road to Bauska. Downstream of the manor house, the dolomite escarpment is slowly eroding away, and the dolomite escarpment is no longer visible in the lines of sight of the river valley. The slopes of both banks are covered with fields, forming long, picturesque vistas downstream.

10 km downstream, the slopes of the Bornsminde river valley form a plastic romantic character, complemented by an agricultural landscape with farmsteads and apple orchards on the highest points of the banks (Lancmanis, 1999; Ziemeļniece, Zilgalvis, Burkāne, 2019). When one reaches the Mežotne part of the park, the steep banks expose dolomite layers. In the park part, the elevation is 13.6 m above sea level and the coast 5.5 m above sea level. Compositionally, the long axis and the central field of the Mezotne Park are parallel to the river bed, forming long lines of sight to the valley slope on the left bank, with a 100-200 m wide floodplain and a slope height of approximately 21 m above

sea level. The spectacular landscape of the two banks of the river culminates in the hill, at the foot of which a spring gnaws, bridging the difference in relief from 22.5 m above sea level to 5.5 m above sea level. 400 metres north of the hill, at 22.7 metres above sea level, is the church of Mezotne. 13 km downstream from Mežotne, the valley of the Lielupe River becomes a picturesque left bank slope with an elevation of about 11.0 m above sea level. A little further down the slope is the Ciemalde Manor, which is situated compositionally opposite the steep bank. The longitudinal axis of the composition of the landscape area of the manor extends for 450 m to the opposite bank or steep bank of the river, with an elevation of 13 m above sea level. The steep bank at this point has no outcrop of dolomite layers, the slope of the left bank of the Seine valley is occupied by extensive cereal fields, giving the landscape a particular expression during the seasons. 1.5 km downstream, on the left bank of the Ciemalde, is the historic settlement of Vedgu, where the enemy's rafts (10.7 m above sea level) could be seen from afar coming up the long axis of the river. A very rewarding natural feature that served to strengthen the protection of the ancient settlment of the Semigallans. 1.5 km downstream from the settlement of Vedgi is the Īslīce Manor, with the Īslīce River tributary on the left bank of the Lielupe River, forming a 200-400 m wide valley with elevations of 10 m above sea level at the manor and 6.9 m above sea level at the mouth. As the river bed changes course, both

Fig. 10, 11, 12. The spatial compositional structure of Bornsminde Manor
(created by the author; Bruģis, 1994)

Fig. 13. The ancient valley of the Lielupe River near
Mezoten castle Engraving, 19th century (Lancmanis, 1999)

Fig. 14, 15, 16. Lielupe escarpment at Mezotne (created by the author,
Ziemeļniece, Zilgalvis, Burkāne, 2019)

Fig. 17,1 8. ev. luth. Mezotne Church and Castle (Lancmanis, 1999)

Fig. 19, 20, 21, 22, 23, 24. Lielupe dolomite bed in the ancient valley
near Mezotne (photo's by the author, 2021)
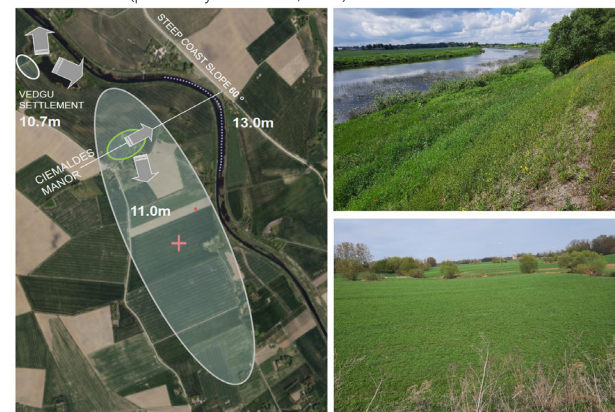
Fig .25, 26, 27. Vedgas settlement and Ciemalde manor. Left bank of the
Lielupe ancient valley (created by the author, photo's by the author, 2022)

upstream and downstream can be seen from the manor house. The historic site is now heavily overgrown, but the compositional position of the buildings is understandable. The very wide agricultural landscape without overgrowth also allows the bell tower of the Salgale church to be seen in long lines of sight 1.5km away on the right bank of the river, at the highest point of the valley at 6.9 m above sea level. 4 km downstream from Salgale church, the Lielupe retains its wide valley character and reaches the Emburga castle mound and the Stalģene manor. At this point, the right bank is high, while the left bank forms a wide floodplain for about 6 km. The right bank high, while the left bank forms a has long views, which is why the ancient Emburga mound was built here. At this point, the lower reaches of the river are clearly visible, as enemy rafts come up to Bauska.

As the River Lielupe approaches Jelgava, it forms a narrow valley with steep banks at Tetelminde and Dandale Manor. Both manor houses were destroyed during the mining era, and parts of the park were lost in the post-war years. Only the steep banks and an old engraving remain of the

Fig. 28, 29, 30. The ancient valleys of Islice and Lielupe ancient valley near the
ev.luth.church Salgale (created by the author, photo's by the author, 2022)

Fig. 31, 32. Tetelminde Manor.
The old building. Parade ground at the end
of the avenue of trees next to the steep
bank (created by the author,
photo's by the author, 2023)

Fig. 33, 34. Dandale Manor.
Engraving from 1868
(JVMM archive; photo by the author, 2023)

Fig. 35, 36. The banks of Lielupe
floodplain and meadows
near Stalgene Manory
(Lancmanis, 1999;
photo by the author, 2023)

picturesque landscape.

The old engraving of Dandāle Manor shows that its buildings were built close to the steep bank - the manor house, the cottages, the stables. From an agricultural point of view, the closer to the water, the easier it is to farm. The Lielupe floodplain extends downstream from Dandāle, where the mouth of the Sesava River is located, creating very large flood areas in spring.

On the right bank is the manor house of the historic Tetelminde manor, with a parade courtyard, which compositionally forms a longitudinal axis parallel to the steep bank. The avenue of trees leading to the parade ground formed a perpendicular to the river bank, providing a visually striking vantage point over the river valley.

Conclusions

The subordination of the geomorphological features of the Lielupe River and the compositional structure of the farmsteads to the characteristics of the natural substrate, which are discussed in the study, clearly draws attention not only to the respect of the river protection zone in the legislation, but also to the detailed criteria that are missing in the documents. The 7 most picturesque landscape areas of the Lielupe valley are united by several factors.

▪ The variable width of the river valley and the different gradients of the two courses create a peculiar sense of scale in small sections of the river. This contrast is particularly pronounced in the Zemgale plain, where the landscape can be read for several kilometres at the viewpoints;

▪ The agricultural landscapes of the Lielupe valley must be preserved, avoiding the formation of overgrowth that would obscure the slopes of the banks; failure to comply with this condition would create a problem similar to the one we are currently facing in the Abava valley, with the disappearance of outstanding vantage points;

▪ Further work is needed to remove the rushes in the river opposite Mežotne, which is part of the Bauska Nature Park; the river is shallow in hot summers and the water level is very low, which encourages the proliferation of rushes;

▪ On the basis of the sites in the river valley covered by the study, the possibility of creating viewing platforms at the highest points, to be determined by geodetic measurements, should be explored.

▪ The overgrowth of large trees and their root systems, which have penetrated the dolomitic layers of the

river bank, should be removed as a matter of urgency. The effect of wind loads on the tree canopy increases the likelihood of cracking in the dolomite bank. The situation of the park at Bornsminde Manor can be used as a comparison by assessing the location of the historic paths in the park on the 1884 plan;

▪ The seedlings or saplings, whose chaotic rooting disrupts the historic compositional structure of the park, should be carefully monitored. The lack of specialists and the occasional maintenance of the park, known as 'clean-ups', contribute to misconceptions about the historical appearance of the heritage.

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Kopsavilkums
Kultūras mantojums ir viena no vērtībām, kas veido valsts tēlu. Latvijas kultūrainavas mantojums pastāv neatkarīgi no politisko varu ambiciozitātes, kas brāzusies pāri Latvijai.

Vietas attīstība laikā un telpā papildus veido jaunu infrastruktūru ar jaunu funkcionālo slodzi: transports, bioloģiskās attīrīšanas iekārtas, troksnis, apkalpes zonas utt. Līdz ar to uzmanība jāvelta nevis atsevišķam objektam, bet kultūrainavai kopumā. Kultūras mantojumu joprojām apdraud globalizācijas tendences un katra indivīda izpratne par savu dzīves telpas komfortu.

HERITAGE HOMESTEAD TRANSFORMATION INTO RURAL-URBAN HYBRID ENVIRONMENT: CONDITIONS AND CHALLENGES

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Abstract. Hybridization trends between urban and rural environments, where rural environments gain urban characteristics, some rural spatial and lifestyle characteristics remain present in peri-urban and suburbs areas which previously constituted a part of countryside as well as emerging high-tech and low-tech farming trends in the urban environment are commonly observed in developed and developing countries. Lithuania is not an exception from this trend of hybridization of environments. The recent shift of attention of urban dwellers to the countryside during the pandemics with the emergence of new hybrid environments and lifestyles there, justify the aim of this research - to analyse and understand better theoretical and practical premises of creation of hybrid environments in the countryside by transforming historical homesteads and developing sustainability aesthetics. This research includes: quantitative and qualitative literature review and theoretical analysis of hybrid environments and the peculiarities and state of research of such environments in the countryside (rural) context; the analysis of practical aspects of transformation of historical homesteads into hybrid environments in Lithuanian landscape focusing on interaction of tradition, practical aspects, and aesthetics.
Keywords: heritage homestead; hybridization of environments; rural-urban hybrid environments; sustainability

Introduction

In the light of recent global events - the Covid-19 pandemic, the war in Ukraine - the urban residents are thinking more and more about where they could feel safe and secure, where they could find shelter with their families and simultaneously could have a place to live, to work and create. When the first quarantine was declared in Lithuania people were shocked. All the country was looking for a safe place to stay, a way to return home, or maybe to stay at their relatives or parents living quarters in the countryside or even places out of the grid. But the unexpected quarantine stopped numerous people in a position right here right now. After the first wave and when quarantine restrictions were loosened, urban dwellers evaluated the circumstances, actualities and took action. Some moved to their country houses, to collective gardens with a possibility of accommodation, still others looked for workation opportunities in rural tourism homesteads, small log cabins, where one can stay for a reasonable fee and have all the conditions to live and work and possibly avoid the virus (Narkūnienė, 2021). People with substantial regular income or savings have rushed to buy real estate: liveable country houses or farmhouses, abandoned liveable properties in rural areas, farmlands without buildings, properties not suitable for living among others (Alonderytė and Kuzmicka, 2020). After the pandemic, not only did this boom subside, but the market suddenly was filled with farmlands and farmhouses, unfinished projects - homesteads the renovation of which had been started, but not finished, or partially renovated homesteads. Such "country homes" have become forgotten and abandoned. This is the case for many of the renovated and underused farmhouses for sale on the market today, bought during the Covid-19 pandemic. Some new country house owners did not adapt to the rural community, to the lack of comfort, the quality of infrastructure and communication, or the feeling of exclusion. Others naturally longed for small city apartments and flats. However, others stayed in the homestead for the summer, for holidays; while there were some owners, who stayed there to resurrect the heritage of wooden architecture, to create new communities and connections, to adapt the rural spaces to their own, far from rural, needs, thus creating a hybrid rural-urban environment in the countryside.

This recent phenomenon of shift of attention of urban dwellers to the countryside, the emergence of new hybrid environments there, justify the aim of this research - to analyse and understand better theoretical and practical premises of creation of hybrid environments in the countryside by transforming historical homesteads and developing sustainability aesthetics.

Methods of research include qualitative literature review and analysis, observation on sites and recording of hybrid environments in photographs, descriptive qualitative analysis of Lithuanian heritage homestead potential sustainable transformation into hybrid environment based on the theoretical frameworks of sustainability aesthetics (Kagan, 2010, 2011) and ecological aesthetics (Dekay, 2012).

Theory: understanding hybrid environments, peculiarities of hybrid environments in countryside (rural) landscapes

Trends of hybridization of environments. The initiation of active hybridization of environments from spatial and functional points of view can be associated with the start of industrial revolution. Questions of hybridization between urban and rural environments are often observed in literature, where rural environments gain urban characteristics and some rural spatial and lifestyle characteristics remain present in peri-urban and suburbs areas which previously constituted a part of countryside. According to D. Torreggiani et al. (2012), the contact of urban and rural environments results in "patterns with hybrid identities", they note, that such hybridization can be observed at different scales: regional (cities merging into megapolitan conurbations including fragments of rural landscape); urban scale (suburban and peri-urban areas, zones of influence of the city), settlement scale (city quarters, farmsteads, villages, homesteads), and even single buildings in rural and urban settings. The research by D. Torreggiani et al. (2012) and similar studies reveal that such multi-scale hybridization is mainly driven by urbanisation. According to C. Iannucci et al. (2012), this can be identified as a dynamic process of dispersion of the city, which can sometimes determine very fast changes in land use and land cover. Urbanisation as a driver of hybridization is well reflected in the egg analogy of the city development and expansion (Iannucci et al., 2012; Vancutsem, 2011) (Fig. 1). D. Vancutsem (2011) and C. Iannucci et al. (2012) summarise city transformations from Middle Ages to present day using egg analogy: "from the old Medieval city 'compact as an egg' to a post-modern city with intertwined functions (the
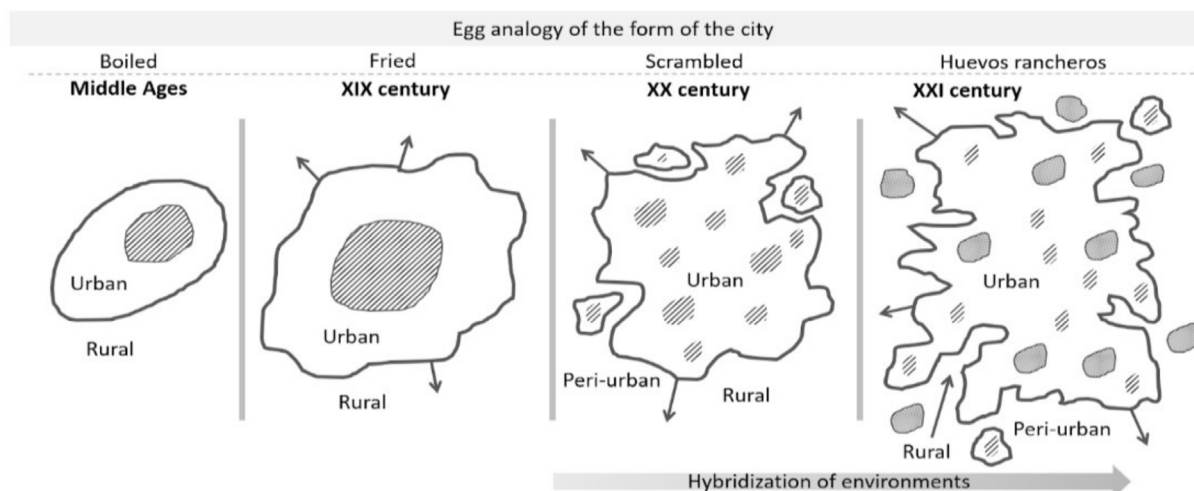
Fig. 1. Egg analogy applied to the transformation of the form of the city (Iannucci et al., 2012; Vancutsem, 2011)
reflects the ongoing trend of hybridization of environments. Adapted by the authors from D. Vancutsem (2011) and C. Iannucci et al. (2012)
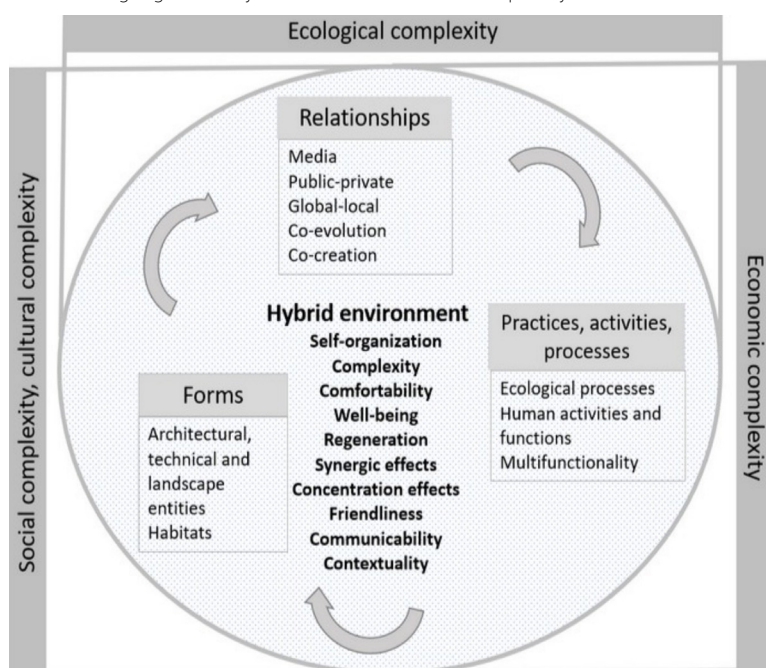
Fig. 2. Summary of features of hybrid environments based on the theoretical model of landscape by J. Stephenson (Hou, 2006; Krasilnikova and Klimov, 2016; Stephenson, 2008)

'scrambled egg') that has finally evolved into a polycentric structure (the 'huevos rancheros') connected by different spatial infrastructures (including the telematics ones)."

Researchers note various processes of hybridization both in urban and rural environments, such as fragmentation in rural spaces (Halfacree, 2006), blurring boundaries between architecture and landscape, between forms and processes, between ecological and cultural realms (Hou, 2006). According to J. Hou (2006), another aspect of hybridity - between ecological and social-cultural realms and functions - occurs in post-industrial cities and must be considered in ecological design. It is possible to summarise, that processes of hybridization encompass urban - rural - natural components, anthropogenic and non-anthropogenic components, human and non-human actors, components, and processes.

Characterization of hybrid environments. Different authors present different aspects of hybridity of environments analysing identity, functions, characteristics, regional differences. For example, J. Hou (2006) mentions dual identity of waterfront transformation projects in post-industrial cities as they result in hybrid spaces with identities both of ecosystem and urban scape. J. Hou (2006) mentions such project examples as habitat barge and salmon spirals, intended both as artificially created habitat for salmon and other fish and simultaneously underwater observatory and playground for children. E. Krasilnikova and D. Klimov (2016) mention the contradictions between global and local identities in hybrid urban spaces. Some researchers (de Souza e Silva, 2023; Leontidou, 2020) distinguish digital space and smart city / smart environment components in hybridization of environments. It is possible to summarise that hybrid environments can have manifold identities including urban, rural, ecosystem, global, local, physical, virtual etc.

Researchers mention functional heterogeneity, multifunctionality and even contradictory functions in hybrid environments (Hou, 2006; Krasilnikova and Klimov, 2016), which are inevitably interconnected with manifold and sometimes competing identities of such environments. For example, J. Hou (2006) mentions combining habitat functions and transportation infrastructure, ecological and public functions, habitats, public access and amenities and the need for negotiations between different and even contradictory functions and processes, such as the necessity to provide access to the waterfront and at the same time to create space for undisturbed development of ecosystems. E. Krasilnikova and D. Klimov (2016) mention integration of
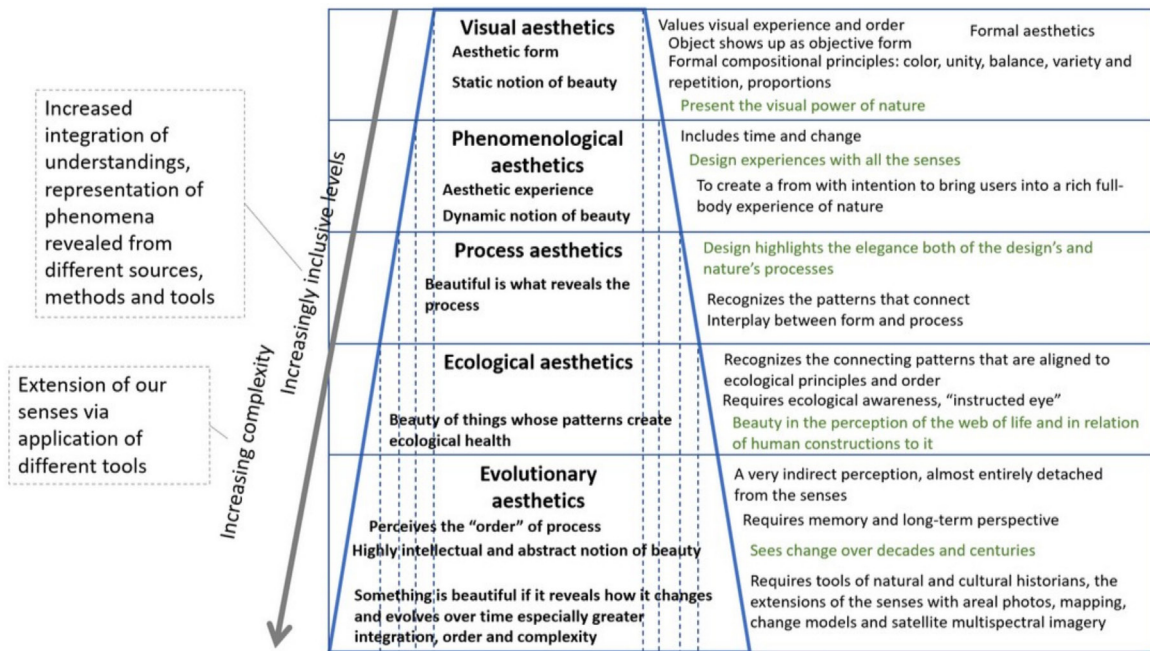
Fig. 3. Stages of perception of ecological aesthetics summarised from M. Dekay (2012)
that can be applied as an analytical framework in order to understand better aesthetic expressions of hybrid environments

residential function, public spaces, and green infrastructure with no clear separation between public and private in hybrid urban spaces.

Various existing and desirable characteristics of hybrid spaces can be identified from literature. For example, D. Torreggiani et al. (2012) mention prevailing ambiguous character of places, where it is difficult to denote clear urban or rural categories. J. Hou (2006) mentions multiple complexities (ecological, social) and expressions and hybrid combinations of activities, identities, and processes. According to the landscape model of J. Stephenson (2008), it is possible to presume that hybrid combinations and multiple expressions of forms, relationships, practices, activities and processes exist in such environments. According to E. Krasilnikova and D. Klimov (2016), hybrid urban spaces contain multi-layer structures, with multilevel public spaces and integrated virtual environments; they also mention such characteristics of hybrid environments as: information capacity, transformation ability, self-organising qualities, synergistic effects. E. Krasilnikova and D. Klimov (2016) additionally distinguish the desirable characteristics of hybrid environment: comfortability, multifunctionality, services for different groups of users, contextuality, friendliness, communicability, historical continuance maintaining genius loci of the place. Fig. 2 presents the scheme summarising components and characteristics of hybrid environments based on analysed literature.

Different characteristics of hybrid environments can be observed in different regions. For example N. Pichler-Milanovic (2007) notes peculiarities of Eastern European suburban areas, which she identifies as ex-urban hybrid landscapes, which are characterised by "commercial developments in traditionally (semi)rural areas, such as new shopping centres, enterprise zones, logistics, warehouses", "coexistence of low- and high-density residential areas", "coexistence of new multi-dwelling housing developments within sparsely settled villages with traditional single family houses on the urban fringe".

General classification of hybrid environments into those existing in urban and rural environments. Based on the research by D. Torreggiani et al. (2012), it is possible to distinguish two general types of hybrid environments for the purposes of this research: hybrid environments existing in urban context and hybrid environments existing in rural context. The examples of first urban type, according D. Torreggiani et al. (2012), are areas and projects that insert into urban settings the elements that are commonly associated with countryside starting from urban agriculture in inner urban or peri-urban areas to farming functions integrated into the envelope of the building. Such hybrid environments in the urban context can be further subdivided into hi-tech farming models (vertical, hydroponic urban farms etc.) and models based on traditional countryside image and direct contact with the ground. Hybrid environments in rural contexts include spaces for business and leisure, shopping malls, entertainment and (agri)tourism centres "ejected" into the countryside (Torreggiani et al., 2012; Pichler-Milanovic, 2007). According to D. Torreggiani et al. (2012), even typical rural activities often aesthetically refer to urban style either due to poor attention to design or deliberately aiming to enhance the image of farming (an intention to show an image of well-being associated with city life). Thus, from one side of view, rural environments - buildings, open spaces, small architecture objects - increasingly acquire urban style and appear as an extension of urban sprawl. They note that recent farm buildings do not differ substantially in their form, materials, colours, and textures from urban buildings. Although another contrary trend was observed by D. Torreggiani et al. (2012) as well, reflected in new insertions into rural environments with exaggerated and mystified countryside identity that often appears out of context and leads to deterritorialization - non-local plants and materials, open spaces are designed without integrating them into landscape. Besides these two negative or ambiguous trends, D. Torreggiani et al. (2012), mention high quality hybrid environments in the countryside with restored traditional buildings and emphasising the relationships between landscape and typical locally produced products. The study by D. Torreggiani et al. (2012) conducted in the Italian context mentions farm wineries as examples of such environments. They conclude that currently hybrid environments in the urban context and the ways of integration of farming functions in the city receive much more attention from researchers compared to countryside hybrid environments; they note that "interdisciplinary work is

needed to analyse how urban functions can be brought into the countryside and improve the quality of rural settlements".

Significance of sustainability aesthetics developing hybrid environments. As it was mentioned by D. Torreggiani et al. (2012), hybrid environments, especially in rural contexts, are struggling with identity, contextuality, and aesthetic expression challenges. Contemporary researchers in the field of sustainability point out the need of distinctive aesthetic expressions of sustainability movement and sustainable environments and even distinguish the need of sustainability aesthetics (Kagan, 2010, 20111).

S. Kagan (2011) notes that sustainability aesthetics originates and is closely linked with ecological aesthetics. S. Kagan (2010, 2011) has based his analysis of sustainability aesthetics and ecological aesthetics on the concept of aesthetics by G. Bateson (1972), who has seen the aesthetic perception as response to the pattern which connects. Accordingly, sustainability aesthetics and its perception are in-depth multi-layered phenomena; thus requiring a stage-wise approach to design and perception (Dekay, 2012) (Fig. 3). According to S. Kagan (2011), sustainability aesthetics should be attentive to complexity, combining and contrasting unity, complementarity, competition, and antagonism at the same time and simultaneously recognizing the meta-pattern uniting the living world.According to S. Kagan (2010, 2011), sustainability aesthetics is both the affective experience of human being's interrelationship with environment and at the same time requires "the ability to perceive connections, commonalities, shared properties between different elements of reality and different levels of reality, at different levels of abstraction". Considering both the complexity of expressions of hybrid environment and the phenomena of sustainability aesthetics and its perception, the framework of perception of ecological aesthetics by M. Dekay (2012) (Fig. 3) was selected as a tool for analysis of aesthetical characteristics of hybrid environments.

Practical aspects: features of heritage homesteads and their transformation and hybridization in Lithuania

Some features of heritage homesteads and their present-day relevance. Lithuanian ethnic culture was professionally studied already at the beginning of the 19th century. After the First World War, the research strongly focused on the spiritual culture and folk art of Lithuanian peasants. Thus, Lithuanian ethnic culture, historic rural landscape development in Lithuania including historic homesteads and villages, is quite well researched topic. Works by Lithuanian researchers K. Čerbulėnas (1958), K. Šešelgis et al. (1965), K. Šešelgis and M. Urbelis (1980), J. Bučas (1988, 2001), J. Minkevičius (2016), D. Puodžiukienė (2014), R. Misius (2011, 2012, 2017), R. Misius and J. Bučas (2009), A. Andriušytė et al. (2013) can be mentioned in this field among others. Diverse aspects of countryside landscape and built structures are analysed: rural landscape history and peculiarities, green structures, landscaping, flower plantings in the homesteads, buildings and architectural features, artistic aspects. It is possible to conclude that Lithuanian rural landscape and ethnic architecture features are well documented and analysed, although sustainable adaptation possibilities of these features and buildings to contemporary needs, their sustainability aesthetics potential are not well researched yet.

Researchers underline complex and peculiar development of Lithuanian countryside landscape. According to R. Misius and J. Bučas (2009), in the historical development of the Lithuanian rural landscape, changes were affected by natural conditions, agricultural technology, economic and socio-political factors including agrarian reforms; changes were influenced by shifts in lifestyles, improvements in construction and material processing technologies as well. According to D. Puodžiukienė (2014), the history of ethnic architecture in Lithuania has spanned many centuries and has no fixed beginning or end. Its chronological development does not coincide with the chronology of professional stylistic architecture. The cradle of ethnic architecture is the wooden countryside buildings. Until the 20th century, around 80 percent of the Lithuanian population lived in villages, farmsteads, manor houses, towns and church villages built with wooden dwellings and other structures. The craftsmen did not pursue innovations, but relied on the tradition handed down from one generation to the next, upheld the notion of harmony that had developed in the region, and gradually improved the usual methods of construction. The structures and shapes of the buildings depended on their functions and the characteristics of the local materials (Puodžiukienė, 2014).

Establishing a homestead. According to ethnic traditions that were followed through centuries, not only in Lithuania, of moving to a new home mainly had two alternatives: a) settling a new homestead on the old existing homestead site, by renovating and fixing the existing buildings, b) building a new homestead by using not only the experience and advice of the elders, the experienced craftsmen, carpenters, stonecutters, but also, often, the expertise of wise men, herbalists or other spiritual authority in the community. Currently emerging nature-based solutions trend in architecture and urban planning encourages analysis and integration of other knowledge systems that go beyond the boundaries of modern science (folk, local community knowledge) in the search for sustainable solutions for our living environment (Eggermont et al., 2015). This research and practice trend is quite new in Lithuania as well. Even if spiritual folk traditions and beliefs are well researched, they are not always connected to the arrangement and management of the living environment. The research by R. Misius (2017) can be noted in this context. He concludes that the interaction between the spiritual culture of the Lithuanian people and their living environment is reflected in Baltic traditions, cosmology, ethno-culture and folk art. According to ethnologist L. Klimka (2011), folk culture and accumulated experience can be interesting and useful today as a subtle method of establishing a harmonious relationship between humans and nature.

Like in our days, centuries ago it was convenient to have a lake or a river near the property. However, people later discovered that through the waterways comes not only water but also invaders, and there is a risk to living in such an open area. The place for a homestead was not chosen occasionally near a hill or a forest for natural shelter from the storms. It was also oriented according to the prevailing winds and the directions of the world (Apanavičius, 2011). Today, these rules are often overlooked when new houses are built in completely new sites. So even though today the energy efficiency of buildings is different, although they may be identical in terms of engineering and materials, due to natural factors, they may operate differently. Thus, if planning to have a house in the rural area, it is advisable to settle in an old homestead and restore it according to present day needs, or at least to obtain a homestead ruin or a place with at least a hundred years of history. Such choice is likely to protect the new owner from the unexpected challenges and help to create a warmer and cosier home.

Arrangement of homestead. Humans cannot survive without water. In most cases, homesteading started with a search for a water source. Thus, every time moving to live in a new place, establish a homestead, or even a village, the first task was to find the underground or the groundwater stream. Consequently, the discovery of the water, digging wells, determined the location of the buildings. For example, ancestral tradition tells us that a wooden house built on an underground water spring is not a good solution and is a sign of bad luck. There is a saying that if you live in such a building, nothing will stay in a house for a long time, neither wealth nor people. Grown-up children will quickly move away, crops will not feed the family until spring, linen cloth will quickly wear out, wool will be eaten by moths, and logs of the house will rot. Some of the claims may be superstition, but the rotting of logs can be truly linked to increased moisture under the house. The cloth will wear and tear faster if kept in a damp room because of humidity and mould. The harvest possibly rots quicker if it is kept in a damp chamber or on a wet floor. Chinese Feng-Shui tradition is well known and widespread today and it is possible to note that it has parallels with Lithuanian ancestors' life practices. It is peculiar that Feng-Shui tradition even today is applied as environmental and design practice together or in parallel with modern scientific approaches (Chen and Nakama, 2004). It was known as well that one should not build a house, or barn too close to a well. This was a custom, but today it is clear that drinking water can quickly become contaminated with slurry if the well is not properly located. Thus even if the arrangement of buildings in the homestead in many cases seems logical, simple, and geometric (Misius, 2012), it was influenced by a number of visible and invisible forces and factors.

As traditional rural life in the homestead was immersed in nature, thus it is not a coincidence that motifs of the natural world were integrated into the decorative features, mainly wood carvings, of homestead buildings and even in the arrangements of decorative flower beds near the house (Misius, 2017). Nowadays such interpretations of nature would be attributed to biophilic design and could also serve as an element or inspiration in sustainability aesthetics.

Plantings in and around the homestead. Today, looking around historical homesteads, it is possible to find old trees - both fruit trees and other seemingly less useful ones. But everything had its purpose in a traditional homestead lifestyle. R. Missius (2012) has identified the historical plantings of the homesteads as the heritage of activity. One of the most characteristic features of the historical homesteads is their extensive tree planting. Trees were planted both for decoration and practicality. According to ethnologist L. Klimka (2011), in the archaic worldview of the Lithuanians, each type of tree had its own mythology, usually associated with the place of manifestation of different deities. From this concept came the tradition of planting diverse trees near the homestead. Large, non-fruiting trees were often planted along the perimeter of the plot (Misius, 2012). Sometimes, avenues or rows of trees were planted to ward off the prevailing wind. These rows were deliberately giving way naturally to grow hawthorn bushes, which protected homestead from the large wild animals, and, in spring and autumn, were the source to fill the house's medicine cabinet with dried blossoms and berries. Lime trees were valued for their blossoms, bark cordage, small nuts, and birch trees for bathing brushwood and brooms, and even spruce trees, whose buds in late spring helped to replenish the vitamin C deficiency in the family diet. R. Misius (2012) notes in his research that in the homesteads in the Sudovia region even after 1930 owners tried to plant protective planting and garden plants in orderly rows, but also adapted the plantings

to the existing natural conditions, such as the terrain, the water bodies and the quality of the soil, i.e. did not forget the old traditions of planting in homesteads. Lithuanian artist and Baltic culture proponent V. Kašinskas (2021) writes in his research and texts that the spruce tree is a door to the other world, but at the same time, it is a symbol of the tree of life, of the evergreen - the living - plant in the homestead. Meanwhile ethnologist L. Klimka (2005) argues differently, according to his research, spruce trees were not generally planted close to the homestead for safety reasons, as they tend to topple over in the wind, along with their roots, and can damage buildings. So, they were only planted specifically for shelter throughout the year, or if they sprouted unexpectedly. Alleys lined with lime trees held a strong, natural base out of the roots, between the trees. Horses and carts did not get stuck here, opposite - the wind was less likely to blow snow on the travellers, and in the event of rain, the foliage gave protection from the storm. On a sunny day there was protection from heat. Blossoms, leaves, branches, and even linden bark were used in the household: as medication, as food, and also as shoe and vessel-making material. Even today, such avenues are still there - they are a delight to the eye, but perhaps they no longer meet the needs of modern humans. Although these sustainable and useful properties of green structures can be rediscovered again.

Tall trees away from buildings often acted as lightning rods. To have the oak tree nearby was some kind of honour because oak was a sacred tree, it looked majestic, but our ancestors avoided it in very close proximity to buildings. Oaks were valued for the strength of their wood, for their acorns, which helped to survive people in times of famine, its flour was mixed with ray or wheat flour, to bake bread or boil porridge. But even when setting up a homestead, it was chosen a safe distance from the oak tree. It is known that this tree has much more iron in its body than other trees commonly found in Lithuania, so it performed the function of a lightning rod near the homestead. Nobody was surprised by an oak tree catching lightning and igniting after a thunderstorm. Oak tree was even considered as a tree of thunder by ancient Balts (Klimka, 2011). Nowadays the excessive love for trees makes people build their houses under the huge old trees, especially oak. Centuries-old trees look charming and impressive next to houses, but our ancestors had more experience and knowledge and combined it with the aesthetic solutions, and looked at such cases more practically.

Protection of landscape. Before the Second World War Lithuanian homesteads maintained harmonious interconnection with landscape and constituted its inseparable part; the aesthetic symbiosis was formed by the natural resources (land relief, naturally grown trees, bushes, and forests) of the countryside and the traditions of the past centuries, still cherished by the people whose families were still full of stories about their ancestors, people who cherished nature and were able to live in harmony with it. According to J. Treinytė (n.d.), Lithuanian folk culture is built on the foundations of natural civilization (Baltic culture). The old Lithuanian customs and folk songs show the traditions of a very old culture, in which the worldview of the Tree of Life, of the unity of man and nature prevailed. Hundred or more years ago, it was rare for anyone to cut down forests on their land. Firewood was prepared only by clearing the forest of dead wood or fallen branches. Even after a storm, fallen trees were carefully tidied up and used for timber and construction, and only what was left was used for firewood and fences. Each timber had its purpose, and only beams or serious structures were made from oak, not floors or every window sill.

Fig 4. Historical homestead transformation into an open museum - hotel (architect - Mantas Maziliauskas),
Pagulbis village, Molėtai district municipality. Photographs by I. Raudnikytė

Fig. 5. Barn transformed into a party hall with a professional kitchen (architect - Mantas Maziliauskas),
Pagulbis village, Molėtai district municipality. Photographs by I. Raudnikytė and L. Garbačauskas

Such practice today could be referred to as sustainable forest management.

Seamless transformation of heritage homestead into sustainable rural-urban hybrid environment. When a person steps on making a decision to obtain a house in the countryside, it is important to clarify the vision of the homestead. The formulation of the vision could start with a purpose. Why does someone need a homestead? Is it needed for developing rural tourism (Fig. 4, 5), as a living property, for recreation - weekends or holidays (instead of a collective garden), farming, for another type of business, etc.? The envisioned concept of a homestead usually reflects previous experience of the owner. For those who have a vision of an ancient, ethnographic homestead - a wooden, log, centuries-old house, built on a foundation of broken stones - will often find an ancient sauna, a barn, a shed, and a cellar besides an old house in such a homestead. Settling in such a homestead there is no necessity to change lifestyle and, for example, to take up farming, giving up modern life amenities. Seamless transformation of historic homestead into hybrid environment adapted to contemporary lifestyles, preserving local character and sense of place, is possible. Those who plan to live in an authentic homestead will soon enough appreciate the advantages of a sauna, and will easily convert a barn or a stable into an outbuilding or even a garage. The barn, as a rather large structure, can become a great space for summer entertainment (Fig. 5), a place for overnight guests, or a family museum. Such an approach is referred to as adaptive re-use.

Adaptive reuse is adopted as a process of modifying, adapting and reusing obsolete buildings with their existing structures to extend their life cycle whilst performing a new function. According to A. A. E. Othman and E. Heba (2018), the adaptive reuse of a historic building should have minimal impact on the heritage significance of the building and its setting. Adaptive re-use requires much less investments and is much more sustainable compared to building a new country house (Hefley, 2010) on the empty spot or even in the site of a vanished village. Moreover, historic, traditional buildings are considered as inherently sustainable. According to A. Hefley (2010), honouring ancient principles and harmonising them with contemporary concepts like sustainability can result in an ideal level of integrated design. Moreover, according to A. I. García and F. Ayuga (2007), reuse of historic countryside buildings and their surrounding features could play a part in landscape protection and restoration, and reduce the total number of new buildings required in rural areas.

Physical condition of the buildings plays an important role in the successful adaptive re-use, thus the best option for such a transformation is a homestead that is both well-maintained, well-preserved, and authentic. The house is the most important structure in the majority of cases; thus, it is always worth checking the condition of the first log crowns and the ones under the windows for signs of rot. Whether the walls are free of vermin. Last but not least, it is important to check that the wall timbers are not badly decayed, or damaged by mould, fungi, and rot. In the case if the house has been covered with polythene sheeting and the surrounding area has not been mowed for many years, it may occur that the outdoor plants may have grown under the coverings and fed on the moisture in the wall timbers for years. Regarding the exterior of the house, primarily roof and the windows, the new owners often think about replacing old tin or slate, and insulating the roof, so the condition of the existing roof will

TABLE 1

Analysis of sustainability aesthetics expression and perception of transformed homesteads in different levels of depth and complexity based on the theory of ecological aesthetics by M. Dekay (2012) based on analysis of literature and own observations(created by the authors)

#	Establishing homestead	Arrangement of homestead	Plantings of homestead
Visual aesthetics (aesthetic form)	Harmonious integration with the natural landscape, using traditional materials that blend with the surroundings. Architectural styles that reflect the local heritage, with modern touches subtly incorporated.	Symmetrical and visually balanced layout, traditional architectural forms with clean, contemporary lines. Consistent use of materials and colours that reflect the local vernacular.	A visually pleasing mix of native and ornamental plants, traditional garden layouts enhanced with modern design elements. Well-maintained old trees and thoughtfully placed flower beds that create a visually appealing composition.
Phenomenological aesthetics (Aesthetic experience)	Sensory experiences such as the sound of wind in the trees, the smell of blooming flowers, and the texture of natural materials. Creating spaces that encourage interaction with the landscape, such as pathways and seating areas with scenic views.	Intimate and comfortable spaces that foster a sense of home. The use of natural light and ventilation to create a pleasant indoor environment. The flow between indoor and outdoor spaces enhances the living experience.	Gardens that engage the senses with seasonal changes, such as blooming flowers, fruit-bearing trees, and changing foliage. Spaces designed for relaxation and contemplation, such as shaded benches and fragrant flower beds.
Process aesthetics (Aesthetic that reveals the process)	Visibility of construction techniques that showcase craftsmanship, use of locally sourced materials. Informational signage or visual cues that tell the story of the homestead's development and its connection to the land.	Design elements that reveal the construction process, such as exposed beams or bricks. Spaces that show adaptive reuse of old structures, maintaining a balance between preservation and modernization.	Gardens that demonstrate sustainable practices, such as composting areas, rainwater collection systems, and seasonal planting. Visible growth stages of plants and trees that illustrate the ongoing process of cultivation and care.
Ecological aesthetics (Aesthetics of patterns that create ecological health)	Natural landscapes that support local biodiversity, integration of ecological corridors. Use of permaculture principles to create a self-sustaining environment that harmonises with the natural ecosystem.	Buildings positioned to maximise energy efficiency, use of renewable energy sources. Water management systems like ponds or wetlands that enhance ecological health.	Diverse plant species that support pollinators and wildlife, use of native plants. Gardens designed to enhance soil health and water retention, contributing to overall ecological balance.
Evolutionary aesthetics (Aesthetics that reveal evolution over time towards greater integration, order and complexity)	Historical layers visible in the landscape, showing the evolution of the homestead over time. Preservation of old pathways and structures that tell the story of the homestead's development.	Buildings that evolve with changing needs, showing a blend of historical and modern architectural elements. Adaptive reuse of old buildings with visible layers of modifications and improvements.	Mature trees and long-established plantings that reflect the passage of time. Succession planting in gardens that demonstrates planning for future growth and sustainability.

reveal whether the structure has been wetted or damaged by roof neglect, and whether rainwater has dripped down the walls, or been drained down gutters or downspouts away from the foundation. Tidy old windows, if they still have extra glass used in winter, will certainly serve well in the first place before installing new, warmer, and more economical wooden framed windows. However, it is recommended to consult with wood restoration specialists to see if existing windows could be restored, repaired and used for many more years. According to A. Hefley (2010), when a historic feature vanishes, so does a quality of craftsmanship that is not dictated by mass production. A foundation is like a live creature's legs, if it is healthy, the house will stand for decades; loose boulders or brick foundations can easily be strengthened and insulated with modern means. If the foundation is not strong and of poor quality and has not been repaired and maintained for years, it can hide the critical condition of the whole building. It is important to look at the internal walls of the house to see if any 'modern' materials have been used on the inside of the building, such as plastic cladding, improper paint, or homemade impregnants made out of used motor oil, that prevented natural timber from breathing or even polluted it. The condition of the ceiling is also very important, as it is often the slab of the house, whether it is badly warped, whether the beams are strong and whether they will need to be replaced or supported urgently. When inspecting the

inside of the house, it is worth looking at the kitchen stove. It is great if the house has been recently inhabitable and the stove has been fired. Probably with minimal repair or a technician's inspection, it will be possible to use and enjoy the appliance. Often homesteaders decide to demolish stoves as unsafe and space-consuming. Although in the event of a serious winter storm it can become a source of heat or even a place to make a cup of tea.

The surroundings of the homestead buildings play an important role in the successful adaptation for contemporary lifestyles. Inspecting the plot of the homestead, it is important to check that there is a functioning, well-maintained well on the plot. If it has been used for its intended purpose until recently and has clean, tasty water, it is an advantage. When a borehole is drilled, no one knows in advance what the water quality will be, and what smell or taste it will have. Sometimes it is very expensive to find a solution to remove the smell of hydrogen sulphide or iron from water. It is not only the buildings that frame the homestead on the map, but also the plants, the trees, and the landscape. A little bit further from the homestead garden will usually be found; maintaining such a traditional garden or applying contemporary sustainable gardening techniques, such as permaculture (Perry, 2013), will help to align with the rhythms of nature and rural life instead of introducing suburban landscaping trends into countryside context. Experience from developing countries demonstrates

that sustainable integration of traditional farming and permaculture is possible (Perry, 2013).

Finally the theme of co-existence with wildlife needs to be taken into account. The newcomers will surely encounter the natural neighbours such as moles, beetles, hares, beavers ect. It is important to understand that living in the homestead differs substantially from city life with a piece of lawn. Moreover, living and growing surrounded by nature has positive educational impact: a number of cross-cultural studies indicate that positive experiences in the outdoors during childhood represent the single most important factor in developing a personal concern for the environment (Snively, 2007).

Sustainability aesthetics of transformed heritage homesteads.Aesthetics is an important factor in historic homestead transformation together with functionality, heritage preservation, and maintenance of traditional landscape character and ecological balance. Currently, various trends of aesthetic formation of countryside homesteads exist, they influence one another, sometimes even forming distinctive contrasting trends. Aesthetic ideals are often very durable, and therefore also form the basis of social acceptance and protection. There is a risk of social rejection if the generally tolerated aesthetic norms change (Malakauskienė and Kučinskienė, 2012). With reference to R. Malakauskienė and J. Kučinskienė (2012), we are currently in the process, where an ecologically motivated ruderal aesthetics tries to win acceptance over traditional countryside landscaping and suburban aesthetics with neatly cut lawns, bright flowers and topiary shrubs. Bearing in mind the threat of dissonant intrusion of urban and suburban aesthetics into valuable countryside settings while adapting the homesteads to the present day needs, it is important to devote special attention to aesthetic expression and perception of the homestead and its environment.

Considering this, the analysis from the sustainability aesthetics (aesthetic experience of sustainability ideas) point of view, and how the sustainability aesthetics of transformed homesteads can be perceived in different levels of aesthetic perception was carried out applying the theory of ecological aesthetics and its in-depth stage-wise perception formulated by M. Dekay (2012). Five levels of aesthetic perception according to complexity and depth (Visual aesthetics (aesthetic form); Phenomenological aesthetics (aesthetic experience); Process aesthetics (aesthetic that reveals the process); Ecological aesthetics (aesthetics of patterns that create ecological health); Evolutionary aesthetics (aesthetics that reveals evolution over time towards greater integration, order and complexity)) (Dekay, 2012) and three aspects of the homestead and its environment (Establishing homestead (location and integration in landscape); Arrangement of homestead (buildings and their location); Plantings of homestead (garden, orchard, flower beds, trees)) were distinguished. Features (expressions) of five above-mentioned levels of aesthetics, how they would present themselves in each of the three distinguished aspects of the homestead are presented in table 1.

Bearing in mind that superficial simplicity of the homestead in the countryside hides invisible aspects, cultural depth, connection with nature civilization (Treinytė, n.d.), its seamless transformation with respect to traditions together integrating contemporary sustainability practices is recommended. It is possible to conclude that adaptive re-use and seamless hybridization and transformation of the homestead extends the life of historical patterns in the countryside landscape and preserves cultural heritage and results in harmonious ecological aesthetics. At the same time, maintenance of

traditional gardening and orchards, preserving the existing trees and co-existence with local wildlife helps maintain ecological balance of environment and ecological attitude and tuning into natural cycles of the locality of homestead owners.

Conclusion

The analysis of possible transformation of historical homestead into hybrid environment using the case of Lithuania has revealed the significance of tangible and intangible heritage in such a process. Depth and complexity of hybrid environments in the countryside landscape and their potential multi-level aesthetic expression and perception require specific approaches for better understanding. The theory of ecological aesthetics and its in-depth stage-wise perception formulated by M. Dekay (2012) was applied in this research in order to better understand the possibilities to create meaningful sustainability aesthetics in historical homesteads adapted to the present day needs. Exploring the sustainability aesthetics of transformed Lithuanian homesteads from various levels of aesthetic perception (Visual aesthetics; Phenomenological aesthetics; Process aesthetics; Ecological aesthetics; Evolutionary aesthetics) can provide a comprehensive understanding of how to create a hybrid rural-urban environment while maintaining the authenticity of the homestead and fostering environments that are both aesthetically pleasing and ecologically sound.

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Kopsavilkums

Transformācijas tendences starp pilsētu un lauku vidi, kur lauku vide iegūst pilsētnieciskus raksturlielumus šobrīd piedzīvo pārmaiņas. Dažādas lauku telpiskās un dzīvesveida iezīmes ir saglabājušas piepilsētu teritorijās, kas iepriekš veidoja lauku teritoriju, bet paralēli notiek transformācija ar tehnoloģijām lauksaimniecībā, kas bieži novērojamas attīstītajās un jaunattīstības valstīs. Lietuva nav izņēmums, vadoties pēc vides transformācijas tendencēm un procesiem. Nesenā pilsētnieku uzmanības pārvirze uz laukiem pandēmijas laikā, līdz ar jaunu hibrīdvides un dzīvesveida rašanos noteiktās teritorijās rakstā attaisno pētījuma mērķi – analizēt un izprast labākas teorētiskās un praktiskās telpas hibrīdvides veidošanai laukos, pārveidojot vēsturiskās viensētas un attīstot ilgtspējības estētiskos jautājumus. Pētījums ietver: kvantitatīvu un kvalitatīvu literatūras apskatu un teorētisko analīzi par hibrīdajām vidēm un to īpatnībām un stāvokli lauku kontekstā, vēsturisko viensētu transformācijas procesiem Lietuvas ainavā, pievēršoties tradīciju, praktisko aspektu un estētikas mijiedarbībai.

A FRIULIAN LANDSCAPE. PASOLINI'S HERITAGE IN CASARSA DELLA DELIZIA TERRITORY

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Abstract. The paper highlights the potential for landscape and territorial enhancement in the Friulian locations associated with Pier Paolo Pasolini's youth. By analysing Pasolini's writings from his Friulian period and conducting archival research on materials and landscape development projects in the Casarsa area -many of which remain only partially realised - it is possible to outline trajectories for future valorisation efforts. These efforts aim to preserve and enhance a landscape that, despite its compromises, retains unique characteristics intrinsically tied to the cultural legacy of Pier Paolo Pasolini.
Keywords: Pier Paolo Pasolini, Friulian Landscape, Greenways, Cycling Routes, Cultural Heritage

Introduction

The cultural legacy of Pier Paolo Pasolini has garnered renewed scholarly attention in the context of his centenary, celebrated in 2022 with national events, exhibitions, and publications. However, the relationship between Pasolini's work and the themes of landscape architecture remains underexplored, as does the potential influence of his thought – especially in today's context of rapid change and environmental crisis – on new approaches to landscape design. Pasolini's vision of the landscape as a layered construct encompassing natural, anthropic, cultural, and historical elements aligns with the notion that "the body of the landscape, a synthesis of all bodies, is a text, a grand narrative material" (Lovino, 2022, p. 15).

Pasolini's oeuvre frequently engaged, albeit indirectly, with landscape themes through his literary and cinematic works. The Roman peripheries depicted in the novel Ragazzi di Vita and the films Accattone and Mamma Roma are landscapes in their own right. Entire sequences from his documentaries serve as tributes to landscapes – from Africa to India to Palestine. His documentary on the walls of Sanaa is particularly emblematic, an explicit homage to the landscape. Across these varied geographies, there is a recurring theme: Pasolini places himself – or chooses to be – in spaces on the cusp of transformation, portraying them at the threshold of profound change. These transitional moments often reflect the tension between an archaic world and the emerging neocapitalist paradigm, a central motif in Pasolini's work (Cirulli, 2019).

This sustained pursuit of scenarios where pre-industrial and archaic forms remain discernible likely finds its roots in Pasolini's early discovery of a world far removed from the bourgeois context of his childhood in Bologna. This discovery began during his youth, following his relocation to his mother's ancestral home in Casarsa della Delizia, Friuli:

La prima immagine della mia vita è una tenda, bianca, trasparente, che pende, credo immobile, da una finestra [...]. In quella tenda si riassume e prende corpo tutto lo spirito della casa in cui sono nato. Era una casa borghese a Bologna. (Pasolini, 1976).

The first image of my life is a white, transparent curtain hanging, I believe motionless, from a window [...]. In that curtain, the whole spirit of the house where I was born is summed up and takes shape. It was a bourgeois house in Bologna (Authors' translation).

Moving to Casarsa, something entirely new, perhaps even exotic, was revealed, which will be mythologised in the idyll of an archaic and rural life:

Ho visto oggetti rustici in cortili di case povere; ho visto suppellettili e mobili proletari e sottoproletari; ho visto paesaggi non cittadini, ma suburbani o poveramente campestri [...] ho presto capito, è vero, che oltre al mio (mondo), piccoloborghese [...] c'era anche un altro mondo. (Pasolini, 1976).

I have seen rustic objects in the courtyards of poor houses; I have witnessed proletarian and sub-proletarian furnishings and furniture; I have seen landscapes that were not urban, but suburban or poorly rural [...] I soon understood it is true that beyond my (world), petty bourgeois [...] there was also another world (Authors' translation).

The encounter with the Friulian peasant civilisation – characterised by landscapes of fields, water channels, and anthropic elements set against natural backdrops – is a recurring theme in Pasolini's work. These landscapes find vivid expression in his poetry collections (Poesie a Casarsa, 1942; Dov'è la mia Patria, 1949; La Meglio Gioventù. Poesie Friulane, 1954; La Nuova Gioventù. Poesie Friulane 1941–1974, 1975) and prose works (Il Sogno di una Cosa, 1962; Amado Mio, 1982; Atti Impuri, 1982; Romàns, 1994). These texts and the numerous sites in the Casarsa area associated with Pasolini's life testify to a profound cultural legacy.

This legacy, further revitalised during the centenary celebrations, continues to offer opportunities for reflection and action regarding the interpretation and valorisation of the distinctive characteristics of these landscapes. Pasolini's engagement with the Friulian environment underscores the interplay between culture and place, inviting contemporary exploration of how such unique landscapes can inform broader conversations on heritage and identity.

1 – An Inherited Landscape

To understand the significance of the Friulian landscape in shaping Pasolini's thought, it is helpful to leap forward in the chronology of his works. In 1974, Pasolini directed the renowned documentary La Forma della Città (The Shape of the Town), focusing on the town of Orte in the province of Viterbo. With a simple yet profoundly meaningful camera movement – either opening or narrowing the frame – Pasolini reveals Orte perched on a wooded hill. Initially, the town appears in its formal integrity, shaped over centuries. However, as the frame widens, modern public housing on the periphery becomes evident, jarring against the town's well-defined historical form and emerging as an irreconcilable intrusion.

Pasolini offers no explicit solution to this juxtaposition.

Instead, he confines himself to a descriptive observation, acknowledging that public housing is undeniably necessary. Yet, it creates a discordant note in what he perceives as an idealised landscape (Pasolini, 1974, 0:03:41). This moment encapsulates a recurring tension in Pasolini's work: the confrontation between historical continuity and the ruptures introduced by modernity.

One segment of the documentary further underscores this tension, inviting reflection on how Pasolini's perspective, informed by his formative experiences in Friuli, frames his understanding of the interplay between landscape, history, and contemporary interventions:

> Questa strada per cui camminiamo, con questo selciato sconnesso e antico, non è niente, non è quasi niente, è un'umile cosa. Non si può nemmeno confrontare con certe opere d'arte, d'autore, stupende, della tradizione italiana, eppure io penso che questa stradina da niente, così umile, sia da difendere con lo stesso accanimento, con la stessa buona volontà, con lo stesso rigore con cui si difende un'opera d'arte di un grande autore. (Pasolini, 1974, 0:09:15).

> *This road we walk on, with this ancient and uneven pavement, is nothing; it is almost nothing and a humble thing. It cannot even be compared to specific works of art by authors stupendous of the Italian tradition. Yet, this nothing-little road, so unassuming, should be defended with the same determination, goodwill, and rigour with which one defends a work of art by a great author (Authors' translation).*

This excerpt reveals a foundational aspect of Pasolini's vision of the landscape as a layered construct, where every element, even the simplest, linked to a culture or tradition, contributes to what he terms form. However, this perspective should not be interpreted as "sterile and paralysing nostalgia" (Biondillo, 2001, p.77). Instead, it reflects the understanding that every layer of the past holds significance for the future. Embedded within this view is an implicit invitation to adopt a reflective attitude toward the layers contemporary society must inevitably overlay.

Nevertheless, Pasolini's stance on this issue grew increasingly critical and disillusioned, particularly in the later years of his life. He became almost resigned in the face of the relentless advance of neocapitalist consumerism, which, to his mind, threatened to erase the meaningful interplay between past and present. This tension underscores Pasolini's dual commitment to preserving cultural heritage and engaging with the transformative forces of the modern world, even as he viewed the latter with profound scepticism:

> Perché io sono un uomo antico, che ha letto i classici, che ha raccolto l'uva nella vigna, che ha contemplato il sorgere o il calare del sole sui campi, [...]; che è poi vissuto in piccole città dalla stupenda forma impressa dalle età artigianali, in cui anche un casolare o un muricciolo sono opere d'arte, [...] (Non so quindi cosa farmene di un mondo unificato dal neocapitalismo [...] (Pasolini, 1975a).

> *Because I am an ancient man, who has read the classics, who has picked grapes in the vineyard, who has contemplated the rising or setting of the sun on the fields, [...]; who has then lived in small cities with an excellent shape impressed by the artisan ages, in which even a farmhouse or a small wall are works of art, [...] (So I don't know what to do with a world unified by neo-capitalism) (Authors' translation).*

This passage illustrates that the Friulian landscape, with its rural and pre-capitalist manifestations, played a pivotal role in shaping Pasolini's intellectual framework. It offered both naturalistic and cultural expressions of a territory that remained on the margins in the late 1940s–still, in many ways, untouched by the postwar development sweeping across Italy (Vallerani, 2007).

To overlook an element part of a landscape's history – one of its layers – demands careful consideration, ensuring that any modifications respect its intrinsic value. The landscape we inherit and enjoy today is, in this sense, the product of a legacy. While it is not immutable or unchangeable, alterations to it must be approached thoughtfully, as they can lead to unpredictable consequences or be driven by purely utilitarian logic, as Pasolini astutely observed.

This reflection is particularly relevant in the present era, characterised by rapid transformations. Time becomes a critical factor, allowing changes to the landscape to integrate and stratify meaningfully. Pasolini's insights highlight the need for deliberate and reflective interventions, balancing progress with preserving cultural and historical continuity.

2 – Planning and Design in Pasolini's Landscapes: The Work of Paolo De Rocco

The theme of the rapid transformation of landscapes, particularly pronounced in the industrial era and accelerating since the postwar period, emerges vividly in the interview Il Paesaggio Rubato (The Stolen Landscape) (Venturini, 2014). Conducted in the Friulian language in 2010 by Adriano Venturini with Paolo de Rocco (1950–2012), a landscape architect deeply engaged with Pasolini's Friulian landscapes, the interview serves as a video denunciation of the damage caused by land consolidation policies. This process, initiated after the 1976 earthquake to optimise the productivity of Friulian farmlands (Mauro, 2006), led to the removal of centuries-old tree rows, hedgerows, and rural pathways. De Rocco emphasises that the alienation from a once-familiar landscape was significantly exacerbated by the rapid pace of these changes (Venturini, 2014, 0:08:19).

Following De Rocco's insights and examining Casarsa's landscape through historical maps – such as the Kriegskarte compiled by Austrian cartographer Anton von Zach between 1798 and 1805 (Rossi, 2005) – in comparison with the postwar reconstruction plans of 1952, it becomes clear that no drastic morphological changes occurred immediately after the war. However, comparing these with maps from the late 1970s reveals the extent of transformation over a relatively brief period, far exceeding the changes seen in the preceding 150 years. De Rocco's observation stems from his work on landscape restoration projects, including the Fonte di Venchiaredo, a locus amoenus between Cordovado and Sesto al Reghena. This location, immortalised in the writings of Ippolito Nievo in the mid-19th century and frequently mentioned in Pasolini's Friulian texts, reflects a continuity of cultural memory. Pasolini, for instance, writes: *"[...] volgendo gli occhi intorno, ritrovava i luoghi neviani [...] dietro la spalla destra a pochi chilometri Teglio e Fratta, e poi Portogruaro, la fontana di Venchiaredo, degna di una Madame de Sévigné [...]"* (Pasolini, 1982) "[...] turning his eyes around, he found the Nevian places [...] behind his right shoulder, a few kilometers away were Teglio and
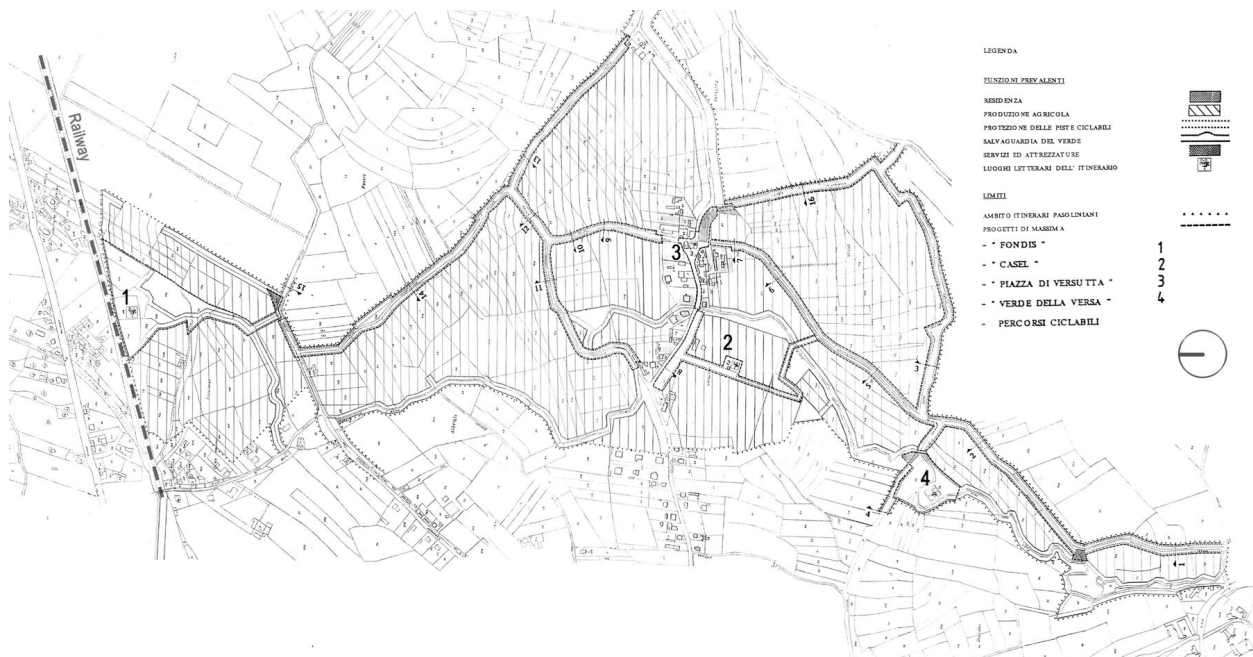
Fig. 1. De Rocco's plan for Pasolini's places of memory establishes a connection between key sites: Le Fondis (1), the Casello of Versuta (2), the Square and Church of Versuta (3), and the bends of the Roggia Versa (Versa Ditch) (4). Following the initial plan, the project was intended to proceed incrementally, with the development of individual sites through specific landscape architecture interventions. However, only the redevelopment of the Piazza of Versuta was ultimately realised. 1991 – Courtesy of the Municipality of Casarsa della Delizia

Fratta, and then Portogruaro, the fountain of Venchiaredo, worthy of a Madame de Sévigné [...]" (Authors' translation). De Rocco's insight lies in recognising that these landscapes likely remained far more similar between the eras of Nievo and Pasolini than they are between Pasolini's time and today. He suggests that the discomfort and disorientation provoked by the industrialisation of northeastern Italy's plains are tied to the scale of transformation and the compression of time, preventing the cultural stratification that typically accompanies landscape evolution.

The restoration of the **Fonte di Venchiaredo** (Venchiaredo's Springs), framed by a stone ring at the base of a staircase, embodies a delicate blend of mysticism and romanticism. It is one of De Rocco's projects in Pasolini's Friulian landscapes. In the early 1990s, the municipality of Casarsa commissioned him to draft a general plan for valorising Pasolini-related sites. This plan, focused on areas south of the railway, sought to connect key locations of Pasolini's memory through pedestrian and cycling paths, often utilising unpaved rural roads.

The identified sites were deeply culturally and scenically significant, including **Le Fondis**, a spring-fed basin near the railway that was clear and swimmable during Pasolini's time but later repurposed as a landfill. The square and the church of Versuta: A hamlet where Pasolini and his mother spent the war years as evacuees. **The Casello** of Versuta: A rural shelter used by Pasolini to teach the children of local farmers during the war, where he founded the **Academiuta di Lenga Furlana** (The little academy of Friulian language). The natural formations along the **Roggia Versa** are waterways with characteristic bends and lush vegetation.

In 1995, the plan saw partial implementation surrounding the Church of St. Anthony Abbot in Versuta. This project integrated elements of the landscape's memory, such as water features – a spring built with stones from the Tagliamento River resembling traditional local masonry – and the planting of mulberry trees, historically linked to silkworm farming.

The plan also originally included the conservation of the **Casello** of Versuta, but legal issues surrounding its acquisition by the municipality stalled the project. However, the small

structure has since been placed under heritage protection and is on the verge of being transferred to municipal ownership. The municipality intends to pursue its restoration and the enhancement of the surrounding areas, ensuring the preservation of this key element of Pasolini's cultural and environmental legacy.

3 – Evolution of the Plans for Cycling Paths
In addition to De Rocco's project Luoghi Pasoliniani della Memoria, which, as noted, saw only partial realisation, the Municipality of Casarsa concurrently developed a **Local Plan for Mobility and Bicycle Transportation.** Drafted in its initial form in 1994, this plan aimed to implement recently enacted regional regulations promoting sustainable and "slow" mobility (L.R. 21-02-1993, n.14). Unlike De Rocco's work, the plan's drafting of routes was not explicitly intended to establish a network of pathways dedicated to exploring and traversing Pasolini-related sites. Instead, it outlined primary axes for bicycle traffic, organised into seven itineraries.

As a cultural homage to Pasolini, these seven routes were named after his cinematic works: Itinerary 1: **Medea**; Itinerary 2: **Edipo Re** (Oedipus Rex); **Itinerary** 3: **Teorema** (Theorem); Itinerary 4: **Decamerone** (The Decameron); Itinerary 5: **I Racconti di Canterbury (The Canterbury Tales)**; Itinerary 6: **Il Fiore delle Mille e una Notte (Arabian Nights)**; Itinerary 7: **Uccellacci e Uccellini (The Hawks and the Sparrows).**

However, the implementation of this plan was limited to portions of Itineraries 1 and 2, which run alongside the main state road traversing Casarsa from east to west. These routes partly repurposed existing sidewalks, adding vertical and horizontal signage. Today, the remnants of these interventions need to be more robust and generic, offering little in terms of a cohesive cultural or experiential pathway.

Moreover, the plan's references to Pasolini's cultural legacy remain nominal. While culturally evocative, choosing to name the routes after Pasolini's films appears arbitrary and unconnected to his Friulian period or the meaningful sites within Casarsa. As such, the effort lacks a deeper integration of Pasolini's local legacy into the design and purpose of the itineraries, reducing its potential impact both as a tribute to
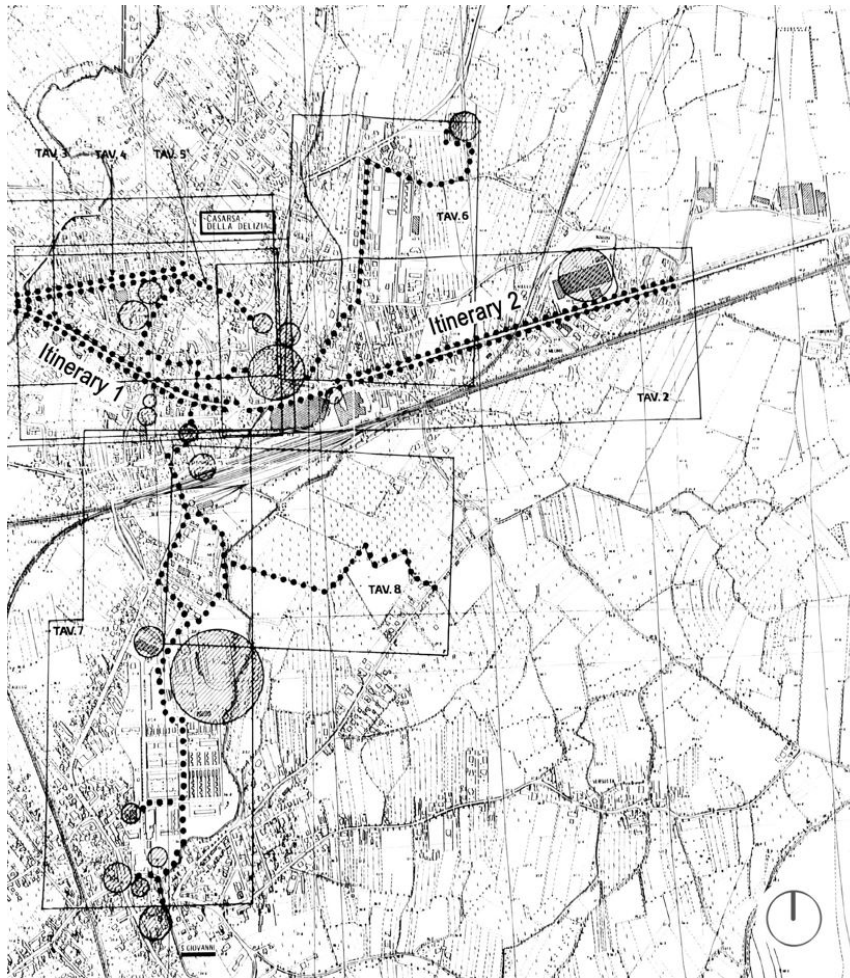
Fig. 2. Cycling Mobility Plan
of the Municipality of Casarsa, highlighting
the two completed itineraries (1 and 2).
1994 – Courtesy of Comune di Casarsa
della Delizia
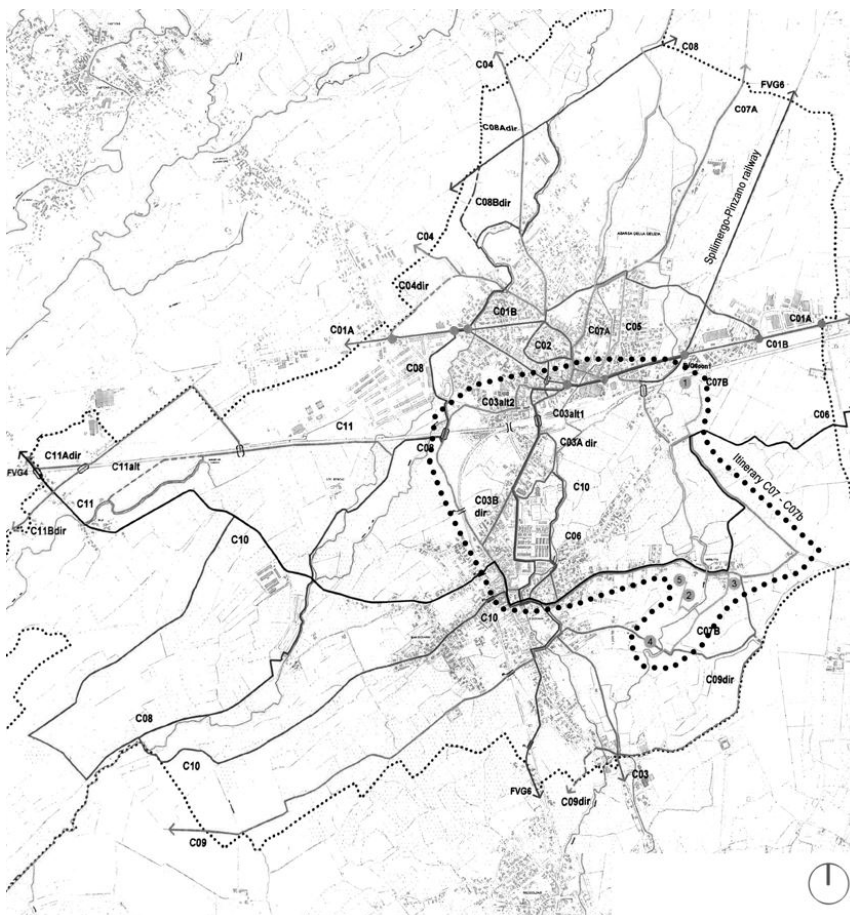
Fig. 3. The Bike Plan (Biciplan) of the Munici-
pality of Casarsa identifies the Pasolini-themed
loop itinerary (C07)
and the route of the disused
Spilimbergo–Pinzano railway line (FVG06),
which is intended to become part of a new
regional cycle-pedestrian axis.
2023. Courtesy of Comune
di Casarsa della Delizia

the artist and as a framework for cultural tourism.

Several initiatives to develop slow mobility itineraries have been incorporated into the new Municipal **Bicycle Mobility Plan** (Biciplan) in recent years. Presented in 2023, this plan serves as the municipal implementation of the regional network known as the **Sistema della Ciclabilità Diffusa** (SICID, Widespread Cycling System), established by regional law L.R. 23-02-2018, n.8. SICID itself is interconnected with national networks (**Bicitalia**) and European networks (**EuroVelo**) (Chiandoni, 2020). Among the planned routes – which largely revise and expand upon the 1994 plan – a dedicated pathway has been identified: route codes C07 and C07b, collectively referred to as the **Itinerario Anello Pasoliniano** (Pasolinian Ring Route).

This route establishes a thematic pathway by utilising a significant portion of rural roads and secondary routes. Notably, it connects several of the Pasolini-related sites initially identified in De Rocco's 1994 plan, including **Le Fondis, Il Casello** and the square in Versuta, and the bends of the **Roggia Versa**. Additionally, the route extends into the southwestern portion of the municipality of Casarsa, below the railway line, integrating an agricultural plain identified by local planning tools as a site of significant natural interest. This extension is particularly noteworthy as it enriches the Pasolini itineraries by linking them to a landscape with distinctive ecological and aesthetic qualities, which will be explored in further detail in subsequent discussions.

The **Pasolinian Ring Route** not only enhances the accessibility and coherence of Pasolini-related sites but also underscores the potential of blending cultural heritage with environmental and landscape valorisation. By incorporating historical and natural dimensions, this initiative represents a meaningful step toward creating a layered and immersive cultural tourism experience reflective of the stratified and multifaceted vision of the landscape championed by Pasolini himself.

Another compelling aspect of the **Pasolinian Ring Route** is its planned integration with one of the axes of the regional cycling network project (still awaiting implementation): the FVG6 route. This branch of the network, as envisioned for the Casarsa area, leverages the old railway bed of the **Spilimbergo–Pinzano** line, which was permanently decommissioned in 1967. This railway segment forms the western branch of another historic route, the **Sacile–Pinzano Pedemontana** railway, which played a vital role from the early 20th century through the postwar era, especially in facilitating mobility for workers and emigrants from Friuli (Fadelli, 2018).

This connection illustrates the potential for creating synergies between local cultural landmarks (such as the Pasolini memory sites) and, on a broader territorial scale, a reimagining and repurposing of disused railway infrastructure as new greenways for slow mobility. This concept aligns with a growing body of literature advocating reusing abandoned railways to enhance sustainable transportation networks (Rovelli et al., 2004).

Moreover, the railway is symbolic and descriptive in Pasolini's depiction of Friulian landscapes. Its sharp linear trace on the terrain and its inherent dynamism fascinated the poet, offering a recurring motif in his literary and cultural narratives. For instance, in **Il Treno di Casarsa** (The Train of Casarsa), Pasolini captures the railway's physical and emotional resonance within the Friulian landscape (Pasolini in Naldini, 1993, pp. 162–163). Similarly, in the text **Il Friuli**, written for an RAI radio program in 1953, the railway emerges as a key element in the spatial and cultural fabric of the region (Pasolini, 1953).

By incorporating this historic railway into the larger framework of slow mobility and cultural tourism, the project underscores the transformative potential of integrating historical and infrastructural heritage with contemporary sustainability goals. Such initiatives honour the -artistic legacy of figures like Pasolini and provide a template for reinterpreting and revitalising Friuli's physical and cultural landscapes.

A recent project aimed at developing slow mobility itineraries, integrated with existing regional and municipal cycling networks, has involved Casarsa alongside seven geographically proximate municipalities: Spilimbergo, Chions, Cordovado, San Giorgio della Richinvelda, San Vito al Tagliamento, Sesto al Reghena, and Valvasone-Arzene. This initiative, conceived within the framework of the 2014-2020 Rural Development Programme (RDP) of Friuli Venezia Giulia, implemented since 2015 and funded by the European Commission (Friuli Venezia Giulia, 2015), envisions the creation of five distinct inter-municipal routes with a dual purpose: to promote alternative mobility and to valorise rural areas by integrating their historical and cultural assets into a cohesive network.

The municipality of Casarsa is traversed by two of these itineraries: Route 2 – "From Arid Lands to Marshes", and Route 4 – "Cities, Forests, and Castles." These routes also serve as pathways through key sites associated with the legacy of Pier Paolo Pasolini, marking locations of significant cultural memory. Notable stops include Pasolini's maternal home, now the Centro Studi Pier Paolo Pasolini; the Church of Sant'Antonio Abate in Versuta; and the Loggia of San Giovanni.

The project's name, **Pais di Rustic Amòur** (Rustic Love Hometown), underscores an intentional connection – almost as a form of branding – to Pasolini's cultural heritage in the region. This title is a direct reference to Pasolini's poetic collection **La Meglio Gioventù** (The Best of Youth), where a celebrated tercet expresses his profound affection for Friulian landscapes:

> Fontana di aga dal me pais.
> A no è aga pì fres-cia che tal me pais.
> Fontana di rustic amòur(Pasolini, 1954).

> *Water fountain of my hometown / There is no water fresher than in my hometown / Fountain of rustic love (Authors' translation).*

4 – Do Two Casarsas Exist?

As presented here, the projects aimed at enhancing Pasolini-related sites in the Friulian territory constitute a non-exhaustive selection of interventions. These have been chosen for their coherence, significance, and comprehensive vision at a territorial scale. While diverse in execution, all these initiatives share a common goal—beyond promoting the enjoyment of the landscape via cycling: establishing a network connecting points of interest directly tied to Pasolini's memory. The approach is undeniably pragmatic and well-tested, relying on strategies of territorial valorisation through cycling networks. Yet, it partly neglects deeper considerations that could inform environmental design rooted not merely in Pasolini's physical presence but also his intellectual and cultural legacy—an approach most clearly seen in Paolo De Rocco's projects of the 1990s. The mere networking of specific landmarks tied to Pasolini's history and memory operates at a territorial scale, often implemented through infrastructural methodologies. These rely on universal and quantitative typological solutions: standardised cross-sections, minimum distances, asphalt wear layer performance, and signage placement. The next step, however, should move towards a cultural scale, employing landscape architecture tools to

achieve this. Only through such an approach can Pasolini's places of memory inspire reflection on their intrinsic meaning rather than solely their physical manifestation. This is particularly pressing given that these sites now exist in a context vastly different from Pasolini's time, often surrounded by suburban sprawl interspersed with new artisanal and industrial developments.

> Fontana di aga di un pais no me.
> A no è aga pì vecia che ta chel pais.
> Fontana di amòur par nissùn. (Pasolini, 1975b)

> *Water fountain in a hometown, not mine / There is no water older than the one of that town / Fountain of love for no one (Authors' translation).*

In this paraphrase of the poem cited at the end of the previous paragraph, Pasolini, in 1975, renounces the youthful love he once associated with Friuli. This sentiment connects to the disillusionment and disappointment that marked Pasolini's final years, as even the refuge of his youthful mythologisation of rural life began to waver. The concept of two Casarsas emerges repeatedly in Pasolini's work: an idealised, dreamlike place defined by genuineness and stunning landscapes, juxtaposed – but not replaced – by the reality of hardship, toil, and the inescapable inroads of consumer society into rural communities:

> D'altra parte – a causa delle esperienze infantili rimaste inalterate nella memoria – esistono due Casarse nettamente distinte: quella della realtà e quella dei sogni. Per esempio nella Casarsa dei sogni, il paese non finisce dietro la chiesa; al contrario, proprio lì dietro sorge una cattedrale un po' in rovina, di un seicento rustico dal fasto orientale, le cui pareti, in parte crollate, lasciano vedere gli affreschi dell'interno, con azzurri un po' freddi e forme vagamente gotiche; e dietro questa cattedrale (che è la vera chiesa di Casarsa) c'è una profonda e verde vallata, in fondo a cui scorre un ruscello, e qui l'aria è stranamente più toscana o laziale che friulana (Pasolini in Ellero, 1995, p.11).

> *On the other hand – due to childhood experiences that have remained unchanged in memory – there are two distinct Casarsa: that of reality and that of dreams. For example, in the ideal Casarsa, the town does not end behind the church; on the contrary, right behind it stands a somewhat ruined cathedral, from a rustic seventeenth century with oriental splendour, whose walls, partly collapsed, allowing you to see the frescoes inside, with slightly cold blues and vaguely Gothic shapes. Behind this cathedral (the real church of Casarsa) is a deep green valley at the bottom of which flows a stream, and here, the air is strangely more Tuscan or Lazio than Friulian (Authors' translation).*

But do two Casarsas still exist today? Certainly not in the dualistic sense of the real and idealised envisioned by Pasolini. However, one can discern a form of duality in the territory: Pasolini's memory sites, such as his maternal home, the Loggia of San Giovanni, the Church of Santa Croce, and the Church of Versuta, now exist in a context far removed from the agrarian world of the 1940s. Yet, while it would be simplistic to call them untouched, some landscapes still represent a deep-rooted history and local agricultural

Fig. 4. Part of the Polisutta naturalistic area in the southwest part of Casarsa, 2024 (photo by the authors)

Fig. 5. The springs of the Sile River emerge from the ground close to a vineyard, 2024 (photo by the authors)

Fig. 6. Permanent grassland surrounded by hedgerows in the agricultural plain of Mulàtis, located between Villa Sile and San Giovanni, 2024 (photo by the authors)

tradition. The "deep green valley" (*profonda valle verde*) behind "this cathedral" (*questa cattedrale*)—identified as the Church of Santa Croce in Casarsa – still exists today in the municipality's southwestern area, south of the railway line. This productive agricultural plain alternates with sites of natural interest, including woodlands, streams, and rows of trees, all recognised and protected by the local urban plan (*PRG – Piano Regolatore Generale*). Within this area lies the *Polisutta*, a formation of well-preserved oak groves, poplar

plantations, and riparian woodlands. Nearby, the springs of the Sile River allow visitors to witness a river emerging from the plains. Local agricultural history and culture are also reflected in stable meadows interspersed with hedgerows. These areas, sufficiently close to the town centre to be reached on foot via dirt roads yet distant enough to seem like another world, represent a "second Casarsa." They should be integrated into Pasolini's cultural heritage not because of a direct link to the poet – unlike specific architectural landmarks – but for their capacity to provoke reflection on the artistic legacy Friulian landscapes gave to Pasolini, which he, in turn, passed on to us.

Conclusions

The value of Pasolini's cultural heritage in the Casarsa territory is evident through numerous sites of interest and various projects focused on creating itineraries, particularly cycling and pedestrian routes, that aim to connect these places. However, it is difficult to perceive a systematic approach to these interventions for several reasons, such as the partial and uncoordinated realisation of different initiatives. Creating these itineraries often adopts a logic akin to an open-air museum, focusing on specific sites without considering the changing contexts in which they are situated. This approach tends to overlook areas that, while not directly linked to Pasolini in a material sense, represent a more vivid testimony of how a landscape – despite its intense human manifestations, such as agricultural land – can remain a place of harmony between natural and cultural elements.

Moreover, many of the proposed itineraries, which undeniably hold value at a territorial scale, tend to result in the practical implementation of standardised intervention typologies commonly used in engineering and construction practices. They are infrastructural projects that need a true landscape architecture vision. The potential to promote the territory through Pasolini's cultural legacy is valuable and tangible, yet it should be more expansive than an infrastructural branding exercise. Instead, this potential should aim to uncover the essence of the landscape by understanding its physical and cultural layers, translating them into actions and a vision that embraces the idea of "design as a critical modification of the context" (Protasoni, 2001). Only in this way can the projects reflect the deep, transformative connection between landscape, culture, and memory.

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Kopsavilkums

Rakstā izvērtētas ainavas un teritoriālās uzlabošanas potenciāls Friuli apgabalos, kas saistīti ar Pier Paolo Pasolini jaunību. Analizējot Pier Paolo Pasolini rakstus un veicot arhīvu izpēti par materiāliem, kas saistīti ar ainavu attīstības projektiem, no kuriem daudzi ir realizēti tikai daļēji, ir iespējams iezīmēt turpmāko virzību. Līdz ar to rakstā tiek aprakstītas pieejas, kas nodrošinātu un uzlabotu unikālās ainavas racionālu saglabāšanu, kas ir būtiski saistītas ar Pier Paolo Pasolini kultūras mantojumu.

CHANGES IN WORSHIP BUILDING LANDSCAPES 21ST-CENTURY IN EUROPE

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**Abstract. Worship building landscapes, like others, are changing. The aspects that are studied about worship building landscapes are also changing. This study aims to create a context for the changes in Latvian worship building landscapes in the 21st century, by exploring and examining what changes in worship building landscapes have been recorded in studies in the anglophone research literature in Europe. Relevant peer-reviewed articles published in scientific journals were searched in the literature database "Web of Sciences". In research was identified 106 publications about worship building landscape practices, which included 51 about physical changes in today's worship building landscape, and also 38 about church politics, 62 about practices connected to the church, and 11 about pilgrimage. A widely explored topic in research is landscape change from a broad perspective, examining the influence of political, social, economic, and migration factors. Publications also show a strong focus on planning challenges, shifts in landscape perception, and how these perceptions evolve about worship building landscapes. The construction of new worship buildings, however, remains a less commonly studied subject. In certain parts of Europe, more specialized topics have gained attention, such as ruins, the risks posed by natural disasters, geotourism, and the role of worship buildings as habitats for owl nesting and bat nurseries. Research papers on changes in worship buildings vividly illustrate the intricate patterns shaping their landscapes, drawing the interest of scholars from diverse disciplines. When planning the development of landscapes surrounding places of worship, a holistic perspective is crucial. Traditionally, the focus has been heavily on the architectural values of these sites. However, in the 21st century, a broader approach is emerging, integrating economic, social, and environmental considerations alongside architectural aspects.
Keywords: worship building landscape, literature review, church**

Introduction

An integral part of the landscape is its variability, which is an endless object of research from a variety of angles. The greatest threat to the landscape is irreversible and undesirable changes. Landscapes today are generally experiencing changes due to both climate change and changes directly caused by humans – redevelopment, energy landscape, infrastructure, and building development (Shannon, 2018). In the context of church landscapes, these issues are also important and are often contrasted with the preservation of the current state of the church landscape. Whatever is decided, it is important to make an informed decision, which is sometimes lacking in time (Corner, 2014).

Cultural and historical landscapes are important not only in a cultural context but also in an economic and social one (Council of Europe, 2000; Council of Europe, 2005). Latvian church landscapes, both urban and rural landscapes, have significant historical, social, and symbolic significance, as they are built on important trade routes, lakes, and rivers in such a way as to be visible from a distance. Often, church landscapes include cemeteries, which are important as an element of the cultural environment, as well as having scenic, ecological, and historical significance. Church landscapes also indicate historical changes and the residents' belonging to a confessional tradition (Spārītis, 2011).

In Latvia, worship building landscape studies have been conducted so far for individual territories, or even individual landscapes in-depth, revealing the main themes – architecture, landscape, worship building garden, worship building landscape and elements, and imageability, where a large focus is on the worship building landscape as a whole, as well as its elements as cultural and historical value. In several regions of Latvia, cultural landscapes are experiencing negative changes, experiencing a loss of function and not introducing new or temporary uses, or there is a lack of justification and context for an informed transformation of the cultural landscape of places of worship so as not to lose existing values (Pidža, 2011; Markova, 2012a; Markova, 2012b; Markova, 2013a; Markova, 2013b; Markova 2014a; Markova 2014b; Markova, Ņitavska 2015a; Markova, Ņitavska 2015b; Markova, Nitavska 2016; Lazdāne, Markova, Ziemelniece 2013; Ziemelniece 2017; Ziemeļniece 2023).

However it is not always necessary to continue local research traditions, a broader vision is also needed. The literature review on the topic is considered good for research development (Pickering, Byrne, 2014). Landscape architects must work on a territorial scale, juxtaposing ecological systems, scientific data, construction methods, social practices, and cultural values, integrating all of this into a human-made environment (Shannon, 2018). Often, cultural landscapes are viewed from a narrower perspective, highlighting their cultural heritage significance, but this is not comprehensive and is more about how to design, taking into account cultural heritage (Riesto, Tietjen, 2018).

UNESCO included cultural landscapes as a component of cultural heritage in 1992, defining them as a product of human-nature interaction (UNESCO, 1992). Given that a coordinated cultural heritage policy is being promoted and developed at the European Union level (and trying to include others) (Council of Europe, 2017), it is important to consider changes at the cultural European level. The European Cultural Heritage Strategy for the 21st Century is based on three components – social, territorial, economic, knowledge, and education, where everything can be developed by integrating each other. In the social aspect of cultural heritage development, opportunity creation and participation are essential. The task of the territorial component is focused on the contribution of heritage to sustainable development, which is based on local resources, tourism, and employment. In turn, the knowledge and education component focuses on cognition and research with the help of cultural heritage (Council of Europe, 2017; European Commission, 2019).

Worship buildings have had different social contexts and meanings in society at different times, which are an inseparable part of the processes taking place in worship building landscapes. Local resources include worship building landscapes, which are historical, with only a small number of newly created worship buildings joining them. In turn, knowledge is often not available in sufficient quantities about cultural landscapes and their changes. This research paper aims to summarize the changes in the landscape of churches

in the 21st century as defined in the scientific literature.

I believe that the literature review method is appropriate not only in the scientific beginnings, (Pickering, Grignon, Steven, Guitart, Byrne 2015) but also over time, to examine the context of the research and to be aware of the topicality of the research, which can change dramatically over time.

Method

The first step was a systematic quantitative literature review, based on Pickering and Byrne (Pickering, Byrne, 2014), to determine general aspects of worship building landscape research done in 21. century in Europe. Were searched the literature database "Web of Sciences" for relevant peer-reviewed articles published in scientific journals. Web of science the formula was used in the search - TS=(temple* OR church* OR mosque* OR synagogue* OR "worship building" AND landscape*). It was also noted that the full article must be available, the article must be in English, the article must be published in this century, and it must be about a European country. The search was done from April to May 2024. Several filter criteria were applied to specify the review (as the terms "worship building" and "landscape", could include a wide range of publications (Table 1)) and at the same time identify as many relevant articles as possible:

- The article should be written in English and published between 2000 and 2024 (chosen to reflect research tendencies in 21. century);
- The article should explicitly address "worship building landscapes";
- The article should examine larger or smaller-scale outdoor spaces of worship buildings (temples, churches, mosques, and synagogues).

Landscapes of churches, as well as cultural landscapes, clearly have an essential value formed by the interaction of man and nature. Therefore, when evaluating scientific publications, publications that focus on human-made elements and changes, as well as natural values and related changes, as well as, of course, studies that focus on human-nature interactions (UNESCO, 1992) and changes in practices, relationships, forms Stephenson, J. (2008).

Results and Discussion

The authors of various articles on changes in worship building landscapes in the 21st century in Europe have researched different aspects of these cultural landscapes. In this literature review, all publications on the relevant topic were selected based on the cultural value distribution model. Relevant subtopics were identified not only for articles that precisely corresponded to the defined goal but also for all publications on the related topic, outlining the main research directions in the topic of worship building landscapes in general.

In total, 445 articles were obtained after the selection. Articles that were not about European countries were excluded from further research and analysis, although this aspect of the selection was indicated, there were 90 such articles. Articles for which only abstracts were available and no full versions of the articles were available were also excluded – there were

Range and definitions of researched worship building landscape aspects (created by the authors)

Aspect	Definition
worship building	a church, mosque, or other building where people go for religious services (Collins et.al. 2024)
landscape	an area perceived by people whose character is the result of the action and interaction of natural and/or human factors (Council of Europe, 2000)

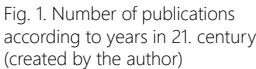22 such articles. The remaining 333 articles were analyzed in more detail.

333 articles, analyzed through the cultural value model, were divided into subgroups (Table 2). The main groups were formed based on the cultural value model, which covers both human and natural practices, forms, and relationships, which was used as a basis for creating a division of the collected articles in the literature review. Although the focus of this article is on the physical landscape of the church, the context is of course also formed by changes in the political landscape of the church (Stephenson 2008). In turn, subgroups were formed if a specific group was read when analyzing the relevant articles.

Articles that simultaneously go the furthest into the history of worship building landscapes, such were 35 articles, speak specifically about forms. Archaeological research is not only carried out in places where it has not been done before but is also carried out repeatedly, using modern new technologies. Various historical research is still being carried out, which is facilitated by new finds, new information, as well as technological developments. The evaluation of the past also differs from the perspective of the relevant time and the change of values, which view rituals, routes, and elements in a different light. To some extent, research on the past of churches also brings to the 21st century worship building landscape, because they can change our perception of the worship building landscape, and provide an understanding of its planning, arrangement of elements, and meaning. This does not directly affect the changes that are taking place today but provides additional information and explanation.

136 studies are related to the historical perspective of worship building landscapes, which are still relevant in the context of worship building landscapes – studying the principles of worship building landscape design in different periods, trying to understand the reasons, and basic principles, and discovering lost landscapes. Worship building landscapes have been a source of inspiration in various historical periods, as well as works of art and literature as a source of knowledge, where to look for information about worship building landscapes, their meaning, elements, and other information - this is reflected in scientific articles - 21 about writers, 10 about painters. A sacred place includes not only the church but also a fairly wide surrounding landscape (Foletti, 2022).

Distribution of landscape cultural values (created by the authors)

Landscape components	Forms	Relationships	Practices (including process)
Landscape component topics related to worship building landscape change/number of articles on the relevant subtopic	- historical landscape elements (archaeology) / 35	- landscape description or landscape as inspiration (paintings, literature, letters, church historical documents, etc.) / 136	- religion politics / 38; - practices connected to church / 62; - pilgrimage / 11; - physical changes in nowadays worship building landscape / 51

Fig. 1. Number of publications according to years in 21. century (created by the author)

Fig. 2. Publication keyword word cloud (https://wordcloud.online/)

There are scientific articles about practices, but not about changes in the physical landscape today, there are 106 in total (which include - religion politics / 38; practices connected to church / 62; Pilgrimage / 11). The research focuses on various topics that are contemporary changes, but not in the physical church landscape, such as the sacralization of nature, church acoustics, a summary of research conducted by a particular journal on worship building landscapes, practices, the spiritual landscape, as a community of believers, the political landscape, the linguistic landscape, the online church, the church music landscape, the assessment of seismic safety in churches, monitoring and conservation methods, a large part of this research examines changes in the worship building landscape in a political context, how this landscape (the number of churchgoers) changes due to migration, political processes, etc. and how the worship building landscape and worship buildings are affected by climate change, changing technological possibilities, and the connection of mental health and well-being with church practices, education.

51 research papers meet the aim of this research and represent the research done on changes in the physical worship building landscape today. Worship building landscape change is not a new research topic, but still, only after 2012, we can find many more publications about this topic (figure 1).

Several subthemes were defined when studying the selected

publications. The graphical analysis of the keyword collection vividly depicts the emphasis on "heritage", as well as the expected emphasis covering topics such as - "conservation", "urban", "cultural", "religion", "architecture" and "geotourism" (figure 2.).

Landscape change

Sacral landscape change includes also confessional changes and functional changes. These changes are visible and could be restored and preserved not only in architecture but also in the sacral landscape (Łach et al., 2022).

Although the modern landscape often has other goals and objectives, the importance of searching for the dominant features of the church, identifying spatial connections, developing the landscape according to historical axes, and creating harmony is still seen. Moreover, the usefulness of using this in both pedagogy and in the practice of landscape architects is increasingly being seen - to look at the compositional elements and techniques of sacred elements (Barreiros Proença et al., 2022).

Landscape changes can occur at different scales and similarly, the area of influence for each change made can be different. Large trees are a kind of point element in the landscapes of churches, but at the same time, they have a wide impact, forming visual boundaries, and affecting sight lines. In many European countries, large trees have an important place attraction, and symbolism. Sacred trees are important elements in sacred landscapes. Trees should not be cut down hastily, but rather their quality should be reviewed and, by making changes, incorporated into the overall landscape, into the composition of the church. Technical capabilities in tree research have changed and provide the opportunity to make more informed decisions, as well as implement tree protection measures, thereby preserving the integrity of the landscape (Dudkiewicz & Durlak, 2023). When planning church gardens and territories, large trees to be preserved must be taken into account, and measures to improve the condition of trees must be implemented accordingly, as well as educating owners and managers about the relevant values and conservation opportunities is important (Dudkiewicz & Durlak, 2023).

A part of the landscape of a church can also be large complexes of buildings and outdoor spaces, which include temples, monasteries, gardens, and public outdoor spaces. For these large complexes in Ukraine, the connection with water areas, natural elements, and terrain remains important (Mishchenko, 2022). In Latvia, a study of landscape changes based on a case study – Ilūkste church – has defined that despite the demographic and economic changes in the

city, the church landscape itself has retained its main characteristics. The positive changes in the landscape are that with EU financial support it is possible to demolish the ruins of the Soviet era, increasing the value of the landscape. The natural base of the landscape – floodplain meadows – ensures the openness of the landscape views and the preservation of sight lines (Ziemeļniece, 2023).

If new buildings are developed near them today, it disrupts the overall perception of the complex and can affect the sacred meaning of the object. A significant part of the landscape of a church can be both the city center building and residential buildings, a monastery, a park, a cemetery, a memorial site, or a complex. When developing new buildings, it is important to consider not only the physical boundaries of sacred objects and complexes but also to look more broadly at the perception zone of the landscape. And the opposite is also true - when creating new and spacious residential structures, it is necessary to think about the location of new religious buildings. Because, as the research survey shows, the most important thing when thinking about the location of a religious building is its proximity to residential buildings (Mishchenko, 2022).

Nowadays, the landscape is influenced by globalization processes, but on the other hand, the landscape is also influenced by migration processes. Mosques are not typical of the Polish landscape, but they are an important part of the local population and an essential part of the Polish Tatar culture. These structures play a significant role for the local population in the specific regions (region of Podlachia). For Muslims and Tatars moving into the area in question, the cultural heritage already there is important, and it is preserved with great zeal and is an essential social bond (Janowski et al., 2023).

Traditional approaches may vary from country to country. For Ukrainian Orthodox churches, traditional approaches include native plants, preservation of existing tree tops, architecture in harmony with nature, alternation of open and closed landscape spaces, and creation of sightlines. Nowadays, landscape changes have led to the fact that Ukrainian Orthodox churches no longer have pronounced regional differences, but what has remained from traditional methods is the creation of diverse sightlines and efforts to include the connection of the sacred landscape with the natural background (Sleptsov et al., 2021).

Landscape changes can also be functional and often this means that the visual image of the landscape does not change significantly, but the changes are more related to the perception and openness of the place. Sedova has defined the cyclical nature of landscape changes (ecclesiastical heritage) in her study, which includes: value investigation/judgment, forms of obsolescence definition, adaptive reuse interventions, creation of value, and impact generation (figure 3). From time to time this cycle begins again, in this process to be implemented in life, it is important to have a decision support system (Sedova, 2022).

One example is the abandoned church development project with the aim not to change the functionality, but to preserve the historical and spiritual significance as much as possible. In Flanders, as elsewhere in Europe, several abandoned churches are emerging as a result of migration and there is a significant discussion about what the possible development is. Several scenarios are proposed for discussion and presented to interested parties. The key to this future development is the vision that the cemetery is a public outdoor space (Goyvaerts & Keere, 2020; Plevoets et al., 2019).

Landscape changes are not always directly related to the sacral building or sacral landscape itself. This is clearly illustrated by the example of Studenica marble restoration of the churches of Studenica and Sopocani, because to use the right material, it was decided to restore the marble quarries. Marble quarries have also become part of the national heritage, and this material is essential precisely in the context of church architecture. The marble quarries are in the same region as the churches, so landscape changes affect both objects in conjunction. Here, the cultural landscape on a wider scale is important, as well as the added value of the management vision, where residents are involved (Ristić et al., 2019).

In connection with landscape changes, the issue of insufficient protection, which is formed by defining formal protection zones but not implementing detailed management steps, continues to emerge. Landscape development can be quite fragmented, and is also affected by the lack of disaster management. In the case of Moldova, drastic changes in sacred landscapes are made by industrialization, household construction, tourism, and the construction of the associated buildings. On the other hand, landscape change is governed by natural processes such as floods, lateral erosion, the variability of the water flow within the catchment, and reforestation (Nicu & Stoleriu, 2019).
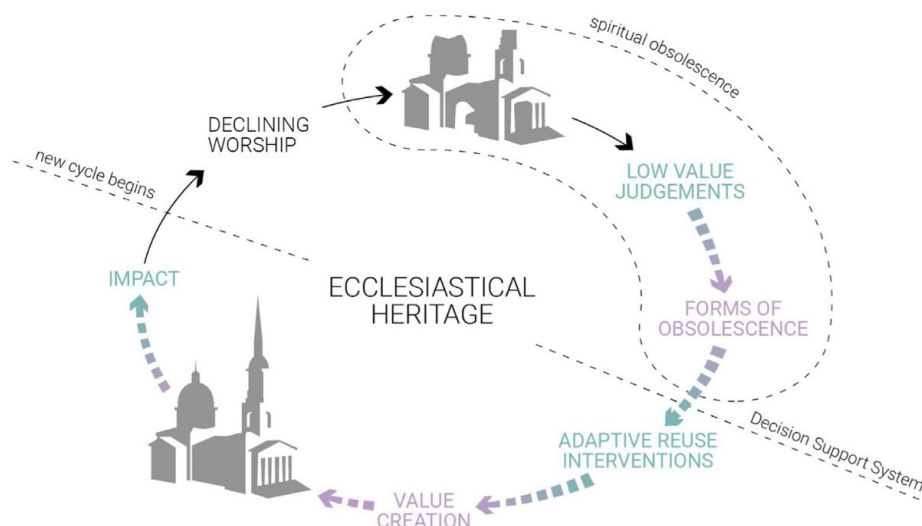

Fig. 3. Landscape change circulation (Sedova, 2022)

The importance of planning

Cultural landscapes and their elements are essential, but their identification is not enough and a specific plan is needed to preserve and restore them. Management must be designed so that the benefit is not only aesthetic but also functional and brings economic benefits. In rural regions, taking into account demographic changes, it is a great challenge to maintain and restore cultural and historical elements, because they often lack functional significance. There is a need to change the perception of the local communities (Constantin & Constantin, 2020).

The connection of the region, the development of tourism, and the development of cross-border regions are of great importance. The landscape values of places of worship also include cemeteries and their planning. The landscape values identified in this study mainly cover the location, diversity of views, the presence of natural values, and architectural stylistics. In turn, for architecture, not only the style, or a mixture of styles, but also the condition (degree of preservation), and the importance of the element are important (Dzikowska et al., 2023).

The connection between natural values and sacred sites has their importance in nature conservation. Sacred sites, and worship building territories often also have the importance of nature protection or preserving natural diversity, but in the Western world, this connection is less emphasized/studied (Frascaroli, 2013).

A planning aspect that needs to be addressed is also the problem of churches and sacred places in general when the territory is covered by private property. The surrounding territories affect both the spiritual and physical accessibility of the landscape, as well as the perception of the landscape. A balance must be found between private property rights and the common good of society. The article (Kalwaria Zebrzydowska Cultural Landscape) emphasizes the importance of local community involvement and the way to develop it positively. Not only the municipality, local stakeholders, and private owners, but also cultural heritage protection professionals must act (Zalasiska & Piotrowska, 2012).

On a city scale, the significance and role of a place of worship are influenced by the historical context, as well as by the changing paradigms of today. In the context of cities, the overall structure of the city and what planning techniques have shaped the overall structure of the city are also important. The example of Barcelona reveals that places of worship are important elements of the city's structure in the public outdoor space of the present and the future (Arboix-Alió et al., 2023). When planning the development of a city, it is essential to consider the buildings of worship and public space to ensure better development quality and usefulness to society.

Cultural landscape planning and management can be implemented using a variety of methods. The Morticelli Church case study illustrates a comprehensive methodology that can be used by a municipality to develop cultural landscapes that have significant public involvement. Each of the stages requires the inclusion of several methods that ensure public involvement in two main categories – co-explore and co-design, as well as the parallel co-evaluation. The four main phases of the exploration and design process are – activation, opening, action, and reuse monitoring (Cerreta et al., 2020).

Landscape changes, if not regulated, can be not only negative but also irreversible. An understanding of the landscape is essential and should be developed among schoolchildren (Corsani Gabriele & Morelli Emanuela, 2015).

Landscape perception

Sacred landscapes in some countries or regions are an integral part of the festive tradition, such as harvest festivals in England. Such traditions attract both local residents and visitors to the area, and the number of visitors to such services can be seen separately from everyday users. Although the role of agriculture in the daily lives of residents has changed, it still retains an important place in the attraction of a place (Walker, 2012).

The perception of the landscape in several European countries shows a connection with nature, which is an important part of the landscape, and affects the location and dominance of the church in the landscape. Churches were built on the highest place, if there was a river or lake nearby, then they were also included in the overall composition. Since ancient times, the natural environment has been considered a component that enhanced the quality of Christian architecture (Chernyshev et al., 2020).

The perception of the landscape is intertwined with the significance and relevance of landscape changes, as often the overall landscape is perceived as a sacred environment. Still, the function of the church has been changed, for example, to a community gathering center. The church building, together with the surrounding environment, retains the significance of a dominant landmark, and architectural values, but its use becomes much more open to different groups of society (Sedova, 2022).

Landscape perception is also an important factor to consider when planning a change or renewal of use, especially for objects such as places of worship. This study emphasizes that the basis of successful development is close cooperation with the community in the research, planning, and evaluation processes, where various methods should be used at each stage. The importance of sacred landscapes as essential to society is demonstrated by the willingness of society to participate in the processes by investing its time and energy (Cerreta et al., 2020).

Changing the function of the church, while maintaining it as an important gathering place, is the guiding motive for the development projects of churches and the territories that include them. There are efforts to be as open as possible so that people in the newly created territories feel comfortable and visit the former church building, which has been given a new function (Shen, 2024).

The perception of the landscape of churches can be a challenge if the landscape of churches is not typical, as in most European countries with prominent church towers. This is discussed in the context of the landscape of churches in Ibiza - seeing it as a challenge and untapped potential - because the churches of the Ibizan countryside are more associated with the mosques of Greece, Italy, Morocco, and Tunisia (Ramón-Cardona & Sánchez-Fernández, 2022).

Modern technologies can help record and pass on the landscape to future generations, allowing for very precise recording of the smallest details. The added value of such videos is detailed additional information, methods, scans, cartographic material, etc. (Valzano et al., 2019).

Nowadays, not only the landscape is changing, but also the tools for studying landscape perception. For example, using modern technologies, it is possible to study how drivers perceive landscape elements, including places of worship, as distinct landscape elements. Research data on landscape perception reveal that the most important elements are the recognizable elements of the landscape, and a study of driver perceptions revealed that wind turbines are not perceived more negatively than church towers. For the study participants, such objects are considered to be recognizable

elements of the landscape and landmarks. This study also did not find any effect of place attraction on emotions or responses to sacred landscapes or other landscape types (Antonson et al., 2014; Bartie et al., 2015; Maehr et al., 2015).

New churches

New churches can be very diverse. Here a connection is formed with planning, as well as with the perception of landscapes. New churches today are considered not only completely newly built buildings but also rebuilt existing churches, as well as buildings and structures that complement the church, as in this case - a boat. Nowadays, the importance of the coexistence of the spiritual and the secular is increasingly emphasized. Here, the religion in question and its openness to secular functions play a role (Jordan, 2022).

The creation of new churches can also have a broad significance for the integration of certain groups in society. For religious communities, a worship building is not only a sacred building, but it is an important cultural center. It is important to understand this, and what the meaning and attitude of the locals are (Fridolfsson & Elander, 2013). Many new churches are being built in Georgia today, so the question of how new churches are perceived and what the reasons are is very relevant. New churches often lack one or more of the qualities that older churches possess and are the basis for the perception of churches as secular objects (Manning, 2008).

The sacralization of the landscape in Poland includes both the construction of new churches, the seasonal use of the landscape, and the creation of other elements in the landscape - chapels, wayside crosses, and religious monuments, as well as linguistic sacralization - in the form of plaques, plates, and banners, as well as religious nomenclature (particularly of patron saints) and signs on streets, town and village squares, and cities and schools. It should be noted, however, that the construction of new churches has decreased in recent decades (Garbin, 2013; Przybylska & Czepczyński, 2017).

Along with new churches, new elements also appear, such as linguistic elements. The linguistic landscape of places of worship appears in the modern urban landscape in a variety of ways - it can be temporary if it is a message board or a notice in a window, but it can also be long-term, if it is a name on a facade, or it is a city sign (tourist signs, road signs) (Alberts & Tieken-Boon van Ostade, 2024).

The challenges of building a new church can be related to the planning process itself, especially if the church in question is a non-white and non-Christian church. The challenges in developing such places of worship are the planning process the public's attitude and the lack of knowledge and experience in various sectors. Here the connection between the spiritual and the political crystallizes and the importance of political support, still present today, becomes apparent (Boland et al., 2021).

Ruins

Ruins can last for a very long time and it is the decision of the society and management of each time to restore, preserve, or perhaps demolish the evidence of the past. After World War II, it was not immediately clear everywhere that buildings with architectural and cultural values should be preserved (Larkham, 2019; Larkham & Adams, 2022).

Ruins are like a kind of continuation of the life of a church landscape, where functions differ and can be different, according to the status and significance of the ruins in society. In many places in Europe, churches were also damaged during the war, but their development has varied since then - ruins have survived, but without a structure; ruins have survived, but without a memorial function; or ruins have survived and the site has a memorial function. The significance of ruins

can also change over time and as generations change, their status, functionality, and spiritual significance and importance in attracting a place are. This has required discussions and has been followed by a long and slow process of raising funding (Larkham, 2019).

Threats of natural disasters

The impact of climate change has not left the worship building landscape untouched. Meteorological hazards and the damage they cause affect both natural and man-made objects. Often, the most threatened areas are those where the threat of natural disasters is rare, and the region is not prepared for it. It is essential to be aware of the safety of construction materials, but it is even more important to train residents and tourists on how to act in such situations. It is essential to be aware of these threats and take them into account both when organizing activities in the area and when considering tools to inform visitors to the area. Regional and local monitoring is essential, as is understanding the building materials used and their specificities (Mihăilă Stefan et al., 2019).

By creating a digital twin for a church, it is possible to monitor, control, and record it in great detail and continuously. It could also be that the large flows of tourists are having a negative impact on the church's structures, or they are being affected because they are not well maintained enough (Lerario & Varasano, 2020).

In the past, buildings were built to withstand natural disasters. One thing would be important for this to be observed today, but another factor is the more frequent occurrence and much wider impact of natural disasters. This article emphasizes that it is possible that it is not municipalities, but many more insurance companies that could influence buildings not to be built in places where the soil and flood conditions are not suitable for them (Kušar, 2008).

Geotourism

Several studies reveal the close connection between church buildings and the geological values of the landscape. An important part of geotourism routes is the various buildings, which also have architectural, social, and economic values of the place and region. Accessibility and comprehensibility of information are essential in geoparks, where various models, digital maps, and different levels are used to help understand the historically formed natural and cultural landscape. Both quarries and churches are equally important in geopark project surveys, where information such as accessibility, state of preservation, location, as well as connections to existing tourism routes, and their potential for geotourism development are collected for both. Studies that highlight the importance of sacred landscapes include the following geoparks and geopark projects: Tras-os-Montes e Alto Douro University campus (Portugal), Nisyros Geopark (Greece), Roztocze Stone Forest Geopark (Greece), Psiloritis Geopark (Greece), Busca Onyx quarry (Piedmont, Italy), Valdelsa Basin (Montespertoli, Tuscany, Italy), Ostrava-Karvina District (Czech Republic), sacral landscape of West Sussex (Bone, 2016; Fassoulas et al., 2022; Freire-Lista et al., 2023; Lamich et al., 2016; Marengo et al., 2019; Nomikou et al., 2023; Skowronek et al., 2024; Tognaccini, 2019).

Owls and bats

Church towers and the surrounding natural areas form an inseparable bond, providing nesting sites for owls (Tyto alba) and nursery sites for bats (Myotis myotis, Rhinolophus hipposideros). In the case of owls and bats, the problems are both the drastic changes in the surrounding landscape, the loss of corridors, and the closure of churches, which often means closing the towers with plywood or over a longer

period, the removal or collapse of the building (Berková et al., 2014; Klein et al., 2023; Reiter, 2004; Žmihorski et al., 2020).

Conclusions

Exploring and examining what changes in worship building landscapes, which are recorded in studies in the anglophone research literature in Europe allows the acknowledgment of the wider aspects of the worship building landscape and its cultural values, both natural and manmade. The various themes that emerge in the context of worship building landscapes vividly illustrate that value lies not only in the stylistics of historical architecture, or in the building itself, as dominant, but it encompasses a vision on a territorial scale of ecological systems, scientific data, construction and restoration methods, social practices, and cultural values, all of which are integrated into a human-made environment. The topic that was widely researched is landscape change in a wider view, where landscape change is researched by looking at political, social, economic, and migration influences. Also in publications is a strong interest in planning challenges and changing landscape perception, as well as landscape perception of changing worship building landscapes. New worship buildings are not so common topic. Topics that are more researched in only some parts of Europe are ruins, threats of natural disaster, geotourism, and worship building role in owl nesting and bat nurseries.

Whether we are talking about the different stages of the landscape, the different users of the landscape, or the drastic changes (wars) of the landscape, it is essential to make a balanced decision about what is preserved, restored, and maintained in the landscape. To successfully develop the landscape, planning, management, and management tools and guidelines are needed, as well as information/education measures are still important.

In the context of sacred landscape planning, two main directions can be read: one is regional, covering rural landscapes and villages, while the other is city-wide. In both, churches are highlighted as essential dominants and connecting objects even today. Although the landscape is changing, society continues to look for the quality of religious buildings in worship building landscapes, which encompasses historicity and connection with natural values. Discussions about whether to preserve the building ruins or the separate sacral elements in question return cyclically.

Worship building change research papers vividly depict the comprehensive pattern of the landscape, attracting scholars from various fields. When planning the development of the landscape of places of worship, it is important to look at it comprehensively, not only at the architectural values of the place of worship, which has been largely predominant until now but in the 21st century, several other aspects are emerging, which encompass not only economic, social but also natural factors. The additional value would be looking at research papers in other languages and a more regional overview.

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Kopsavilkums

Raksta mērķis ir analizēt izmaiņas dievnamu ainavās 21. gadsimtā Eiropā, īpašu uzmanību pievēršot angliski rakstītai zinātniskajai literatūrai un veidojot kontekstu Latvijas dievnamu ainavu pārmaiņām. Pētījumā tika izmantota sistemātiska kvantitatīva literatūras pārskata metode, analizējot 333 zinātniskus rakstus no datubāzes *Web of Science*.

Literatūras analīzē identificētas četras galvenās tematiskās grupas: fiziskas izmaiņas dievnamu ainavā, politiskās norises, reliģiskās prakses un svētceļojumi. Vairums publikāciju koncentrējas uz plaša mēroga ainavu pārmaiņām, kuras ietekmē politiskie, sociālie, ekonomiskie un migrācijas faktori. Fiziskās izmaiņas dievnamu ainavās tika analizētas 51 publikācijā, īpaši izceļot koku nozīmi, sakrālās telpas struktūru un ainavu uztveri. Tika secināts, ka jaunu dievnamu celtniecība ir reti pētīts temats, bet vietumis apskatīti specializēti aspekti, piemēram, drupas, dabas katastrofu riski un dievnamu loma dzīvnieku biotopos. Ainavu uztvere ir svarīga sabiedrības līdzdalības un plānošanas daļa, jo baznīcu un to apkārtnes uztvere mainās līdz ar to funkciju pārdefinēšanu. Pētījums uzsver plānošanas nozīmi sakrālās ainavas attīstībā, uzsverot sabiedrības iesaisti, ilgtspēju un dabas vērtību saglabāšanu. Tika konstatēts, ka ainavu pārmaiņas var būt gan funkcionālas, gan vizuālas, un to cikliskums ietekmē kultūrvēsturiskās vērtības saglabāšanu. Kopumā pētījums parāda, ka mūsdienu pieeja dievnamu ainavu pētniecībā kļūst aizvien integrētāka, ietverot arhitektūras, sociālos, ekonomiskos un ekoloģiskos aspektus.

DETERMINATION OF LEVELS OF VISUAL PERCEPTION OF THE MAIN TYPES OF FORMS OF ART OBJECTS

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Abstract. This article is a study of the main forms of art objects in the interior, where a system of levels of their visual perception is proposed for the first time. Such a system represents an effective way of solving practical issues, when at the first stage of design, the artist and designer solve the problems of the place of installation of this or that art object from the point of view of determining the necessary zone of its perception depending on the type of form. The main key emphasis in the research was made on the analysis of contemplation and perception of art objects of certain forms from different perspectives. 3D modeling of conventional art objects in virtual space was used as an experimental tool. The results of various experiments with three main types of forms were presented in the form of graphic drawings, diagrams with angular dimensions of perception zones, which reflect the content and structure of the studied problems. The method of systematization and generalization of the results made it possible to formulate the necessary levels of visual perception of the main forms of art objects in the interior, which consist of: First maximum level; Second intermediate level; The third minimum level. To test the reliability, the obtained research results were checked by student design practice. The research results were applied in real architectural projects, which made it possible to evaluate their effectiveness and practical value. The effectiveness of the formulated levels of visual perception of the main types of forms of art objects in the interior space was clearly demonstrated by the results of practical implementation. The results of the research can improve the theoretical basis in the design methodology and be recommended for implementation in the educational process, as well as for practical use in the development of art objects in various types of interiors. The proposed system of levels of visual perception can allow to expand the designer's toolkit and will contribute to the optimization of design solutions in the context of modern trends in the design of the object-spatial environment.
Keywords: art object, levels of visual perception, types of forms of art objects, design

Introduction

The study of artistic form in space is becoming more and more relevant in the context of modern approaches in the art design of interior spaces. In conditions where aesthetics and functionality strive for synthesis, studying the perception of artistic form allows for a deeper understanding of the organization of the visual environment. Visual perception plays a key role in the interior, where design as a visual art forms aesthetics and a sense of beauty. Spatial orderliness and emphasis on the main forms create a powerful visual impact, simplifying the perception of the structure (Meng & Cai, 2014).

The form mystically embraces the external contour of the objects, the interaction of elements in the space is a physical incorporation of structure and composition, playing a key role in achieving a balance between aesthetics functionality, and is also of paramount importance for creating a harmonious and effective design (Ching, 2007; Dodsworth & Anderson, 2015). Visual arts are mainly divided into flat forms (painting, graphics, photography, etc.) and volumetric forms (relief panel, sculpture, installations, etc.), which are distinguished by methods of creation and ways of perception. For example, painting exists in a plane, while sculpture and architecture develop in volumetric space. Each of these forms of art organizes space in its own way, influencing the perception of the surrounding environment and has its own strategies for the formation and configuration of form, with their inherent parallels and differences (Marcos et. al., 2024). Leon Batista Alberti wrote in his treatise that the human eye seeks to most clearly determine the qualities of surfaces, perceiving any object occupying a certain place in space. For the artist, this is expressed in the perception of silhouettes of objects, the combination of bodies and forms in space (Alberti, 1966). According to Itten, the basic geometric shapes – the square, triangle and circle – evoke different emotional responses and can be combined to enhance perception and artistic expression (Itten, 1975). Arnheim, based on Gestalt psychology, shows that people perceive works of art as whole images, and not as a collection of separate parts, which is key to understanding visual perception (Arnheim, 1974). Heidegger claims that in plastic arts, space and form are dynamic: we actively participate in their creation and interpretation, and do not simply perceive them passively. Form is constantly changing under the influence of our perception and interaction with the environment (Heidegger, 2009). Accurate perception of form is critical to the perception, identification, manipulation, and reproduction of objects. People are able to evaluate both objective (physical) and projective (retinal) form. Objective judgments benefit from a global approach that includes context to overcome the effect of viewing angle on object shape, while projective judgments benefit from a local approach to filter out contextual information (Robles et. al., 2022). Marković emphasizes that when perceiving a form, attention is focused on the visual and structural characteristics of the object, which strengthens the cognitive aspect of perception (Marković, 2012). Studies show that the starting point and viewing angle have a significant effect on the perception and memory of pictures. Spectators, especially those without artistic experience, more often fix their gaze in the center. Spatial scale and starting position can shift this focus, which emphasizes the importance of viewing angle and distance in perceiving the form and composition of artworks (Trawiński et. al., 2023). Aesthetic perception is highly dependent on the context in which it occurs, including the manner of viewing artworks, considering factors such as viewing distance, number of fixations and their duration, as well as the size and static properties of images (Fourier amplitude spectrum, fractal dimension, and entropy) (Estrada-Gonzalez et. al., 2020).

Accordingly, today the topic of visual perception of the main forms of art objects in space is relevant. Researchers consider it in various interdisciplinary areas, highlighting such aspects

as: the influence of form on the perception of distance and size, the role of psychological distance in the interpretation of works of art, and the cognitive mechanisms of form perception. But, unfortunately, there is a gap in the study of the perception of different forms of art objects from the point of view of choosing the best angles and viewing areas of planar and volumetric works of art. Understanding such aspects can help in the presentation and design of works of art to optimize their perception by viewers in interior spaces. The purpose of this article is to define, systematize and formulate the levels of visual perception of the main types of forms of art objects in the interior space.

Materials and Methods

The research used methods of analysis and a structural approach to the material, as well as their optimization, which made it possible to obtain significant results and formulate key conclusions.

- The methodological basis was a critical analysis of bibliographic sources, which allowed us to reveal the main aspects of the topic, as well as systematization of data for a deeper understanding of the problem. This study used the results of previous works by the authors, which laid the theoretical foundation for the analysis of visual perception of forms in architectural space. These studies provided important concepts of the relationship of art objects in the space of the environment, but did not solve the problem in terms of establishing different zones of visual perception of the main forms of art objects in the interior. Our previous studies have shown that the patterns of visual perception in the interior are subject to specific conditions of spatial relationship and require a separate analysis for a deeper understanding of the visual impact of forms and objects on the viewer (Pylypchuk & Polubok, 2022; Pylypchuk, 2024; Polubok & Pylypchuk, 2023).

- The method of experimental design using modeling of visual perception made it possible to obtain results on the example of the main types of forms – planar, semi-volumetric, volumetric. As an experimental tool, 3D modeling of conventional art objects in virtual space was used, which provided data fixation for further analysis. The results of various experiments with three main types of forms were presented in the form of graphic drawings, diagrams with angular dimensions of perception zones, which reflect the content and structure of the studied problems.

- The method of systematization and generalization of the results made it possible to formulate the necessary structural and instrumental means, which were important for further practical application. These tools ensured the effective use of data and contributed to the optimization of the processes of analysis and interpretation of information within the framework of the study.

- The reliability of the obtained results was checked through their implementation in creative practice. For testing, they were first integrated into student design practice (masters of interior design at the Kyiv National University of Construction and Architecture (KNUCA), Ukraine), where the created design solutions were analyzed. In the future, the research results were applied in real architectural projects (the implementation was carried out in Kyiv, Ukraine), which made it possible to evaluate their effectiveness and practical value. The method of field observations, realized interiors of world practice, aimed at studying the relationship between art objects and interior space, also provided the necessary material to confirm the research results and determine regularities.

Results

1. Structural analysis of theoretical provisions.

To substantiate the key provisions of the topic, a preliminary structural analysis of theoretical provisions was carried out, which made it possible to identify the following key aspects:

- Form in architectural space is defined by three key parameters: geometry, size, and location. It can be either two-dimensional or three-dimensional, possessing length, width, and depth. The structure of form often aligns with geometric outlines, such as rectangles, squares, triangles, trapezoids, semicircles, and others (Ching, 2007).

- There are three main strategies for the formation of space in the context of the genesis of form: addition, subtraction, and limitation. These approaches can be applied individually or in combination, particularly in sculpture (Marcos et al., 2024).

- Unlike painting, which creates only the illusion of spatial depth, sculpture and architecture exist in real space. The perception of volumetric objects depends on the number of visual impressions received from different angles and viewpoints (Ciftcioglu & Bittermann, 2013).

- The perception of form arises from the interaction of visual and psychological factors. It is an active process shaped by prior experience, context, and the interpretation of sensory information (Moles, 1981). For instance, knowledge of an object's actual size influences the perception of its shape and distance (Smeets et al., 2022). Helmholtz's theory posits that the perceived size of an object is determined by the viewing angle: larger visual angles make objects appear bigger, even when viewed from the same distance, while spatial relationships within the visual field also contribute to perception (Helmholtz, 1867). Gibson further argues that form perception is an active process involving the interaction between the observer and the environment, guided by available visual information and the observer's goals (Gibson, 1950).

- Foreshortening introduces visual shortening, where angles between lines increase as vision underestimates height reduction compared to smoother azimuth changes. Errors are most pronounced at tilt angles of 50-60°, due to differences in linear azimuth changes and the quadratic elevation function (Wnuczko & Kennedy, 2021). These phenomenological deviations result in systematic errors, with minimal distortions in vertical and horizontal directions but more noticeable distortions at oblique angles. Classical models of the field of vision fail to fully explain perception, as they do not account for environmental interaction mechanisms (Van Doorn et al., 2013).

- The field of view is a concept in geometric optics that describes a beam of rays captured by an optical system, distinct from subjective human perception (Koenderink et al., 2024). Binocular vision provides accurate depth information, enabling the perception of three-dimensional position and shape. However, depth perception in flat images differs significantly from that in real three-dimensional environments (Hibbard et al., 2023). The human binocular field of vision spans approximately 180 degrees horizontally and 130 degrees vertically, which differs from the "field of view" that includes eye movement. While most artworks capture only a small portion of this field, certain art forms require

a field of view of 180 degrees or more to achieve full spatial perception (Baldwin et al., 2014).

- The perception and memorization of geometry and shape in visual scenes are closely linked to the perception of indoor space (Oliva et al., 2011). This includes object position and visual orientation, both essential for understanding interior shape. Like objects, the shape of space is defined by contours and surfaces, with perception encoded in the brain. The point of view represents a cone of visible space, constrained by the human eye's aperture, covering approximately 90 degrees (theoretically up to 180 degrees). The median visible field is around 90 degrees, ranging from 10 to over 210 degrees. Wide angles create a sensation of seeing "behind one's ears", while narrow angles focus perception directly ahead. The field of vision varies both quantitatively and qualitatively among individuals (Koenderink et al., 2009).

- The two-stage angular processing theory proposes that the human visual system processes angular characteristics in two stages. First, the orientation of bounding lines is encoded. Second, angles are represented in an orthogonal internal frame of reference. This approach complements existing theories, such as Weber's law and line combination theories, by offering a new perspective on the integration of linear features to form a holistic perception of shape (Xu et al., 2018).

The structural analysis of the main theoretical propositions gave an understanding that the features of visual perception of any art object in the object-spatial environment are determined by the nature of its shape – volumetric, planar, half-volume. Each type of form needs its own directions, points of perception, which collectively make up zones of perception of a certain size. Art objects with a planar form are limited mainly to small zones of perception, the main frontal direction with limited lateral additional viewing angles (paintings, panels, paintings, super graphics and others). Art objects of semi-volumetric form have a much larger area of perception due to the sufficiently volumetric nature of the form, it has frontal and side viewing angles, which are equally important for the expressive perception of such a form (relief, high relief). Art objects with a full volumetric form have a circular zone of perception, which is due to the active development of such a form in the space in which it is perceived from all sides/viewing angles. All perspectives of the volumetric form are equally complete and important for the expressive perception of art objects of this type (sculpture, volumetric installation).

So, the characteristic features of the visual perception of an art object depend on the type of its shape (flat, semi-volumetric, volumetric) and consist in the principle of determining the level of visual perception, which is achieved by the method of establishing the ratio of different sizes of the perception zones of the main types of art forms objects in the interior space. Establishing the ratio of magnitude (in degrees) of different zones of perception was revealed as a result of measuring and comparing each separate zone of perception of each of the three main types of forms of art objects. Measurement and comparison of each individual zone of perception was carried out in the process of the author's scientific experiment – by the method of computer modeling of the object and its perception in virtual space.

2. Experimental procedure.

2.1. An experiment with a plane shape.

In the first experiment, the visual perception of a planar art object was investigated.

Examining the object in the frontal direction P1 (plan-scheme A1) of the perception zone, an image (A) was obtained, in which the art object looks with the full width of the picture plane and the proportions of the depicted objects. This direction of perception is the most optimal for considering art objects of the planar nature of the form. When examining the object in the direction of the extreme boundary of the perception zone on the left P2 (plan-scheme B1), an image (B) was obtained in which the art object already appears with an incomplete width of the picture plane and proportions of the depicted objects. The art object in the left perspective was examined at an angle of 35 degrees from the frontal direction of perception and obtained images with a reduced, but still quite recognizable width of the picture plane and proportions of the objects. With an increase in the angle of deviation from the frontal direction of more than 35 degrees, the width of the picture plane and the proportions of objects turned out to be distorted enough for their full perception in their original (initial) form. Therefore, a deviation from the frontal direction of approximately 35 degrees is the extreme limit of visual perception on the left.

When examining the object in the direction of the extreme boundary of the perception zone on the right P3 (plan-scheme C1), an image (C) was obtained in which the art object also appears with an incomplete width of the picture plane and proportions of the depicted objects. The art object in the perspective on the right was also examined at an angle of 35 degrees from the frontal direction of perception and obtained images with a reduced, but still quite recognizable width of the picture plane and proportions of objects. An increase in the angle of deviation from the frontal direction by more than 35 degrees affected the width of the picture plane and the proportions of objects, which also turned out to be distorted enough for their full perception in their original form. Therefore, a deviation from the frontal direction of approximately 35 degrees is the extreme limit of visual perception on the right. Thus, as a result of experimental modeling of the perception of a planar form in three main directions, a zone of perception of a planar art object of 70 degrees was obtained (Table 1).

2.2. An experiment with a semi-volumetric form.

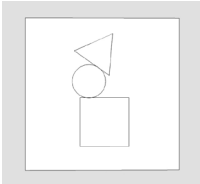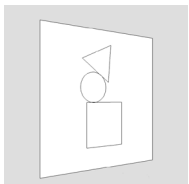In the second experiment, the visual perception of an Art object with a half-volume shape was investigated.
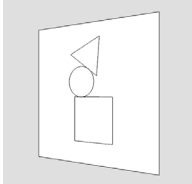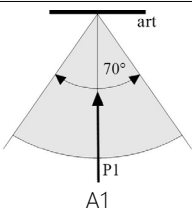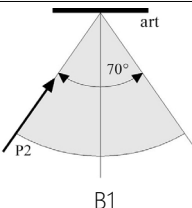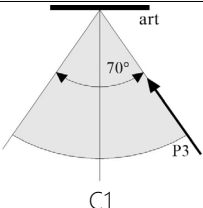
Considering the semi-volumetric object in the frontal direction P1 (plan-scheme A1) of the perception zone, an image (A) was obtained, in which the art object looks like a clear perfect silhouette of a relief volume, perceived with the help of falling shadows with full width and proportions of the depicted objects. This direction of perception is the main one for considering art objects of a semi-volumetric nature of form.

When examining the object in the direction of the extreme boundary of the perception zone on the left P2 (plan-scheme B1), an image (B) was obtained in which the art object already appears with incomplete width and proportions of the depicted objects, but with an expressive thickness of the relief. The art object in the left perspective was examined at an angle of 80 degrees from the frontal direction of perception and obtained an image with a reduced width, but a sufficiently expressive thickness of objects. With an increase in the angle of deviation from the frontal direction of more than 80 degrees, the width of the relief details almost disappears and is not perceived, and only the thickness remains expressive. Therefore, a deviation from the frontal direction of approximately 80 degrees is the extreme limit of perception on the left.

When examining the object in the direction of the extreme boundary of the perception zone on the right P3 (plan-

Reflection of the process of experimenting with planar form (created by the authors)

Components	Frontal direction of the perception zone	The direction of the extreme border of the perception zone is on the left	The direction of the extreme border of the perception zone is to the right
Conventional representation of a planar form	A	B	C
Plan-scheme	A1	B1	C1

Note to Table 1: P – direction of perception; art – designation of an art object; images A-C, A1-C1 – developed by the author.

scheme C1), an image (C) was obtained in which the art object already appears with incomplete width and proportions of the depicted objects, but with an expressive thickness of the relief. The art object in the perspective on the right was examined at an angle of 80 degrees from the frontal direction of perception and obtained an image with a reduced width, but quite expressive thickness of objects. With an increase in the angle of deviation from the frontal direction of more than 80 degrees, the width of the relief details almost disappears and is not perceived, and only the thickness remains expressive. Therefore, a deviation from the frontal direction of approximately 80 degrees is the extreme limit of perception on the right. As a result of experimental modeling of the perception of a semi-volumetric form in three main directions, a perception zone of a semi-volumetric art object of 160 degrees was obtained (Table 2).

2.3. An experiment with volumetric form.

In the third experiment, the visual perception of an art object with a full volumetric shape in space was investigated.

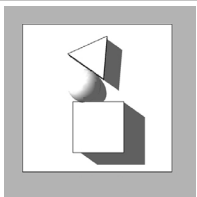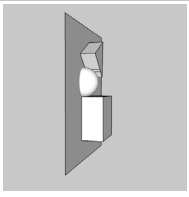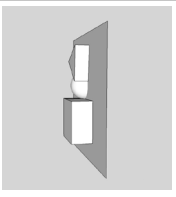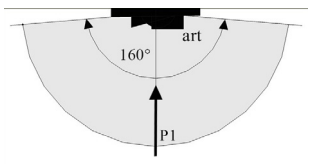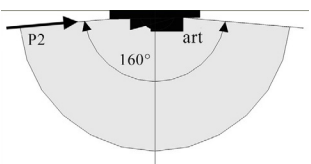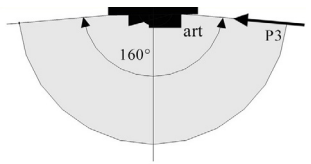Looking at the volumetric object in the direction P1 (plan-scheme A1) of the perception zone, an image (A) was obtained, in which the art object looks like a full-fledged expressive silhouette and a volume that is perceived in this perspective with full width, thickness and proportions without any reductions or distortions of the shape of the depicted details. This direction of perception is also one of the main ones for considering art objects of a volumetric nature in space.

Looking at the object in the direction of P2 (plan-scheme B1) of the perception zone, an image (B) was obtained. In this image, the art object also looks like a full-fledged silhouette and a volume that is already perceived in another, but no less expressive perspective, with full width, thickness, and proportions without any reduction in the depicted details. This direction of perception is one of the main ones for considering art objects of a volumetric nature in space.

Looking at the object in the direction of P3 (plan-scheme C1) of the perception zone, an image (C) was obtained. The art object also looks like a full-fledged silhouette and volume, which is perceived from the other side in a third, no less expressive perspective with full width, thickness, and proportions without any reduction of the depicted details.

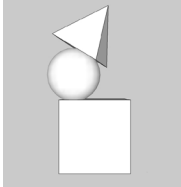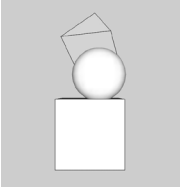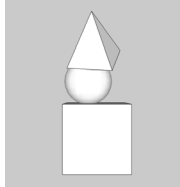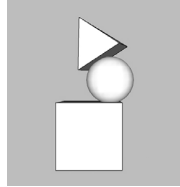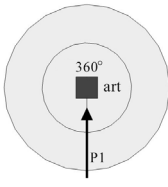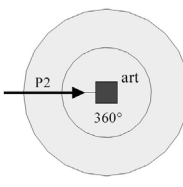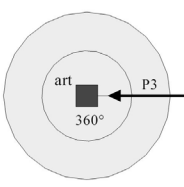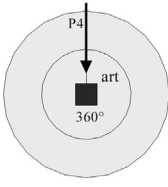Reflection of the process of experimenting with semi-volumetric form (created by the authors)

Components	Frontal direction of the perception zone	The direction of the extreme border of the perception zone is on the left	The direction of the extreme border of the perception zone is to the right
Conventional image of a semi-volumetric shape	A	B	C
Plan-scheme	A1	B1	C1

Note to Table 2: P – direction of perception; art – designation of an art object; images A-C, A1-C1 – developed by the author.

TABLE 3

Reflection of the process of experimenting with volumetric form (created by the authors)

Components	The direction of the perception zone (P1)	The direction of the perception zone (P2)	The direction of the perception zone (P3)	The direction of the perception zone (P4)
Conventional image of a volumetric shape	A	B	C	D
Plan-scheme	A1	B1	C1	D1

Note to Table 3: P – direction of perception; art – designation of an art object; images A-D, A1-D1 – developed by the author.

This direction of perception is also one of the main ones for considering art objects of a volumetric nature in space.

Looking at the object from the direction P4 (plan-scheme D1) of the perception zone, an image (D) was obtained where the art object still appears as a full silhouette and volume, which is already perceived from the side opposite the first perception direction (P1) and also has a sufficiently expressive angle with complete width, thickness, and proportions without any shortening of the depicted details. This perception direction is also one of the main ones for the consideration of volumetric art objects in space.

As a result of experimental modeling of object perception, it was found that, for a complete observation of a volumetric shape in space, more than four directions of perception are necessary. Each intermediate direction among the main four provides additional, diverse, and equally expressive angles of the art object. Thus, the perception of art objects that are fully volumetric in nature requires a circular perception zone of 360 degrees (Table 3).

Analyzing and summarizing the obtained three different sizes of visual perception zones, a conclusion was made – the change in the shape of the art object also requires a change in the size of the perception zone with its increase from a planar, half-volume to a fully volumetric form. So, as a result of experimental modeling, three main zones of visual perception with different values in degrees were obtained: the first experiment determined – 70° perception of planar, the second – 160° perception of half-volume, the third – 360° perception of volumetric form.

3. Determination of the levels of visual perception of the main forms of art objects.

Based on the ratio of the various values of the three zones obtained, three levels of visual perception of the main forms of art objects were defined and formulated, containing the name and number, certain sizes of ranges in degrees, characteristics of the form of the art object and a visual image in the form of a plan-scheme. The revealed equalities are systematized and presented in Table 4.

The results of the conducted experiments determined three levels of visual perception of the main forms of art objects:

I Max level – is based on the features of visual perception of volumetric art objects, which require a circular viewing area with the possibility of observing the volume from different sides, each of which constantly forms a set of new fully expressive perspectives and new impressions from the perception of form. Thus, the perception of art objects of a full volumetric character in space does not have limited perspectives and requires a circular maximum perception zone of 360 degrees.

II Intermediate level – based on the features of visual perception of semi-volumetric art objects, which require a sufficiently wide viewing area with the possibility of observing the relief volume from the main frontal and a set of additional lateral directions of perception, each of which constantly forms new expressive perspectives and impressions from the perception of a semi-volumetric form. So, taking into account the somewhat limited volume of this nature of the form, a perception zone of a semi-volumetric art object of 160 degrees was obtained.

III Min level – determined on the basis of limited visual perception of planar art objects, which require a sufficiently small viewing area with the ability to observe the planar form from the main frontal and minimal set of additional lateral directions of perception. Therefore, taking into account the purely planar nature of the form, a perception zone of a planar art object of 70 degrees was obtained.
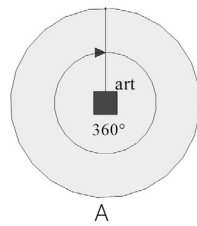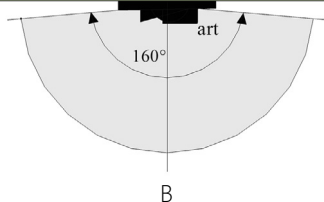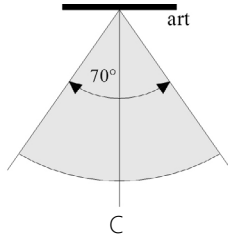
4. Implementation in creative practice.

To confirm the results of the research, 3D modeling was used and implemented in the diploma qualification works of master's students of the Design Department of KNUCA (Ukraine). An art object in planar, half-volume and volumetric form, created by hand or with the help of 3D modeling, was considered in relation to the corresponding angles and directions of visual perception, according to the placement plan in each design decision.

In the frontal direction of perception P1 (plan-scheme (D), Figure 1), an image (A) was obtained, in which the art object looks with the full width of the picture plane and the proportions of the details depicted in it. Image (A) shows that this direction of perception is the most optimal for viewing such a painting as an art object of the plane nature of the form. Examining the painting in the direction of the extreme border of the perception zone on the left P2 (plan-scheme (D)), an image (B) was obtained, in which it looks already with a slightly reduced width of the picture plane and the proportions of the details depicted on it. The painting in

TABLE 4

Levels of visual perception of the main forms of art objects (created by the authors)

| Levels	Perception zones in degrees	Characteristics of the form of the art object and the level of perception	Plan-scheme
I Max	160º-360º	volumetric art objects with a circular perception zone	A
II Inter-mediate	70º-160º	Semi-volumetric art objects with a wide perception zone	B
III Min	Up to 70º	Flat art objects with a limited perception zone	C

Note to Table 4: P – direction of perception; art – designation of an art object; images A-C – developed by the author.

A

B
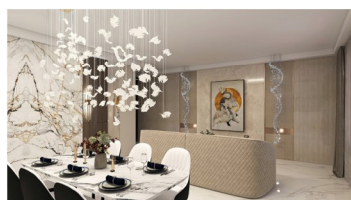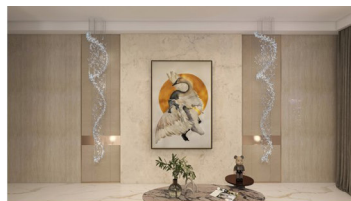
C
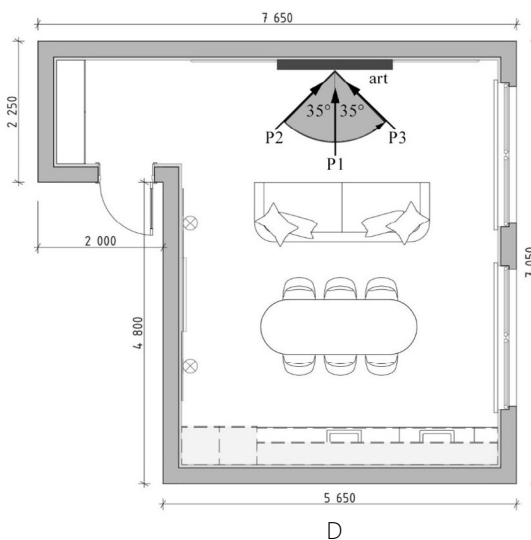
D

Fig. 1. The painting " Swan in Golden Rays" in the living room interior of a residential building. Project proposal by Oleksandra Kirmach, supervised by Oksana Pilipchuk;
A – frontal perception of the picture;
B – lateral perception of the picture (on the left);
C – lateral perception of the picture (right);
D – is a plan-scheme of the interior space with a planar art object (art) and directions of perception (P1, P2, P3) (authors' material)

the perspective on the left was viewed at an angle of 35 degrees from the frontal direction of perception and received an image with reduced, but still sufficiently distinct width of the picture plane and proportions of the details of the composition. With an increase in the angle of deviation from the frontal direction of more than 35 degrees, the width of the picture plane and the proportions of the details of the composition turned out to be quite distorted for their full perception in their original form. Therefore, a deviation from the frontal direction of approximately 35 degrees turned out to be the extreme limit of visual perception on the left.

In the direction of the extreme border of the perception zone on the right of P3 (plan-scheme (D)), an image (C) was obtained, on which the picture also looks with inferior width of the picture plane and proportions of the depicted details of the pictorial composition. The painting from the right angle was also viewed at a 35-degree angle from the frontal perspective, resulting in an image with a shortened but still sufficiently recognizable width of the pictorial plane and proportions of the details. Increasing the angle of deviation from the frontal direction by more than 35 degrees affected the width of the picture plane and the proportions
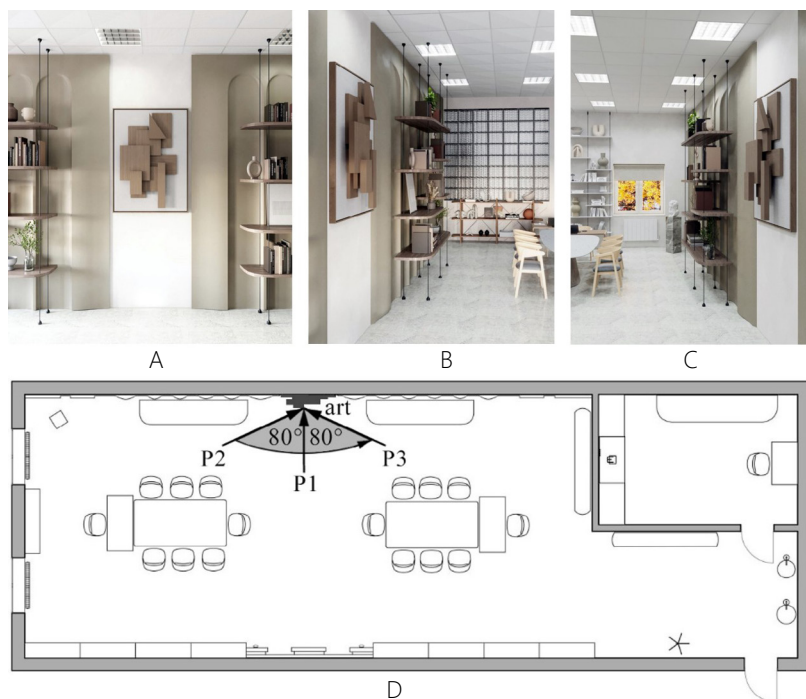
Fig. 2. Relief "Abstraction" in the 3D model of the interior of the creative studio. The author of the project proposal is Anna Pechonkina, supervisor – Andrii Polubok:
A – frontal perception of the terrain;
B – lateral perception of relief (left);
C – lateral perception of relief (right);
D – is a plan-scheme of the interior space with a half-volume art object (art) and directions of perception (P1, P2, P3) (authors' material)

of the details of the composition, which also turned out to be quite distorted for their full perception in their original form. Therefore, a deviation from the frontal direction of approximately 35 degrees is also the extreme limit of visual perception on the right. So, in the process of introducing a painting in the interior as a planar form, the results of the experimental design (the first experiment) were confirmed and a perception zone of 70 degrees was obtained, which corresponds to the third minimum level of visual perception. In Figure 2, in the frontal direction of perception of P1 (plan-scheme (D)), the relief in image (A) has the appearance of a clear completed silhouette of a half-volume shape, which is perceived by means of falling shadows with the full width and proportions of the depicted details. This direction of perception is the main one for considering relief images as art objects of a semi-volumetric nature of the form. Looking at the relief towards the extreme border of the perception zone on the left of P2 (plan-scheme (D)), an image (B) was obtained, in which the object looks already with inferior width and proportions of the depicted details, but with a distinct

thickness of the relief. The art object in the perspective on the left was viewed at an angle of 80 degrees from the frontal direction of perception and received an image with a reduced width, but a sufficiently expressive thickness of details. With an increase in the angle of deviation from the frontal direction over 80 degrees, the width of the relief details almost disappears and is not perceived, and only its thickness remains distinct. Therefore, the deviation from the frontal direction by approximately 80 degrees turned out to be the extreme limit of perception on the left. The direction of the extreme border of the perception zone on the right P3 (plan-scheme (D)) received an image (C), on which the relief looks also with inferior width and proportions of details, but with a distinct volume thickness. In the perspective on the right, the art object was viewed at an angle of 80 degrees from the frontal direction of perception and received an image with a reduced width, but a sufficiently expressive thickness of details. With an increase in the angle of deviation from the frontal direction over 80 degrees, the width of the relief details almost disappears and is not perceived, and
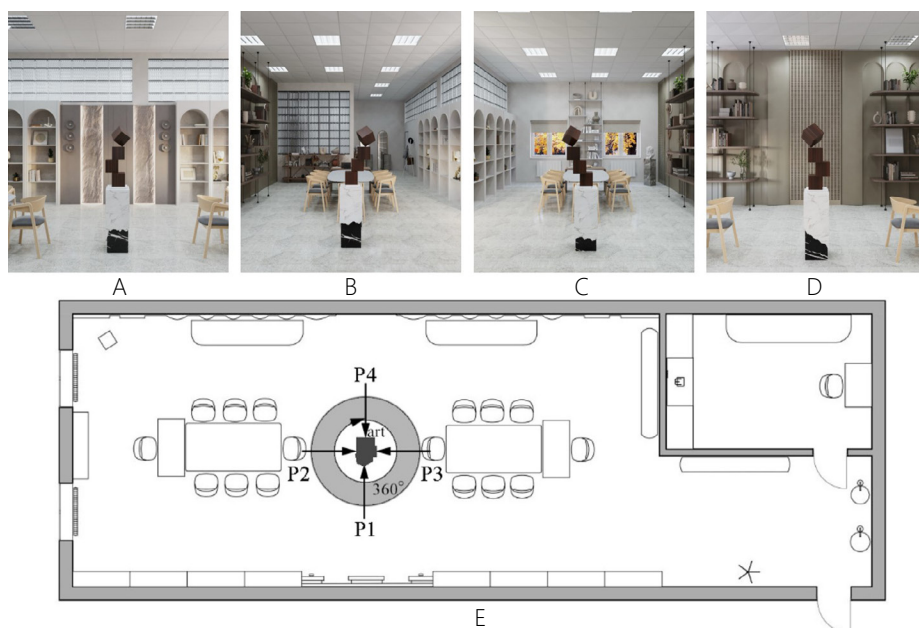
Fig. 3. The sculpture "Balance" in the 3D model of a creative studio interior. Project proposal by Anna Pechonkina, supervised by Andrii Polubok:
A – front view of the sculpture;
B – left-side view of the sculpture;
C – right-side view of the sculpture;
D – rear view of the sculpture;
E – is a plan-scheme of an interior space with a volumetric art object (art) with directions of perception
E – is a plan-scheme of an interior space with a volumetric art object (art) with directions of perception (P1, P2, P3, P4) (authors' material)

A   B   C

Fig. 4. Implementation of planar, semi-volumetric, and volumetric forms in various types of interiors in Kyiv (Ukraine): A – the painting "Tropical Forest" in a residential interior, artist – Oksana Pilipchuk; B – the relief "Abstract Fantasy" in a residential interior, artists – Oksana Pilipchuk, Andrii Polubok; C – the sculpture complex "Rhythms of the Universe" in the interior of a street food gallery space "BEE'S KNEES", architects – Hushel Vladyslav, Elena Kolesnikova (authors' material)

only the thickness remains distinct. Therefore, a deviation from the frontal direction of approximately 80 degrees is the extreme limit of perception on the right. So, in the process of implementing the relief in the interior as a semi-volumetric form, the results of the experimental design were confirmed (the second experiment) and a perception zone of 160 degrees was obtained, which corresponds to the second average level of visual perception.

When considering a volumetric object (abstract sculpture) in the direction of P1 (plan-scheme (E), Figure 3), an image (A) was obtained in which the sculptural composition appears as a fully expressive silhouette and volume. This angle allows for the perception of the complete width, thickness, and proportions of the shapes of the depicted objects without any reduction or distortion. This direction of perception turned out to be one of the main ones for considering the sculpture as an art object of the volumetric nature of the form in space. In the direction of P2 (plan-scheme (E)), an image (B) was obtained, in which the sculptural composition also looks like a full-fledged silhouette and volume, which is perceived already in a different, but no less expressive perspective with full width, thickness and proportions without any abbreviations of depicted details. Like the P1 direction, the P2 perception direction also turned out to be one of the main ones for a full consideration of art objects with a volumetric shape in space. When perceiving the sculptural composition in the direction of P3 (plan-scheme (E)), an image (C) was obtained, where it also looks like a complete silhouette and volume, which is perceived from the other side in a third no less expressive angle with full width, thickness and proportions of details without any reductions. This direction of perception also turned out to be one of the main ones for considering a sculpture of a volumetric character in space. When examining the object from the direction P4 (plan-scheme E), an image (D) was obtained where the sculptural form still appears as a complete silhouette and volume, perceived from the side opposite to the first perception direction (P1). It also has a sufficiently expressive angle with full width, thickness, and proportions of details without any reductions. This direction of perception is equally expressive as the previous ones and is also one of the main ones for considering the sculptural composition as a volumetric art object in the space of the interior.

As a result of the introduction of the sculpture as an art object of volumetric nature of the form, it was found that for its full observation in space, even more than four directions of perception are required. Among the main four, each intermediate direction gives other additional, but no less expressive perspectives of the volumetric form. Thus, in the process of integrating the sculptural composition

into the interior as a fully volumetric form, the results of the experimental design (from the third experiment) were confirmed. A complete 360-degree visual perception area – the largest circular viewing area – was achieved, corresponding to the first level of visual perception.

The results of the implementation of various forms of art objects in interiors demonstrated the optimization of the main levels of visual perception during design. This made it possible not only to improve the aesthetics of the space, but also to more effectively use the perception of various forms of art objects in the interior. In addition, such an approach helps to increase the visual interaction between the space, its visitors and the art object, making the interior more expressive and individualized.

Discussion

Architectural structure in art implies that forms must conform to the laws of space perception, and not be random or arbitrary. Hildebrand focuses on the synthesis of visual and tactile sensations, emphasizing that effective art should not only visually affect, but also evoke tactile perception, which is especially relevant for architecture and sculpture. The optical impression in the sculpture is natural, but its quality depends on the shape of the object and the distance at which complete visual perception is possible (Hildebrand, 1908). Cutting, on the other hand, adds an evolutionary component, emphasizing the importance of movement for the perception of form and distance, which allows us to adapt to the surrounding environment (Cutting, 1986). On the other hand, modern art and design are developing in the context of the changing role of visual practices (Okeke et al., 2019). This is complemented by the ideas of Baldwin et al., who propose new methods of visual field mapping through direct observation, allowing designers to gain a deeper understanding of the perception of objects in space (Baldwin et al., 2014). But in the modern digital context, the perception of space is expanded due to information measurement, when human movement affects the creation of new elements of space. This "cyber layer" adds dynamism to architecture, transforming traditionally static elements into flexible and changing structures, which requires a revision of classical ideas about the perception of physical space (Posta & Tuncel, 2023). Researchers propose a method of merging different points of view to design complex spaces, which improves visual awareness and helps designers understand informed decisions when creating interiors and architectural objects (Ciftcioglu & Bittermann, 2013). Finally, the log-polar model introduces additional mathematical parameters, showing how shape perception preserves local details without distortions, providing a more accurate representation of spatial structure and its invariants. This opens new possibilities for designing

complex spaces, which is particularly useful in the context of virtual and augmented reality (Koenderink et al., 2018). All this leads to the idea that the perception of form and space is not only a matter of geometry, but also the result of a complex interaction of visual, motor and cognitive processes, which in the future will require further research and the search for new, more ideal approaches to solving this issue to create more harmonious and functional spaces in architecture and design. In this study, for the first time, a three-level system for assessing the visual perception of the main forms of art objects in the interior is proposed from the point of view of establishing the values of different perception zones. Such a system represents an effective way of solving practical issues, when at the first stage of design, the artist and designer solve the problems of the place of installation of this or that art object depending on the type of its form. The levels of visual perception of the main types of forms of art objects determined in the course of the study can be expanded due to the constant development of new theories and discoveries in the field of visual perception, as well as the evolution of visual practices in fine arts and design. The obtained results of the conducted experiments can make a significant contribution to scientific theory and have practical significance in the field of fine arts and interior design. This issue remains promising and requires further research, as the dynamics of visual approaches and technologies inevitably affect the understanding, perception and interpretation of artistic form and interior space.

Conclusions

As a result of the study, three levels of visual perception of the main types of forms of art objects in the interior space were identified and formulated, based on the consideration of various forms of art objects from the point of view of choosing the best angles and viewing areas of planar, half-volume and voluminous works of art.

- I Max level, which is based on the features of visual perception of volumetric art objects, with a circular viewing area with the ability to observe the volume from different sides, each of which constantly forms a set of new fully expressive perspectives with a maximum perception area of 360 degrees.
- II Intermediate level is based on the features of visual perception of semi-volumetric art objects, which require a sufficiently wide viewing area with the ability to observe the relief volume from the main frontal and a set of additional lateral directions of perception, each of which constantly forms new expressive angles with an average perception zone in the size of 160 degrees.
- III The Min level is determined based on the limited visual perception of planar art objects, which require a sufficiently small viewing area with the ability to observe the planar form from the main frontal and a minimum set of additional side directions with a minimum perception area of 70 degrees.

The results of practical implementation clearly demonstrated the effectiveness of the formulated levels of visual perception of the main types of forms of art objects in the interior space. The developed system of levels of perception of art objects can make a significant contribution to the development of the topic of artistic synthesis in the context of the visual relationship between art objects and the subject-spatial environment, as well as contribute to the improvement of the theoretical basis of systematization in design methodology. The proposed system of levels of visual perception is also recommended for use in the educational process in order to improve creative skills, as well as for use in the design of art objects of basic forms in various types of interiors.

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Kopsavilkums

Veiktais pētījums ietver izvērtējumu par galvenajām mākslas priekšmetu formām interjerā, kur pirmo reizi tiek piedāvāta to vizuālās uztveres līmeņu sistēma. Analizētā sistēma ir efektīvs praktisku jautājumu risināšanas veids, kad pirmajā projektēšanas posmā mākslinieks un dizainers risina tā vai cita mākslas objekta uzstādīšanas vietas problēmas no tā uztveres nepieciešamās zonas noteikšanas viedokļa atkarībā no formas veida. Pētījumā galvenais uzsvars tika likts uz noteiktu formu mākslas objektu komplektāciju un uztveres analīzi no dažādām perspektīvām. Kā eksperimentāls instruments tika izmantota tradicionālo mākslas objektu 3D modelēšana virtuālajā telpā. Rakstā iegūto dažādo eksperimentu rezultāti prezentēti grafisku zīmējumu veidā, diagrammas ar uztveres zonu leņķiskajiem izmēriem, kas atspoguļo pētāmo problēmu saturu un struktūru. Rezultātu sistematizācijas un vispārināšanas metode pētījumā ļāva formulēt nepieciešamos interjera mākslas priekšmetu galveno formu vizuālās uztveres līmeņus.

THE SENSE OF LOSS IN MEMORIAL SPACES: 'ABSENCE' VS. 'PRESENCE'

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Abstract. In recent years, memorial parks have garnered increased attention as spaces for public commemoration and individual reflection. However, despite their growing significance, many contemporary memorials have been criticised for over-reliance on abstraction and a lack of tangible connections to memory, limiting their ability to engage visitors' perspectives effectively. This research explores the interplay of presence and absence in the design of memorial parks, focusing on their role in engaging visitors' sensory perceptions and fostering emotional connections to memory. Through an analysis of the Vietnam Veterans Memorial and the 9/11 Memorial, this research identifies and categorises four standard design methods that utilise presence and absence to evoke reflection and remembrance. In this context, presence refers to visual or audible elements, such as reflections and repetition. At the same time, absence encompasses inaudible and invisible features like negative space and cut-outs. These methods operate not as isolated elements but within a dynamic continuum where presence and absence blend and transition, creating spaces that resonate with individual and collective memories of loss. By examining the application of these design methods in both case studies, this paper elucidates how memorial landscapes can evoke a profound sense of loss, providing visitors with a space to confront and reflect upon historical trauma. This analysis contributes to a deeper understanding of the fluid boundaries between presence and absence in commemorative design, offering insights into how these concepts can be employed to enhance the emotional and sensory engagement of memorial spaces.
Keywords: Memorial Parks, presence, absence, sensory perception, memory

Introduction

Current memorial design has evolved to address the emotional complexities of historical trauma. Designers today strive to balance abstraction and representation to convey the themes of presence and absence. This research defines presence as the aspects of memorial spaces that visitors can directly perceive through sight or sound—such as structured names, symbolic forms, or reflective surfaces that foster a sense of continuity within memory. On the other hand, absence refers to elements within the memorial that elude direct perception—those that visitors cannot see or hear yet evoke a profound sense of loss. These concepts, however, exhibit fluidity and functional variability within memorial parks; presence and absence are not static states but adaptable tools that contribute to the memorial's expressive capacity, allowing designers to craft spaces that resonate emotionally across different audiences.

In the context of memorial spaces, absence holds a particularly central role, often expressed through two primary design strategies: the portrayal of loss through the void and the deepening of absence through disappearance into the land. For example, presence is conveyed through tangible arrangements, like the repetition of names or symbolic elements that establish a flow within the memorial's design. By contrast, absence emerges through voids or infinite spaces, invoking an emotional depth that encourages contemplation on what is lost.

The Vietnam Veterans Memorial and the 9/11 Memorial were selected for comparative analysis because they exemplify distinct yet complementary approaches to presence and absence. As depicted in the diagram, the Vietnam Veterans Memorial embodies presence through reflection and repetition, while the 9/11 Memorial conveys absence through negative space and land scarification. By analysing these contrasting elements, this research aims to elucidate how different memorials utilise presence and absence to evoke sensory perception and emotional connection. Two landmark sites that utilise contrasting strategies to articulate absence. The Vietnam Veterans Memorial employs repetition as a form of absence, symbolised by the endless listing of names that underscores the scale of loss. The 9/11 Memorial, in contrast, uses void as a spatial strategy, with reflective pools and cascading water symbolising an unfillable gap, creating a multi-layered experience that engages individual and collective memories.

Literature Review

The conceptualization of presence and absence in memorial design has been shaped by interdisciplinary debates spanning phenomenology, landscape theory, and critical heritage studies. This section synthesizes key theoretical frameworks that inform the interplay of sensory perception, spatial design, and collective memory.

Memory, Spirit of Place and Fluidity. Christian Norberg-Schulz's concept of "genius loci" emphasises that a site's identity is rooted in its physical characteristics and ability to evoke emotional responses by connecting visitors to the earth (Norberg-Schulz, 1974, p. 120). This theory underscores the importance of grounding memorials in their contextual landscapes to foster authenticity.

In contrast, critics argue that not all memorials rooted in land art principles achieve the same effect. The emphasis on grounding a site in physical and historical context, as Norberg-Schulz suggests, may only sometimes foster emotional attachment, especially in designs that lack symbolic resonance. Critics may view some minimalistic or abstract land art memorials as overly ambiguous, risking a "placeless" quality that lacks cultural specificity and personal connection. Regarding the fluidity of visitor's perception, Merleau-Ponty's view on relational embodiment posits that the self is dynamically interconnected with others and one's environment. This interconnectedness grounds identity in embodied relationships, significantly impacting ethical and social interactions (Lojan & Kremarik, 2022). Additionally, Edward Relph's concept of "insideness" highlights the emotional attachment individuals develop with specific places, fostering a sense of identity and collective memory (Smith & Relph, 1974, p. 116). According to Relph and Merleau-Ponty, commemorative spaces gain significance by embedding experiential layers that strengthen viewers' connections to collective history. However, Dimitropoulos observes a trend in modern memorials toward minimalistic designs that reject traditional allegorical forms, fostering introspection and mirroring broader cultural shifts toward

complex, introspective national identities (Dimitropoulos, 2009). Broudehoux and Cheli argue that abstract designs encourage empathy and collective healing over nationalistic displays (Broudehoux&Cheli, 2021). While Relph emphasises rootedness in place, modern minimalistic memorials often prioritise emotional openness over a fixed cultural or historical context, appealing to diverse interpretations. This can foster an inclusive form of memorialisation but may need a deeper connection to places that Relph views as essential to authentic memorial experiences.

Reflective Surfaces as Presence. Reflective surfaces in architecture serve as sensory mechanisms that deepen interaction between viewer and monument. I.M. Pei's use of reflective glass in the Louvre Pyramid blends history with modernity, allowing the surrounding environment to dialogue between past and present. P. Davey's analysis includes a look at the reflective materials used to create visual harmony and contrast with the historical surroundings (Davey, 1989). Pei's philosophy underscores light and reflection as essential to creating architectural resonance, transforming spaces into dynamic, living elements that adapt to their environment.

Pallasmaa and other phenomenologists argue that sensory design and kinesthetic awareness create emotional connections with architecture. This approach involves crafting atmospheres that foster embodied experiences, allowing users to intuitively grasp the character of space before analysing its elements (Pallasmaa, 2014).

In contrast, some critics question whether reflection alone can foster a meaningful connection to memory without additional symbolic elements. While reflective surfaces invite introspection, they may need to provide more context for viewers unfamiliar with the history or meaning behind the memorial. Reflection can evoke personal engagement but may risk superficiality if the memorial lacks other elements that ground viewers in a specific narrative.

Challenges in Interactive Design. Interactive design in memorials, such as the Princess Diana Memorial Fountain, demonstrates the complexity of engaging visitors while maintaining reverence. Stevens and Franck argue that interactive elements can sometimes inadvertently undermine the solemn purpose of memorials, as recreational features may overshadow the intent for reflection (Stevens & Franck, 2014). This challenge is also present in "living memorials" like those dedicated to the 2005 London bombings, which use ongoing acts of care and community engagement to commemorate. Allen and Brown suggest that living memorials can incorporate acts of stewardship and embodied remembrance, transforming spaces into dynamic memorials that emphasise collective resilience over static memory (Allen & Brown, 2011).

Fig. 1. Conceptual Diagram of Presence and Absence (created by the authors)

While interactive elements enhance accessibility, they can dilute the solemnity essential to commemoration, particularly in spaces that must balance engagement with reverence. Interactive memorials must navigate the tension between open and inclusive public spaces and serve as sites of reflection and mourning. While dynamic features can make memorials more approachable, there is a risk that such designs could lessen the space's symbolic depth and emotional resonance. The balance between interactivity and solemnity remains crucial in modern commemorative design.

Research Gaps and Conceptual Framework. Existing scholarship predominantly examines singular design elements (e.g., reflection, negative space) rather than analyzing how presence and absence dynamically interact within memorial landscapes. Few studies explore how topographic strategies—such as descent, scarification—activate embodied memory through physical participation. This research addresses these gaps by proposing a phenomenological framework to analyze how spatial sequences and sensory layering in the VVM and 9/11 Memorial mediate between absence and presence, thereby shaping emotional and mnemonic engagement. This research seeks to answer the following question: How do the spatial design methods of the Vietnam Veterans Memorial and the 9/11 Memorial facilitate visitors' sensory perception and emotional connection to memory between absence and presence?

Methodology

This research employs a phenomenological framework to analyze how spatial design in memorial parks mediates between absence and presence, shaping visitors' sensory and emotional engagement with memory. The methodology is structured as follows:

Research Design and Case Selection. The Vietnam Veterans Memorial and the 9/11 Memorial were selected for their distinct approaches to conveying "presence" (Visibility and Audibility) and "absence" (Invisibility and Inaudibility) and for their popularity as influential sites of public memory (see Fig.1). Both memorials share similar design methods, including sunken landscapes, reflective materials, and interactive elements. Their popularity and resonance with diverse audiences make them ideal for examining how these design strategies can evoke varied experiences of memory and reflection.

This research selects phenomenology as the primary methodology for analysing the two memorial sites (the Vietnam Veterans Memorial and the 9/11 Memorial) due to its unique strengths in exploring sensory experience and memory interaction. A phenomenological lens provides insight into how sensory engagement shapes emotional responses within memorial spaces. Pallasmaa's "haptic architecture" theory is particularly relevant here, as it emphasises the role of touch and vision in eliciting emotional connections (Pallasmaa, 2014). By analysing visitors' embodied experience in these spaces, this research explores how the senses are activated to reinforce themes of "presence" and "absence".

Phenomenology enables an in-depth examination of subjective experiences within memorial spaces, especially in contexts involving grief, remembrance, and self-reflection. This approach unveils the emotional and sensory connections people establish with these spaces, revealing how individuals interact with and interpret memorial environments on a profoundly personal level. For instance, phenomenology captures memorials' immersive and material nature, illustrating how visitors engage with collective memory through personal recollections and sensory experiences (Wagoner et al., 2019).
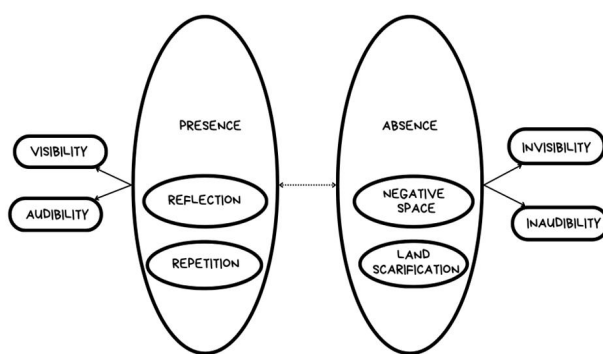
Additionally, phenomenology is well-suited to investigating "genius loci" (the spirit of place) and emotional resonance in memorial design. Memorials are not merely physical containers of memory; they serve as spaces of sensory and emotional exchange. Phenomenological analysis of the relationship between landscape and visitor reveals how design elicits memory and emotional responses, endowing the memorial with profound meaning and relevance for visitors (Baptist, 2013).

Furthermore, phenomenology provides a framework for understanding how sensory cues in memorial design evoke memory. Unlike traditional methodologies, phenomenology focuses on sensory details, spatial structures, and user interactions to capture memorial sites' rich emotional and cultural dimensions. This method offers a distinct lens for analysing how both case studies utilise design to foster memory and emotional connection among visitors (Park et al., 2020). By employing phenomenological methods, this research seeks to uncover how sensory and emotional aspects of memorial design shape and influence visitors' memory experiences, providing both theoretical insight and practical guidance for future commemorative space design.

Comparative Analysis

Both memorials use reflective materials and engraved names to embody memory, but their approach to these elements shapes different visitor interactions.(see Table 1) At the VVM, the polished granite surface allows visitors to see their reflections alongside the names of the fallen, symbolising the enduring presence of memory. Adding a deeper layer to this reflective experience, Juhani Pallasmaa notes that buildings using reflective materials can create a "dreamlike sense of unreality and alienation," which contributes to a form of detachment as the viewer's gaze is returned without encountering the life or reality beyond those walls (Pallasmaa, 2012, p. 35). Watkins et al. argue that this reflective surface helps reduce trauma symptoms, providing veterans with a space to engage deeply with personal memories and grief (Watkins et al., 2010). This therapeutic quality aligns with the minimalist design, facilitating a space for reflection rather than imposing a specific narrative. The polished surface acts as a boundary between the living and the deceased, offering a quiet space that enables personal healing and reflection on loss. In contrast, the 9/11 Memorial employs reflective materials to evoke absence through dynamic, fluid interactions. Its twin reflecting pools, lined with cascading water and bronze parapets engraved with victims' names, create a kinetic interplay of light and sound. The water's continuous flow disrupts static reflections, symbolizing the irreparable rupture of the event while inviting contemplation on the passage of time and the persistence of memory. Unlike the VVM's mirror-like surface, which merges the visitor's reflection with the names of the dead, the 9/11 Memorial's turbulent water surfaces fragment reflections, embodying the instability and impermanence of post-traumatic memory. This design choice aligns with James E. Young's concept of the "anti-monument," where voids and ephemeral elements challenge traditional notions of permanence in memorialization (Young, 1993). The auditory dominance of falling water further shifts focus from visual reflection to collective auditory immersion, fostering a communal sense of mourning that contrasts with the VVM's introspective silence.

The vertical black granite wall of the Vietnam Veterans Memorial (VVM) puts visitors in direct line of sight with the names of the fallen, creating an egalitarian dialogic relationship, while the horizontal bronze panels of the 9/11 Memorial require visitors to lean down to read them, reinforcing the ritualistic nature of mourning through the humility of the gesture. This difference in spatial height not only shapes the visual interaction, but also guides the emotional experience through the adjustment of physical gestures - VVM's "looking at each other" symbolizes the coexistence of the living and the dead, while 9/11's "bending down" suggests the need for an irreversible relationship with the dead. The "staring" of VVM symbolizes the coexistence of the living and the dead, while the "stooping" of 9/11 suggests submission to irreversible trauma.

The sequence in which the names are arranged at each memorial also reflects different conceptual approaches to memory. The spatio-temporal logic of the arrangement of names reveals the two memorials' different interpretations of collective memory (see Fig. 2).VVM arranges the names in chronological order (1959-1975), incorporating visitors into a linear historical process that culminates in a closed loop of first and last names at the lowest point of the memorial, hinting at the cyclical and unfinished nature of the memory of the war, while the 9/11 Memorial grouped names according to their social relations (e.g., companies, rescue teams, relatives' requests), weaving individual tragedies into a mesh of collective narratives. The former emphasizes the "presence" of history, while the latter highlights the "presence" of community ties, which together prove that the temporal and spatial encoding of memory directly affects visitors' empathy for the "missing". The two together prove that the way memory is encoded in space and time directly affects the visitor's empathy for the "absence".

The topographic strategy regulates the emotional intensity through the design of spatial sequences (see Table. 1). The sloped descent of the VVM forces visitors to go through the physical path of "descending-staying-ascending", this process can be explained by Merleau-Ponty's "body-space" theory (Merleau-Ponty, 1962, p. 123): the body's movement and perception are not passive acceptance of space, but actively construct spatial meaning through muscle tension and trajectory. When the visitor descends down the slope, the continuous contraction of the leg muscles and the gradual lowering of the center of gravity transform the body into a

TABLE 1

Comparison Table (created by the authors)

Design Dimensions	Vietnam Veterans Memorial (VVM)	9/11 Memorial
Reflective Interaction	Vertical black granite wall, living and dead looking at each other	Horizontal copper plate, need to lean down to read
Negative Space Strategy	Sloping "wound" embedded in the ground	Twin pools flush with the ground, auditory guidance
Logic of Name Arrangement	Chronological Order (Linear Historical Closed Loop)	Social Relationships (Mesh Collective Narrative)
Body Engagement Model	Downward-Upward Pathway Simulating Trauma Immersion and Return to the Everyday	Edge Proximity Triggering Void Perception
Sensory dominance	Visual (reflections) vs. tactile (wall touch)	Auditory (sound of running water) vs. visual (depth highlights)

medium for perceiving trauma -- the sense of resistance at each step is a metaphor for the difficulty of entering the abyss of memory; and when staying in the valley, the feeling of oppression surrounded by the black granite is felt through the skin's sense of touch. At the trough, the feeling of repression, surrounded by black granite, reinforces the embodiment of the memory through the tactile and visual reflections of the skin. Ultimately, the relaxation of muscles and the broadening of horizons on the way up suggest a psychological release from the trauma of "surfacing". According to Merleau-Ponty, "the body is the vehicle of being in the world", and it is through the kinetic involvement of the body that the VVM's ramp design transforms abstract historical trauma into a physical object that can be carried by muscular memory). While the flat surface of the 9/11 Memorial creates an emotional impact through the sudden drop in depth - visitors encounter emptiness from the urban hustle and bustle without warning. The flat surface of the 9/11 Memorial Plaza, on the other hand, creates an emotional impact through a sudden drop in depth - visitors encounter emptiness from the urban hustle and bustle without warning, reinforcing the sense of rupture between the "everyday" and the "traumatic". The gradual and abrupt topographical interventions respectively shape different rhythms of memory awakening.

Furthermore, building on the method of negative space and land scarification to present "presence" and "absence" in memorial landscapes, it's valuable to examine how these design methods extend beyond the Vietnam Veterans Memorial (VVM) and the 9/11 Memorial to other memorials that use land as a medium for conveying trauma and loss. The "5-12" Wenchuan Earthquake Memorial (2010) by Yongjie Cai (see Fig, 2), like the VVM, utilises the idea of land scarification—creating a "wound" on the earth's surface to symbolise the lasting pain of natural disasters. This approach mirrors the VVM's concept of an embedded, visible wound within the landscape, deepening the viewer's emotional response by making the trauma part of the earth itself. Korzilius underscores this by highlighting the memorial's profound use of absence as a symbol for loss and trauma, noting that this "wound" in the landscape invites introspection and collective mourning (Pallasmaa, 2012, p. 35). Visitors can experience a visceral connection to the deceased as they descend into the quiet, somber space, where absence is embodied through silence and isolation. This design choice supports Relph's theory of "insideness," which suggests that spaces fostering multiple layers of experience enable visitors to form deeper emotional attachments, enhancing personal connections through the sense of loss embedded in the landscape.

On the other hand, Micha Ullman's "The Empty Library" (1995) employs a similar yet distinct method to express absence, focusing on cultural and historical memory (see Fig, 2). Here, absence is portrayed through a void that reveals empty bookshelves beneath the ground. This emptiness reflects the books burned by the Nazis, a physical absence that extends beyond mere symbolism to address the erasure of knowledge and culture. The void is both a memorial and a reminder of loss—an unfilled absence, inviting reflection on what was irretrievably taken. Ullman's and Cai's designs reflect an extension of the design methods seen in the VVM and the 9/11 Memorial. These memorials embody loss and cultural memory through land scarification and negative space, making the absence powerfully present. They demonstrate how design can both reveal and conceal, guiding visitors from an initial absence to a profound realisation of presence, each step reinforcing the memory of trauma and loss.

Through these comparative design elements, the Vietnam Veterans Memorial and the 9/11 Memorial illustrate distinct approaches to representing "presence" and "absence." The VVM's embedded structure and reflective wall lead visitors on a journey from hidden trauma to visible memory, while
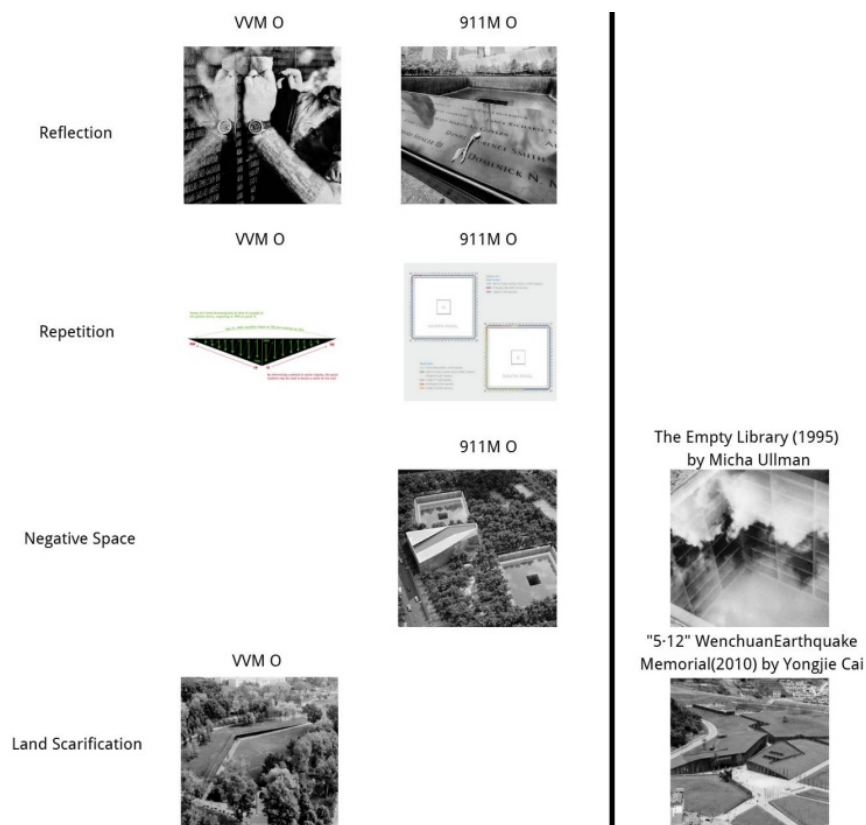

Fig. 2. In comparing memorial design methods in VVM and 911M and another memorial with the same design methods, 'O' signifies existence in the case studies (created by the authors)

the 9/11 Memorial's hidden pools and soundscape create a progression from absence to presence as visitors approach the edge. Both sites use reflective materials and engraved names to invite interaction, yet they differ in placement and posture, impacting the nature of visitor engagement. The chronological versus relational order of names highlights contrasting views on individual versus collective memory. These memorials reveal how spatial design, material choice, and layout can shape how we remember and honour loss, providing spaces where personal and collective reflections on memory are both possible and profound.

Discussion

This study, through a comparative analysis of the Vietnam Veterans Memorial (VVM) and the 9/11 Memorial, reveals the theoretical significance and practical value of "presence" and "absence" as core strategies in memorial space design. The findings demonstrate that these two memorials employ design methods – reflective materials, repetitive names, negative space, and land scarification – to transform individual trauma into a physical carrier of collective memory, while validating the phenomenological hypothesis that the body acts as a medium for memory (Pallasmaa, 2012, p. 52-54). Specifically, the VVM's embedded scar renders the trauma of war visible through land scarification, while the 9/11 Memorial's reflection pool metaphorizes irreparable loss through negative space and cascading water. These design strategies not only align with Edward S. Casey's philosophical interpretation of "traumatic places"–"where fissures in the earth are not merely physical voids but topological containers of memory" (Casey, 1996, p. 214) – but also expand Christian Norberg-Schulz's theory of genius loci, proving that landscapes are not passive containers of memory but active participants in its reconstruction (Norberg-Schulz, 1974, p. 45). Meanwhile it resonates Pallasmaa's highline that spaces and landscapes act as amplifiers of emotions that can evoke feelings of belonging or alienation .

However, the scope of this article is limited by its focus on only two cases and four primary design methods for discussion and comparison. While these methods provide an overarching framework, the analysis only includes the symbolic meaning of surrounding vegetation, the integration of memorials into daily life for city residents, or a detailed exploration of materiality. These aspects may play significant roles in shaping visitors' experiences and would benefit from further examination in future studies.

Mechanisms of Design Methods and Theoretical Dialogues. This study directly addresses the research question, "How do spatial design methods facilitate visitors' sensory perception and emotional connection to memory?" by delineating the following mechanisms:

Reflective materials (e.g., the VVM's black granite) blur the boundary between the living and the deceased through mirrored surfaces, triggering self-dialogue. This design resonates with Pallasmaa's concept of the "uncanny" in place memory, where reflections force visitors to confront the "otherness of the self," thereby renegotiating individual and collective memory (Pallasmaa, 2012). This approach could provide a dynamic, living interaction with the memorial space, deepening the visitor's reflective experience, bridging past and present. Future memorial parks could expand on this design method by incorporating more immersive reflective surfaces that engage sight, sound, and light, allowing the environment to change according to the time of day or seasons.

Repetition (e.g., the VVM's chronological name arrangement) amplifies the scale of collective sacrifice through rhythmic patterning. This method echoes Paul Connerton's theory of ritual repetition, where repetitive acts inscribe memory into landscapes through bodily practices (Connerton, 1989). Repetitive symbols in memorial spaces are 'written' into muscle memory through physical movement, making memory a palpable, dynamic presence. Take the Vietnam Veterans Memorial (VVM) as an example: touching the walls inscribed with names (e.g., relatives looking for a specific name) becomes a repetitive ritual, and the contact of the fingers with the cold stone transforms individual wounds into haptic symbols of collective memory, as same as the names on 911 memorial. Moreover, repetitive symbols evoke emotions through visual rhythm and spatial cadence. the linear arrangement of tens of thousands of names in the VVM creates an overwhelming visual repetition, forcing the visitor to confront the scale of the sacrifice of war and triggering a mixture of awe and grief. Awe and grief are mixed. Additionally, repetitive rituals not only affect the immediate experience, but also reconstruct long-term memory through habituation. Year after year, visitors repeat the act of laying flowers and printing their names on Memorial Day, making the memorial space part of their personal life history. Negative space (e.g., the 9/11 Memorial's sunken pools) metaphorizes historical rupture through visual voids. This strategy echoes Micha Ullman's The Empty Library (1995) – a subterranean void of empty bookshelves commemorating Nazi book burnings – which functions as an 'anti-monument' that compels viewers to actively reconstruct erased histories (Young, 1993) Both are completely embedded in the ground, and visitors are required to gaze down into the subterranean void (World Trade Center site, bookshelves), their body posture forced to shift from looking down to introspection. Both are situated in their original locations, in direct response to the traumatic events that destroyed the city's life and cultural memory. The design of the negative space not only challenges the vertical authority of traditional monuments (ancient Egyptian obelisks or Roman statues), but also transforms the visitor into a co-conspirator through the negative space, and the viewer's act of gazing becomes a participation in the reconstruction of memory.

Land scarification (e.g., the Wenchuan Earthquake Memorial) embeds trauma into topography, transforming the environment into a memory carrier. This aligns with Karen E. Till's critical geographical perspective, wherein scars on landscapes serve as both physical symbols and contested sites of power (Till, 2008). Similarly, the VVM's "wound" in the landscape, has the potential to make trauma a visible part of the environment, these sites often evokes complex emotional responses, allowing individuals to grapple with feelings of loss, grief, and anger, transforming these environments into dynamic memory carriers. This method could be adapted to different topographies or terrains for future memorial parks, creating scars or earth cuts reflecting the cultural or historical trauma being commemorated. Additionally, integrating pathways within these scarred landscapes could allow visitors to physically traverse and engage with the memorial space,reinforcing a collective journey through remembrance. While the phenomenological approach effectively captures individual sensory experiences, its neglect of structural power dynamics risks oversimplifying the sociopolitical context of memorialization. For instance, although the VVM's design is offering a space for visitors to reflect on personal and collective trauma without imposing a specific political message (Hobbs, 2014), its initial controversies (e.g., public resistance to abstraction) reveal how state narratives co-opt memorial spaces. Similarly, the 9/11 Memorial's void-centric

design, while emphasizing universal loss, risks depoliticizing the event's historical complexity (Dimitropoulos, 2009). Future studies should integrate critical theories, such as Derek Alderman's framework of "memorial landscapes," to interrogate how design is appropriated by or resists ideological agendas (Alderman & Dwyer, 2009). Meanwhile, Future research could further explore how these methods might be adapted and enriched by additional elements, such as vegetation, natural materials, or interactive features, providing comprehensive guidance for the evolution of memorial park design that resonates across diverse cultures, events, communities and environments.

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Kopsavilkums

Pēdējos gados memoriālie parki ir ieguvuši lielāku uzmanību kā vietas publiskai piemiņai un individuālām pārdomām. Tomēr, neskatoties uz to pieaugošo nozīmi, daudzi mūsdienu memoriāli ir kritizēti par pārmērīgu paļaušanos uz abstrakciju un taustāmu saikņu trūkumu ar atmiņu, ierobežojot to spēju efektīvi iesaistīt apmeklētāju perspektīvas. Līdz ar to pētījums atspoguļo klātbūtnes un prombūtnes mijiedarbību memoriālo parku dizainā, koncentrējoties uz to lomu, nozīmi apmeklētāju maņu uztverē un emocionālās saiknes veicināšanā. Izmantojot Veiktais pētījums identificē un iedala četras standarta dizaina metodes.

Rakstā ir izskaidrots, kā memoriālās ainavas var izraisīt dziļu zaudējuma sajūtu, sniedzot apmeklētājiem vietu, kur konfrontēt un pārdomāt vēsturisko traumu. Pētījumā veiktā analīze veicina dziļāku izpratni par mainīgajām robežām starp klātbūtni un prombūtni piemiņas noformējumā, sniedzot ieskatu par to, kā šīs koncepcijas var izmantot, lai uzlabotu piemiņas telpu emocionālo un sensoro iesaistīšanos.