# LANDSCAPE ARCHITECTURE AND ART

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## INTRODUCTION

The collection of scientific articles brings together several research directions — urban planning, preservation of cultural and historical heritage, and the search for the contextual meaning of artistic elements. The topics are divided into five research blocks:

- the concept of the 15-minute city in large-scale residential districts. Although the political, social, and economic context has changed significantly since the mid-20th century, the physical environment of large-scale residential areas has largely preserved the fundamental principles of the original urban planning concepts. Examples from Riga and Vilnius.

- research on architectural acoustics and the semantics of sound in the urban environment. Example from Ukraine.

- waterfronts, tourism, and landscape space. Modeling of hydrological conditions.

- research on cultural and historical heritage. Spatial and compositional approaches, analyzing similarities and differences in the motivation of cultural environments. Architectural heritage — as the evolution of measures for the protection of material cultural values, from the restoration of utilitarian architectural objects to the implementation of complex scientific, methodological, and technological approaches — conservation, restoration, and partial reconstruction. In European society, both approaches to the preservation of architecture have always coexisted: the practical and the aesthetic-artistic. The Enlightenment era and the academically educated European society of the 19th century came to recognize the significance of the historical, symbolic, emotional, and aesthetic values of architecture, laying the foundations for the theory and practice of architectural heritage preservation.

- the semantic significance of sacred heritage in the preservation of cultural space. Example from Lithuania.

## PRIEKŠVĀRDS

Zinātnisko rakstu krājums apkopo  vairākus pētnieciskos virzienus - pilsētplānošana, kultūrvēsturiskā mantojuma saglabāšana un mākslas elementu konteksta meklējumi. Minētais ir sadalāms piecos pētniecības blokos:

- lielmēroga dzīvojamo rajonu 15 minūšu pilsētas koncepcija Lai gan politiskais, sociālais un ekonomiskais konteksts kopš 20. gs. vidus ir būtiski mainījies, lielmēroga dzīvojamo rajonu fiziskā vide lielā mērā ir saglabājusi; sākotnējās pilsētbūvnieciskās idejas pamatprincipus. Rīgas un Viļņas piemēri;

- pilsētvides arhitektoniskās  akustikas un skaņas semantikas izpēte. Ukrainas piemērs;

- ūdensmalas, tūrisms, ainavtelpa. Hidroloģisko apstākļu modelēšana;

- kultūrvēsturiskā mantojuma izpētes bloks. Telpiski kompozicionālie paņēmieni, analizējot līdzības un atšķirības  kultūrvides motivācijā. Arhitektūras mantojums - kā materiālās kultūras vērtības aizsardzības pasākumu evolūcija no utilitāras arhitektūras objektu atjaunošanas līdz kompleksai zinātniski metodisku un tehnoloģisku paņēmienu īstenošanai - konservācija, restaurācija un daļēja atjaunošana. Eiropas sabiedrībā vienmēr ir līdzās pastāvējušas abas pieejas arhitektūras saglabāšanā: gan praktiskā, gan estētiski mākslinieciskā. Apgaismības laikmets un 19. gadsimta akadēmiski izglītotā Eiropas sabiedrība nonāca pie atziņas par arhitektūras vēsturisko, simbolisko, emocionālo un estētisko vērtību nozīmi, liekot pamatus arhitektūras mantojuma saglabāšanas teorijai un praksei;

- sakrālā mantojuma semantiskā  nozīme kultūrtelpas saglabāšanā. Lietuvas piemērs.

**Aija Ziemeļniece**
Editor of Chief

# CONTENT

# SEARCHING FOR 15-MINUTE CITY IN LARGE-SCALE HOUSING ESTATES: SERVICE PROXIMITY AND DIVERSITY IN THE CONTEXT OF POPULATION DENSITY

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**Abstract. The "15-minute city" concept develops a sustainable mobility paradigm in the context of the city's central neighbourhoods and outlines clear planning parameters. Since in many cities most of the population lives outside the city core, a sustainable city needs the adaptation of the "15-minute city" concept to other contexts. Large-scale housing estates (LHE) are home to a significant proportion of the population in many European cities, especially in Eastern and Northern Europe. LHE were planned with the idea that a neighbourhood is a unit that provides both housing and essential daily needs within walking distance. Although the political, social and economic context has changed significantly since the LHE concept was developed in the mid-20th century, the physical environment of LHE has largely retained the principles of the original urban idea. The aim of the paper is to investigate the multifunctionality of large housing estates and assess the correlation between the centres of gravity associated with four travel destinations - public transport stops, groceries, recreation and education. The study analysed four LHEs in two cities - Riga and Vilnius, assessing the proximity and diversity of their services in the context of population density. The methodology is based on simulative mathematical modelling. The calculation of the gravitational centrality allowed for a spatially functional analysis, revealing movement patterns and better reflecting the functionality of the city in monofunctionally zoned large housing zones. The main results confirm that in all studied LHEs the average population density within 1 km was higher than the average in both cities. The density of other indicators was different in each case. They even exceeded the average values, showing that post-war large housing districts could have the critical mass of objects necessary to implement the 15-minute city concept in the neighbourhoods of Riga and Vilnius.
Keywords: proximity-based planning, urban regeneration, sustainable cities and communities, sustainable mobility**

## Introduction

The move towards implementing the sustainable mobility paradigm at the regional and local levels is currently a trend in many places. In this context, the essential goals of sustainable urban development are to reduce the dependence on cars in urban areas and to reduce daily travel needs [2]. However, the aim of these planning activities is not to ban the use of private cars but to build such human-friendly environment that people won't need to use them.

The "15-minute City" concept is an approach that develops the idea of a sustainable mobility paradigm in the context of the city neighbourhood and outlines clear planning parameters. The 15-minute accessibility to essential consumer goods and services determines the neighbourhood's size and the potential population density so that these basic needs can be effectively provided. The original idea and the subsequent numerous studies are mainly focused on the central parts of cities, where effective provision of everyday needs is possible by improving the infrastructure for pedestrians, cyclists, and public transport. However, in many cities, most of the population lives outside the city core, so adapting the "15-minute City" concept to other contexts is necessary for a sustainable city. Moreno, the author of the "15-minute City" concept, has emphasised the need to create context-specific solutions while continuing to develop his idea.

Large-scale housing estates (LHE) are home to a considerable proportion of the population in many European cities, particularly in Eastern and Northern Europe. Many large-scale housing estates were planned with the idea that a neighbourhood is a unit that provides both housing and essential daily services, including education, healthcare and food purchases within a walking distance [29]. Since the context of their conception, planning and construction have changed significantly in terms of political, social, and economic settings, the physical environment of large-scale housing estates has mostly preserved the principles of the original urban idea. The aim of the paper is to study the multi-functionality of the large housing estates and assess the correlation between gravity centralities associated with four travel destinations - public transport stops, groceries, leisure, and education. Four LHE in two cities - Riga and Vilnius, were analysed by evaluating their service proximity and diversity in the context of population density.

## Background

The 15-minute city concept is an urban planning model which aims to create compact populated areas where all the essential daily services are accessible within a 15-minute walk or bike ride from home. This urban planning model aims to reduce the population's dependence on cars, promote sustainable transport development, and promote public involvement in community life and the liveability of cities. [1, 16]. The cornerstone of the 15-minute city model is a well-planned integrated public transport network that provides efficient connections to the other parts of the city. This reduces dependence on private cars and the time spent on the way to work, health care and other services, thereby improving the overall quality of life [17, 28]. Supermarkets and local markets should be within walking distance, providing quick and convenient access to daily necessities and fresh food [4; 31]. Recreational functions also should be accessible without long journeys and located strategically to ensure social cohesion and support a vibrant community [19; 24]. The attractiveness of the residential environment to different age groups and families is essential for community stability, and in this context, the placement of necessary institutions, including educational ones, in the city and residential areas is critical [7, 10]. In general, the 15-minute city concept approach to urban planning aims to promote sustainable living in the city, increase the overall quality of life and build sustainable, dynamic communities, making convenient accessibility of services and functions to residents through proximity-based planning.

Proximity-based planning is an urban design approach that focuses on the accessibility of services necessary to people in residential areas. This planning paradigm aims to create an environment where residents have all significant amenities

within a short distance from their homes, including public transportation, grocery stores, recreational facilities, and educational institutions. In this way, people's daily travel distances and their dependence on cars are reduced, sustainable urban development is promoted, and citizens' quality of life is improved [1; 28]. An essential component of the proximity-based planning, to promote sustainable mobility of citizens, is the availability and location of public transport stops and the ability of public transport to connect neighbourhoods with employment centres, educational institutions and recreational areas. Accessible and, therefore, more frequently used public transport in daily activities in a neighbourhood, according to research, can contribute to a higher level of social interaction and community involvement than in neighbourhoods without an efficient and accessible public transport system [7; 17]. The availability of grocery stores within walking distance of where one lives allows buying food more often, thus promoting more frequent access to fresh products and supporting the maintenance of healthier eating habits. Regular use of local grocery stores helps local people meet more often, and through regular interaction and building relationships, it also contributes to a sense of community [4; 31]. The availability of leisure facilities (parks, sports facilities, cultural venues, etc.) provides both a health-improving function and, as an outdoor activity, serves to promote social interaction [19; 24]. Access to schools and educational institutions near the place of residence significantly reduces the time spent on the road for families and improves the overall educational experience for children. At the community level, the proximity of educational institutions can attract young families to the specific neighbourhood and have a beneficial effect on property values, thus contributing to the stability and growth of the community [10; 16].

The large-scale housing estates built in the post-war period form an essential part of the urban environment in many cities. These LHEs were built quickly and at the lowest possible cost to eliminate the lack of housing and deal with the problem of the growing population. For this reason, LHEs consist of high-rise multi-apartment type buildings spread over a large area, providing housing for many residents in a relatively small city area. Considering the high population concentration, the time when the estates were created, and the current situation, these estates serve as an object of discussion regarding the issue of easy access to basic services, including public transport, grocery stores, recreational opportunities and educational institutions [15; 26]. The availability of quality schools in large-scale housing estates is essential for improving the living environment of families. If quality educational institutions are located far from residents' homes, this can affect children's success and the choice of families to live in a given area [10; 13] or an increase in the time spent on the way to the available or chosen educational institution can be noticed, which contradicts the primary setting of the 15-minute city concept. Analysing availability of basic services in LHEs, it should be emphasised that the situation of different estates within the same city and in different countries may vary, and since the emergence of these estates, both the demographic situation and the structure and location of workplaces have changed. The availability of grocery stores in LHEs is an aspect that can be evaluated differently. On the one hand, many LHEs have retail spaces available. However, changes in the structure of trade since the construction of these estates, incl. the emergence of many new supermarkets outside these districts near transit roads and other factors [25; 31], can affect the profitability

of local stores in LHEs, with residents still preferring to take long distances for a more diverse grocery supply. Large-scale housing included green areas for rest and recreation in their initial designs. However, since their construction, the structure of the properties has changed, the number of private car transport in the courtyards has increased significantly, some of the previously accessible areas have been built over, and some are not adequately maintained. Consequently, there is a risk that the green areas necessary for many leisure activities in LHEs could be insufficient [27]. Well-developed green areas are an essential prerequisite for promoting the socialisation of residents, which can be considered within the framework of the 15-minute city concept. In general, large-scale housing estates within the framework of the 15-minute concept are a place for both opportunities provided by a large concentration of residents and generally well-conceived infrastructure within the framework of earlier planning, as well as challenges caused by the change of the social and economic structure since the creation of large-scale residential areas, the life, work and movement of residents changing habits, and the wear and tear of previously built infrastructure.

## Methodology

The methodology for comparing four selected post-war housing neighbourhoods in Riga and Vilnius is founded on simulative mathematical modelling. This approach was chosen because a city, or its part, can be conceptualised as a complex system. According to Siegfried [22], such systems require specific simulative models that enhance our understanding and provide predictive capabilities critical for managing the dynamic nature of cities. Simulative modelling not only aids in comprehension but also reduces research time, can partially replace in situ observations if the model is validated successfully, and helps fill data gaps—such as by simulating inhabitant movement, which is otherwise difficult to capture.

In this study, a mathematical graph-based model was employed. This model type has been pivotal in urban analysis since Hillier's development of the Space Syntax theory [11]. Additional researchers, including Porta and Latora, with their multiple centrality assessment models [18], Batty's advocacy for graph theory as a foundation for the "New Science of Cities" [3], and Sevtsuk's analyses [21], have furthered this approach. Recent work by Cooper and Chiaradia has integrated mathematical graph-based analysis into the GIS environment [5]. The sDNA tool was selected for this analysis due to its versatility and effective GIS integration with the software utilised [6].

In mathematical graph theory, cities are represented as networks. For this analysis, the network comprised street segments based on Open Street Map (OSM) data. Graph theory calculations focused on evaluating the centrality of nodes or segments, with centralities such as closeness (indicating the most accessible areas within varying radii, including pedestrian or 1 km radius, thus highlighting potential urban centres), betweenness (identifying streets with the highest transit flows), street network length within different radii (identifying active social interaction zones), and gravity, which combines network density with closeness. These indicators were calculated in the initial model and used for model validation, correlating Spearman's rho with densities of Points of Interest (POIs, e.g., shops, restaurants, schools, bus stops) density within 400 meters and national census data on inhabitant density within grid 1 km on 1 km.

The study also calculated the multi-functionality of the LHE and assessed the correlation between gravity centralities
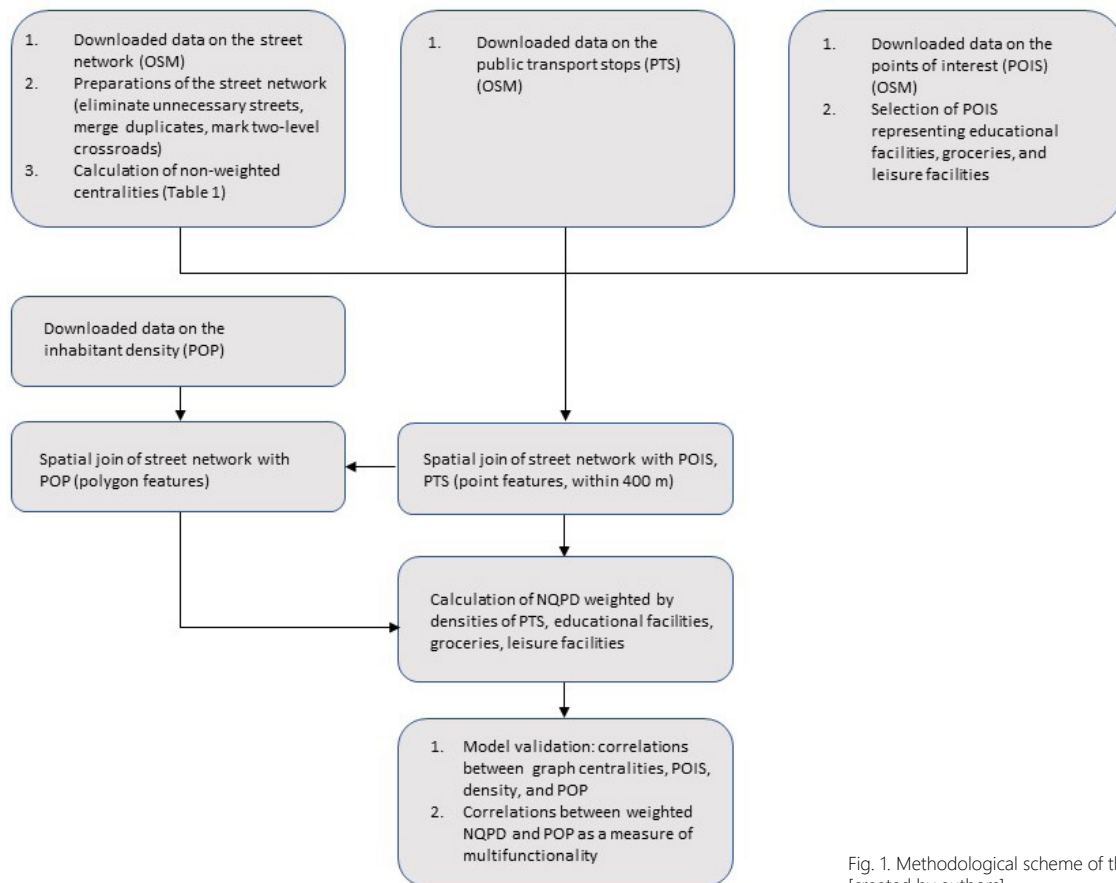
Fig. 1. Methodological scheme of the study [created by authors]

associated with four travel destinations [30]: public transport stops, educational facilities, groceries, and leisure facilities (e.g., restaurants). OSM data allowed for intercity comparability. Gravity centrality calculation enabled a spatial-functional analysis, revealing movement patterns and better reflecting urban functionality in monofunctionally zoned LHE. The Network Quantity Penalized by Distance (NQPD), also known as gravity, was calculated according to the following formula [23], where dM(x,y) denotes the distance between node x (where calculations are centred) and all other nodes y in the graph, W(y) is the weight of each node (equal to 1 for the initial validation of the model and replaced by specific densities for multifunctionality analysis), and P(y)P(y) is the portion of the street segment within the calculation radius, ranging from 0 to 1. In this study, a 1000 m calculation radius was applied, using default values for the degrees nqpdn and nqpdd, both set to 1. Elevated NQPD values (without additional weighting) reveal denser urban zones, indicating potential urban or local centres with heightened precision (Fig.1.).

**Case study areas**

In many major European cities, LHEs constitute a significant part of the housing stock. This trend is particularly pronounced in Central and Eastern European countries, where large-scale industrialization took place in many cities after World War II. The LHE approach made it possible to address the acute housing shortage for the growing number of urban residents. The capitals of Latvia and Lithuania, Riga and Vilnius, are typical examples of this process. Even today, the majority of the population of these cities lives in LHEs built in the second half of the 20th century. Two different LHEs in each city were chosen as case studies for this study. Imanta in Riga and Lazdynai in Vilnius were built at the same time with a similar number of populations. Their initial development concepts accurately illustrate the complex nature of the LHE approach.

Ziepniekkalns LHE in Riga and Žirmūnai LHE in Vilnius are LHEs with the highest population density in their cities, consequently the population demand for services in the defined district area is expected to be the highest.

**Riga** is the capital city of Latvia and an important centre of industry, business, culture, sports, and finance in the Baltic States, as well as a port city. With 605,273 inhabitants (2024), it is the largest city in Latvia. The total area of the city is 307.17 sq. km. To preserve the diversity of Riga's urban environment, emphasising the identity of different parts of the city, thus increasing the sense of belonging of the inhabitants to a certain part of the city, in 2008, the Riga City Council introduced the division into fifty-eight neighbourhoods.

**Imanta** is a neighbourhood of Riga located in the western part of the city. Its total area is 9.00 sq. km, while the large-scale housing estate occupies 3.23 sq. km. In 1967, a detail plan for Imanta development was worked out to provide housing for 60,000 inhabitants, introducing the principle of the micro-district structure. Each micro-district consisted of five to six groups of residential buildings around a central courtyard. The park, enclosed by the boulevard semicircle, was planned as a recreational area. Five micro-districts with local commercial and public centres, as well as kindergartens and schools in each of them, were built. At present, the Imanta neighbourhood is home to more as 42,000 inhabitants (2024), the most significant part of whom reside in the large-scale panel residential buildings.

**Ziepniekkalns** neighbourhood is located at the southern boundary of the city. The total area of it is 10.92 sq. km. A significant part of the neighbourhood area is occupied by detached housing, while 0.85 sq. km is under the development of one of the LHEs of Riga. The detail plan for constructing a large-scale housing estate was developed in 1972 and reworked in 1987. Four micro-districts were designed, including a public and shopping centre and park

area, but only two were constructed. At present Ziepniekkalns neighbourhood is home to more than 29 000 inhabitants (2024), a significant part of them in the large-scale housing estate.

**Vilnius** is the capital and the largest city in Lithuania and the second-most-populated city in the Baltic states, with a population of 605,270 (2024). Vilnius area covers 401.00 sq. km, of which one-fifth is developed; the other area is greenspace and water. The city is known as one of Europe's greenest capital cities. The present city area consists of 21 neighbourhoods. Neighbourhoods around the Old Town (Antakalnis, Žirmūnai, Naujamiestis, and Žvėrynas) have a variety of apartments and green space, while more distant neighbourhoods (Lazdynai, Karoliniškės, Viršuliškės, Šeškinė, Justiniškės, Pašilaičiai, Fabijoniškės and Naujininkai), incorporate more affordable housing.

**Žirmūnai** is the most populated neighbourhood in Vilnius. Its area reaches a size of 5.70 sq. km. The area was named during the early 1960s when it became the site of an award-winning residential construction project; it was the first large-scale housing estate in Lithuania. Designed in 1962, the estate consisted of three micro-districts – residential and industrial sections centred around public facilities. The new residential housing in the micro-districts consisted almost exclusively of five-story prefabricated concrete block apartment buildings, with some higher buildings constructed later. At present, Žirmūnai neighbourhood is home to about 43,000 inhabitants. Lazdynai is a neighbourhood of Vilnius, situated on the right bank of the Neris River. It covers an area of 9.90 sq. km and has a population of about 30,945 (2021).

The LHE in **Lazdynai** was constructed based on studies of experience in developing large-scale housing estates in Finland. The project was recognised by awarding the Lenin Prize to the authors of the urban development project. For the first time in Lithuanian urban design practice, Lazdynai represents a large residential district built far from the city centre, where a completely new block configuration was tested. The construction works started in 1969, and the last buildings were erected in 1985. A system of four micro-districts was created, each connected by a 3.5 km long Architektų Street (which resembles the defensive wall of old Vilnius in both shape and length). The location for Lazdynai was chosen so that residents on the first could conveniently reach the expanding Žemieji Paneriai industrial zone, where many jobs were concentrated. Today, Lazdynai is largely forgotten and is not considered prestigious. At present Lazdynai neighbourhood is home to about 31,000 inhabitants.

**Results and Findings**

The following data was obtained for the modelling and comparison of the four neighbourhoods:

- central lines of streets in both Riga and Vilnius from the OpenStreetMap (OSM) are used as background data for mathematical simulative modelling while constructing mathematical graph models from interconnected street segments.
- data on the points of interest (POIS) from OSM was used for two purposes: validating the initial model and identifying specific travel destinations, such as groceries, schools, etc., for more precise modelling and analysis of multifunctionality.
- open data on inhabitants' density was downloaded from Geostat [9]. It was used for both: validation of the initial model and analysis of the multifunctionality of the territories.
- specific categories of travel destinations were identified while using POIS from OSM:

- **groceries** as 'bakery', 'butcher', 'convenience', 'department_store', 'greengrocer', 'market_place', 'supermarket',
- **leisure objects** such as 'bar', 'biergarten', 'cafe', 'cinema', 'fast_food', 'food_court', 'nightclub', 'pub', 'restaurant', 'sports_centre', 'swimming_pool', 'theatre',
- **educational objects** as 'college', 'kindergarten', 'school'.

Densities of those objects, together with public transport stops within a radius of 400 meters as an optimal urban resolution grid which is not sensitive to some big buildings and corresponds to 5 minutes of walking time, were used as weights while calculating NQPD and making multifunctionality analysis.

During the first stage of analysis, the Space syntax models with usage just of the street network without any additional weights were prepared for both Riga and Vilnius. Besides NQPD calculations, the other space syntax indicators were identified within radius 1000, 5000, and 11000 (unlimited radius):

- Mean Euclidean distance (MED) and mean angular distance (MAD) distance which simply represents a sum of distances from each street segment to all the other segments counted either in metres or degrees of turns taken at turns. The idea behind the usage of metric and angular distance is that people, while walking, can feel metric distance better and for drivers (radiuses 5000 and 11000) number of turns becomes more important. MED and MAD show the most reachable zones within the network just without consideration of the density of the street network as NQPD does.
- BtE and BtA as metric and angular between which represents simple transit flows while simulating movement of inhabitants from every street segment to all the other segments in the shortest route.
- Len1000 or length of street network within a radius 1000 metres which represents more dense networks of streets.

This syntactic model was validated while calculating correlations between the above-mentioned graph centralities and densities of POIS and inhabitants. The idea behind validations is the following: the most reachable, dens, transit attractive zones in the model should demonstrate either positive or negative correlations with both densities as a reflection of natural attraction for inhabitants and various functions of certain places because of configurations of street network or city plan if the simulative model is "working".

The obtained correlations are presented in Table 1. It could be concluded that in both cities, the space syntax model reflects real urban processes. Very strong significant correlations are observed in Riga between POIS, inhabitants' density (POP), and NQPD1000, Len1000; POP and NQPD5000, Len5000. Medium correlations are found in both POIS and BtE1000, etc. If Riga is compared to Vilnius, it could be noted that strong correlations are observed more in higher radiuses and not found in radius 1000. In essence, it could be concluded that Riga demonstrates better suitability of its urban form for the 15-minute city concept while Vilnius is a more car-oriented city. It should also be noted that practically all correlations have 0.01 level significance meaning that the probability that they demonstrate accidental processes is just 1 percent.

After the validation of the model weighted NQPD was calculated as described in the Methodology chapter. The graphical results of the modelling are represented in Figure 2.

If graphical results are compared then, based on the allocation of the high NQPD weighted values represented in red colour in the maps, large-scale housing estates should demonstrate

TABLE 1

Correlations between the density of points (POIS400) of interest within a radius of 400 metres,
inhabitants' density (POP) within 1 km on a 1 km grid, and Space Syntax indicators. All correlations marked by ** have a significance level of 0.01.
Orange colour marks strong and yellow – moderate correlations

| Vilnius | | 15 minutes city or neighborhood level | | | | Neighborhood group level | | | | The whole city level | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MED1000 | NQPDE1000 | BtE1000 | Len1000 | MAD5000 | NQPDA5000 | BtA5000 | Len5000 | MAD11000c | NQPDA11000 | BtA11000c | Len11000c |
| Spearman's rho | pois400 | .230** | .648** | .433** | .635** | .018** | .711** | .321** | .702** | -.204** | .704** | .264** | .713** |
| | POP | .350** | .597** | .435** | .656** | .087** | .805** | .369** | .821** | -.114** | .782** | .299** | .798** |
| **Riga** | | | | | | | | | | | | | |
| | | MED1000c | NQPDE1000c | BtE1000c | Len1000c | MAD5000c | NQPDA5000c | BtA5000c | Len5000c | MAD11000c | NQPDA11000 | BtA11000c | Len11000c |
| Spearman's rho | pois400 | .279** | .717** | .584** | .757** | -.023** | .685** | .410** | .660** | -.246** | .603** | .311** | .566** |
| | POP | .358** | .728** | .618** | .786** | .007* | .725** | .437** | .705** | -.189** | .642** | .333** | .607** |
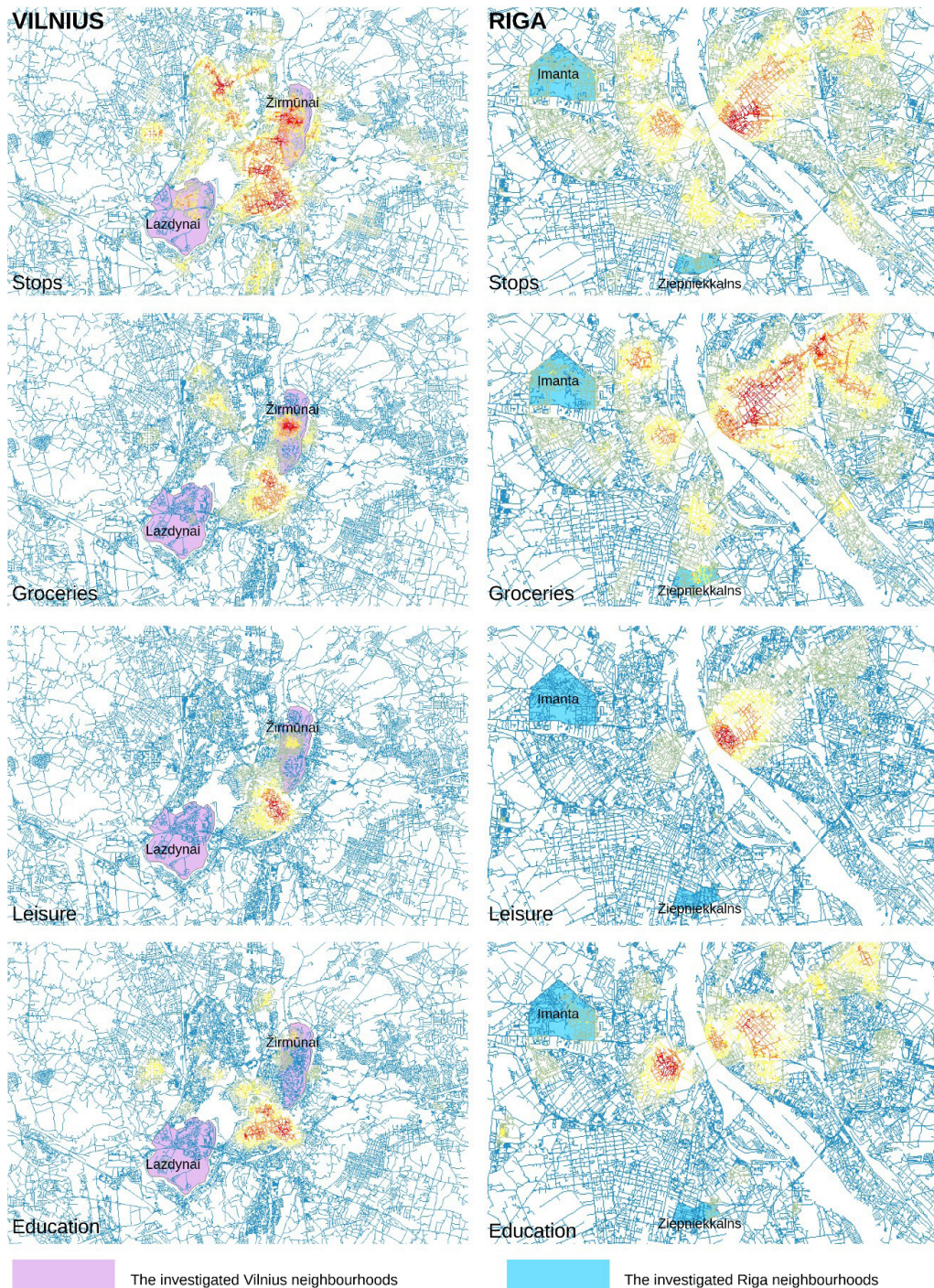


Fig. 2. Network quantity penalised by distance (NQPD) and weighted by the density of stops, groceries, leisure, and educational objects within a radius of 400 metres. Red represents the biggest values, and blue represents the lowest [created by authors]

TABLE 2

Multifunctionality as correlations between NQPD weighted by four types of travel destinations and inhabitant density.
All correlations have a significance level of 0.01. Orange colour marks strong and yellow – moderate correlations

**Lazdynai**

|  | Education | Leisure | Groceries | Stops | Pop |
|---|---|---|---|---|---|
| Education |  | -0.35 | -0.347 | -0.291 | -0.217 |
| Leisure | -0.35 |  | 0.918 | 0.887 | 0.716 |
| Groceries | -0.347 | 0.918 |  | 0.799 | 0.781 |
| Stops | -0.291 | 0.887 | 0.799 |  | 0.656 |
| Pop | -0.32 | 0.936 | 0.89 | 0.922 |  |

**Ziepniekkalns**

|  | Education | Leisure | Groceries | Stops | Pop |
|---|---|---|---|---|---|
| Education |  | 0.054 | 0.573 | 0.37 | -0.211 |
| Leisure | 0.054 |  | 0.787 |  | 0.543 |
| Groceries | 0.573 | 0.787 |  | 0.902 | 0.388 |
| Stops | 0.37 | 0.83 | 0.902 |  | 0.383 |
| Pop | 0.037 | 0.839 | 0.741 | 0.825 |  |

**Žirmūnai**

|  | Education | Leisure | Groceries | Stops | Pop |
|---|---|---|---|---|---|
| Education |  | 0.274 | 0.202 | 0.265 | -0.503 |
| Leisure | 0.274 |  | 0.929 | 0.817 | -0.474 |
| Groceries | 0.202 | 0.929 |  | 0.74 | -0.337 |
| Stops | 0.265 | 0.817 | 0.74 |  | -0.274 |
| Pop | -0.074 | 0.569 | 0.655 | 0.775 |  |

**Imanta**

|  | Education | Leisure | Groceries | Stops | Pop |
|---|---|---|---|---|---|
| Education |  | 0.191 | -0.134 | 0.338 | -0.541 |
| Leisure | 0.191 |  | 0.598 | 0.902 | -0.199 |
| Groceries | -0.134 | 0.598 |  | 0.506 | 0.375 |
| Stops | 0.338 | 0.902 | 0.506 |  | -0.372 |
| Pop | -0.029 | 0.524 | 0.793 | 0.426 |  |

lower multifunctionalities if compared to historical and central parts of both cities. Such a result is not unexpected, so the next question is how much these multi-functionalities are lower, and do they differ between compared modernistic neighbourhoods?

To make a precise multi-functionality comparison Spearman's rho between weighted NQPD values and POP within a radius of 1000 metres was calculated in the four neighbourhoods. The results can be seen in Table 2.

A stronger correlation between weighted NQPD (e.g., public transport stops and groceries or POP and educational objects, etc.) means that densities of those objects and gravity or attraction fields around them created by street networks, overlap more, thus meaning more multifunctional urban structure. A commonly seen tendency is that there are concentrated clusters of groceries and leisure objects and stops with educational objects set apart in all four neighbourhoods. Negative correlations between educational objects and the rest of travel destinations make this segregation even stronger. Allocation of people far away from groceries, leisure, education, and stops differs in each neighbourhood, as can be observed in Table 2: the strongest negative correlations are seen in Žirmūnai, positive moderate or even strong collections are observed in Lazdynai and Imanta.

To clarify how those LHE look within the whole city concept, additional analysis was conducted while taking each weighted NQPD1000 value and counting its average correlation value with all the other NQPD1000 values. As a result, we can see a slightly more generalised picture where it is possible to clearly state that, e.g.: education objects, in essence, have worth or better correlations with other objects, etc. The comparison is presented in Figure 2 with the whole Riga and Vilnius data included.

Based on the comparison presented in Figure 3, it could be concluded that in terms of multifunctionality within radius 1000, Riga represents higher and better mean values than Vilnius. Ziepniekkalns demonstrates the best results, Imanta the worst except for the allocation of education establishments far away from the other indicators. The differences and similarities between the analysed case studies are quite clear, with the remark that the presented pilot research is based on open data from OSM, which is not always reliable as some of the objects could be not marked there or some earlier marked objects could already be not functional. In this case, the presented results are more important to demonstrate the possibilities of the proposed methodology and if applied to real urban planning, it should be based on more reliable data obtained from national agencies or registry centres, etc.

The presented multi-functionality analysis, which is based on the calculation of correlations of different groups of travel destinations within a radius of 1000 metres, says nothing about densities of destinations, street network, or even inhabitants as good correlation could be achieved based on the proper allocation of the actual objects even within lower densities. To compare the neighbourhoods in those terms, the mean values of various NQPD were calculated and compared with bigger values meaning that there are bigger densities of the named objects accessible within 1000 based on the street network. The results of the comparison are presented in Figure 4.

As follows from the study, street network density is similar to or even higher in the investigated areas than the mean values of the whole city. The results would possibly be different if a comparison were made just with historical areas, but it still demonstrates that the situation is not the worst in terms of



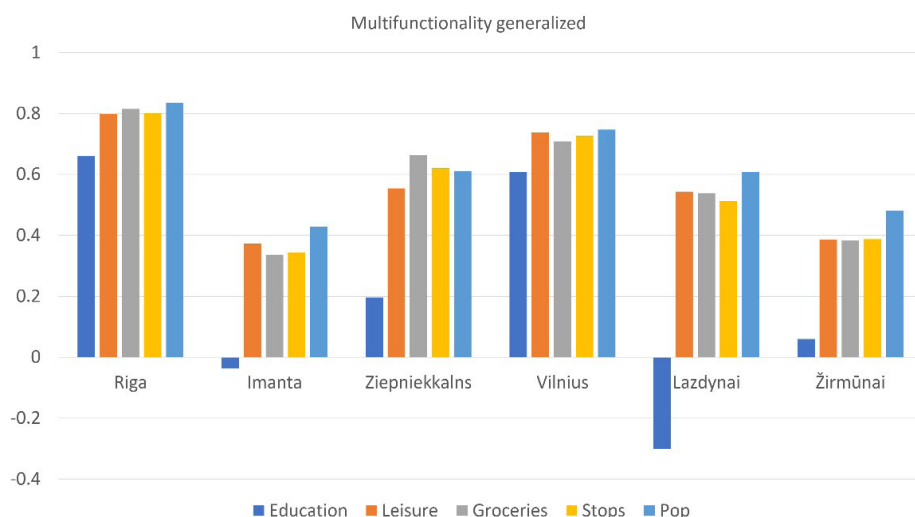Multifunctionality generalized

Fig. 3. Generalized multifunctionality indicators as average correlations between NQPD weighted by four types of travel destinations and inhabitant density
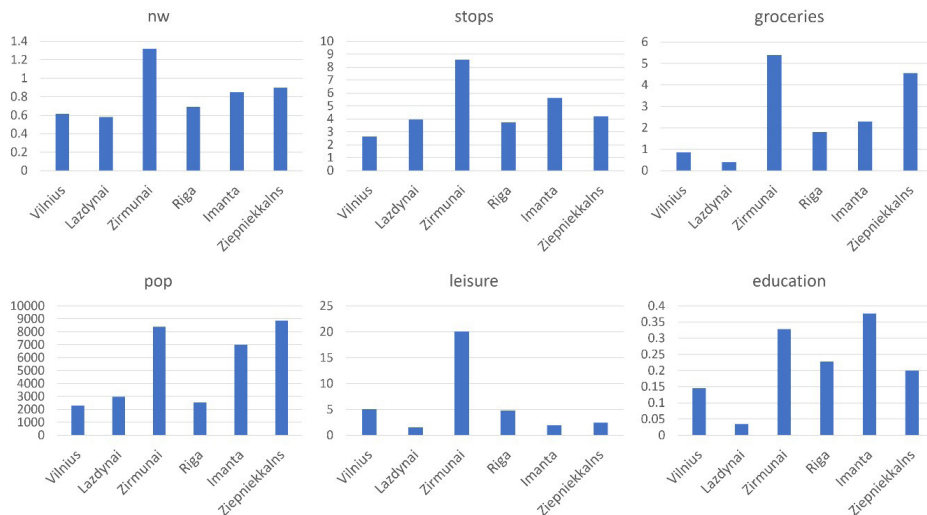
Fig. 4. Average values of NQPD of not weighted (nw), weighted by four types of destinations and inhabitant density within 1 km radius [created by authors]

street network thinning. Education density demonstrates different situations in different neighbourhoods, from very low in Lazdynai in Vilnius to high in Imanta in Riga – again, such a conclusion should be treated with care as the results are based just on OSM. The present number of public transport stops is not insufficient in all four areas. The densities of other objects vary and demonstrate quite good results in Imanta (education), Žitmūnai, and Ziepniekkalns (groceries). If compared to multifunctionality analysis results, which in terms of education (Figure 3) were not good for Imanta, it might mean that simply schools or kindergartens are located not in the most accessible spots. At the same time, it might give a clue for the adaptation of the LHE for the 15-minute city - one of the keys here could be not an increase in the number of objects but positioning them in the „right" urban spots.

### Discussion

The 15-minute City concept focuses on the sustainability of cities and neighbourhoods by providing people with access to primary services – education, healthcare, shopping, recreation, etc. – within a 15-minute walk or bike ride from their homes [1; 16; 17; 28]. LHEs, on the other hand, were created with a primary focus on providing housing for a growing population [26; 27; 29]. Although their concept also included the creation of infrastructure for primary services, they usually prioritised high-density housing. As in many cities, still, a significant part of the population resides in LHEs, the shift towards creating a more diverse, human-centred mixed-use environment responds to the up-to-date urban regeneration interventions where pedestrian-friendly and cyclist-friendly infrastructure is prioritised while reducing reliance on cars [2; 4; 14; 17; 20]. It should become the new paradigm where various activities – residential, commercial, educational and recreational – are integrated and well-connected close to residences.

In this study, the 15-minute City concept was compared with the spatial environment of LHE in the neighbourhoods of the capitals of Lithuania and Latvia – Vilnius and Riga, where the distribution of the most frequently needed primary service facilities — public transport stops, groceries, leisure enterprises and educational institutions – was evaluated. Each LHE was found to have a relatively unique overview, the components of which could be accurately assessed by equating these neighbourhoods to the 15-minute City concept. In all studied LHEs, the average population density within 1 km was higher than the averages in both cities, thus confirming the fact that a large part of the population

still lives in these areas. The density of other indicators was different from case to case. They even exceeded mean values, demonstrating that LHE might have a critical mass of objects needed for the 15-minute City concept implementation within the Riga and Vilnius neighbourhoods.

Despite the similarities between the LHE and 15-minute City concepts in proximity-based planning, the LHE situation in both cities showed lower multifunctionality than the city-wide average values. It encourages daily migration from the neighbourhood to the neighbourhood or city centre for various services that are not available nearby, or the range or quality of choice is insufficient. Due to the long distances between attractions and climatic conditions, people often prefer private cars or public transport to walking or cycling. Thus, the expansion of the services offered in the immediate vicinity can positively affect the perception and evaluation of the LHE environment [7; 8; 17; 28]. Therefore, the regeneration of the urban environment in LHE should aim not only at expanding the service offer but also at attracting new active residents of different ages; otherwise, there is a risk that they may turn into residential areas for the elderly [7; 12; 24; 31] or social assistance recipients, resulting in a deterioration of the quality of the social climate and LHE. The needs of new residents, both in the layout of apartments and in the quality of outdoor spaces, may differ from those living longer [19; 20]; this topic leaves room for further research.

Although the case study areas discussed are typical examples of LHE in Vilnius and Riga, a more comprehensive overview can be obtained after more extensive data analysis in other neighbourhoods. The study reveals that, despite the common planning approach of unifying large housing areas, quite significant differences have been found in the location of stops, groceries and rest areas and the multi-functionality of the facilities. The results can be used to create individual strategies for adapting the 15-minute City in each neighbourhood.

### Conclusions

The 15-minute city concept, in contrast to LHE that were designed with a primary focus on providing housing for a growing population, focuses on the sustainability of cities and neighbourhoods, ensuring that people have access to basic services, including education, healthcare, shopping, recreation, etc., within a 15-minute walk or bike ride from their homes. Each post-war LHE has a relatively unique overall picture, the components of which can be accurately assessed by comparing these neighbourhoods with the 15-minute city concept.

The spatial syntactic model reflects real urban processes. The proven methodology allows for a reliable overall picture, and when applied to real urban planning, it should be based on verified data obtained from government agencies or registry centres, etc. Regardless of the initial urban design and subsequent development, LHEs have lower multifunctionality compared to the historical and central parts of cities. Each LHE demonstrates both certain similarities caused by the same basic model of post-war era urbanism and significant differences at the same time. Such diversity of the analysis results supports the idea that the 15-minute city model could function in the LHE.

Lower multifunctionality compared to the city's average values encourages daily migration from one neighbourhood to another or to the city centre to receive various services that are not available nearby or that are of insufficient choice or quality. Due to the long distances between attractions and climatic conditions, people often prefer private cars or public transport to walking or cycling. Thus, expanding the range of services offered nearby can have a positive impact on the perception and assessment of the local environment.

As in many cities, a significant proportion of the population still lives in LHEs, the transition to a more diverse, people-oriented mixed-use environment responds to contemporary urban renewal interventions that prioritise pedestrian- and cyclist-friendly infrastructure while reducing car dependency. It should become a new paradigm in which different activities – residential, commercial, educational and recreational – are integrated and well-connected close to places of residence.

Urban regeneration is not limited to the expansion of service provision; it also entails the attraction of new active residents across different age groups. In the absence of such a balance, there is a risk of LHE becoming predominantly inhabited by the elderly population or recipients of social assistance; a process that may contribute to the deterioration of the social climate and undermine the quality of local health care facilities.

Future studies focused on a broader set of LHEs and city cases will deepen understanding of the challenges and solutions related to implementing the 15-minute city model, thereby offering a foundation for strategies that promote a more liveable urban environment.

## Acknowledgements

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## Kopsavilkums

"15 minūšu pilsētas" koncepcija attīsta ilgtspējīgas mobilitātes paradigmu pilsētu centrālo apkaimju kontekstā un nosaka skaidrus plānošanas parametrus. Tā kā daudzās pilsētās lielākā daļa iedzīvotāju dzīvo ārpus pilsētas centra, ilgtspējīgas pilsētas attīstībai nepieciešama šīs koncepcijas pielāgošana arī citām pilsētvides situācijām. Lielmēroga dzīvojamie rajoni ir mājvieta ievērojamai iedzīvotāju daļai daudzās Eiropas pilsētās, īpaši Austrumeiropā un Ziemeļeiropā. Šie rajoni tika plānoti, balstoties uz ideju, ka apkaimei jābūt funkcionālai vienībai, kas nodrošina gan dzīvošanu, gan būtiskākās ikdienas vajadzības gājiena attālumā. Lai gan politiskais, sociālais un ekonomiskais konteksts kopš 20. gadsimta vidus, kad tika izstrādāta šī koncepcija, ir būtiski mainījies, lielmēroga dzīvojamo rajonu fiziskā vide lielā mērā ir saglabājusi sākotnējās pilsētbūvnieciskās idejas pamatprincipus. Pētījuma mērķis ir izpētīt lielo dzīvojamo rajonu daudzfunkcionalitāti un novērtēt korelāciju starp "smaguma centriem", kas saistīti ar četrām pārvietošanās galamērķu grupām — sabiedriskā transporta pieturām, pārtikas veikaliem, atpūtas zonām un izglītības iestādēm. Pētījumā analizēti četri lielmēroga dzīvojamie rajoni divās pilsētās - Rīgā un Viļņā - vērtējot to pakalpojumu pieejamību un daudzveidību iedzīvotāju blīvuma kontekstā. Metodoloģija balstīta uz simulācijas matemātisko modelēšanu. Gravitācijas centralitātes aprēķins ļāva veikt telpiski funkcionālu analīzi, atklājot pārvietošanās modeļus un precīzāk raksturojot pilsētas funkcionālo struktūru monofunkcionāli zonētos lielmēroga dzīvojamajos rajonos. Galvenie rezultāti apstiprina, ka visos analizētajos dzīvojamos rajonos vidējais iedzīvotāju blīvums 1 km rādiusā bija augstāks nekā vidējais rādītājs abās pilsētās. Citi rādītāji atšķīrās katrā gadījumā, dažkārt pat pārsniedzot vidējos lielumus, kas liecina, ka pēckara perioda lielie dzīvojamie rajoni varētu nodrošināt nepieciešamo objektu kritisko masu "15 minūšu pilsētas" koncepcijas īstenošanai Rīgas un Viļņas apkaimēs.

# SOUND STUDIES OF THE ARCHITECTURAL ENVIRONMENT: URBAN SOUNDSCAPE AND SOUND SEMANTICS

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**Abstract. The article is dedicated to a new field for Ukraine – the acoustic study of the architectural environment, the semantics of sound, and the impact of sound signals on human behavior in urban spaces. The concept of the soundscape, introduced into scientific discourse in the 1970s by R. Murray Schafer and his followers, is explored. They laid the foundation for and initiated acoustic studies of cities in the context of their auditory pollution. The methodology for studying the urban soundscape developed by them became the basis for contemporary practical work and was tested by students of the National Academy of Fine Arts and Architecture (Kyiv, Ukraine). Their task involved recording changes in the soundscape according to different types of urban spaces and observing human behavior under the influence of sound signals. All research results were visualized on graphic sound maps. The role of sound in perceiving the architectural space of a city is defined in comparison to the significance of sound in cinema. It is noted that, as in cinema, sound in the urban architectural environment has its own functions: illustration; contrast or counterpoint to the visual sequence; communication; synchronization; structuralization. As in films, sounds can emphasize events (e.g., the sound of a theatrical celebration in a city square), maintain tension in transitional spaces (e.g., the sound of a traffic light), warn of danger, obstacles, or threats (e.g., the sound of a siren), act as a dominant element indicating direction (e.g., a clock on a town hall), convey the novelty of a space or its mystery (e.g., unclear, atypical sounds for a given soundscape), and so on. Based on this, it is hypothesized that the architectural environment can be modeled by programming impressions of its perception and influencing people's behavior within it. Sound is one of the most powerful tools for shaping the perception of architectural space, and sound compositions become an essential component of the sound environment of a modern city, requiring further research and the development of principles for urban sound design. The authors note that the study of the semantics of sound in general and sound signals in particular, as well as their influence on human behavior, is not yet complete but holds great promise for further development of such research on the architectural environment of cities, particularly in Ukraine.
Keywords: architectural environment, soundscape, sound design, sound semantics, sound signal**

## Introduction

Since the mid-15th century, thanks to Johannes Gutenberg's invention, it became possible to mass-produce and distribute images in any quantity across vast territories. This marked the beginning of the formation of visual culture, with visuality becoming dominant in the perception of the surrounding environment. Visual images not only permeated everyday life but also began to displace other ways of perceiving the world—sounds, smells, and tastes.

It is believed that humans perceive 70-80 % of information about the surrounding world through their eyes, which is why most studies on the architectural environment of cities focus on its visual perception. It should be noted that perception largely depends on the cultural frameworks established within a particular society. Today, this is the so-called e-culture – a digital culture shaped by the influence of cinema and new media. The main feature of this culture is its spectacle-oriented nature, which means that the relationship with the environment is primarily based on visuality and cinematic principles. This legitimizes the study of urban environments using methods developed in cinema, as evidenced by prior research by scientists, including Olena Troshkina [6; 7; 18; 25], as well as Luidmyla Shevchenko and Natalia Novoselchuk [17] – the authors of this article.

However, comparisons between the perception of urban architectural spaces and film frames usually focus exclusively on imagery and rarely consider sound, smell, tactility, or other sensory experiences. It is clear that films are not just moving images, where the movement of the camera simulates the viewer's eye movement—they are a complex of elements that ensure the "realness" of the cinematic environment on screen, aligning with the audience's everyday experiences in real settings. The most crucial component here is the film's sound accompaniment. Therefore, our studies of cities should be not only visual but also auditory.

This highlights the urgent need to study the role of sound in urban spaces, not only from the perspective of acoustics and ecology but also in exploring how sound can influence a person's perception of urban environments. This requires defining the principles, techniques, and tools of urban sound design, which can only be achieved after a thorough examination of its semantic foundation.

The aim of this article is to analyze existing auditory methods for studying the architectural environment of the city, to identify the symbolic nature of sound, and to examine the influence of sound-signs on the perception of urban space and, consequently, on human behavior.

## Materials and Methods

Over the past two decades, studies dedicated to sensory perception – such as sound, smell, taste, and touch – have emerged in the global scientific field. While not all of them may currently be applicable to the analysis of the architectural environment (at least, as far as is known today), sound studies have been widely practiced internationally since the 1960s. This initially occurred within the framework of acoustic ecology, a field founded by Canadian composer and researcher Raymond Murray Schafer (1933-2021). Schafer aimed to teach people how to listen and sought to restore auditory culture, which had been gradually displaced by visual culture.

R. Murray Schafer introduced the term "soundscape" into scientific discourse – a composition of sounds perceived by individuals in their surrounding environment. A soundscape

is a landscape whose sounds create a "sound picture," through which one can determine the form, state, dynamics, and other properties of natural landscape components and predict their impact on living organisms and their individual development [21].

Together with his students, Schafer studied urban sounds and emphasized the need to revive the practice of listening, which had been diminished by the dominance of visual culture over the past centuries. According to Schafer, modern humans, due to the primacy of visuality, are aurally illiterate. They have developed an auditory immunity that simply blocks out excessive sound information, leaving them defenseless in an auditory sense. This is especially evident in urban environments, where the cacophony of technical sounds, sirens, advertisements, and other noise is so overwhelming that people stop actively listening as a survival mechanism – learning to filter out sounds and subconsciously transferring them into a "safe" zone.

Schafer points out that, unlike a visual image, one can't simply look away, close their eyes, or avoid what they dislike. Sound, however, permeates the environment entirely. Even if it is unpleasant, we cannot ignore it or "close" our ears [21]. A person cannot always choose what to listen to and does not necessarily interpret the meanings of sounds in the same way as others.

In his book "The Soundscape: Our Sonic Environment and the Tuning of the World", Schafer practically demonstrated the evolution of soundscapes associated with the Industrial Revolution. He traced this progression, starting from the sound of the first typewriter (1714) and cast-iron railways (1738) to the hydraulic press (1794) and the screw-cutting lathe (1797) – and this was just in the 18th century! Schafer also highlighted the influence of rural, industrial, and electronic environments on the formation of soundscapes [21].

The scientific works of the composer and researcher R. Murray Schafer became a catalyst for other sound studies, not only within the realm of urban acoustic ecology and the fight against noise pollution but also in anthropology and sociology. In these fields, sound is examined beyond its physical characteristics – such as pitch, duration, tone, timbre, frequency, and volume – taking into account its broader meanings.

It is worth noting that Schafer's research was conducted in the 1960s, while the global emergence of sound studies began only about 20 years ago. In Ukraine, however, scientific works on this topic are still rare and are mostly limited to the fields of acoustics and geography. For example, the article by V. S. Kanskiy and V. V. Kanska focuses on concepts and approaches to the classification of soundscapes within the study of anthropogenic landscapes [2]. Another notable work is by O. Z. Baiteryakov, who applied a geographical approach to the study of urban soundscapes. In his article, he proposed a "structural-logical model of the urban soundscape, which allows for a systematic understanding of the subject of study. The model consists of four main components: the prerequisites for the formation of the soundscape, its functional structure, as well as the typological structure and the peculiarities of human perception of the sound environment" [1].

Architectural acoustics is perhaps the only discipline within the training system of architects that directly deals with sound. Its foundation lies in the diverse abilities of surfaces and materials to reflect or absorb sound. Previously, acoustics was considered particularly significant for entertainment buildings and, in general, for spaces with auditoriums or conference halls. However, today, the understanding of the importance of acoustic characteristics in various spaces has significantly expanded.

In this regard, it is worth mentioning the dissertation research of K.O. Komarov, "Principles of Architectural Organization of Internal Transit Spaces Considering the Features of Non-Visual Perception" [3], where the researcher examines the principles, techniques, and tools that "create tactile, auditory, thermal, and aromatic markers in the internal spaces of buildings, which can be regarded as navigational elements of the spatial environment to improve orientation for the visually impaired" [3, p. 23]. These elements can also be used for sound modeling of both interior and exterior spaces, i.e., for the sound design of the architectural environment. The researcher concludes that impressions of a space and orientation within it can be modeled by altering surfaces and influencing their tactile and auditory characteristics.

Thus, every space has its unique sound. As in the past, when music was composed for specific places such as temples, palaces, salons, and parks, today composers create music tailored to particular locations. Supporting this claim is the popularity of contemporary soundscape composers like Michael Rüsenberg, who released an album featuring recordings of Cologne's bridges and the sounds of Rome, or Brian Eno, the pioneer of the Ambient style (from the English word "environment"), whose music for various spaces – most famously music for Airports [16] – has gained widespread acclaim.

As for the study of sound semantics, aside from a certain number of academic works in the fields of music and linguistics – such as A.M. Kondratov's "Sounds and Signs" (1978) – as well as research into the human vocal system, it is worth highlighting the work of researchers from the renowned semiotic school led by Yuri Lotman, which operated in Tartu, Estonia, during the 1960s-1980s. Many studies by members of this school were dedicated to the semiotics of cinema, and consequently, sound within it, but they did not address the architectural environment [5].

As mentioned earlier, methods for studying the soundscape of a city were developed by R.M. Schafer in collaboration with his students. The study of a soundscape in any given area can be conducted by a researcher-observer who may either remain stationary or move through the space. Their task is to document all the sounds they hear in accordance with the typological features of the locality and identify the following characteristics:

- Moments when elements of the sound background transition into the sound focus, determined by intersections along the listener's route (paths, boundaries, nodes, landmarks with static and dynamic elements of the soundscape—background sounds, ignored and recognized signals, etc.);
- Differentiation of soundscape elements based on their source, origin (natural or mechanical), and types of sounds, both predictable and manageable.

Thanks to the availability of audio recording technology and the ability to measure sound using applications installed on smartphones, soundscape studies have not only advanced since Schafer's time but have also become an accessible and engaging practice for students. For instance, students of the National Academy of Fine Arts and Architecture, during their studies in courses such as "Fundamentals of Urban Planning" and "Urbanism," tested Schafer's methodology over the course of one semester.

The group was divided into subgroups of 2-3 students, with each team assigned a unique route. All routes started from the academy's campus and extended to various locations

in Kyiv, including residential streets, squares, public centers, and major transportation corridors. In addition to the primary task – observing and documenting changes in the soundscape in accordance with the changes in land use – students monitored human behavior under the influence of auditory signals. These signals were identified as sound signs that act as stimuli for certain behaviors.

The results of the observations were compiled into albums, which effectively served as graphic sound maps of the routes. These maps allowed for the acoustic zoning of the studied areas, enabling the identification of acoustically problematic and acoustically appealing spots. Such findings could inspire professionals from various fields, particularly architects and designers, to improve or adjust the architectural environment and its soundscape.

Thus, this experience became one of the first attempts in Ukraine to study the architectural environment of a city through sound, to define the role of sound in its perception, and to reveal its semantic nature and influence on human behavior.

### General regulations

When studying the physical properties of sounds (volume, speed, pitch) in the soundscape of urban areas, R. Schafer identified three types: background sounds or "keynotes", primary sounds or "sound signals", and the most distinctive sounds or "soundmarks" [21]. Essentially, this classification aligns with the categorization of sounds by their informativeness: background sounds, dominant sounds, and unique sounds.

It is evident that every area contains all these types of sounds, but their intensity, speed, pitch, and duration vary. This variability forms the basis for identifying territories by their prevailing sounds and creating their sound maps.

As noted by Kansky V.S. and Kanska V.V., the first attempts to represent the sound component of a landscape using cartographic methods were made by Finnish geographer J. Granö in 1929. He developed a qualitative classification of acoustic phenomena and attempted to document them cartographically [2]. The global spread of such studies is primarily linked to two factors: the growing noise pollution in cities, which needs to be addressed through systematic study, and the availability of sound recording equipment, which enabled the creation of sound maps for urban areas.

Sound maps allow for the acoustic zoning of a city's territory, thereby identifying acoustically problematic and acoustically attractive locations. Without a doubt, such psychoacoustic maps of urban spaces should serve as a stimulus for professionals from various fields – primarily architects and designers – to improve or adjust the architectural environment and its soundscape.

Sound maps of cities reveal that each district has its unique soundscape, which influences the sense of territoriality and self-identity of its residents. The practice of creating sound maps has highlighted a pathway for identifying vernacular districts – areas that "are distinguished based on the analysis of their perception by the population (local residents, tourists, residents from other regions)" [4].

Sound studies of urban architectural environments conducted in Europe have confirmed that the boundaries of actual districts sometimes differ significantly from those perceived by people under auditory influence [10; 26]. At the juncture of sound and silence, a sound barrier often emerges – a powerful, symbolic protection of these boundaries that is not always physical but perceptual.

For example, auditory studies of areas near the National Academy of Fine Arts and Architecture (NAFAA) in Kyiv, conducted by its students, revealed a notable sound barrier at the intersection of Voznesensky Uzviz, Hlybochytska Street, and Nesterivskyi Lane. This barrier symbolically marks the transition from one soundscape (the relatively quiet NAFAA territory) to another (a bustling street with significant vehicular, pedestrian, and bicycle traffic).

The territory of NAFAA is perceived by residents, employees, and students to extend beyond the academy building to the points of these intersections. Consequently, in their minds, this area is much larger than its actual physical boundaries.

Sound maps correlate closely with mental maps, introduced by Kevin Lynch in the 1960s [15]. Urban sound studies allow researchers to highlight transitions in the soundscape – from background to focus – based on intersections along a listener's route (corresponding to Lynch's concepts of paths, edges, nodes, and landmarks) with static and dynamic elements of the soundscape (background, integrated, and recognizable signals).

For instance, the actual boundary of the Solomianskyi district, ending near the high-speed tram tracks and the Povitroflotskyi overpass, does not align with the vernacular boundary of the same district, which is perceived as extending to Ivan Ohienko Street, reaching the railway station. This perception



| Map of Unique Sounds | |
|---|---|
| 1 | Sounds of a foreign language |
| 2 | Bell ringing |
| 5 | Operation of a coffee machine |
| 7 | Construction work |
| 13 | Live music |
| 14 | Live music, metro sounds |
| 16 | Sounds of skateboards, scooters, music from the theater |
| 20 | Sounds of public transport (trolleybuses) |
| 22 | Sounds of a cooling system, trolleybuses |
| 23 | Sounds of children, dogs |
| 24 | Sounds of live music, dogs, children |
| 25 | Sounds of playing chess |
| 26 | Sounds of live music |
| 29 | Music |

Fig.1. Study of unique sounds on the streets of Kyiv [created bu authors]

# Sound



The territory of the city is aurally expanded
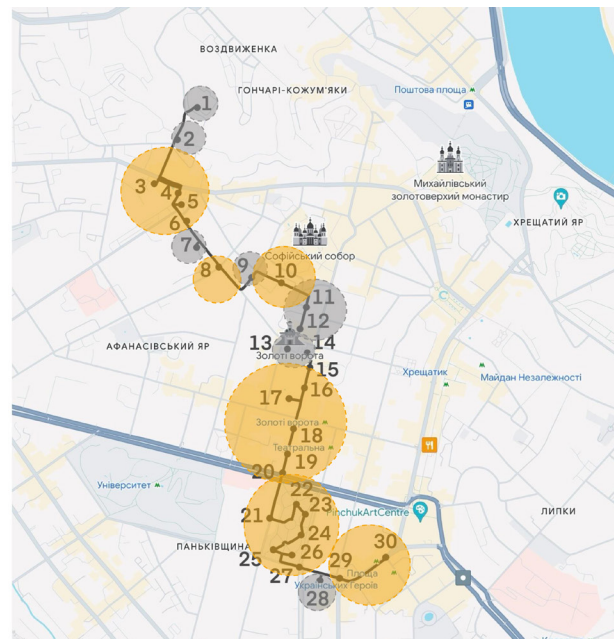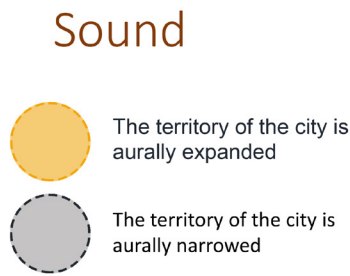
The territory of the city is aurally narrowed

Fig. 2. The influence of sound on the perception of the territory [created by authors]

of a district's territory is shaped by multiple factors, with changes in the soundscape being just one among them – others include the side barriers of the overpass, the railway tracks below, the lack of adjacent spaces to diverge from the main route, and the absence of a visual dominant feature.

Sound can act as a spatial landmark, guiding movement, indicating distance to/from a sound source, and serving as a temporal landmark – for example, the sound of the first tram or train often serves as a precise time signal for nearby residents.

Unlike sound landmarks, background sounds are often unheard or unacknowledged. People have even learned to ignore background noise, regardless of its intensity.

Generally, the intensity of a territory's soundscape depends on two factors: the intensity of the background noise and the frequency of sudden focal elements, as well as the stability of the listener's attention and rhythm. The dynamics and intensity determine the stability of the soundscape. For example, the sound background of Beresteiskyi Avenue in Kyiv remains consistently intense regardless of time, weather, or season (Fig.1).

A number of researchers studying sound within specific areas emphasize the existence of acoustic communities, where sound serves as a medium of relationships between the listener and the surrounding environment. Sound is not merely heard or perceived as noise; it must be distinguished from other sounds and its meaning understood. Scholars often cite examples of distinctive sounds in rural areas – church bells, the evening return of cows from the fields, or the sound of an axe as a neighbor chops wood in their yard. These sounds are uncharacteristic of urban environments. However, the sound of a rarely passing minibus, recognized only by local residents before it even becomes visible, exemplifies this phenomenon. This ability to perceive, distinguish, and understand the sounds specific to a particular area is a hallmark of belonging to an acoustic community [9; 10].

The phenomenon where residents become accustomed to an intense background noise and cease to hear it (e.g., the residents of Beresteiskyi Avenue in Kyiv ignoring its consistently intense soundscape), in contrast to individuals visiting the area for the first time, can also be viewed as a form of membership in an acoustic community.

Sound Studies often explore urban spaces through the lens of their identity and memory. It is believed that sounds intertwine with memories, and recordings of soundscapes can substitute for memory. The collection of associations and symbols that shape a district's identity in the minds of its residents – those who relate to it as their place of residence, work, or leisure – is complemented by a distinctive soundscape. In such communities, locals can not only hear but also distinguish the sounds unique to the area and, most importantly, grasp their meaning [9; 10].

Sound influences both the mastery of space and its appropriation and personalization. Analysis of sound maps demonstrates that sound allows for the personalization of an environment, indicating its ownership or even expanding or reducing its perceived boundaries. For instance, music playing in a café can be heard not only within the venue but also on its outdoor terrace, audibly marking the presence of the establishment and symbolically extending its territory to the reach of the music. However, excessively loud sound within the venue may compel patrons to lean closer during conversations, disrupting their private interpersonal distance. Thus, sound can enforce a shift between different social distances, a concept explored by renowned anthropologist Edward Hall within the framework of proxemics [11] (Fig.2).

Personalization of space can also occur through the suppression or exclusion of inappropriate signals. For example, people may completely ignore street noises by wearing headphones, using other sounds as a filter for the soundscape of their surroundings. Similarly, a car can act as a protective capsule, with its own auditory environment defined by the sound of the car radio.

Sound not only manifests territoriality but also emphasizes the function of urban environments and facilitates the identification of people with space. It delineates contrasts such as external versus internal, familiar versus unfamiliar, center versus periphery, and festive versus mundane.

Territoriality itself corresponds to different types of spaces – primary (full control), secondary (partial control), and public (minimal or no control) – which people perceive, manage, and adapt their behavior accordingly. Sound can also express

territorial aggression when boundaries are breached or unauthorized intrusions occur.

Sound, noise, and silence can be viewed as categories of social inequality. The American sound designer and scholar B. Labelle discusses how different social groups perceive urban sounds differently, emphasizing the need to consider the "acoustic politics of space." In this context, the territorial and sonic boundaries of urban areas do not align but are crucial for understanding an individual's sense of auditory privacy [10]. The researcher highlights the significance of sound in delineating metropolitan spaces into public and private zones, where the latter is often interpreted as a domain of silence. Silence is not merely the absence of sound but also a privilege in urban settings, carrying social significance.

Sound serves as a marker of status and power. R. Murray Schafer noted that a person wielding a jackhammer is more imperialistic and endowed with power than someone with a shovel, and the quieter the neighborhood where one resides – especially in central areas – the higher their social status [21, p.79].

Thus, with the onset of the Industrial Revolution, sound emerged as a territorial marker, particularly evident in contrasting spaces, such as urban versus rural or public versus private. Here, noise and silence are perceived as signs of everyday life, festivity, or privacy.

It is evident that urban sound possesses its own semantic significance and therefore warrants dedicated study, especially considering that psychologists are aware of synesthetic effects – the hidden connection between auditory imagery and non-auditory elements. Consequently, the symbolic nature of sound becomes a subject of inquiry within the semantics of the urban architectural environment. Of particular interest to the authors is the semantics of sound in the context of exploring the cinematic qualities of the urban environment, shaped by the influence of new media.

The soundscapes of films include keynote sounds, sound signals, and sound marks, corresponding to noise, signal-sound, and sign-sound in the semantics of the architectural environment.

It is worth noting that everything that sounds in the city is always contextual. The perception of the environment depends not only on the texture and arrangement of surfaces (facades, roadways, trees, small architectural forms, etc.) that reflect sound, the season, time of day, weather, and so forth, but also on the culturally conditioned expectations of perception – what is expected or customary to hear and what is not. For instance, the Sunday church bell or the sounds of a herd of cows returning home from pasture.

Sound signals (the chime of a town hall clock, church bells, fire truck or ambulance sirens, alarm sounds, mobile phone ringtones, advertising jingles, etc.) are all culturally significant auditory symbols, whose meanings are so familiar that they often go unnoticed. These sound signals are frequently perceived as noise and, alongside actual noise – such as traffic, rustling leaves, or construction sounds – they "go unheard." According to R. Murray Schafer, such sounds necessitate the practice of listening, as all people must cultivate the habit of active auditory perception [21].

By extrapolating research on cinematic sound to the urban architectural environment – which can be designed using cinematic scripting methods, as explored in the scientific works of O. Troshkina [17; 18; 25] – we can trace the similarities in the semantic meanings of sound. For example, the in-depth study of the role of music in films allowed Ukrainian researcher Polina Kharchenko to identify the following

functions of music: illustration, contrast or counterpoint to the visual sequence, communication, synchronization, and structuring of on-screen action [12].

P. Kharchenko writes about musical illustration of on-screen action, where "...movement in the frame is accompanied by corresponding changes in tempo, rhythm, melody, harmony, timbre, and so on" [13], [14]. Auditory illustration of cinematic action can be compared to urban noise and soundscapes when the visual and auditory elements align, forming a cohesive whole. For instance, the noise of a busy highway accompanied by a significant flow of vehicles, or the sound of water trickling from a fountain in a city square or a cascading waterfall in a park.

Counterpoint – the simultaneous combination of multiple melodic lines within a musical composition – can be likened to the leitmotifs of an urban environment's narrative: its pathways and the adjacent spaces linked to them. In this case, the visual and auditory layers of urban spaces do not always coincide due to the presence of overlapping environments with varying sounds. For example, the noise of traffic audible in a city park, blending with birdsong and the rustling of leaves, or the sounds of a festive theatrical performance in a city square carrying over into a quiet residential neighborhood. In such instances, sound often precedes the visual element until one arrives at the square to witness the event in person. Thus, sound in the environment functions as a message-sign, allowing individuals to anticipate upcoming events. It also serves as a unifying and connecting element – linking people to spaces and bridging different spaces themselves. This exemplifies the communicative function of sound.

The fusion of soundscapes with the visual environment either enhances the interaction between all components of the human-sound-environment system – synthesizing and unifying them into a cohesive composition of urban space – or, conversely, grants autonomy to each element. In the latter case, the visual and auditory layers may not align. Sound may precede the visual, creating anticipation for events likely unfolding ahead, encouraging individuals to move forward to discover what lies ahead. Alternatively, by lagging behind the main narrative of the urban composition, sound can compel individuals to deviate from their planned route, explore adjacent spaces, or even turn back.

This autonomy of urban visuality and audibility often highlights sound's contrastiveness – its unfamiliarity within a given soundscape. Any abrupt or unexpected sound stands out in an environment with a consistent auditory background. Moreover, as the researcher, composer, and musician David Toop notes, silence is "... not a neutral void. It is the negative of sound, which we anticipate or imagine, and it is the result of contrast" [23, p. 83]. The alternation of sound and silence – a technique used to heighten dramatic tension in cinema – can thus also be applied to architectural environment design.

Contrast and counterpoint, as in cinema, represent a conflict between the visual and auditory layers. According to David Toop, this conflict amplifies dramaturgy [24].

The synchronizing function of sound manifests in its ability to shape the emotional perception of space and, as P. Kharchenko notes, to create "...additional prerequisites for unfolding the narrative and stimulating further events on screen" [14]. The same applies to the architectural environment, where a sound sign not only evokes emotions but also influences the creation of creation of a suitable background for the main storyline of the urban composition and its other leitmotifs. It unifies all elements of urban architectural scenography – visual images of the territory, enhanced by sound and the

movement of people and objects – with a single emotional tone.

Previously, we discussed how sound can personalize the environment, indicate its identity, expand or contract its perceived boundaries, and contribute to the formation of vernacular neighborhoods. This reveals the structuring function of sound in urban space.

Sound has a beginning, continuation, and end, which cannot be rearranged, as sound develops sequentially, typically in a linear manner. "Sound, unlike vision, inherently implies movement", writes David Toop [23, p. 107]. Thus, sound can also be seen as a driving force behind the narrative of urban composition, encouraging people to move in the direction intended by the author, gradually unfolding – like frame by frame in a film – the scenario of urban space perception. This movement is not only predominantly linear but also rhythmic, as even changes in day and night, weekdays and weekends, or seasons affect the transformation of the urban soundscape.

Sound can act as a stimulus for action, and consequently, for specific behavior within an environment. Research on consumer behavior regulated by background music highlights its impact, such as influencing perceptions of food appeal and subsequently increasing sales [8; 19; 20].

Charles Spence, a professor at the University of Oxford, has dedicated his studies to exploring how music, color, and even the weight of tableware can enhance the taste of food and beverages. In his book "Gastrophysics: The New Science of Eating", Spence argues that people tend to associate specific sounds with specific tastes. For instance, sourness is linked to high-pitched tones, bitterness corresponds to deeper tones, and salty flavors are associated with certain pulsating sounds. Overall, background music can make food taste better. Slow music extends the duration of taste sensations, while lively music causes them to fade more quickly. Using modern technology, Spence conducted experiments showing that music can even replace spices. The more participants enjoyed the music, the tastier they found the food, whereas overly low-pitched sounds made food taste bitter [22].

Thus, consumer psychologists and marketers have demonstrated that environmental cues, including background music, can influence numerous subconscious consumer behaviors, effectively driving higher food and beverage sales. Modeling food choices is now a reality in the competitive struggle for consumers.

It is evident that the background sound of a specific environment encourages habitual actions, whereas unfamiliar sounds in an architectural space can provoke abrupt reactions and behavioral changes. It is also worth noting that sounds originating from anywhere other than directly in front of a person are often perceived as a threat. It is crucial for individuals to see the source of a sound and/or understand its meaning.

Similarly to visual elements, auditory signs semantically shape behavioral patterns, which remain insufficiently studied. David Toop highlights the existence of certain sounds that should be interpreted as public auditory signs capable of both uniting and dividing people, as well as spreading panic [23, p. 146]. Experiencing the reality of nighttime drone attacks on a city, one can assert that the sounds of nearby bomb explosions unite people in a shared state of panic.

Thus, in an urban architectural environment, as in film, sounds can emphasize events (e.g., the sound of a theatrical celebration on a city square), sustain tension in threshold spaces (e.g., the sound of a traffic light), or warn of danger, obstacles, and threats (e.g., the sound of a siren). Sounds can also serve as dominant markers, indicating direction (e.g., the chime of a town hall clock), or convey the novelty or mystery of a space (e.g., unfamiliar, non-characteristic sounds for a given soundscape). Moreover, the same sound in different contexts can symbolize entirely different, sometimes opposing situations. For instance, in peaceful times, the sound of a working generator was perceived as irritating – akin to the noise of a jackhammer that one either had to endure or escape from due to its intolerability. Today, however, this sound in Ukraine is perceived as a sound-signal of rescue, refuge, and safety – ultimately as a sign-symbol of life itself.

The cinematic nature of the city's architectural environment, shaped by the influence of new media and computer interfaces, fully legitimizes its sound design, as it remains within the framework of audiovisuality inherent to contemporary cinematography. Sound fountains, sound sculptures, sound installations, and sound gardens transform the character of public spaces, influencing residents' perceptions and behaviors. Sound art can exert a powerful impact, leading to its widespread presence in urban settings, much like street art, graffiti, street music, and advertising.

## Conclusions

Sound is one of the tools for understanding the city. Although auditory research by architects-urbanists and urban planners is still insufficiently widespread, it demonstrates that urban spaces can be structured, defined, and identified not only through various forms of visuality (material-architectural objects, plan configurations, skyline silhouettes, etc.) but also through sound.

Global sound studies in urban audio ecology, as well as the methods and techniques for sound adjustment, are applicable for examining architectural environments, their semantic meanings, imagery, and the behavior of people – an important component of architectural science. Sound is one of the most powerful tools for influencing the perception of architectural space, while sound artworks have become an essential element of the soundscape in modern cities, necessitating further research and the development of principles for urban sound design.

Thus, the semantics of the architectural environment in contemporary cities is shaped under the influence of digital culture, with its integral components – cinematography and new media – creating new signs and reproducing them within the spaces surrounding individuals. The urban cinematic text affects a person's emotional perception of a place and their behavior within it, provided they know how to interpret and understand it correctly. In turn, an architect must understand the rules of contemporary grammar, morphology, and syntax of architectural language to anticipate and deliberately program impressions. This is why research into the semantics of architecture using cinematic methods should become one of the approaches to studying the architectural environment of cities, with auditory studies taking their rightful place in this process.

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## Kopsavilkums

Raksts ir veltīts jaunam pētniecības virzienam Ukrainā – arhitektoniskās vides akustiskajai izpētei, skaņas semantikai un skaņas signālu ietekmei uz cilvēka uzvedību pilsēttelpā. Tiek analizēta skaņas ainavas koncepcija, ko 20. gadsimta 70. gados zinātniskajā apritē ieviesa R. Marejs Šēfers *(R. Murray Schafer)* un viņa sekotāji. Viņi aizsāka pilsētu akustiskos pētījumus, pievēršot uzmanību to skaņu piesārņojuma problemātikai un ieliekot pamatus mūsdienu akustiskās vides analīzei. Rakstā tiek definēta skaņas nozīme pilsētas arhitektoniskās telpas uztverē, ko salīdzinot ar skaņas funkcijām kino mākslā. Tiek norādīts, ka – līdzīgi kā kino – arī arhitektoniskajā vidē skaņai ir vairākas funkcijas: ilustratīva; kontrastējoša vai pretstatīta vizuālajai ainai; komunikatīva; sinhronizējoša; strukturējoša. Tāpat kā filmā, skaņas pilsētvidē var uzsvērt notikumus (piemēram, svētku trokšņi pilsētas laukumā), uzturēt spriedzi pārejas zonās (piemēram, luksofora skaņa), brīdināt par briesmām, šķēršļiem vai draudiem (piemēram, sirēnas skaņa), norādīt virzienu (piemēram, rātsnama pulksteņa zvanīšana), kā arī radīt telpas jaunuma vai noslēpumainības iespaidu (piemēram, neparasti, konkrētajai skaņu ainavai neraksturīgi trokšņi). Pamatojoties uz šiem novērojumiem, tiek izvirzīta hipotēze, ka arhitektonisko vidi iespējams modelēt, programmējot tās uztveres iespaidus un ietekmējot cilvēku uzvedību tajā. Skaņa ir viens no spēcīgākajiem līdzekļiem arhitektoniskās telpas uztveres veidošanā, un skaņas kompozīcijas kļūst par nozīmīgu mūsdienu pilsētu skaņu vides sastāvdaļu, kas prasa turpmākus pētījumus un skaņas dizaina principu izstrādi pilsētvides plānošanā.

# CONTEXT OF COASTAL LANDSCAPE DEVELOPMENT IN JŪRMALA

## Una Īle, Reičela Ozola

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**Abstract. The study examines the coastal landscape of Jūrmala as a sustainable public outdoor space, ensuring seasonal accessibility and a modern identity in the context of the beach and coastline. The spatial structure of the coastal and beach areas was studied, including the beaches and coastal areas of Bulduri, Dzintari, Majori, Dubulti, Jaundubulti, Pumpuri, Melluži, Asari, Vaivari, and Kaugurciems. Historical information was researched and the coastal and beach area was surveyed in the present day, obtaining an assessment of public outdoor spaces. Based on the data obtained from the research, coastal and beach development measures were created.**
Keywords: coastal landscape space, infrastructure, design

## Introduction

The most iconic feature of Latvia's landscape is its coastline along the Gulf of Riga and the Baltic Sea. Latvia's 496 km coastline is rich in diverse beaches, including high-quality sandy and rocky beaches, as well as coastal meadows and cliffs. The Latvian coast is of unique value. It features unique landscapes, 50% of which are protected areas, as well as 630 state-protected cultural monuments. The most populous coastal cities are Liepāja, Ventspils, Riga and Jūrmala, with the majority of Latvia's population living in these areas [2; 13; 16; 7]. A study found that Riga's proximity to Jūrmala brings economic benefits and stimulates Jūrmala's growth. The Baltic Sea region is a leading destination for resorts, business tourism, active recreation, and cultural centres, offering attractions that attract tourists not only from Latvia, but also from Lithuania, Estonia, and other countries. The Baltic Sea coast is an area of national interest, boasting natural and cultural heritage. It needs to be preserved and its landscape development promoted [3; 7]. Jūrmala has been a popular resort town since the 19th century. In 2013, the entire administrative territory of Jūrmala was granted resort status. Today, Jūrmala is one of the largest resort towns in Latvia [12; 15]. The Baltic Sea coast is one of the most attractive destinations, and coastal and sea tourism is one of the fastest-growing sectors. Currently, four tourism models dominate: attractions, amenities, accommodation and access. Previously, there were only three models: sun, sea and sand. The influx of tourism is influencing the transformation of culture and nature today, changing the coastal landscape – essentially a unique landscape between land and sea. The area is gradually becoming increasingly sensitive to changes in urbanisation. The influx of tourism and the transformation of coastal areas for commercial purposes affect issues of place identity, resulting in coastal cities becoming increasingly similar to each other and losing their distinctive character [12; 10; 9].

The study evaluated ten beaches in Jūrmala: Bulduri, Dzintari, Majori, Dubulti, Jaundubulti, Pumpuri, Melluži, Asari, Vaivari and Kaugurciems. It examined beach congestion, connectivity with the city and surrounding areas, and the aesthetic design and functions available to tourists and local residents. The study aimed to evaluate Jūrmala's beaches as sustainable public spaces, ensuring seasonally accessible beaches in the context of a modern place identity.

## Materials and Methods

The study, conducted between 2023 and 2024, employed several methods, including cartographic, photographic, monographic, and descriptive approaches. The cartographic method involves studying all historical data, historical maps and contemporary cartographic materials. The monographic or descriptive method, on the other hand, involved compiling and describing all material obtained from the surveyed area regarding the coastline of Jūrmala city. A detailed assessment of the city's coastal landscape has been carried out, evaluating the existing functional infrastructure. Based on the research data, a unified, interconnected spatial solution for the beaches and coastline of Jūrmala has been developed, complete with a suitable brand to promote the area.

To obtain data on the current situation in the neighbourhoods and on the beach, research matrices were created during the study. These highlighted several aspects that were evaluated in all study areas. The study analysed the harmony of amenities, children's playgrounds, connectivity to cities, access paths, visitor numbers, functional beach zoning, sightlines, beach development structure, the environmental/natural base and general factors affecting information availability for each beach. It also examined Blue Flag status issues, rescue centre size and general prohibitions in coastal areas.

## Results and Discussion

Jūrmala was officially established as a city in 1959, having historically evolved from fishing villages and bathing resorts. Jūrmala became a popular resort as early as the 19th century. In 2003, it was recognised as the best resort on the Baltic Sea and, in 2005, it was awarded "Healthy City" status. In 2010, the observation tower in Dzintaru Mežaparks was opened, and Jūrmala was recognised as 'Europe's Most Outstanding Destination' in the 'Healthy Cities' category. In the same year, Dzintaru Mežaparks with its observation tower opened, and Jūrmala was recognised as the 'Most Outstanding Destination in Europe' in the 'Tourism and Water Resources' category. The city of Jūrmala has had resort status since 2013.

The development of beaches and coastlines has the potential to contribute to urban development by creating interaction and connectivity between cities and beaches. Visitors are mainly motivated by beauty, inspiration, relaxation, and the restoration of physical and mental abilities. Other motivations include opportunities for self-expression, learning, enjoying culture, observing nature, and the symbolic values, lifestyle and identity associated with the seaside [7; 8]. 1Visiting the coast can be associated with our perceptions of the environment, its identity, and its impact on us. The coast has its own identity, which is constantly changing and evolving. The study found that human intervention is causing some beaches to become major tourist destinations and develop into functionally rich places. This pushes local residents aside. Therefore, it is necessary to create an interconnected beach identity and character that highlights the beach's value, inspiration, culture and identity, which the study identifies as a current issue to be improved in the future. The main seaside recreational activities are swimming, water sports (such as water skiing and jet skiing), boating and sea fishing, while coastal activities include beach recreation, walking, sunbathing, picnics and enjoying the sea view [7; 14].

Various studies have been conducted on the coastal area. For example, on a Latvian scale, Professor Dr Arch. Natālija Ņitavska's doctoral thesis examined the development and change of Latvia's Baltic Sea coast. Meanwhile, Dr. arch. Baiba Vērpe conducted extensive research on the architecture of Jūrmala in her doctoral thesis, entitled ' The Development of Jūrmala Resort Architecture. As part of this research, the meaning of the term 'resort' was evaluated, and it was found that it corresponds to the current situation in Jūrmala. Another study, conducted in Poland in 2020, examined the development of the Polish Baltic Sea coast and the extent to which tourism affects the development and degradation processes of the Baltic Sea coast. This study was carried out by the Department of Contemporary Architecture and Design Theory and Methodology at the University of West Pomerania [8; 3; 12]. It can therefore be concluded that if the overabundance of beach amenities with inappropriate designs continues, the beach and coastline will inevitably lose their aesthetic value and charm. However, beaches and coastlines have their own identity, formed over time, which must be preserved for future generations.

The research materials obtained during the study highlight the most important findings concerning the differences between each neighbourhood and their specific problems. These were identified using the matrix system employed in the study. Bulduri was developed on manor lands and was originally an agricultural area. Summer cottage construction developed in the 19th century, especially along the banks of the Lielupe River and later by the sea. This area became popular with wealthy Riga residents and the first
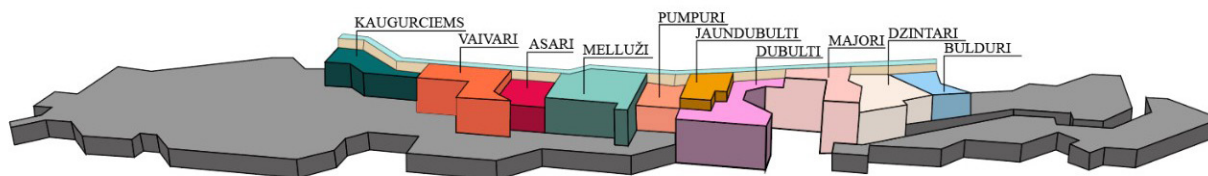
Fig. 1. Location of the studied neighborhoods within the territory of Jūrmala city [R. Ozola diagram, 2024]

railway station in Jūrmala opened here in 1877. The Dzintari area was developed on the land of the Bulduri manor and was originally called Edinburgh. It is characterised by summer cottages and historic wooden buildings. It is home to the Morberg Neo-Gothic castle and more than ten architectural monuments. Majori developed around the Majori tavern and manor. In the 19th century, it became the centre of social life in Riga's seaside resort thanks to the railway. Here you will find Jomas Street, the city's first hotel and concert hall and historic pavilions. Dubulti is the narrowest part of the city, located between the Lielupe River and the sea. As early as the 19th century, it became an elegant bathing area with guesthouses and hotels. Its development is linked to the creation of bathing areas, summer houses and concerts. In 1920, Dubulti became the centre of Jūrmala. Jaundubulti developed as an extension of Dubulti in the mid-19th century. Melluži is considered the geographical centre of Jūrmala. It is famous for being the site of the first spa, "Karlsbādi", and for strawberry cultivation. A park with an outdoor stage was created at the end of the 19th century and has been preserved to this day. Pumpuri's history is closely linked to the railway. Pumpuri Station opened in 1877 and has been known by its current name since 1939. Historically, Pumpuri was a peaceful summer cottage area that developed along the coast. Today, it is referred to as part of 'Quiet Jūrmala' because it is located further away from the tourist areas and the centre. The area is characterised by spacious green spaces, a peaceful atmosphere, low-rise buildings and well-developed cycle paths. Asari-Vaivari is a historically important fishing village. Summer cottage construction began in the 19th century, followed by the development of strawberry cultivation. One of the first sanatoriums in Jūrmala was located here. In the 20th century, Asari station was renamed Vaivari. The wooden Asari station building burned down in 1917 and was rebuilt in brick in 1927, and this building still stands today. However, two stations were created: Asari I and Asari II. To avoid confusion, Asari II station was renamed Vaivari station in 1938, and the entire neighbourhood took on the name Vaivari [5; 6; 9]. Kauguri/Kaugurciems is one of the first bathing spots where people went to the sea at the end of the 18^(th) century.

### Problems with the current situation

### on the coast of Jūrmala

In accordance with City Council Regulation No. 3, Jūrmala Beach is divided into three zones: active recreation, quiet recreation, and neutral recreation. However, in practice, the zoning often does not correspond to the regulations – information signs are inconsistent and do not always indicate the neutral zone, and colour markings often do not match the designated zones. Although there are stands on the beaches with icons indicating swimming areas, permitted and prohibited activities, rescue stations, children's playgrounds and showers, the boundaries and zoning of the areas are not clearly marked. The swimming season runs from 1 May to 15 October. Before the start of the season, the beach must be cleaned and, during the season, the sand must be raked regularly and rubbish collected. However, these requirements are not always met in practice. It is prohibited to bring animals or motorised vehicles to the beaches, smoke, spend the night or light fires. In 2024, residents submitted an initiative to allow pets on the beaches, but the amendments have not yet come into force. The zoning of beaches in certain neighbourhoods does not comply with the regulations:

- Bulduri: No neutral zone is indicated in nature and the markings do not comply with the regulations.
- Dzintari: the neutral zone is indicated as peaceful.
- Majori: Zoning is chaotic and quiet zones overlap with active zones.
- Dubulti: the markings do not correspond to reality; the volleyball court is located in the quiet zone.
- Jaundubulti: the entire beach is designated as a neutral zone in the regulations, but sports equipment is located there in reality.

- Pumpuri: According to the regulations, the entire beach is a neutral zone. In reality, however, there are marked active and quiet zones, as well as a children's playground.
- Melluži, Asari, Vaivari and Kaugurciems: the zoning partially overlaps, the neutral zones are not clearly defined and sports equipment is often placed in the wrong areas.

From 1997 to 2019, several beaches were awarded the Blue Flag, confirming their high quality and safety standards. However, Jūrmala withdrew from the programme in 2020 due to increased membership fees, which has had a negative impact on the condition of the beaches. Data from the 'My Sea' campaign in 2024 indicates that Jūrmala has become one of the most polluted beaches in the Baltic Sea in Latvia, particularly in the Lielupe and Majori areas. There are special conditions for beach construction – seasonal buildings must be lightweight, blend into the landscape and be built on screw piles. In reality, however, there are discrepancies, such as the permanent café buildings in Bulduri and Asari, which do not comply with the standards and visually degrade the environment. Jūrmala's beach regulations set out detailed rules for use, maintenance and construction, but these are often not consistently enforced in practice. The loss of Blue Flag status has led to a decline in quality standards and the condition of the beaches has deteriorated. To restore Jūrmala's image as a resort city, it is necessary to ensure compliance with regulations and resume participation in international quality programmes.

Artist Laima Puntule recalls her childhood memories of Jūrmala: nature, images, memories, associations, the sea, sand, and the romanticised, independent city with its wooden architecture, white sandy beaches, and shady gardens. Later, during the Soviet era, she remembers Jūrmala as a place filled with crowds of tourists, white cotton hats and refreshing ice cream from the seaside café. Today, Jūrmala is an unfamiliar place with a confused identity, tasteless displays of wealth and promenades dominated by foreign values [5; 8; 3]. The beach in Jūrmala has not been redesigned for years and there is no division between the city's neighbourhoods. The neighbourhoods and coastline of Jūrmala are not interconnected. In the coastal area, the neighbourhoods of Jūrmala, which have developed at different times in history, are not naturally separated. There are no informative signs in the city environment indicating the division of neighbourhoods, nor a common map showing this division, even though the neighbourhoods are divided by specific streets. There is also a lack of information points about the main access points to the beach and no indication of which access points are intended for people with mobility impairments. Each neighbourhood has at least one access point and changing room equipped for people with mobility impairments.

There has been no modern development on Jūrmala's city beach for quite some time. The amenities do not fit into the overall seaside landscape and lack a unified design. The benches are uncomfortable, the changing rooms are outdated and the bins are scattered chaotically along the beach. They also do not fit into the overall landscape and are unergonomic for small children as the bin lids are very heavy. The beach cafés are not designed according to a consistent style and do not comply with Jūrmala city café regulations. The beach lacks showers, foot-washing facilities and public drinking water taps. Information signs along the beach, at the main access points and on the beach itself, have remained unchanged since 2000. Most of the access points to the beach in each neighbourhood are in disrepair, the recreational benches are vandalised and the footbridges are ergonomically unsound, causing great discomfort to people with mobility impairments when accessing the beach [1; 13; 11] (Fig. 2, 3, 4, 5, 6, 7, 8, 9, 10).

Jūrmala's coastline and beaches need to be connected by creating comprehensible, well-developed infrastructure that is easy for both city residents and visitors to understand.

Fig. 2. Current situation of Kaugurciems neighborhood and beach [author's photo documentation, 2024]

Fig. 3. Current situation of Vaivari neighborhood and beach [author's photo documentation, 2024]

Fig. 4. Current situation of Asari neighborhood and beach [author's photo documentation, 2024]

Fig. 5. Current situation of Mellužu neighborhood and beach [author's photo documentation, 2024]

Fig. 6. Current situation of Pumpuru neighborhood and beach [author's photo documentation, 2024]

Fig. 7. Current situation of Jaundubultu neighborhood and beach [author's photo documentation, 2024]

Fig. 8. Current situation of Majoru neighborhood and beach [author's photo documentation, 2024]

Fig. 9. Current situation of Dzintaru
neighborhood and beach
[author's photo documentation, 2024]



Fig. 10. Current situation of Bulduru neighborhood and beach
[author's photo documentation, 2024]

## The development potential
## of the coastal landscape in Jūrmala
## in the context of spatial design structures

The landscape is closely linked to human cognitive perception. A person's inner world, emotions, associations and memories form their identity, which is reflected in historical traditions and culture. These are directly influenced by economic, mass media and political situations, but everyone's experiences, family traditions, emotions, feelings and sensations are unique. The coastlines of the Baltic Sea and the Gulf of Riga each have their own characteristic features, natural ecosystems, and protected natural features. Most of Latvia's coastal landscape consists of forests [16; 11].

The quality of the Baltic Sea coastline is deteriorating due to political and natural factors, social processes and coastal erosion. A particular transformation of the coastline has begun in recent decades. The Protected Areas Law restricts and regulates the Baltic Sea coastline, stipulating that the economic activity zone in the Baltic Sea and the Gulf of Riga protected areas is up to 5 km wide (taking natural conditions into account). Several coastal areas in the Baltic Sea and the Gulf of Riga have developed into small fishing villages that hold iconic value. However, these historic fishing villages are disappearing from the coast and being replaced by new buildings that do not fit into the landscape. This threatens the future of the high-quality landscape [8; 9]. Based on beach research, it can be concluded that the existing zoning of active and quiet recreation areas on the beach is irrational and fragmented. Visitors and residents of the city do not observe the existing beach zoning and the existing amenities do not meet the conditions for use of the specific zone. It is necessary to redesign the existing zoning to create a clear concept for the functional zones of Jūrmala's beaches and coastline.

Jūrmala boasts unique architecture, including not only wooden buildings, but also Soviet-era architectural gems which previously served as medical institutions. Today, half of these institutions no longer exist and do not perform medical functions [15]. Following an assessment of Jūrmala's coastline and beaches, a detailed infrastructure development plan was created within the context of spatial design. Existing neighbourhood-level problems have been addressed, such as the natural division of neighbourhoods, the introduction of information signs and improvements to existing infrastructure. Beach-level problems have also been addressed, such as amenities, beach ergonomics and improving access points and recreation areas.

Based on historical research into the history of Jūrmala's neighbourhoods and beaches, as well as field research into the current situation in these areas, new solutions are proposed to improve Jūrmala's neighbourhoods and beaches, making them more modern and distinctive. Each neighbourhood is assigned a colour that symbolises it and forms its identity. The identity of each neighbourhood is shaped by historical facts, architecture, events and residents, and accent colours are assigned according to these identity symbols. These symbols and colours form the identity of the neighbourhoods, distinguishing them from the overall image of Jūrmala's neighbourhoods. These colours will also be used in accents and information signs at neighbourhood and beach amenities (Fig. 11).

There are currently no signs in the city indicating the boundaries of the neighbourhoods. Instead, each neighbourhood will have informational signs at the beginning to inform city residents and visitors of the neighbourhood they are passing through or visiting. An informative neighbourhood logo would help city visitors and residents to navigate the neighbourhood divisions more easily.

Each neighbourhood has multiple access points to the beach. At the main access points, there is an information sign indicating the neighbourhood name, beach usage regulations, the location of amenities and the zoning of beach activities. Most of these signs have not been changed for several decades and many of them have been vandalised, which detracts from the overall appearance and quality of the landscape. New information signs are planned for placement at beach access points. These new signs will provide information about the neighbourhood name, beach usage restrictions and existing beach amenities. Currently, there is a lack of signage on the main streets, smaller streets and walking streets that run parallel to the beach. Signs indicating the direction to the beach and the walking time from the current location are needed. Therefore, it would be advisable to equip this area with consistent amenities [2; 9; 10].

The planned improvements to Jūrmala City Beach are made from two basic materials: wood and concrete (Fig. 12, 13, 14). Wood symbolises Jūrmala City's natural character, and is also a locally significant material. A composite material is used for the interiors of the changing rooms, public showers and public toilets, which are coloured to reflect the neighbourhood. Concrete is used for the supporting



Fig. 11. Assigned identity and accent color of Jūrmala city neighborhoods: Bulduri, Dzintari, Majori, Dubulti, Jaundubulti, Pumpuri, Melluži, Asari, Vaivari, Kaugurciems
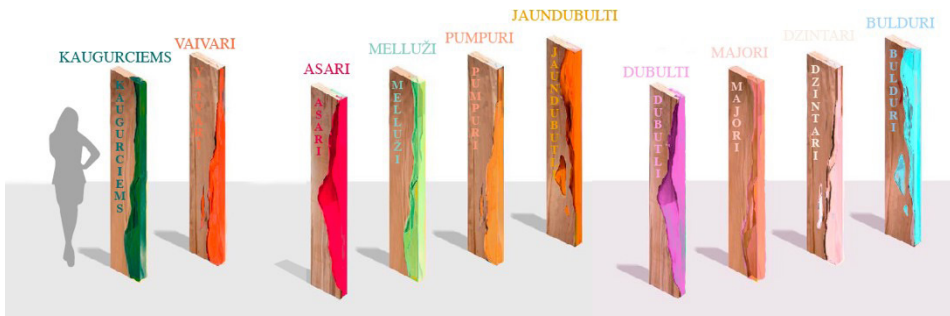[R.Ozola diagram, 2024]

Fig. 12. Informational signage at the entrances of Jūrmala city neighborhoods [R. Ozola diagram, 2024]



Fig. 13. Improvement of the multifunctional active leisure infrastructure point [R.Ozola visualization, 2024]



Fig. 14. Layout of beach improvement elements [R. Ozola visualization, 2024]

structures of the amenities to create greater mass and prevent them from being moved by storms. Using concrete for the framing of landscaping elements would ensure durability and longevity in all coastal conditions [14; 6].

The developed amenities prioritise practicality, ergonomics, quality and durability. They are also easy to install and dismantle for seasonal use. The design goal for all elements is to create amenities suitable for every user. They must fit harmoniously into the overall landscape of Jūrmala's beaches and be arranged along the coastline in a way that does not create a sense of chaos on the beach. The main sources of inspiration for the amenities are the sea, waves, sand and wind. These four elements also characterise the city of Jūrmala itself, and their flowing forms are inspired by the natural processes that take place on the coast [13; 9].

All beach improvement elements complement the surrounding area's theme, giving the beach a greater sense of belonging to the neighbourhood, its history, and character. The amenities would be arranged along the coastline in accordance with the regulations for each neighbourhood's multifunctional activity zone [4; 10].

## Conclusions

The city of Jūrmala has a long history, with the first small fishing villages appearing at the beginning of the 13th century. By the 18th century, Jūrmala's beach was already a popular swimming spot for visitors. However, in 2024, it was revealed that Jūrmala's beaches are among the dirtiest in Latvia. This prompted visitors to seek out other seaside beaches. In recent years, the coastal landscape has changed rapidly due to an increasing number of tourists, leading to changes in the beach's function. Beaches are increasingly offering a wide range of activities, which overshadow the basic activities of relaxation, peace, and enjoying nature.

The beaches of Bulduri, Dzintari, Majori, Dubulti and Kaugurciems experience the fastest influx of tourists and visitors. These beaches offer the widest range of activities. Bulduri, Dzintari and Majori have the highest concentration of beach cafés. Due to the abundance of activities, those seeking peaceful relaxation may feel uncomfortable on these beaches. In contrast, the beaches of Jaundubulti, Pumpuri, Asari and Vaivari do not offer many activities. With no more than one seasonal beach café in these areas, most visitors and Jūrmala residents choose to come here to relax.

Based on the information obtained in the study, Jūrmala's city budget is one of the largest among Latvian municipalities. After researching and comparing the beach in Liepāja, for example, with the beach in Jūrmala, it can be concluded that the latter has not been modernised,

even though the city budget is sufficient for this.

The study concludes that the neighbourhoods lack well-organised access points to the beach, meaning that not all visitors can access it regardless of their mobility. It recommends that more than one well-organised access point should be provided. The beach facilities are neither ergonomic nor harmonious in design and do not fit into the overall coastal landscape. There is a lack of playground equipment for different age groups, as well as public showers, foot-washing facilities and public drinking water taps.

The beach is zoned for both active recreation and peaceful relaxation, but this zoning is fragmented and chaotic. Visitors do not observe it, and there are areas where the signs providing information about the zoning of activities are vague and do not correspond to the actual situation. Therefore, new beach zoning is needed to promote the distribution of specific activities, which would facilitate comfortable recreation for all visitors.

According to the results of the study, Kaugurciems Beach is the best-maintained beach, despite the high number of visitors to the area. This is because the beach is not located in a toll zone and is visited not only by local residents, but also by guests from nearby cities such as Tukums, Talsi and Jelgava. The beach offers a wide range of children's play equipment for different age groups, a modernised lifeguard station and unobtrusive beach cafés. The only drawbacks are the lack of public toilets, showers and foot-washing facilities.

Based on the data obtained in the study, it can be concluded that the city of Jūrmala needs to carry out more rigorous beach cleaning work during the summer season. Regaining its Blue Flag status would promote an increase in the number of new tourists, improve Jūrmala's economic situation and promote the modernisation of the beach while preserving the values and character of the existing landscape.

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## Kopsavilkums

Pētījumā veikta izpēte par Jūrmalas piekrastes ainavtelpu kā ilgtspējīgu publisko ārtelpa, nodrošinot sezonālu pieejamību, mūsdienīgu vietas identitāti pludmales un piekrastes kontekstā. Izpētīta piekrastes un pludmales telpiskā struktūra, pludmales un piekrastes – Bulduri, Dzintari, Majori, Dubulti, Jaundubulti, Pumpuri, Melluži, Asari, Vaivari, Kaugurciems. Veikta vēsturiskās informācijas izpēte un apsekota piejūras un pludmales teritorija mūsdienās, iegūstot publiskās ārtelpas novērtējumu. Balstoties uz izpētes iegūtajiem datiem, izveidoti piekrastes un pludmales attīstības pasākumi.

Kopumā var secināt, ka Jūrmalas pilsētai ir jāveic stingrāki pludmales sakopšanas darbi vasaras sezonas laikā. Jūrmalai ir nepieciešams atgūt „Zilā karoga" statusu, kas sekmētu jaunu tūristu skaita pieaugumu un uzlabotu Jūrmalas ekonomisko stāvokli, kā arī veicinātu pludmales modernizāciju, vienlaikus saglabājot esošās ainavtelpas vērtības un raksturu.

# STRATEGIES FOR THE REVITALIZATION OF THE WATERCOURSE LANDSCAPES: A CASE STUDY OF THE LIELUPE RIVER

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**Abstract. River tourism is a popular type of recreation across the globe. There is a strong tradition of river tourism in Latvia, mainly boating and rafting in wildlife areas. Zemgale district, with its slowly flowing rivers and predominantly agricultural landscape, is not among the most popular boating destinations. However, the main river of Zemgale – Lielupe River has a tremendous history of river shipping traffic, which nowadays is largely neglected. Seeking a way to revive this kind of river traffic, this paper examines the river's forces on human society to find a way of river traveling that is compatible with ecological and human comfort necessities. The territory of the Lielupe River floodplain section from Bauska to Sloka towns is characterized according to a travel perspective, considering a passage both on the river and alongside it. The sustainability of the territory is analyzed from the aspects of accessibility, attractiveness, and environmental quality. Since river travel is not imaginable without public access to the riverbank, this paper discusses the development of public waterfronts. It proposes examples of tourist routes along the river and the development of public infrastructure for shipping and boating. The places and character of primary development are considered. The research fits in the framework of the policy of sustainable development of the Latvian countryside.**
**Keywords: landscape planning, sustainability, river tourism, waterfronts**

## Introduction

Human habitats emerge near rivers for several reasons related to the basic needs of human beings, as described in the hierarchy of needs by Abraham Maslow [1]. The beneficial impact of river presence is noticed in every basic need of humans. It is a source of food, a guardian, a provider of new routes, and an establisher of relationships, as well as a developer of self-esteem [2]. The interaction between rivers and humans is the most important realization in port cities. As the sea is the ultimate destination for every river, the port is the ultimate substance fulfillment for a city, with the utmost manifestation of both positive and negative features. Looking at the growth of ports [3], a common problem can be noticed, which is true for every feature of human impact – that the uncontrolled growth of infrastructure outgrows the capabilities of the environment to sustain it and finally destroys both itself and the environment. Therefore, sustainable development planning, which correlates the scale of development with the capabilities of the location, is crucial. The attempts to revitalize the areas previously depleted by the overgrowth of industrial development since 1970ties have brought ideas of the viability of new efforts [4]. Several institutes have formulated their recommendations. "Cities on Water" offers the following territorially oriented principles of successful revitalization: 1) Secure the quality of water and the environment; 2) Waterfronts are part of the existing urban fabric; 3) The historic identity gives character; 4) Mixed use is a priority [5]. "Project for Public Spaces" again defines the following socially oriented principles: 1) look first at the public space; 2) make sure public goals are the primary objective; 3) build on existing assets and context; 4) create a shared community vision; 5) create multiple-use destinations by tapping the "Power of 10"; 6) connect destinations along the waterfront; 7) maximize opportunities for public access; 8) balance environmental benefits with human needs; 9) start small to make big changes [6]. The common thing among these points is that river and water features provide a multi-faceted and multifunctional value that cannot be reserved for only one need. Therefore, public access means a multifunctional approach. The second idea is to create harmony between water and human environments. Humans should feel at home by the river, not in a place that is somehow strange and unfamiliar. The water itself makes the difference. Therefore, it is suitable to place buildings of all kinds of use near the river if the collaboration of water and building masses is considered. A variety of public-use building functions is used in contemporary waterfront development projects: 1) commercial; 2) culture, education, environment; 3) historical; 4) entertainment; 5) industrial; 6) residential [7]. Their challenge is to create a new model of coexistence where humans and nature supplement each other. As a part of this new coexistence, environmental tourism, and recreation must be considered. Term recreation (from Latin re + creation) includes the idea of human beings experiencing the processes of dismantling the original creation in a manmade environment, and its (creation's) need for renewal. Humans return to the natural environment, especially water, to renew themselves. Since renewal is more a process than a position, it is accompanied by sensible acts, which are best described as a road or being together on one's path. In the same way as planning a local landscape is done, one can plan a landscape of movement instead of a fixed design using a dynamic type of design. Nowadays, this kind of planning is enhanced by modern technologies, which can depict a landscape not in picture type but like a movie or a view with a time dimension [8]. British architect Gordon.Cullen defines this as "serial vision" [9]. It emerges from the human sense of environment - from the need to feel 'here' - the environment where the spectator is now and the eyesight given the possibility to see the environment which is 'there.' The tension between 'here ' and 'there' creates the notion of making 'there' into 'here.' This is important for movement motivation, for it explains why human beings move from one place to another. If the space is not plain and transparent so that a human may climb to a high place and see all the surroundings as the 'here' place without the intrigue of 'there,' then such an intrigue moves a human toward exploration – to go 'there' and see and feel. This intrigue and intrigue-based movement is rooted in the hierarchy of needs. It offers the possibility of fulfilling the needs or the possibility of danger; therefore, it is an important element of environmental planning. Relating this pattern of exploration toward a river, one can distinguish the following types of journeys: paths of everyday life, evacuation routes in case of a flood, recreation routes, and sports distance. Every type has its specifics, but mostly, all demand straight routes and quick passage. Only the recreation route demands the experience of esthetical discovery. Therefore, the river, with its curvy flow, provides needs for recreational purposes, leaving the fulfillment of other needs for another means of transportation. Two basic types of passage can describe the time-space experience of the journey. Architecturally, it is solved as two types of connecting spaces: corridor (Fig.1.1) and enfilade (Fig.1.2). Man-made connections are usually made like corridors – straight segments connecting two functional destinations. A typical feature of a corridor is its separation from surrounding spaces. Their advantage is providing privacy for the adjacent spaces, but the main disadvantage is a lack of purpose other than transportation from one point to another. On the contrary, Enfilade is designed for gradual flow, with many opportunities for flow regulation and the organization of public spaces based on hierarchical and scale-based principles [10]. Enfilade in open spaces is mostly connected with the need to achieve emotional intensification during a visit to a prominent person. The arrangement of spaces prepares the visitor for the most important. Concerning the character of river flow, the most appropriate description would be enfilade because a river is an arrangement of experiences the water encounters in a certain location. Water's sense of place is what creates river space. Riverbeds, banks, and floodplains emerge out of the interaction of water with ground structures, water capturing the sense of 'here,' feeling its space. Traveling along a river, the traveler can share the water's experience and feel not only sights but the character of
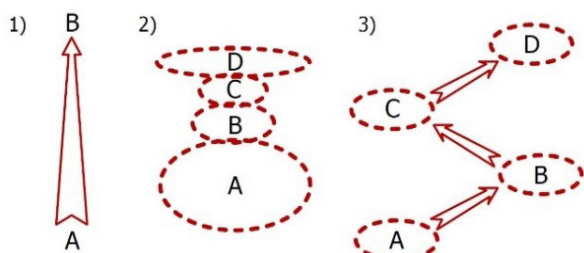
Fig. 1.1-1.3. Types of passage between different spaces. A to D – stages of passage [Cērps, 2025]

interaction, thus learning to encounter his own life experience – a lesson that cannot be learned in man-made corridors. In real-life situations, every journey consists of both principles, combining their advantages. Tourists quickly reach their destinations, where they can slowly process through the place, capturing its sense. Journey planning can be expressed as the order of several such places of sense connected not by thresholds but by various corridors (Fig.1.3). Tourism, especially country tourism nowadays, offers not only the usual 'sightseeing' but much more 'life-experiencing' for acquaintance with lifestyles inaccessible to city inhabitants. That supposes considering not only esthetical considerations but also social aspects during route planning. The cultural landscape comprises local inhabitants' daily and festive activities and traditionally noticed architectural and natural features. Characteristics of successful tourism destinations have been formulated by institute "Project for public spaces": 1) Surrounding Buildings Enhance Public Space; 2) Limits are Placed on Residential Development; 3) Activities go on Round-the-Clock and Throughout the Year; 4) Flexible Design Fosters Adaptability; 5) Creative Amenities Boost Everyone's Enjoyment; 6) Access Made Easy by Boat, Bike and Foot; 7) The Water Itself Draws Attention; 8) Local Identity is Showcased; 9) Iconic Buildings Serve a Variety of Functions; 10) Good Management Maintains Community Vision [11]. Summarizing these points, one can see that a successful tourism destination is a public, multi-functional space accessible to different people with different ideas and a place of experimentation and cooperation.

The paper introduces the concept of sustainable public waterfront development as applied to the Lielupe River section from Bauska to Sloka.

## Materials and Methods

Territory is studied according to the specifics of the given topic, and evaluation is done according to the stated goal of vitality – a diverse, publicly accessible, and attractive river landscape. For this purpose, description criteria based on diversity, sustainability, and resilience are proposed to represent the accessibility, attractivity, and environmental quality of the landscape. In order to provide a more detailed evaluation of the landscape and to represent the dynamics of change, the territory is divided into 19 landscape areas – territories with common characteristics and visually united structure. Landscape passports have been created to characterize these landscape areas and provide transparency in research.

The evaluation criteria. Accessibility is a critically necessary feature for public landscape, and several components specify it: 1) distance to the driveway; 2) road surface material; 3) availability of transportation hubs and connectivity; 4) pedestrian and cycling infrastructure; 5) water transport infrastructure; 6) type of property ownership. Attractivity is characterized by the esthetical viewpoint and the availability of public objects. The following components have been chosen: 1) objects of cultural and public activities; 2) objects of public services; 3) objects of local identity and landmarks; 4) viewpoints of particular esthetical quality; 5) natural objects of importance; 6) character of local building. Environmental quality and comfort define whether the interaction of society and nature provides sustainability and resilience for both sides. In-depth research of the ecological situation of a given territory is done by LVGMC (Centre of Latvian Environment, geology, and Meteorology) in the "Plan of flood-risk management and catchment basin management of Lielupe River for years 2022 -2027" [12]. The needs of the current research are provided by visual evaluation. The following components are chosen for the criterion: 1) natural diversity, 2) riverbank quality, 3) floodplain quality, 4) windiness, 5) safety, and 6) amenities.

## Results and Discussion

The research results show that vitality is the leading indicator for the success of revitalization measures. The presence of the river is vitalizing itself, as shown previously, which means that solving the revitalization of river space mainly includes finding the obstacles preventing a river from performing its natural function. Therefore, one success factor for revitalization is accessibility. The possibility of transportation along the river is essential. The survey shows two main factors that influence accessibility – the presence of roads and restrictions due to private property. Restrictions show more influence since one can restrict access even if the road quality is good. That is why the public state of the territory is the primary key to success and vitality [13]. It obliges the owner of private property to realize himself as a part of society and to find a way to increase his well-being and that of all of society. Thus, the belonging tier of Maslow's hierarchy of needs is stimulated, and the added value of vitality is created. This added value is primarily generated as a service of hospitality or tourism, which private owners near the river provide. A higher stage than local service may emerge by creating a whole tourism route that demands the cooperation of individual landowners and the creation of a public initiative. In such a way, it may turn into the revitalization of the society, which is the main goal – to activate the society along the river and give it an identity larger than the private backyard. That correlates with the balance of rights and responsibilities and the understanding of land property as a part of one's part of social responsibility. This responsibility is reflected in the criterion of environmental quality, which is an equally important factor of vitality. At the same time, it is strongly connected to sustainability. One can say that sustainability is the second name for vitality because vital is everything that can sustain its energy of life. The river's ecological quality is the primary premise for further revitalization activities. With uncontrolled access to water objects, their surroundings may turn into waste disposal areas. To prevent that is the role and positive value of private property. The third function of private property or human presence is the creation of the attractivity of a place. The added esthetical value of the area raises interest in other people coming and seeing it. The necessary parts for reaching the goal of revitalizing the river landscape are: 1) measures to improve the quality of the environment and provide sustainable management; 2) measures to improve accessibility; and 3) measures to offer objects of attractivity. These three steps form a concept of the public river Lielupe.

Further elaborations of this concept include a close focus on accessibility, leaving the design of the attractivity objects to local entrepreneurship efforts, and locating the zones of optimal placement for such objects. Revitalization measures are complex – they include territorial and social aspects [14]. The same relates to route planning since the road also consists of these two aspects – territorial and social. Therefore, two proposals are considered for a cultural landscape: environmental and social activities. Social activities can be divided into usual cultural and festive events, sightseeing, and not-so-usual activities connected to traditional rural households and agriculture. The territorial aspect is represented in the sequence of the touristic route. The previously detected landscape areas can be used to evaluate this sequence. It is not good to keep human attention in constantly increasing tension since it grows wary very soon, and the route could be abandoned without reaching its destination. Therefore, it is better to vary places of tension with places of relaxation. It correlates with the human rhythms of life [15], where growth alters with decline, and focus alters with distraction. This rhythm of increasing and decreasing attention is shown as three–a stage index given to the landscape areas (Fig. 2). They are 1) destination, which is the space with the maximum level of attention created by high-level indexes of attractivity, accessibility, and environmental quality; 2) secondary destinations, which are places with several high-level indexes of attractivity, not so much influenced by other criteria and 3) transitory zones, which offer the least levels
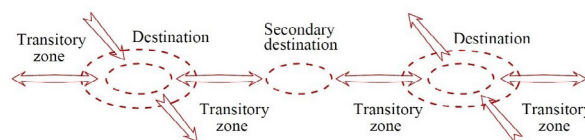


Fig. 2. Stages of the route [Cērps, 2025]

of attractivity and primarily serve as a place of relaxation before the attention arousal given by two other positions. These stages may also relate to property type: 1) mainly public area with state or municipality-owned property; 2) semi-public area with mixed-type property; 3) mainly private property with restricted access. The correct sequence of these stages helps to keep the flow of the route and maintain its vitality.

A successful tourism route must consist of all three stages, starting and ending at the destination stage. Thus, one must first seek destinations, which are areas with good and diverse connections, and then draw possible routes to desired neighboring destinations, trying to include enough secondary destinations en route to provide the necessary attractivity. This method will be applied to a case study of the Lielupe River.

## Case study. Potential tourism routes
## along Lielupe River

Why Lielupe? The following factors have been considered when choosing the research area: 1) it is one of the big Latvian rivers with its characteristic river-generated landscape; 2) it is a river with a dominative proportion of cultural landscape, so it has a rich history of interaction between natural and human environment, 3) compact length fit for the scale of research, 4) diversity of landscape and river functions. The human component of the river landscape at first enclosure seems to fit the pattern of route development since it is symmetrically built – its flow is marked by three towns at its beginning, middle, and end and some smaller settlements in between. Thus, it can be a good example of drafting a route. Based on the scheme of Figure 2, it is possible to extract two routes: 1) Bauska – Jelgava (Fig. 3) and 2) Jelgava – Sloka (Fig. 4).

## Route 1, part 1. Nature and cultural landscape
## route Bauska – Mežotne. Nature park "Bauska"

Routes can be planned from the upper part of the Lielupe River downstream as it parallels a possible route for the boat trip. Thus, the town of Bauska is the right place to start. According to the Bauska Centre of Tourism Information Route Bauska – Rundāle is one of the most popular routes in Latvia, and Rundāle palace is an object of ultimate recognition on a European scale. Lielupe River flows along this major route, but somehow, its picturesque valley has remained absent from the focus of most travelers. The end of this part of the river route is in Mežotne – a location of rich historical, cultural, and scenic value slowly emerging out of neglect and gaining its deserved attention at the side of Rundāle palace. The main characteristics and proposed actions for the vitalization of the route are as follows. **Environmental quality.** The advantage of the route is the status of the territory of Natura 2000, which means it is properly maintained and monitored by environmental protection services. **Accessibility.** The main access road is an old route along the river, which has been largely neglected since the construction of the new highway Bauska–Eleja. This is an advantage, though, for creating a slow-speed road fit for pedestrians, bicycling, and even horseback riding, developing the necessary amenities. It is recommended that big tourist buses are kept out of this scenic road. The opposite riverbank remains reserved for private property with limited access. **Attractivity.** The total attractivity of the route is higher than average even if not all the attractivity objects are handled the best way. The main challenge is to find the necessary activities to attract the public interest. The unifying activity for this part of the route would be sightseeing and recreation for a weekend. **Connections and links to other routes.** Guest houses in Mežotne and Rundāle offer the possibilities for staying for a night and continuing the journey in two main directions – 1) following the river flow to Jelgava or 2) Dobele with side destinations at Eleja and Tērvete. Additional linkage for the first direction could be visiting another palace of Rastrelli. The second could be the rich historical heritage and scenery of Zemgale Plain. To keep with the river route, we should seek objects that attract attention in this direction.

## Route 1, part 2. Countryside cultural landscape
route Mežotne – Jelgava

Unlike the previous route, a significant contribution to the revitalization of the landscape is needed here to be considered attractive to tourism. One offer that could be developed from this perspective is estate tourism, which is the intermediate link between castle and rural tourism. Historically, it can be seen that the network of estates along the Lielupe River has been quite thick. However, currently, below

Mežotne, none of them is involved in the initiative of the Latvian Palace and Manor Association. A more realistic option, therefore, is to create a rural cultural landscape route, not emphasizing estates but offering a view of the countryside where an element of estates is included, among other elements, matching sightseeing objects that reflect the countryside's history, daily activities, and festivities. Staļģene village, which provides the processing of agricultural products, cultural life, education, and historically important buildings, serves as the local center of rural life. Such a combination creates a potential point of gravity to orient the flow of rural tourism. The point can be expanded into an attractive area to include the culturally historically significant Salgale and "Auči" estate of the first President of the Latvian Republic, Jānis Čakste. Such a district can create enough offers for full-day or weekend activities. From the point of view of water transport, the total length of the route is approximately 40 km; such distance cannot be accomplished by rowing boat within one day; therefore, it should be divided into two sub-sections, Bauska – Emburga and Emburga – Jelgava. Emburga is traditionally the destination of river vessel traffic, so this split may also include changing the vessel from a rowing boat to a motorboat. Such a change provides an opportunity for another type of transport change, such as bicycle or hiking. This, in turn, creates an opportunity for a hospitality service offering in Emburga or Staļģene. Here we mark the route node where several travel options meet.

Part Mežotne – Staļģene. Environmental quality. Since, at this stage, the river is surrounded by agricultural areas for almost the entire length of the river, the most topical measure to ensure the quality of the environment is to prevent the establishment of arable lands in the floodplain area instead of taking measures to preserve or restore the grasslands. This can be facilitated by granting ecologically sensitive status, subsidies, or the education of farmers in environmental matters. **Accessibility.** To improve accessibility, it would be critical to asphalt the existing gravel road in the Mezotne – Stalgene section. This would be the necessary infrastructure for cyclists and pedestrians alike. From the point of view of water transport, coastal accessibility can be ensured by restoring the grasslands. On the upstream side, approximately till Emburga, such a measure is enough to draw boats and let them into the water. **Attractivity.** The main attractiveness of objects of the area lies in the cultural and historical heritage of Emburga and Salgale, which, unfortunately, is in a poor state, so it requires revitalization solutions that are more social-related, namely economic development and population growth, to generate a critical mass for the restoration and revitalization of public infrastructure. The unifying activity of the area includes rural products and everyday lifestyle. **Connections and links to other routes.** This is a linear route with slight variation. As one gets to Staļģene, choosing one way from three is the only possibility to get to Jelgava. The logical destination is Jelgava, which offers a wide range of following destinations.

Part Staļģene – Jelgava. **Environmental quality.** At this stage, the agro-landscape of the Zemgale Plain changes to the woodland of the Piejūras lowland, the flow of the Lielupe River becomes slower, and the width of the valley increases. Here, too, the state of the floodplain meadow ecosystem needs to be given main attention. In addition, wildlife appears here, which can serve as a source of appeal. Particular attention should be paid to the state of the riverbanks, protecting them from erosion. **Accessibility.** This section of the route is quite remote and sparsely populated, so access to the river would be required at larger settlements. The considerable width of the valley requires boating to use the tributaries of the Lielupe River to get from the edge of the valley to the river itself. Svitene River is used to access Vecsvirlauka village and Garoza River to Garoza village. Closer to Jelgava, starting in Tetele, public and private boat jetties must be developed, with the possibility of staying there longer. Attractivity. This stage is like a transition between the countryside and the natural landscape. The man-made attractions cluster near the end points of the section, while the middle is plagued by calm. Enjoying peace by swinging in river waters and breathing the air of meadows and woodland to welcome the city's approach with a new boost of impressions is a key element of attraction at this stretch of the route. Closer to Jelgava, starting from Pūcīši cemetery, a scenic stretch begins with ensembles of former estates on the riverbank, choosing former Tetele and Ane estates as points of public infrastructure. There is also a need to develop service infrastructure and potentially restore an old tradition for urban trips by nature,

expanding the availability of holiday homes and, in particular, water rest. Unifying activity – holiday rest. **Connections and links to other routes.** It is a section with increased attention leading to Jelgava as the route's destination. Traveling from Jelgava as a large-scale transport hub in all directions – by train, car, and water transport is possible. While remaining in Jelgava, it is possible to create separate river routes, the attraction objects overlapping with the longer routes. These routes are circular since it is possible to do them by departing from Jelgava and returning there. This would be consistent with the old habit of Jelgava citizens in arranging entertainment trips to suburban estates to spend their spare time there. Langervalde and Tetele were popular places. Ozolpils and Valgunde are in the opposite direction at a similar distance. These can be the outermost

points reached by river transport within a reasonable period of time. An additional amenity is the availability of public city bus transport within these borders.

**Route 2. Nature route Jelgava – Sloka - Jelgava**
The total length of the route in one direction is approximately 45 km. As this is a stretch of the lower Lielupe River, where the river is broad and deep, an officially navigable stretch, the primary focus should be on the traffic of larger-gauge craft, resp., ships and motor boats, and the corresponding infrastructure. As opposed to the development of river transport, the environment is becoming more and more wild, so this is rightly called a natural route. It is located in the important landscape area of the Lielupe Valley and the Ķemeri National Park, and the essential objects of the territory are related to nature values
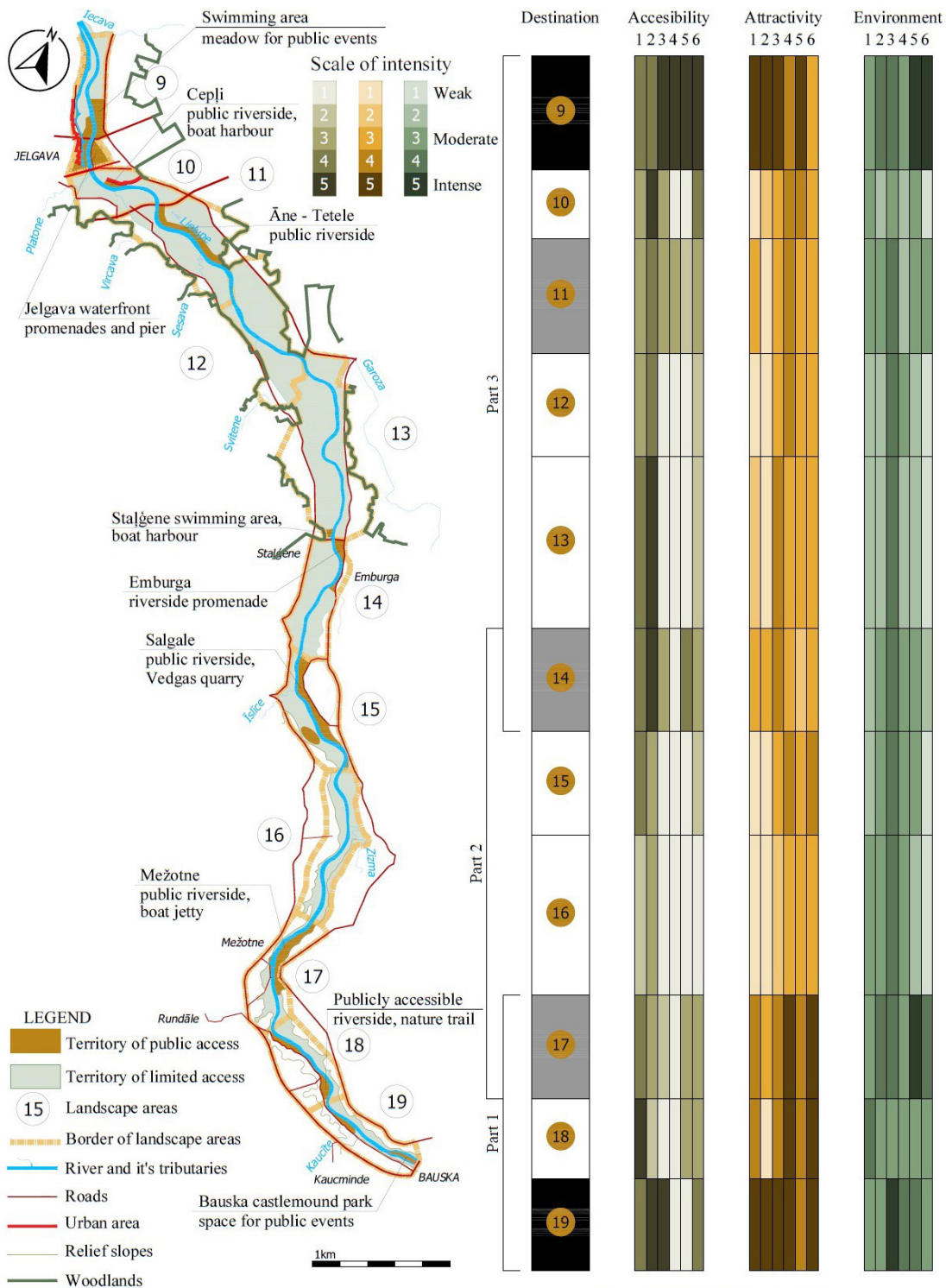


Fig. 3. Evaluation of the qualities of the route 1 Bauska – Mežotne – Jelgava [Cērps, 2024]
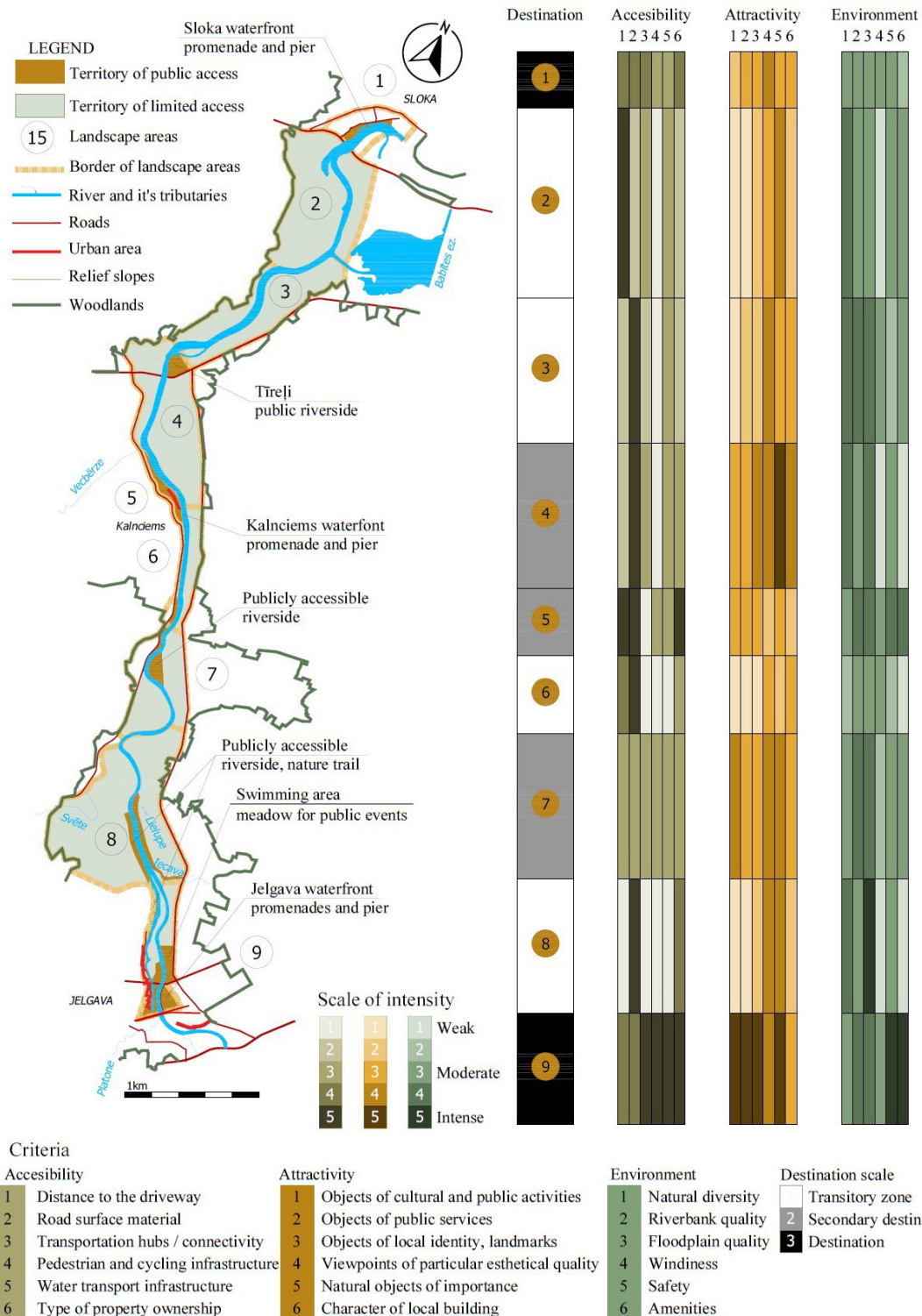
Fig. 4. Evaluation of the qualities of the route 2 Jelgava – Sloka [Cērps, 2024]

and their protection. The nature of the route is more for watching than for activity-oriented measures. Nature and its occupants serve as objects of attraction here. Unlike the upper Lielupe route, it is not desirable to divide this route into smaller sections since the planned speed of travel is higher, so the agglomeration of Kalnciems situated in the middle of the section does not serve as a place of stay, but rather as a stop for essential services. A separate Valgunde landscape area is to be distinguished as a place for holiday recreation to enjoy the landscape of rural life and the scenic river curves of the Lielupe River. The route can also be carried out parallelly along the road on both sides of the river, which means that a combination of modes of transport is possible, for example, by taking a bicycle on board and then continuing on the road from a further stop. The other difference is that this route can be used in both directions. This means that each landscape area can have a dual visual function, depending on the direction of the view.

**Environmental quality.** The advantage of the route is that a large part of the adjacent areas are Natura 2000 sites. The environment's quality here demands increased attention and is monitored by the services responsible. The remaining areas must comply with the conservation rules for the floodplain meadows. In addition, the conditions for maintaining polder grasslands, protective ramparts, and necessary infrastructure must be maintained in this area. **Accessibility.** Overall, river accessibility is above average at this stage. The Tuški – Kalnciems road has been included in the planning documents of the municipality [16] as a road with exceptional landscape value but has not been asphalted. Improving its coverage and equipment would also provide a better opportunity to revitalize potential attraction objects. Widened road borders for parking should also be planned in favorite fishing areas. The jetty at the old location of the ferry has to be connected to

the Rīga -Liepāja highway and the means of transport it offers. Optimizing the cycle route requires solving the Gāte crossing, possibly with a pedestrian bridge. **Attractivity.** Historically, this has not been a densely populated area; few cultural and historical sites exist here. Instead, a natural landscape must be maintained and protected to be a significant attraction. Basic attention should be paid to the social climate and well-being of the settlements, particularly Kalnciems and Sloka. The Sloka riverfront needs to undergo a cardinal transformation, restoring its former qualities and giving a solution according to contemporary requirements. Both locations must renovate or create a central square linked to the riverfront space. In the vicinity of Celmraugciems (part of Kalnciems), it is necessary to connect the riverbank and the residential area and maintain or partially improve it. **The unifying activity** includes nature tourism, recreation trips, and ship traffic. **Connections and links to other routes.** Transport nodes are at the end of the route and potentially at the Rīga -Liepāja highway crossing, where access to public transport is currently impoverished. In the case of both Sloka and Jelgava, transport accessibility is excellent and varied. In Sloka, a continuation of shipping traffic to Majori and Rīga should be planned. In Jelgava, it is necessary to consider improving traffic connectivity and extending the function of the planned bus station and Railroad Station complex to include the river traffic station in the nearest suitable location. The two destinations must be closely linked to Rīga; therefore, it is an advantageous possibility for the inhabitant of Rīga or tourist to make a boat travel on the Lielupe within one day.

## Public spaces

Planning and design ideas are offered for public space development. Priority spaces with a developed public component are designated as follows: 1) Bauska Castle Mountain Park, applicable measures – maintenance of existing public infrastructure and equipment for boat embarkment and disembarkment; 2) The left bank of Lielupe along the old road to Bauska, the applicable measures – development of pedestrian and bicycle infrastructure, placement of information stands regarding cultural history and nature values, designing stops at places of most expressive views; 3) The the right and left river banks at Mežotne, the applicable measures – maintenance of meadows, establishment of infrastructure for public events – car parking, picnic places, placement of information stands regarding cultural history and natural values, equipment for boat embarkment and disembarkment; 4) Salgale riverbank and Vedgas quarry, applicable measures – establishment of a recreation space with a picnic place, establishment of an infrastructure for public events near the church – car parking, location of information stands regarding cultural history values, equipment for boat embarkment and disembarkment; 5) Emburga waterfront, applicable measures - maintenance of flloodplain meadows, establishment of infrastructure for public events - car parking, picnic places, information stands regarding cultural history values, equipment for boat embarkment and disembarkment; 6) Staļģene boat harbour - establishment of water transport and swimming facility infrastructure; 7) The waterfront of Ane – Tetele, the applicable measures – development of pedestrian and bicycle infrastructure, establishment of recreational places; 8) The shore of the Cepļi neighborhood - the establishment of a boat harbour and public recreational infrastructure; 9) Jelgava pier – newly established connection with the public traffic hub; 10) Jelgava promenades – additional measures are not being proposed; 11) swimming facility at the end of the Robežu Street - establishment of public recreational infrastructure; 12) the banks of Valgunde -1 and Vārpa polders - creation of a nature trail, equipment for boat embarkment and disembarkment; parking place for anglers' cars; 13) site of Valgunde Manor - establishment of a public boat jetty for the use of guesthouses, rental of water bikes, on the opposite bank – establishmentof a nature trail; 14) Kalnciems coast promenades - a maintained natural riverside with place and equipment for outdoor activities, development of pedestrian and bicycle infrastructure, equipment for the boats' traffic, next to the local municipality building - an expanded and improved ship jetty; 15) Kalnciema Manor site (Tīreļi village) - establishment of a public jetty, car parking and equipment for the boats' traffic, information stand; 16) Sloka Coast Promenade - a set of measures for the establishment of a representative urban waterfront.

## Conclusions

Recognizing that the development of waterfronts is an endless and necessary process but can never be completed, just as the river flow is never-ending, it can be concluded that the solutions presented in this paper are just one step toward revitalizing the Lielupe River landscape. The complement of this will surely trigger the following stages, which will be just as interesting and helpful for further healthy and vital interaction of humans and nature. Finding the right impact points is also essential to start the process. In this case, we see the Sloka town as a critical point whose development would revive a considerable area upstream. The second point of impact is the Salgale neighborhood. Improving these objects could start a more serious development of tourism infrastructure in the Lielupe area. Regarding river traffic, it is visible that the intensity of private traffic is increasing, and solutions will soon be needed for its organization and optimization, which could be a separate theme for exploration. The focal point for further development should be sustainability and resilience, i.e., finding the correct scale and intensity of interaction between human needs and natural capacity, which could benefit all.

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# HYDROLOGICAL MODELLING FOR SUSTAINABLE RURAL AND URBAN LANDSCAPES IN LATVIA

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**Abstract. Effective landscape planning requires a comprehensive understanding of how land use affects hydrological processes - especially in regions such as Latvia, where climate change, urbanisation, and fragmented hydrological data complicate decision-making. This study applies the METQ conceptual rainfall–runoff model to three representative Latvian catchments (Iecava, Pērse, and Imula), each characterised by differing forest, agricultural, and urban land use patterns. Using long-term hydrometeorological data and detailed land cover classifications, the model was calibrated and validated to simulate daily runoff dynamics and explore the influence of land use on flood risk and water balance. Results indicate that forested and semi-natural areas attenuate peak flows and enhance baseflow retention, while intensively cultivated and urbanised landscapes increase surface runoff and flood potential. Scenario simulations further reveal that even small increases in impervious area can significantly elevate peak discharge, whereas the implementation of green infrastructure can mitigate these effects. The study demonstrates that METQ provides reliable, spatially explicit hydrological insights that support sustainable land use planning, particularly in data-scarce contexts. The findings emphasise the importance of incorporating hydrological models into spatial planning and environmental assessment processes. Such integration allows planners and designers to visualise the consequences of development decisions, evaluate alternative land use configurations, and enhance landscape resilience in the face of climate change. The approach presented here offers a transferable model for landscape planning in other Baltic and Northern European regions facing similar socio-environmental challenges.**
**Keywords: Hydrological modelling, Sustainable landscape planning, Land use impact, Flood risk management, METQ model**

## Introduction

Sustainable landscape planning depends on understanding how water moves through the landscape. Hydrology connects cities, farmland, forests, and wetlands, shaping both ecological health and human safety. In Latvia, as in much of the Baltic region, climate change is disrupting this balance by altering rainfall patterns and snowmelt timing [1]. These changes are increasingly influencing river flow patterns—raising concerns about flood risks, water security, and ecosystem stability.

At the same time, urbanisation and land use change are placing additional pressure on water systems. As cities expand and rainfall intensifies, localised flooding becomes more common, especially in built-up areas with poor drainage. Vulnerable communities often suffer the most from these events. This has led to stronger policy responses, such as the EU Floods Directive (European Parliament and Council of the European Union, 2007), which requires all member states to map and manage flood risks.

In this context, planners and landscape architects must design environments that can absorb hydrological extremes and adapt to long-term change. However, Latvia's fragmented and sometimes outdated hydrological data—particularly river discharge records—limit the capacity for informed decision-making.

To fill these gaps, hydrological models offer an essential tool. They allow the simulation of river responses to different weather and land use scenarios, even in areas with limited monitoring. Conceptual rainfall–runoff models have been widely adopted to simulate catchment-scale hydrological processes under varying conditions. These models provide a flexible and interpretable means of representing runoff generation, as discussed in foundational works by Beven (2012) and Seibert (1999).

In Latvia, one such model is the METQ series. Originally created in the 1990s by Zīverts and Jauja, METQ has evolved through several versions—METQ96, METQ98, METQ2007BDOPT, and METQUL2012—each improving its accuracy and adaptability. In practice, METQ is applied from 5 km² up to 2000 km² as a single lumped/semi-distributed model. For larger basins, it is operated as a network of sub-basins with routing, which preserves scalability and performance while maintaining conceptual parsimony [15; 1; 2; 6].

Land use plays a central role in how water moves through a catchment. Latvia is roughly half forested, with the remainder made up of farmland, wetlands, and urban areas. Each land type influences hydrological responses differently. Forests tend to absorb and store water, while urban surfaces increase runoff. Wetlands act as natural sponges, and agricultural areas vary widely depending on soil management.

Hydrological models help quantify these effects and offer planners insights into the potential outcomes of different land use strategies. For example, simulations can reveal how forest conservation or wetland restoration might reduce flood peaks, or how unchecked urban development could worsen surface runoff and degrade water quality.

Despite the availability of hydrological models like METQ, there is limited understanding of how varying land use conditions—from forested uplands to intensively managed lowlands—affect runoff and streamflow dynamics in Latvian river basins. The aim of this study is to demonstrate how hydrological modelling can support sustainable planning and landscape design—not only in Latvia, but in other regions of temporal climate facing similar challenges.

## Materials and Methods

### Study Area and Land Use Data

This study focuses on three river basins in Latvia—Iecava, Pērse, and Imula. These catchments were selected due to their contrasting land use patterns, ranging from forested to agricultural and mixed-use landscapes, which provide a representative basis for assessing land use impacts on hydrological processes. Additionally, their relevance to both rural and urban planning makes them suitable case studies for evaluating model performance under varying environmental conditions. The Iecava River basin, located in southern Latvia, is the largest of the three. Its area ranges from approximately 1,100 to 1166 km² depending on how the basin is defined. The landscape is mostly rural, with about 60 % covered by
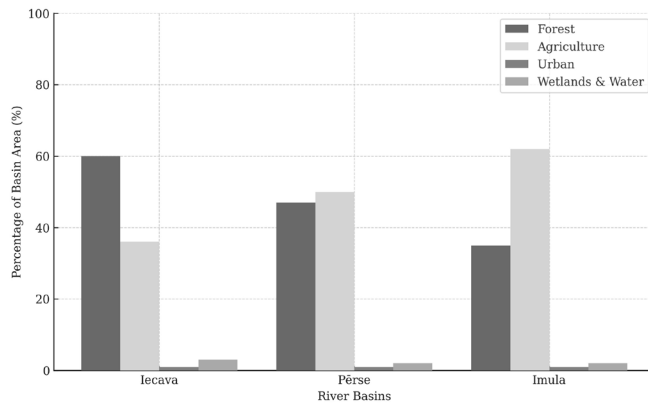
Fig. 1. Land use composition of the Iecava, Pērse, and Imula river basins.
Forest and agricultural land dominate across all basins, while urban and wetland areas represent minor proportions [created by authors, 2025]
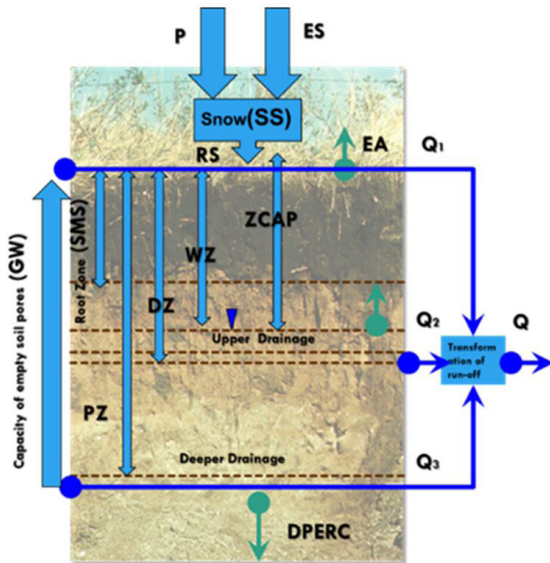


Fig. 2. Conceptual structure of the metq hydrological model [Grīnfelde & Bakute, 2017]. The model includes p- precipitation, mm/day; es- evapotranspiration from snow, mm/day; ss-snow storige, mm; rs-rain and snow melt water, mm/day; ea- evapotranspiration from the root zone, mm/day; zcap- height of capillary rise, cm; wz- depth of the groundwater level (cm); dz-depth of the upper level "drain" (cm); pz-characterises the depth of the lower level "drain"; sms- water storage in the root zone, mm; gw- capacity of empty soil pores, mm; q1- surface runoff, mm/day; q2- upper layer subsurface runoff, mm/day; q3- the base flow, mm/day ; dprec- deep percolation to the aquifers, mm/day

forest and 36 % by agriculture. Urban areas are minimal- less than 1 %—and consist mainly of the town of Iecava and a few small settlements. Wetlands and open water bodies make up the remaining land cover.

In contrast, the Pērse basin, located in the hilly uplands, has a more balanced mix of forest and agriculture. Forests cover around 47 % of its 329 km² area [2]. Meanwhile, the Imula basin, situated in the lowlands, is more intensively cultivated, with 62 % of its 263 km² area used for farming. This variation provides a valuable testbed for examining how different land uses affect hydrological behaviour.

For modelling purposes, land use was grouped into six categories:
- **Urban** (buildings, roads, infrastructure)
- **Agriculture (**fields and pastures)
- **Forests** (broadleaf, coniferous, and mixed types)
- **Wetlands** (bogs and marshes)
- **Water bodies** (rivers and lakes)

Each category was mapped and quantified in square kilometres, then used to define the parameters of the model's hydrological response units (HRUs). Forest areas were assigned higher infiltration and evapotranspiration values, while urban zones were modelled with reduced absorption and higher runoff rates. This configuration

allowed the model to accurately represent the spatial heterogeneity of land cover and its influence on runoff. Figure 1 shows the proportion of each land use type in the three study basins.

### Hydrological Model: METQ

The METQ model, originally developed by A. Zīverts in collaboration with I. Jauja in the early 1990s, is a conceptual hydrological model designed to simulate daily streamflow based on rainfall, snowmelt, evapotranspiration, and soil storage processes [15].It was specifically formulated for the hydrological conditions of Latvia and has since been extended through multiple versions—each improving its capacity to represent different land use and climate scenarios.

In this study, the METQ2007BDOPT version was applied, which includes a semi-automatic calibration module [2]. The model also incorporates parameter extensions introduced in METQUL2012, including a dedicated urban hydrological response unit [6], allowing the simulation of spatially differentiated runoff behaviour.

The model represents the hydrological cycle using a series of storage compartments for snow, soil moisture, and groundwater. Snow accumulation and melt are simulated using a temperature-index method. Rainfall or snowmelt first infiltrates the soil, up to a maximum storage capacity. When the soil is saturated, excess water generates surface runoff (Q1). Water that infiltrates further contributes to subsurface flow (Q2) and groundwater baseflow (Q3).

Figure 2 illustrates the model's structure, showing how inputs are transformed into streamflow components.

Key model parameters include:
- **ALFA** (soil porosity),
- **ZCAP** (capillary rise),
- **CMELT** (snowmelt rate).

These parameters were adjusted based on land use and soil type. For example, sandy forest soils were given higher ALFA values, while clay-rich agricultural soils received higher ZCAP values to reflect greater moisture retention. Urban areas were modelled with lower infiltration and storage capacity, consistent with observed behaviour in similar contexts [6].

### Data and Calibration

Hydrological and meteorological data were obtained from the Latvian Environment, Geology and Meteorology Centre. Discharge data came from gauging stations at Iecava–Dupši, Imula–Pilskalni, and Pērse–Ūsiņi. Simulations were run over long-term periods (30–50 years), divided into calibration (e.g., 1960–1990) and validation (e.g., 1991–2015) phases.

Model calibration combined manual parameter tuning with semi-automated optimisation. Parameters were constrained using available land use and soil data. Performance was
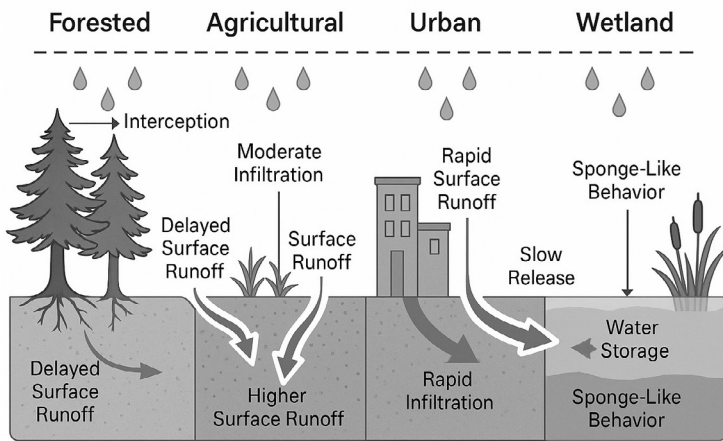
Fig. 3. Conceptual illustration of runoff generation under different land uses. Forested and wetland areas delay and reduce runoff, while agricultural and urban surfaces accelerate surface runoff due to reduced infiltration and increased imperviousness [created by authors, 2025]

evaluated using standard metrics:

- **Nash–Sutcliffe Efficiency (NSE);**
- **Pearson correlation coefficient (r);**
- **Bias.**

Typical NSE values ranged from 0.65 to 0.75, with r values near 0.8 - indicating reliable performance [2].

To explore future land use impacts, scenario simulations were also conducted. These tested how changes in urbanisation or green infrastructure might affect runoff and flood peaks. The results of these scenarios are discussed in subsequent sections.

## Results

### Model Performance and Runoff Simulation

The METQ model was successfully calibrated for the Iecava, Pērse, and Imula catchments, producing a good agreement between simulated and observed daily streamflow.

Land use differences among the catchments, shown in Figure 2, underpinned variations in runoff dynamics. Model performance met established thresholds for conceptual models (Moriasi et al., 2007; Gupta et al., 2009). The Nash–Sutcliffe Efficiency (NSE) ranged from 0.65 to 0.70, and Pearson correlation coefficients (r) were between 0.75 and 0.85. These values indicate a satisfactory level of predictive reliability.

While the model occasionally underestimated sharp peak flows during intense rainfall, seasonal patterns—such as spring snowmelt and summer low flows—were reproduced with accurate timing and magnitude. These underestimations are consistent with known limitations of lumped conceptual models in representing fine-scale urban runoff dynamics.

The calibration process revealed that key model parameters were closely linked to landscape characteristics. For example:

- In the Iecava basin, dominated by forests and sandy soils, higher soil porosity (ALFA) supported infiltration and delayed runoff.
- The Pērse basin, with heavier clay soils, showed higher capillary rise (ZCAP), indicating saturation-excess runoff tendencies.
- In the agriculturally dominated Imula basin, compacted soils and lower infiltration rates led to a faster and more pronounced surface runoff response.

These findings confirm the model's capacity to reflect how land use and soil properties shape catchment hydrology.

### Influence of Land Use

### on the Hydrological Regime

Model outputs and parameter sensitivity analysis confirmed that land use exerts a clear influence on catchment-scale hydrology.

Forested catchments, such as Iecava and Pērse, exhibited attenuated hydrographs with delayed peaks and more

sustained baseflows. These effects reflect the known buffering role of forest ecosystems, which promote infiltration and evapotranspiration [14].

By contrast, the Imula basin, with over 60% of land in cultivation, generated quicker runoff responses. Rainfall in this basin was converted more rapidly into direct runoff (Q1) and shallow interflow (Q2), particularly due to reduced infiltration capacity and increased surface drainage—common in intensively managed agricultural landscapes.

Urban areas, although covering less than 1% of basin area, had a disproportionate impact on runoff. Urban hydrological response units (HRUs) generated rapid surface flows during storm events, producing earlier and steeper hydrograph peaks [6].

Figure 3 provides a conceptual illustration summarising these observed differences in runoff generation mechanisms associated with forested, agricultural, urban, and wetland land uses. As shown, forested and wetland areas effectively delay runoff through interception, infiltration, and sponge-like water storage. Conversely, agricultural and urban landscapes exhibit accelerated runoff due to reduced infiltration and higher surface imperviousness.

To evaluate the hydrological implications of potential land use changes, scenario simulations were conducted. These indicated that:

- A 5–10 % increase in urbanised land could raise peak discharges by up to 15% in the Iecava and Imula basins.
- The implementation of green infrastructure (e.g. retention ponds, permeable pavements) could reduce peak flows by 5–8 % [16].

These results are summarised in Figure 4 and underline the importance of incorporating land use impacts into flood risk and spatial planning strategies.

## Discussion

### Integrating Hydrology into Landscape Planning

This study has demonstrated that conceptual hydrological models such as METQ are valuable tools for linking catchment-scale hydrological processes with landscape planning practice. Model calibration with detailed land use data provided quantitative evidence of how variations in Latvian landscapes influence runoff response.

Importantly, the findings illustrate that identical rainfall inputs can produce markedly different runoff outcomes depending on land cover. Forested zones in the Iecava basin, for instance, consistently moderated flood peaks more effectively than agricultural or urban areas. These results reinforce the hydrological significance of forest conservation in landscape planning [14].

Therefore, planners should prioritise preserving forests, riparian buffers, and wetlands to enhance flood mitigation and improve
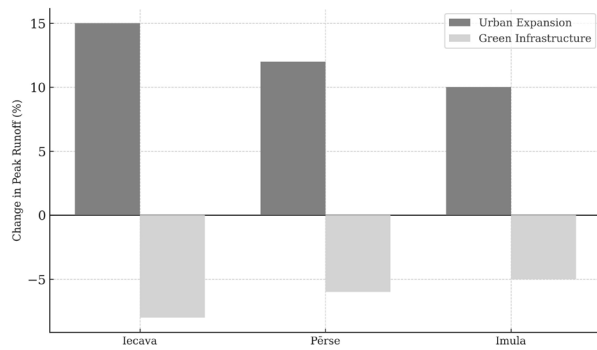
Fig. 4. Simulated changes in peak runoff under urban expansion (+10% impervious area) and green infrastructure implementation.
Values represent relative change in peak discharge for the Iecava, Pērse, and Imula river basins [created by authors, 2025]

water retention. In urban contexts, green infrastructure - such as bioswales, rain gardens, and permeable surfaces - offers a cost-effective and ecologically sound strategy for mitigating increased run off. Based on the modelling evidence, it is recommended that hydrological impact assessments become a standard component of land conversion projects, especially where deforestation or urban expansion is proposed

*Rural–Urban Coordination*

The results also underscore the need for better coordination between rural and urban land use planning. Hydrological processes do not adhere to administrative boundaries: surface runoff generated in upstream rural areas can affect downstream urban flood risk, and vice versa.

Restoring forest cover in headwaters or maintaining wetlands in agricultural zones may yield more sustainable outcomes compared to investments in large-scale downstream flood infrastructure. Likewise, poor urban stormwater practices can influence stream baseflow and nutrient loads in rural areas.

Catchment-scale planning offers a solution to these interconnected challenges [12]. The METQ model proved useful for simulating these interactions and can serve as a decision-support tool to promote cross-boundary planning cooperation.

*Climate Resilience and Land Use*

Projected climate changes for Northern and Eastern Europe - including increased winter precipitation, earlier snowmelt, and more frequent extreme rainfall events—are expected to amplify hydrological risks [8; 4]. These risks are particularly acute in areas where natural buffering features have been degraded or removed.

The modelling results confirm that land use significantly shapes hydrological response, making it a critical lever for climate resilience planning. Forests and wetlands provide low-regret adaptation benefits by absorbing stormwater and delaying runoff. In this context, strategic landscape management - guided by model-informed scenario analysis - should become a central pillar of local and regional adaptation efforts.

*Extending the Role of Hydrological Modelling*

Although this study focused on runoff quantity, land use also influences water quality, particularly through agricultural nutrient runoff. While METQ was not used here for modelling water quality, its conceptual design allows for potential integration with nutrient transport modules.

Such a coupling would support multi-objective planning, enabling assessment of both flood reduction and water quality benefits from measures such as wetland restoration or reduced tillage.

Future work should explore these opportunities, aligning with calls for integrated hydrological–ecological modelling in planning practice [16; 12].

*Model Limitations and Planning Implications*

As with all conceptual models, METQ involves simplifications. Its spatial generalisation limits its ability to simulate detailed urban drainage infrastructure, such as culverts or stormwater tanks [7]. Furthermore, scenarios extending beyond calibration conditions introduce parameter uncertainty.

Land cover data must also be regularly updated to ensure modelling accuracy. The growing availability of high-resolution satellite imagery—particularly through EU platforms such as Copernicus—offers practical solutions for this.

Despite these limitations, the METQ model provides robust, interpretable outputs that can inform strategic planning. Used appropriately, it enables decision-makers to explore sustainable land use configurations and visualise the hydrological impacts of development.

**Conclusion**

This study has demonstrated that effective landscape planning in Latvia—and across comparable Baltic contexts - depends on a clear, integrated understanding of catchment-scale hydrological processes.

By applying the METQ conceptual hydrological model to three contrasting river basins, the influence of different land use configurations on runoff generation, peak flows, and water balance was evaluated.

The model was successfully calibrated using long-term observational data, achieving satisfactory predictive performance across rural, forested, and agriculturally dominated catchments. These results confirm METQ's suitability as a decision-support tool for sustainable land use planning, especially in regions with incomplete hydrological records.

Forested and semi-natural areas were shown to moderate surface runoff, support infiltration, and sustain baseflows, while intensively cultivated and urbanised landscapes were found to accelerate runoff and produce elevated peak discharges. Even minor expansions in impervious surfaces resulted in disproportionate impacts on flood dynamics. Conversely, the implementation of green infrastructure measures—such as retention ponds and permeable pavements—was associated with measurable reductions in peak flows.

These findings reinforce the importance of preserving forests, wetlands, and floodplains as natural buffers and of integrating green infrastructure into urban design. They also highlight the value of hydrological modelling in assessing land use trade-offs and supporting evidence-based planning.

Hydrological impact assessments, supported by models such as METQ, should be integrated into spatial planning processes, especially when evaluating significant land conversion proposals. This would ensure that the hydrological consequences of development are understood and mitigated in advance, reducing long-term risks to both communities and ecosystems.

Maintaining accurate and current input datasets—particularly land cover, meteorological, and streamflow data—is critical for continued model reliability. Open-access platforms such as Copernicus should be leveraged to ensure that modelling remains up to date and responsive to landscape change.

The need for interdisciplinary collaboration between hydrologists, landscape architects, planners, and engineers is emphasised. Although hydrological models can be technically complex, their outputs can be effectively translated into actionable guidance for policy and design. When used collaboratively, models such as METQ enable more resilient, multifunctional landscapes that balance ecological integrity, flood protection, and human development.

This study demonstrates that conceptual hydrological modelling provides a practical and scientifically grounded

framework for guiding sustainable land use decisions in Latvia. The approach and insights presented here are relevant not only to national planning efforts but also to broader regional challenges across the Baltic and Northern Europe. Integrating hydrology into landscape architecture will be increasingly essential to support the development of resilient and sustainable landscapes under intensifying climate and land use pressures.

## Acknowledgements

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## Kopsavilkums

Efektīva ainavu plānošana prasa padziļinātu izpratni par to, kā zemes izmantošana ietekmē hidroloģiskos procesus, īpaši Latvijā, kur klimata pārmaiņas, urbanizācija un nepilnīgi hidroloģiskie dati apgrūtina lēmumu pieņemšanu. Pētījumā izmantots konceptuālais hidroloģiskais modelis METQ, lai analizētu trīs Latvijas upju baseinus – Iecavas, Pērses un Imulas, kas atšķiras pēc mežu, lauksaimniecības un pilsētu teritoriju proporcijas. Modelis kalibrēts un validēts, izmantojot ilgtermiņa hidroloģiskos un meteoroloģiskos datus, lai modelētu diennakts noteci un novērtētu zemes izmantošanas ietekmi uz plūdu risku un ūdens bilanci. Rezultāti parāda, ka mežaini un daļēji dabīgi apgabali samazina virszemes noteci un aiztur plūdus, savukārt intensīvi apstrādātas un urbanizētas teritorijas palielina plūdu risku. Pat neliels necaurlaidīgo virsmu pieaugums ievērojami palielina noteces maksimumus, bet zaļā infrastruktūra – lietus dārzi, caurlaidīgi segumi, dīķi – spēj mazināt šos efektus. Pētījums pierāda, ka METQ modelis sniedz ticamus, telpiski diferencētus hidroloģiskus datus, kas ir noderīgi ilgtspējīgai teritoriju plānošanai un klimata riska pārvaldībai. Modelēšanas rezultāti uzsver nepieciešamību saglabāt mežus, purvus un piekrastes buferzonas, kā arī iekļaut hidrologisko analīzi teritoriju attīstības plānos. Autori iesaka hidroloģiskās ietekmes novērtējumus integrēt kā obligātu daļu teritoriju plānošanas un zemes izmantošanas veida maiņas projektos, nodrošinot līdzsvaru starp ekosistēmu funkcijām, plūdu aizsardzību un ekonomisko attīstību. Pētījums apliecina, ka hidroloģiskā modelēšana ir praktisks un zinātniski pamatots rīks ilgtspējīgas ainavu plānošanas nodrošināšanai Latvijā un citos Baltijas reģiona kontekstos. Šī pieeja palīdz stiprināt ainavu noturību pret klimata pārmaiņām, nodrošina ūdens resursu ilgtspējīgu izmantošanu un atbalsta starpdisciplināru sadarbību starp hidrologiem, ainavu arhitektiem, plānotājiem un inženieriem.

# STAGES OF RESTORATION OF MEDIEVAL ARCHITECTURAL MONUMENTS. LATVIAN EXPERIENCE

## Ojārs Spārītis

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**Abstract.** The purpose of the article is to provide a focused overview of the evolution of measures taken to protect Latvia's medieval architectural heritage as a value of material culture, from the restoration of the functionality of utilitarian architectural objects to the complex implementation of scientific methodological and technological techniques for the preservation of the original substance through conservation, restoration and partial restoration. In European society, both approaches to the preservation of architecture have always coexisted: both practical and aesthetic, with the latter partially appraising the artistic value in addition to its utilitarian function. The scope and attitude of their application have been dictated by rational considerations. It was only the academically educated European society of the Age of Enlightenment and the 19th century came to understand the importance of historical, symbolic, emotional and aesthetic values of architecture, laying the foundations for the theory and practice of architectural heritage preservation. In the experience of preservation of medieval architecture in Latvia, there have been both ups and downs of a prudent attitude, caused by either political cataclysms or a revisionist attitude. Taking care of the preservation of their cultural heritage, since the second half of the 18th century, the Baltic German community in Latvia have been trying to discover and nurture the evidence related to their immigration to the Baltics. This was done with encyclopaedic historical research and also with early archaeological and architectural research methods. A hundred years ago, the protection of Latvia's cultural heritage developed as a science-and-research-based system, but due to insufficient resources, it did not become comprehensive. After the Second World War, cultural heritage preservation was dictated by a politicized approach and ideological motives. The re-establishment of Latvia's independence in 1991 could provide support for a modern scientific, methodological and theoretical basis as well as appropriate technical and professional realization of the conservation and restoration. of medieval architectural monuments.
Keywords: restoration, conservation, architecture, the Middle Ages, cultural monument

## 1. Formation of value consciousness

Mission work in the late 12th and early 13th centuries was unthinkable without the subjugation of territories and peoples, as had been the case since Charlemagne's efforts to establish a Frankish state as the core of European Christian identity. Subjugated and Christianized by the bishops with the help of the Sword Brothers and the Teutonic Order, Livonia had to become a safe trade bridge for Hanseatic merchants and craftsmen between Mecklenburg, Westphalia, also the port cities of Northern Europe and the principalities of Smolensk, Polotsk and Novgorod, beyond which the trade routes extended further to Kiev, Baghdad, Kabul and even Beijing [18]. With the first decades of the conquest and Christianization of Livonia, knowledge of masonry architecture and skills in the construction of typologically different buildings and structures reached also Livonia. By dividing the conquered lands into administrative territories along the overland trade routes and on the banks of the most important rivers, both the Teutonic Order and the bishops organized the construction of military defence structures. The same happened inland as well, where both feudal lords established the so-called "table manors" or leased lands to their vassals to manage the territory and secure the market. Stone castles were also built in the centres of these economic units for production and tax collection, which in the cultural landscape of the Baltics still largely bear witness to the consequences of the colonization policy.

In the 13th and 14th centuries, following the European model, towns of a certain administrative and legal status developed at the ports and the intersections of trade routes. Their architectural image was determined by such typological features as the presence of a fortified defensive wall (Riga, Valmiera, Cēsis, Limbaži), town halls, guild houses and public buildings, churches and monasteries, hospitals and asylums, residential buildings and warehouses. In the eight oldest medieval cities of Latvia – members of the Hanseatic Trade League (Riga, Straupe, Valmiera, Limbaži, Cēsis, Koknese, Kuldīga, Ventspils) – only a limited number of medieval architecture have survived to this day because of political and economic consequences. The attitude towards a functionally

usable building, or vice versa - a building of merely historical interest - has been different at different times, with a pragmatic, or a romantic approach prevailing, disregarding the content of the term "restoration".

For example, after the conquest of Vidzeme in the last decade of the 16th century, the officials of the Polish king carried out an inventory of the most important medieval fortresses to be reflected in "metrics". The purpose of this stock-taking was the assessment of the defence structures in the conquered territory according to their suitability for military purposes and the calculations of the budget required for repairs or reconstructions. However, the attitude towards the fortresses that were not included in the strategy of the Polish defence doctrine and could serve the enemy as a shield in an attack was depreciatory. Christian Kelch, pastor of St. John's Church in Järve, Estonia, in his chronicle "Liefländische Historia" described the Polish king Sigismund August's attitude towards fortresses in the following way: *"weil auch die Vielheit der Schlösser und festen Häuser in Liefland zur Krieges Zeit dem Lande mehr schädlich als nützlich, zumahlen der Moscowiter (als welcher Lieflandes gefährlichster Nachbar) ein solcher Feind, der zwar leicht aus dem Felde zu schlagen, wann er aber, wie letzt geschehen, ein Hauß und Vestung nach dem andern einbekäme, übel wieder auszutreiben wäre. Als begehrten Königliche Majestät, daß alle die von Adel ihre Schlösser und feste Häuser schleiffen, und nur den innern Stock zum Wohnhause behalten, und selbigen mit einen hölzernen Stackete verwahren solten. Und damit sie so viel weniger Ursache haben sollten, sich dessen zu weigern, wollten Königliche Majestät an etlichen ihren eigenen Schlössern hierzu den Anfang machen"* [19].

During the Swedish rule, an official was appointed to Vidzeme (Livland) as the executive of the State Antiquary, whose duties included creating lists of rare and artistically valuable objects, recording historical inscriptions, ornaments and texts on tombstones. Already during the lifetime of Gustavus Adolphus, the Swedish administration had entrusted this work to Martin Aschaneus, and at the end of the 17th century,

to Christoff Zeigner, the Riga Dom School professor [29].

In the modern sense, restoration as a method of preserving the functionality, architectonic and artistic elements of an architectural monument is a concept whose content, although fixed in many internationally accepted documents, including the charter adopted in Venice in 1964, is constantly developing and goes hand in hand with the maintenance, preservation and conservation tasks [28]. Ever since the Age of Enlightenment, the increased attention of the intellectual society to the architectural heritage has brought about a change of opinions about the loss of the functionality, material and visual value of the architectural object, as well as about the means and techniques for preservation of these qualities. Modern restoration theory has evaluated both the medieval, Renaissance and Baroque approaches to the practice of preserving architectural heritage, the main being to ensure the functioning of buildings by supplementing the lost parts in the forms and materials of their time.

## 2. Renovation as protection and origin of restoration

Until the beginning of the 20th century, talking about restoration in its traditional modern sense concerning the protection of Latvian cultural heritage is impossible because architects and builders did not have binding methodological as well as legislation-based documents on the sequence and technical performance of the tasks. In the late Enlightenment period, an important step in understanding the protection of cultural monuments was the first law on the protection of monuments issued by Tsar Nicholas I on December 31, 1826: an order for the enforcement of police institutions in all provinces to list ancient buildings and describe their condition without damaging them.  Since the late 18th and early 19th centuries, the information and pictures of the medieval construction monuments recorded in the manuscripts and printed works of J.C. Brotze, co-rector of the Riga Imperial Lyceum, and of Philip Kerber, pastor of the Wendau parish, display efforts to educate the public to treat the evidence of the past with care.

In the mid-nineteenth century, the Baltics experienced rapid industrial growth, which demanded sacrificing a large part of the historical architectural heritage, mainly in the cities. The Baltic German community in leading political and administrative positions, remained interested in economic development although some of the landed gentry and intelligentsia, united around the Society for the Research of History and Antiquity (*Gesellschaft für Geschichte und Altertumskunde*), founded in 1834, perceived in this "progress" both unwelcome tendencies of Russification and a threat to their own culture. While congratulating the plans for the demolition of Riga's ramparts and modernization of the city, the Society-allied landlords and architects drew attention to the demolition of medieval buildings that revealed the architectural fragments of the bishop's castle in the foundations and brick walls of the earlier Mūku, Mazā and Lielā Bīskapa streets, and evidence for the hypothesis of the location of the oldest Town Hall in the building details of No. 4 Tirgoņu Street [33].

In 1884, the research and restoration of the Riga Dom Church was put forward as a particularly important task for the protection of cultural heritage. The nineteenth-century fondness of Eclecticism also introduced a romanticized and intuitive approach to restoration among Riga's historians and architects, whose representatives practised experimental reconstructions, using fragments of lost originals to obtain decorative and compositional solutions. This approach is demonstrably proven by the cycle of renovation and



Fig. 1 The Riga Dom [photo by O. Spārītis]



Fig. 2. Cross Gallery of the Riga Dom [photo by O. Spārītis]

restoration works at the Riga Dom that lasted almost thirty years. The architect Reinhold Guleke, a professor at the Dorpat University, had offered a project for the reconstruction of the western façade and the construction of two towers in stylized Romanesque forms, but the Dom construction company (est. 1885) rejected it and entrusted the work to Karl Neuburger. Demolition of poor-quality occasional extensions, architectonic research and early restoration began with the transformation of the southern façade in 1887. Following the decision of the Dom construction company, the architects Wilhelm Bockslaff, August Reinberg, Vilhelm von Strick, Karl Mohrmann and Wilhelm Neumann in 1888 gradually became involved in the restoration. Their contribution included the restoration of the Chapter Hall, the theoretical reconstruction of the tonsory, the restoration of the Cross Gallery with its capitals and consoles. The work was completed in 1894 [30].

In the following years, W. Neumann took over the supervision of the restoration and proposed to use new bricks for the restoration of the eastern and northern façades, to build a theoretically reconstructed vestibule in front of the northern portal,  to complement St Mary's chapel with  innovations in neo-Gothic forms, to erect a new cement-cast portal and a rose window on the north façade of the tower (Fig.1, 2).

The restoration of the Riga Dom that lasted till 1912 included a whole complex of various professional activities related to the preservation of the technical condition of the cultural monument. They can be qualified as removing unwanted layers, repair and conservation of the original substance, as well as the era-appropriate restoration, and innovations implemented with the method of stylistic reconstruction, which included modern elements adapted mainly for decorative finish and the interior [12]. Great encouragement

Fig. 3. Castle of the Teutonic Order in Cēsis [hoto by O. Spārītis]



Fig. 4. Ēdole Castle [photo by V. Mašnovskis]

for this direction of restoration related to the principle of historicity (or historicism) in the 19th century was provided by the practice of the French architect Eugène Violette-le-Duc, who combined the techniques of both restoration and reconstruction, as well as stylized novelty methods [21]. On the initiative of the architect Wilhelm Neumann, the framework of the wall tomb of Meinhard, the first bishop of Livonia, in the northern wall of the choir of the Riga Dom was restored that clearly revealed the shortcomings of the romanticized approach in the restoration of cultural monuments. Based on C.J. Brotze's drawings and approximate measurements in 1775, W. Neumann in 1892 developed an academic theoretical project for a neo-Gothic wall tomb [6].

With the efforts of the historian Joseph Girgensohn, amateur history researchers Anton Buchholz, Gustav von Sengbusch, Nikolai Bockslaff, Karl von Loewis of Menar, architects Wilhelm Bockslaff, Wilhelm Neumann, Heinz Pirang, August Reinberg and other enthusiasts who were involved in the activities of the Society for the Research of History and Antiquity, extensive research and surveys of medieval architecture were carried out in Riga in the late 19th and early 20th centuries.

When uncovering the ancient structures, architectural details, wall and ceiling paintings and carrying out their partial conservation in Riga, the Baltic German architects followed the theoretical principles of the restoration and reconstruction theorist and architect of the Marienburg [Malbork] Castle Conrad Steinbrecht and maintained professional contacts with him. In 1887, inspired by the authority of C. Steinbrecht, Karl von Löwis of Menar identified the walls of the altar,

apse and congregation space of St George's Church (built by the Sword Brothers) in the buildings of the Convent Yard that was rebuilt after the Reformation. In 1888, the architect Wilhelm Bockslaff in the architecture of Riga's St Peter's Church identified traces of structures and original vaults built by Johann Rumeschottel, the master builder of St Mary's Church in Rostock. During the restoration of both Riga's St Jacob's and St John's Churches, the remains of ornamental and figural paintings were uncovered, but the methods of the restorers in the late 19th century and the insufficient degree of preservation of the paintings rendered restoration ineffective. In the late 19th and early 20th centuries, architects Wilhelm Bockslaff and August Reinberg discovered structures of St Catherine's Church and monastery concealed in the reconstruction of residential buildings. In a similar way, several medieval fragments have been identified in the Riga fortification walls and the watchtowers that had been considered lost: material for research and restoration.

The twentieth century introduced new knowledge, methods, technologies and materials into the practice of protection and restoration of European cultural heritage. Owing to the involvement of the Historical Research Society, archaeological excavations, surveys of medieval castles and protective measures to strengthen the ruins against erosion had already been carried out. However, only the initiative of Emanuel von Sievers Jr., owner of the Cēsis manor house, can be considered a measure of architectural monument conservation, not restoration. It envisaged, in 1914, to save the Teutonic Order castle's western or Master's Tower with a conical-shaped tiled roof, which has ensured the preservation of the wall structures, vaults and interior elements to the present day (Fig. 3).

At the first congress of Baltic historians in Riga in April 1908, the Riga Society of Architects and the Society of History Researchers agreed on the establishment of the Commission for the Monuments Protection (Kommission für Denkmalpflege), with the architect Wilhelm Neumann as its chairman [31]. However, since the Society of History Researchers was only a private foundation, the focus of this enthusiasm-based initiative was also more focused on ascertaining the state of sacred architecture using the method of inventory.

The renovation of medieval buildings and elements of restoration had to be tackled on a larger scale after 1905, when several families of landed gentry had to restore their burned medieval castles. There were several of them in Kurzeme - Dundaga, Jaunpils, Ēdole, but the most significant loss to Vidzeme's cultural heritage was the burning of the Lielstraupe Castle. The most prominent families of landed gentry, who had sufficient means at their disposal, embarked on the rebuilding task. During the period from 1906 to 1911, the renovated Ēdole Castle façade regained greater monumentality, abandoning the Tudor Gothic details of 1835-1841 (Fig. 4), [2].

On the order of Christian von der Osten-Sacken, the German architect from Braunschweig, Hermann Pfeiffer, in 1909 developed a project for the restoration of the Dundaga Castle [13]. He supplemented the burnt down medieval building with stylized interior elements, while the façades were supplemented with new structures, neo-Gothic merlons, as well as figural and heraldic reliefs on the facades, made by the sculptor August Foltz. The experience and talent of the architect Wilhelm Bockslaff were put to use in the renovation of the castles at Lielstraupe and Jaunpils, which had been burned down in 1905. Both castles had lost their historical interiors that were replaced with simplified neo-Baroque

and neo-Classical elements – wall panels, new doors and stoves, plaster mouldings. More substantial reconstruction took place in Jaunpils. The northern wall facing the pond in Jaunpils was complemented with an Art Nouveau bay window and a loggia, while the lattice construction lent a romantic "thieves' staircase" image to the stairs in the corner of the yard. Moreover, Hans von Rosen, the owner of the Lielstraupe Castle, requested Wilhelm Bockslaff as an imitator of refined historical styles in architecture to give an archaic appearance to the 13th century Riga archbishop vassal's castle. When the restoration of the Lielstraupe Castle was completed, the architect Heinz Pirang assessed the retrospective achievement of his colleague as a true embodiment of medieval philosophy [4].

## 3. Development of a national approach

The professional interest of Baltic German historians and architects with their scientific publications formed an academic basis for the activity of public organizations related to the research of Baltic history and culture [23]. They developed and refined understanding of the care, promotion and protection of cultural monuments, including the beginnings of science-based restoration. However, practical restoration in Latvia in a scientifically and legally approved manner began only in 1923 with the establishment of the Monuments Board and the Saeima adoption of the "Law on the Protection of Monuments" [22]. Until then, individual projects comparable to restoration were not systematic, but rather occasional in nature, manifested mainly by corporate or private initiative. From 1918 to 1940, the protection of cultural monuments, including measures for the conservation and restoration of medieval architecture, became part of state policy, which was inevitably influenced by both the economic situation and ideological standpoints. This attitude is illustrated by the 1935 list of state-protected monuments with only 35 of the 100 medieval castle ruins identified in the territory of Latvia [25].

From 1937 to 1939, small-scale preventive conservation and wall strengthening works were carried out in the castle ruins of Cēsis, Rauna, Koknese and Sigulda. However, at the same time, at the meeting of the Monuments Board on July 18, 1939, it was decided to exclude the castle ruins of Rēzekne and Grobiņa from the list of protected objects [40]. With the ongoing revisionist trend aiming to reduce the number of financially intensive monuments, the possibility of starting the demolition of the castle ruins of Rēzekne, Ludza, Grobiņa and Dobele was considered. A precedent for a similar practice was the conciliatory position of the Monuments Board in the case of the demolition of the northern block of the Mazstraupe Castle [26] and the reconstruction of the Krustpils Castle, allowing the latter to be used for the needs of the Latvian Army [24].

During the interwar period, archaeological and architectonic research was carried out in individual objects of medieval sacral architecture in Latvia as well as efforts were taken to get rid of the damage of the First World War. For the most part, it concerned the medieval sacred architecture of the regions but did not affect Riga. In 1927, under the leadership of the Swedish architect Helgi Kjellin, excavations were carried out in the ruins of the Ikšķile Church, and measurements of these ruins were also made [39]. Based on the research and on behalf of the Board of Monuments, P. Kampe developed a project for the restoration of the oldest part of the church, intending to abandon the late 19th century neo-Gothic reconstructions. However, the project remained unimplemented [20]. In connection with the Aizkraukle mound archaeological excavations, the archaeologist Pēteris Stepiņš in 1939 excavated and measured the foundations of the Aizkraukle


Fig. 5. Fresco "Crowning of Mary", the Riga Dom [photo by V. Mašnovskis]
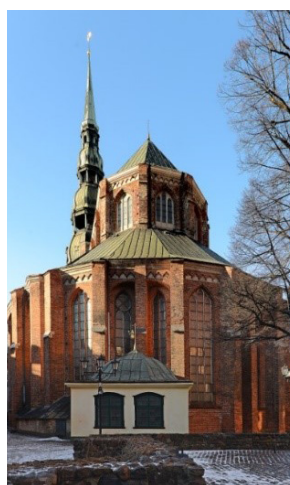

Fig. 6. Choir part of St Peter's Church in Riga [photo V. Mašnovskis]
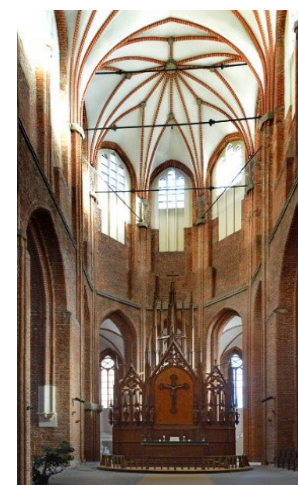

Fig. 7. Nave of St Peter's Church in Riga [photo V. Mašnovskis]


Fig. 8. Ruins of the Ikšķile Church after conservation [photo by O. Spārītis]

medieval church, which allowed to reconstruct the plan of the church [37]. Architects Pauls Kundziņš (Rauna, 1936-1937) and Pēteris Ārends (Lielstraupe, 1938) supplemented the interiors of the churches with stylized vaults, thus creating a visual image consistent with the aesthetic ideas of the 20th century [27]. Summarizing Latvia's state policy in the field of protection and restoration of monuments in the 1920s-1930s, it appears ideologically motivated, insufficiently supported in terms of finances and thus unable to embrace the entire spectrum of the heritage.

The Second World War caused irreversible damage to the cultural heritage of both Latvia and Riga. In the first days of the war, part of the administrative centre of the medieval city was destroyed. Fire ravaged the Town Hall and the Blackheads House, as well as St Peter's Church. As the front line moved to the east, Riga's architects embarked upon the

survey of the ruins of the damaged cultural symbols and carried out preliminary works for their conservation. In 1943, the architect Pēteris Ārends published the book "Blackheads House in Riga" [Melngalvju nams Rīgā], and a year later a book documenting the history of the church and the damage caused by the fire: "St Peter's Church in Riga" [*Sv. Pētera baznīca Rīgā*] [1]. Already in the summer of 1941, museum employees and students of the Faculty of Architecture of the University of Latvia, who had been invited by the initiative of the Monuments Board, took part in the removal of the ruins and the measurement of the most important details. To ensure St Peter's reconstruction in the autumn of the same year, the Riga City Directorate of High-rise Buildings erected a protective wall of boards above the entrance portals, while the aisles of the church and the crown of the chapels were covered with a temporary roof. However, in the final phase of the war, in the autumn of 1944, these preventive defence structures were also destroyed [38].

## 4. The approach during

## the Soviet occupation period

### (1944/1945-1991)

The repressive Soviet power imposed ideological clichés on Latvian cultural life and deformed the cultural heritage protection system. In 1948, sappers of the Soviet Army blew up the remains of the Blackheads House medieval walls, and the walls of the Town Hall were also demolished in 1954. The expropriation of the Riga Dom created a paradoxical precedent in the protection of cultural heritage, allowing funds to be officially allocated for the repair and partial restoration of the medieval sacred building. On the completion of the renovation works in 1962, the Riga Dom church was transformed into a concert hall and museum for 40 years to come. Only in 1989 was the church returned to its rightful owner - the Evangelical Lutheran Church of Latvia. Repeated repairs, visual improvement of the Dom, restoration of the organ took place in 1982-1984, while in 1986-1987, under the supervision of the architect Juris Galviņš, the conservation of the consoles and capitals of the cross gallery was carried out [11]. The Czech restorer Miloš Gavenda in 2009-2010 restored the 14th-century fresco "Crowning of Mary" above the northern portal of the church (Fig. 5), [9]. Since 2011, the restoration of the church has been ongoing, preventing the harmful effects of groundwater in the foundations and walls of the church.

The tower walls of St Peter's Church in Riga received a temporary roof structure only in 1950, while the preparatory work for restoration under the architect Pēteris Saulītis commenced in 1954 and continued until 1970. Gradually, a roof was put on the aisles and the nave, the vaults were strengthened and restored, construction parts were measured, and the project of the organ balcony and administration rooms was developed. To continue the work on the restoration of the church, the decision of the Council of Ministers of the Latvian SSR on June 11, 1966, which defined the future use of the church for the purposes of a museum, exhibitions and tourism, was necessary. In cooperation with the specialists of the Science Council of the All-Union Ministry of Culture and the restoration and construction organizations of the Belarussian SSR, a project was developed for the restoration of the Baroque spire of the tower. It provided for the installation of a high-speed lift in the centre of the tower metal structures. The restoration of the church and the reconstruction of the tower were completed on August 21, 1970 (Fig. 6, 7), [35].

In the context of the restoration of Latvian medieval architecture, the conservation measures of the Ikšķile church are notable. The project that was developed in 1962-1963 by the architect Gunārs Jansons and the historian Roberts Malvess was implemented for the conservation of the ruins of the church that had been damaged by shelling in 1916, and the marking of the contours of the foundations with the aim of providing a visual representation of the lost volume and preserving the most important details. The speeded construction of the Riga HPP in 1968 also brought unwanted haste to the preservation of the medieval castle and church ruins of Ikšķile. The planned increase of the water level by about 1.5 m above the level of the church floor threatened to turn the territory of the cultural monument into an island. Thus, in 1973-1975, a compromise decision was reached to raise the surface of the island by two metres and bury the foundations of both the castle and the church with gravel and rubble [16]. To protect the walls of Latvia's oldest masonry architectural monument from adverse weather conditions, a metal canopy was installed in 2002 over the church ruins (Fig. 8). The conservation measures of several medieval castles were stimulated by their archaeological and architectural research. It created favourable conditions for the use of these objects for educational and tourism purposes. Archaeologists Jānis Graudonis, Jānis Apals, Ēvalds Mugurēvičs, Andris Caune and Ādolfs Stubavs developed recommendations for the conservation and further use of medieval architectural objects [34]. Their initiative was supported by the Ministry of Culture and the State Inspection for the Protection of Cultural Monuments. The Society for the Protection of Nature and Monuments of Latvia, founded in 1959, further popularized these goals of cultural education and patriotic regional studies among wider public.

The Cēsis Castle of the Teutonic Order in Livonia ranks among the most important medieval architectural monuments in Latvia. Its function at the edge of the wall-protected town was to serve as the residence of the Master of the Order and,


Fig. 9. View of Turaida Castle ruins, 1930 [photo by E. Ansulis]


Fig. 10. View of the restored bergfried, granary and the semi-circular tower in the courtyard of Turaida Castle [photo by V. Mašnovskis]

Fig. 11. Reconstructed Blackheads House [photo by V. Mašnovskis]



Fig. 14. Castle of the Teutonic Order in Ventspils [photo by O. Spārītis]



Fig. 12. Sigulda Castle ruins after conservation and improvements [photo by O. Spārītis]
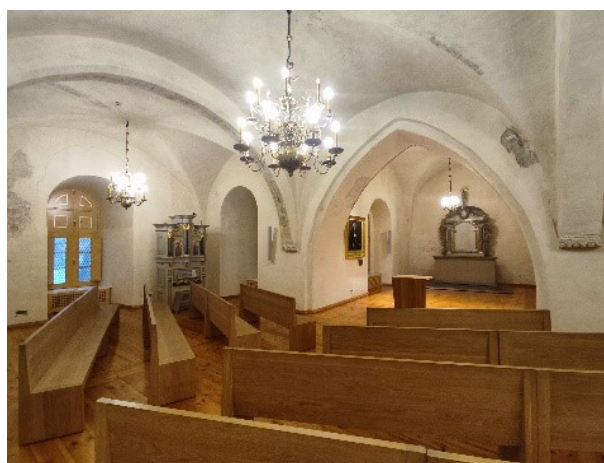


Fig. 15. Chapel of the Ventspils Castle [photo by O. Spārītis]



Fig. 13. Conservation structure of the watchtower as a tourist viewing platform at Sigulda Castle ruins [photo by O. Spārītis]

together with St John's Church, form a military, administrative and religious complex. Partial conservation of the northern tower and the castle walls was carried out already in 1952-1960 under the supervision of the architect Ojārs Treigūts. Since 1974, the archaeological excavations under the archaeologist Zigrīda Apala have uncovered parts of the western block of the castle, the buried cellars, bridge structures and fragments of the forecourt buildings that had been destroyed since the Livonian War [15]. Conservation of the most important parts has eliminated the most critical risks of erosion, and the castle is open for the purposes of educational tourism.

Noteworthy objects of Latvia's cultural and historical heritage are the castle ruins of Sigulda and Turaida, whose romantic attraction was already known during the Enlightenment period. The strengthening of the northern tower of the

Sigulda castle ruins according to the project of the architect G. Zirnis was already carried out in 1962, but in the following period the Chapter Hall and the chapel were conserved and restored under the supervision of the architect T. Vītola [7]. The link between the early construction period of the castle and the Order of the Sword Brothers is reminded by the so-called Jerusalem cross, preserved in the red-brick pediment of the chapel. In 2011-2012, with the European Union co-financing, extensive conservation and partial reconstruction of the Sigulda castle ruins were carried out that created a safe infrastructure for cultural events in the inner courtyard of the fortress and adapted the northern and southern towers for tourist visits.

The present-day image of the Turaida Castle, residence of the Archbishop of Riga, is formed by the sum of various components that includes both emotional cognitive values and the information obtained through archaeological research, conservation and restoration. The construction of the viewing area in the ruins of the defence tower, bergfried, in 1936, is noteworthy as the first conservation measure of the castle ruins. According to the project developed by the architect Kārlis Vikmanis, in 1953-1959 the tower was raised by about one third. It was given several new floors, a visitor entrance was created, the inside staircase system was restored and topped with a conical roof (Fig. 9, 10), [17].

The granary, the best-preserved building of the castle, was also restored in 1961 according to the project of the architect G. Zirnis. Until the mid-20th century, the walls of the semi-circular defence tower had survived at a height of about 15 metres. The conservation measures in 1962 protected the walls from erosion, but the entire restoration of the semi-circular tower was completed in 1973 according to the project of the architect G. Jansons. The archaeological excavations

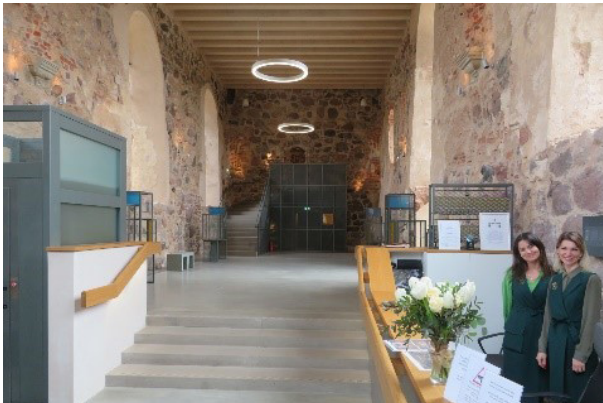Fig. 16. Chapel block at the Dobele Castle ruins [photo by O. Spārītis]



Fig. 17. Interior of the former chapel after renovation [photo by O. Spārītis]



Fig. 18. The Riga Castle [photo by O. Spārītis]



Fig. 19. Chapel of the Riga Castle during restoration [photo by O. Spārītis]

under the archaeologist Jānis Graudonis were started in 1976 which made it possible to develop a plan for the scientific research, conservation and restoration of the castle ruins, adapting the castle ensemble for the needs of the Sigulda Local History Museum. The restored castle defence wall creates the necessary seclusion for the museum territory. To avoid exaggerated historical credibility when restoring the medieval fortress, the uncovered foundations of the southern and northern blocks of the castle have been strengthened by conservation. This technique protects the foundations from further erosion and provides minimal information about the configuration of the castle ensemble building plan.

## 5. Continuation or a new beginning?

In the brochure "Restoration" published by the National Cultural Heritage Board in 2019, the art historian Dace Čoldere wrote: "With the re-establishment of the independent State of Latvia, the field of restoration in 1991 did not start completely anew - as is known, the monument protection system in Latvia had been operating since 1923 and, thanks to the people who continued to protect the heritage, maintained its continuity during the Soviet period. Neither had restoration as a field of activity to be reinvented" [10]. This description, in a generalized form, includes the idea of implementing a sustainable policy of protection of cultural monuments under changing economic and political conditions, which directly affected the choice and result of the objects to be restored, but allowed the advance of new knowledge about conservation methods and restoration technologies and materials.

The technical conditions of the medieval building monuments that have survived to the present day are not uniform, so a complex approach is needed to improve them. The measures taken for the preservation of medieval architectural monuments reflect the methodological and technological approaches for improving the technical condition depending on the intended function for each individual object. Even several methods can be used on one monument – conservation, restoration, as well as reconstruction, as has been done, for example, in the complex research and adaptation of the Turaida Castle ruins to the function of a museum. However, from the point of view of the philosophy of cultural heritage protection, reconstruction is the last and least recommended method, to be used only in rare cases that are justified by the policy of culture. In Latvia's architecture, this approach was applied in the reconstruction of the Blackheads House in Riga that had been destroyed in the Second World War (Fig. 11), individual elements of the Turaida Castle complex, the state stairs, roof and interiors of the Renaissance block of the Bauska Castle.

Considering the large number of castle ruins in Latvia, it is the conservation measures that are most often recommended and implemented for their preservation, as has been done for preventive protection of the most valuable construction parts, such as structures, foundations and wall fragments of Sigulda, Rauna, Koknese, Cēsis, Aizpute, Ludza, Alūksne, Dobele, Ērģeme, Valmiera, Tērvete and other castles. Along with the wall strengthening and conservation measures, several damaged castle complexes have been supplemented with elements of tourism infrastructure: paths, stairs, viewing platforms. Architecturally significant fragments of buildings in the castle ruins of Limbaži, Rauna, Bauska have been given roofs to protect the original constructions (Fig. 12, 13), [8].

The general picture of the cultural monuments' protection is enriched by those special cases whose re-valuation programme is determined by the diversity of the intended

functions. The typical uses are representation, cultural and art events, scientific research, education and tourism. Preservation of scenic, architectural and art values is a means to achieve these goals. The part of the Cēsis Castle complex with the "Lademacher Tower", the former Zwinger and the gatehouse between the first and second forecourts, jointly called "New Castle", in the possession of Karl Adam von Wolff, had undergone a major reconstruction since the 1860s. After the renovations, the former Teutonic Order castle block acquired the comfort and space appropriate for the life of aristocrats, with artistic decoration reducing the impression of medieval structures to a minimum. During the modern restoration from 2007 to 2011, the New Castle recovered both the 18th and 19th century interior decorative finishes as an expressive cultural environment for the Cēsis History and Art Museum located in the premises. The restoration in the basement of the Lademacher Tower and of the first floor of the new castle helped to preserve the medieval constructions and certain decoration elements [5].

The castle of the Teutonic Order, built in the 13th century, restored with the Ventspils City Council authorization and handed over to the Ventspils City Museum, was revived from 2002 to 2012. Research and restoration of the former fortress built by the Teutonic Order in Livonia to protect the port of the Venta, renovation, repairs and adaptation of the premises for the new functions required several years. The Ventspils Castle is a typical a rectangular convent-type building within a territory fortified with a protective wall. The concept of modern use envisaged the adaptation of the castle for the reception of visitors in the basement and the first two above-ground floors. At the same time, the restored rooms on the third and fourth floors were intended for the creation of the museum's repositories and exhibitions, as well as for a modern exhibition hall. According to the project developed by the architect Pēteris Blūms, modern restoration technologies and the craftsmanship of professionals made it possible to carry out perfect conservation of the Gothic-style brick walls, portals, building structures, vaults, niches and capitals (Fig. 14, 15) [3].

The municipality of Dobele region commissioned restoration of the Dobele Castle ruins of the Teutonic Order in Livonia and, from 2018 to 2020, the walls of the 14th-16th cent. architectural monument were strengthened with conservation measures, the spatial reconstruction of the Reformation period chapel was also carried out with restoration techniques. According to the architect Pēteris Blūms' project, the upper part of the walls was strengthened with a layer of fibre-reinforced concrete. Without changing the overall silhouette of the castle ruins, the chapel space was covered with a recessed horizontal roof. This approach ensured that the romantic silhouette of the castle ruins was preserved in the urban landscape and an attractive viewing area for tourists was obtained. The conservation of the castle ruins and the restoration of the chapel have created a winsome place for cultural events and the exhibition of archaeological finds (Fig. 16, 17), [36].

After the restoration of Latvia's national independence, the rooms for the chancellery of the President of the State, the office of the President of the State and the reception rooms were fixed up in the Riga Castle. Large-scale repairs and restoration related to this process had taken place already in 1993-1994. From 2009 to 2015, according to the project developed by the architect Artūrs Lapiņš and the office AIG, cosmetic repairs of the President's workspace and representation rooms as well as the restoration of the rooms of the eastern annex of the Riga Castle and forecourt

were carried out with the management and financing of the State JSC "Valsts nekustamie īpašumi". The measures taken corresponded to the goals set for the restoration of the castle and practically did not affect the medieval architectural fragments that had been integrated in the reconstructions of the 17th-20th centuries. Ten years later, the tandem of "Sudraba arhitekti" and "Mark arhitekti" offices under the leadership of architect Reinis Liepiņš developed a project for the renovation and restoration of the 14th-16th cent. convent-type castle, adapting the premises to the function of the Latvian National History Museum. The project envisaged to open the restored premises with an area of 12,000 square meters for the needs of museum visitors, exhibitions, staff offices and collections. The restoration of the castle took a longer time than was intended, and the construction phases 1 and 2 were completed at the end of 2023. It resulted in the renovated exhibition halls on five floors of the castle, as well as the restoration of the basement, the castle chapel and the refectory, with maximum respect for the medieval image of the historical premises, the authenticity of constructions, sculptural details, fragments of frescoes and decorative painting, as well as the aesthetics of individual elements of the finish (Fig. 18, 19), [32].

**Conclusion**

In summary, the changing nature of Latvian society's attitude towards medieval architectural heritage becomes evident, subject to dialectical development in all centuries and at any time.

The Middle Ages in the Baltic area (13th - 15th centuries) constitute the period of Livonia's Christianization, conquest, founding of feudal states and European-type cities and, above all, the emergence of defensive wall structures. The development of the typological diversity of buildings in the urban cultural environment called forth the planning, construction and aesthetic evolution of buildings based on their functions of either sacred, administrative or civil architecture.

The spiritual and technical revolution of the Renaissance period brought to Livonia not only the Reformation, Counter-Reformation, wars and other political upheavals, but also cardinal social changes that endangered material culture as well. Some of the fortresses destroyed in the Livonian wars remained in ruins, others were restored and adapted to protection against modern firearms, and still others were rebuilt and adjusted to the planning and aesthetics of Renaissance-style residences. Therefore, the attitude of 16th and 17th century customers towards medieval architecture can be characterized as pragmatic, with the desire to adapt the buildings of the earlier centuries to the new functions and comfort requirements. A noteworthy feature of modern history is the interest in the heritage of the past caused by Renaissance humanist culture, which in 17th century Sweden and the part of Livonia under its control manifested itself as the documentation of historically significant artefacts.

The spiritual aspirations of the Age of Enlightenment all over Europe stimulated the encyclopaedic thirst for knowledge in society and the concurrent birth of academic science. They stirred interest not only in the ancient heritage, but also in the culture of more recent historical periods. Impressive architectural evidence of the past became objects of study for artists and architects, while the educated society saw in the buildings of the past an idealized testimony of the achievements of previous generations. Surveys of Greek and Roman buildings, sketches in travel albums, and the romance of the ruins documented in works of art fed imagination and promoted the transfer of medieval, Renaissance and Baroque

architectural forms to contemporary buildings. Moreover, it also taught people to identify and preserve authentic evidence in historical buildings or to imitate them. Thus, at the end of the 18th century and the beginning of the 19th century, foundations were laid for the educated society's interest in the enhanced cognitive possibilities of history, archaeology and architecture.

The industrial 19th century developed new construction technologies and, based on researches in the history of architecture, encouraged defining the principles of preserving valuable buildings and embarking on practical renovation or reconstruction works, which would be too early to be called restoration. However, these efforts encouraged further action, and the reconstruction method, although questioned as a reliable method of visual imitation of buildings and their details, has been often used since the middle of the 19th century as a method of obtaining a medieval image of socially significant and recognized medieval architectural objects.

At the turn of the 20th century, the theoretical and methodological prerequisites for the preservation of cultural monuments in Latvia were formed based on the efforts of some professionally educated historians, archaeologists, architects and history enthusiasts to explore and restore specific architectural objects. Also, the optional approach to restoration made it possible to accumulate significant experience in documenting historically significant objects and the restoration process itself. It proved useful at the early stages of the implementation of national cultural policy that included a systematic inventory of historical, archeological, architectural and art monuments, as well as measures for their practical protection. The process began in 1923 with the creation of the Monument Board and the adoption of the "Law on the Protection of Monuments".

Today, when more than a hundred years have passed since the national approach to the protection and restoration of cultural heritage, it has become evident that the protection of all types of cultural monuments depends on political and ideological positions, as well as on the financial possibilities that the state budget and society are able to devote to preventive actions, as well as to the research, conservation and restoration of architecture. A politically motivated attitude towards medieval architectural heritage has existed throughout the 20th century - both in the interwar period and during Soviet occupation. More objectively, it came into being after the restoration of Latvian national independence in 1991. The change in attitudes is ensured by the extensive international experience and information exchange, the necessary materials, technologies and special knowledge on offer in the global market for obtaining for unlimited construction and restoration. Within the available budget, it permits the implementation of the national cultural policy also in the field of restoration of medieval architecture.

Preservation of cultural heritage, enriched by a continuous cognitive process through its conservation, restoration or even reconstruction, is the responsibility of both the owner and the public. Ensuring the long-term function of a valuable architectural monument is an endless process that requires observing the ethics of cultural heritage preservation, investing financial resources in the maintenance of the physical condition of the historical artefact, and using the era-specific technological and artisan skills. This is an axiomatic truth concerning the preservation of cultural artefacts from the Middle Ages and any other historical period.

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## Kopsavilkums

Raksta mērķis ir sniegt koncentrētu pārskatu par Latvijas viduslaiku arhitektūras mantojuma kā materiālās kultūras vērtības aizsardzības pasākumu evolūciju no utilitāras arhitektūras objektu funkcionalitātes atjaunošanas līdz kompleksai zinātniski metodisku un tehnoloģisku paņēmienu īstenošanai oriģinālās substances saglabāšanai konservācijas, restaurācijas un daļējas atjaunošanas ceļā. Eiropas sabiedrībā vienmēr ir līdzās pastāvējušas abas pieejas arhitektūras saglabāšanā: gan praktiskā, gan estētiskā, pēdējai bez utilitāras funkcijas daļēji novērtējot arī māksliniecisko vērtību. To piemērošanas apjomu un attieksmi ir diktējuši racionāli apsvērumi. Tikai Apgaismības laikmeta un 19. gadsimta akadēmiski izglītotā Eiropas sabiedrība nonāca pie atziņas par arhitektūras vēsturisko, simbolisko, emocionālo un estētisko vērtību nozīmi, liekot pamatus arhitektūras mantojuma saglabāšanas teorijai un praksei.

# THE TRANSFORMATION OF THE CULTURAL LANDSCAPE OF REMTE MANOR

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The cultural and historical landscape of Latvia, formed by rural manor building ensembles, is increasingly attracting the attention of researchers, as it is an integral part of our cultural environment. The first half of the 21st century is marked by a new trend in the rural historical landscape of Latvia, i.e. the cessation of the exaggerated construction boom, which was associated with the development of collective and state farm centres around the manor building centre. The tendency of the occupying power was fundamentally aimed at concealing the cultural heritage buildings and disrupting the spatial structure that has historically formed the expression of the manor ensemble. This is also applicable to the Remte Manor ensemble, whose historical buildings are masterfully integrated in the picturesque natural setting - lake, terrain, forest, meadows, which are also complemented by the old trade highways located nearby. The last century has brought changes to the historically spatial structure of the manor ensemble. The current direction of the state's economic policy contributes to the emptying of the Latvian countryside, as well as the abandonment of cultural and historical sites, creating a range of problems in their management for rural municipalities.
Keywords: protection and preservation of architectural and cultural heritage, monument, landscape architecture

## Introduction

The history of the protection of cultural heritage has always been closely tied to the domestic policy of the state. With the increasing importance of cultural heritage in the formation of collective historical memory at the beginning of the 21st century in Latvia, the protection and promotion of monuments became an essential part of the state ideology. Architectural monuments are perhaps the most visible part of cultural heritage, requiring public attention, and to some extent, become a benchmark for its attitude towards cultural heritage in general. Under the influence of nationalist ideology, architectural monuments became cultural symbols with political significance in the public consciousness - their preservation was recognized as essential for the entire system of social relations, as a confirmation of past traditions, aesthetics, didactically educational values [14].

The 1990s and the restoration of the free state of Latvia in rural areas brought the cessation of economic activity in the former collective farm centres. New farms were formed, developing further away from the former collective farm and state farm centres. In turn, in the 1950s-1980s, in accordance with the collectivization policy, construction was formed in a ring around the old manor centre - a storage area for agricultural machinery, livestock housing, apartment buildings, grain towers, dryers, etc.; reconstructions, extensions, new buildings began on the basis of cultural and historical construction (the manor house, the carriage house, the manager's house, stables, etc.), which were closely adjacent to the manor parks. Most often, protective zones around historical construction were assessed as a minor factor that hindered the "prosperity" of Soviet power. Such



Fig.1. Remte Manor with park , lake and old road from Blieden-Schloss/Pilsblidene. Drawing by K.J.R. Minkelde. 1st half of the 19th century. View from the highway to the castle hill [NCHB MDC]

deliberate harm of this style contributed to the disappearance of historical values.

In the 1980s and 1990s, the concept of cultural heritage began to be understood more broadly – shifting from an exclusively museum-related function to a part of everyday living space more and more. Not only iconic values concern us, but also the heritage of everyday surroundings. In the future, the care and restoration of cultural heritage will likely  develop in two dimensions:

- broad public involvement, through self-assessment and participation in the renovation and restoration works;
- the second - a significantly smaller dimension, which will be related to the professional level, based on science and modern technology, specific knowledge and restoration skills.

Cultural heritage has always been and will continue to be threatened by new economic development and construction. It is paradoxical that such a significant part of the heritage is being destroyed not in wars and natural disasters, but in conditions of peace and apparent sanity. What is created in place is incompatible with the concept of balanced development [3;10].

An important contribution to cultural heritage has been made by the Florence International Charter of Monuments (1982), setting out the conditions for the protection and preservation of historic gardens. The Florence Convention (2000) on understanding of landscape and its concept, highlighting not only the perception of "beautiful landscape", but also understanding rural landscapes as natural meadows, suburban meadows, floodplains, pastures, etc. [11].

The duty of man to care for and protect values is described in the earliest sources, the Holy Scriptures, where it is mentioned that "*the Lord God made all kinds of trees grow out of the ground-trees that were pleasing to the eye and good for food*" (Genesis 2:9) [5]. So first aesthetic pleasure, and only then usefulness. Care for nature has already initially included the environment created by man, which currently also corresponds to the concept of cultural heritage [4]. The depiction of cultural and historical landscapes, which can be read in Broce engravings, provides a good understanding of the landscape spaces of historical manors. Using several historical engravings and their sight lines, and evaluating it with the current situation today, both old tree sites and open spaces are recognizable. *There is something to learn in old country parks - the mutual proportions of open spaces and planting groups, the composition of tree and shrub species, the edges of the largest tree arrays and the perspectives of*

*views* [8; 9].

The uniqueness of the visual expression of the overall ensemble of the Remte Manor landscape lies in the geographical choice of the location. This is due to the geomorphological character, which is formed by a pronounced relief elevation along the bend of the lakeshore. This place is complemented by the crossroads of ancient highways by the lake - to Jaunpils, Gaiķi, Tukums, Saldus. The elevation, as the culmination point of the landscape space, gathers distant view lines. This has determined the overall spatially functional and compositional structure of the manor. Consequently, the subject of the study is related to the study of the manor centre buildings, park and lake shore, where historically important trade crossroads have been located, leading both to the sea and to the duchy cities of Kuldīga and Jelgava.

In turn, the aim of the research reflects the transformation processes of the rural cultural and historical landscape, which have brought both spatially visual and functional changes since the agrarian land reform in the last hundred years.

To achieve the goal, the research task is based on the assessment of four landscape spaces of Remte Manor, using archival materials, in order to define in a comparative methodology, the course of transformation processes in the Remte cultural landscape, which has been influenced by both the change in the state economic policy and the volatility of the state cultural policy on crucial issues. This is attributable to the importance of the preservation of cultural heritage for future generations. The cultural and historical landscape under research covers an area of approximately one square kilometre.

**Materials and Methods**

The Remte Manor Ensemble (Remten) is located in Saldus County. Its centre is adorned with an impressive palace and an expressive landscape park, rich in various park structures. The park is crossed by the Viesata River, which gives the ensemble picturesque sight lines. The manor has changed several owners over the course of four centuries. Each of them has made their own contribution to the change in the cultural landscape. In 1506, the Livonian Order Master Walter von Plettenberg leased it to Ludwig von Buttlar (1480 – 1531, Buttlar). In 1696, Magnus Buttlar sold the manor to Lieutenant Captain Magnus Ernst von der Brincken. In 1723, Remte was bought by Lieutenant Friedrich Casimir von Brucken - Fock, whose daughter Agnese Elizabeth married Johann Friedrich von Medem (1722 - 1785) in 1767. In 1779, he received the title of count and inherited Remte manor after his wife's death. There were no children in their marriage, and therefore the property was inherited by J. F. von Medem's son from his second marriage, Karl Johann Friedrich von Medem (1762 - 1827). It was at his initiative that a new manor house was built in the classicist style in 1800. The facade of the castle has been preserved on the park side, because the courtyard facade was transformed into the eclectic (historicist) style between 1880 and 1900. In 1905, the castle burned down, but was later restored. The manor house (19th century) has also been preserved, which was transformed into a community house in 1922–1927. The last owner of the manor was Karl Friedrich Johann Ernst von Medem (1886–1958) with his wife Helene Mathilde von Medem (1888–1958).

The change of owners over four centuries has developed the process of transformation of the ensemble centre. In turn, the 20th century has brought an even more intense course of changes, with the Latvian cultural environment experiencing four very difficult economic and political stages:

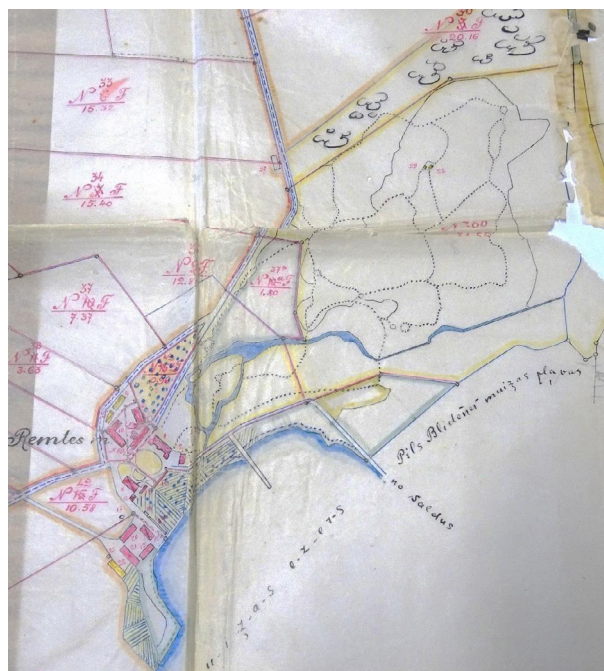- agrarian land reform and the period of the free state (1920-1940);



Fig. 2. Remte Manor land distribution plan during the agrarian land reform [LSHA,1925]

- the devastation of the war years (1941-1945);
- the period of collectivization and repression (1945-1990);
- the rebirth of the free state with a new economic policy (from 1990).

Each of the mentioned periods brought adjustments to the spatial and architectural expression of the cultural heritage. The consequences of the mentioned period are still felt today, and they are not easy to correct. Not only in terms of construction volumes, but also in the recovery of spatial structures and sight lines, highlighting the dominance that once existed historically.

In Latvia, as a result of agrarian land reforms, new farms emerged radially around the historical manor centres, leaving the manor with the centre building, parade courtyard and park. Without arable land, pastures and livestock housing, it became impossible to maintain the manor centre building. This also applies to Remte Manor. The result of the reform can be clearly seen on the map [fig.2].

As already mentioned, the research methodology is based on the comparative method, which relies on the compilation of archival materials and their changes compared to the current situation. This creates a convincing understanding of the economic and political processes that have accumulated over decades in a small landscape space.

When reviewing the historical course of the preservation of Latvia's cultural and historical heritage, it is necessary to mention the guidelines of the 1920s-1930s, which were related to Latvian political nationalism. The influence of the ideology of nationalism on the priorities of monument protection work is also reflected in the budget structure of the Monuments Board . The activities of the Monuments Board in the 1920s-1930s were part of the Latvian state cultural policy, therefore it was influenced by the economic situation in the country and also by ideological policies. A characteristic desire to highlight more objects related to Latvian ethnic culture, in contrast to the so-called "style architecture" was characteristic of the architectural and spatial solutions of manor buildings [14].

The agrarian reform of the Republic of Latvia in 1920 radically changed the legal status of manor centres and, consequently,

their protection possibilities. The agrarian reform was based on the so-called principle of restoring historical justice and the goal of creating a layer of young landowners who would guarantee social stability in the country [1].

The inalienable land area of the manor centre (50ha) was equivalent to a medium-sized farm, but it was not enough for the former or new owners of the manor centre to maintain it [14].

Historian Edgars Dunsdorfs points out that this practice saved the manor houses from destruction. However, it is understandable that the establishment of new farms and institutions in the manor centres actually meant their transformation and adaptation to new functions [7].

During the Soviet era, Latvian rural manors were mostly included in the "C" category of architectural monuments, which were allowed to be used for economic purposes [13].

The manor farm buildings were rebuilt and expanded, and the parks were also partially adapted to the needs of agricultural production [14].

However, establishing or maintaining a school in a manor house was the lesser of two evils principle , because heating the school premises kept the building dry. When the school moved out of the historic building, dampness and mould returned to the premises.

More attention was paid to the structural condition of the buildings – roof, floors, waterproofing, prevention of rotting of wooden beams, etc. In turn, the landscape space around the manor centre – alley, visibility of the parade courtyard, sight lines, park forecourt, side wings, depth plan, groups of trees, regular-shaped flower beds, small architectural elements, etc. – was considered a less significant formation. As the building serves school needs, new tree plantings of graduates arise next to the manor house – memorial groves, alleys, groups of trees, etc., without consideration for the obstruction of sight lines, the spatial compositional logic of shading and sun exposure.

During the agrarian reform in Latvia in the 20th century, palaces and manor houses were most often adapted to the needs of rural schools, parish halls and poorhouses. The upsurge of national patriotism seriously affected the shrub plantings and young trees in manor parks, which played an important role in the spatial compositional structure of the park. During school clean-ups, under the banner of promoting "order", hazel bushes, wild rose bushes, currants, spireas, etc. were cut down in the parks, justifying it with the transparency of the park and maintaining student discipline. The historically valued romanticism and the balance of the play of sunlight and shading in landscape parks were not understood. Consequently, as the functional meaning of the building changed, the historically compositional structure of the outdoor space changed as well.

The gently undulating terrain of the Eastern Courland [Kurland], with its hills and valleys, has served well for the placement of the historical Remte Manor centre construction next to the lake, along the shore of which the old country road to Saldus once ran [fig.1]. Its location at the crossroads of trade routes was important for the prosperity of the manor, where a church and a roadside tavern were typically also found. The Remte Manor centre is characterized by long sight lines across fertile clay fields. On the eastern side of the palace, there is a park that turns into a hunting forest. In the foreground of the park, a meadow like a giant parterre, which is connected to the castle by massive granite stairs that lead from the terrace into the meadow. It is associated with a giant stage or depression, in the southern part of which there
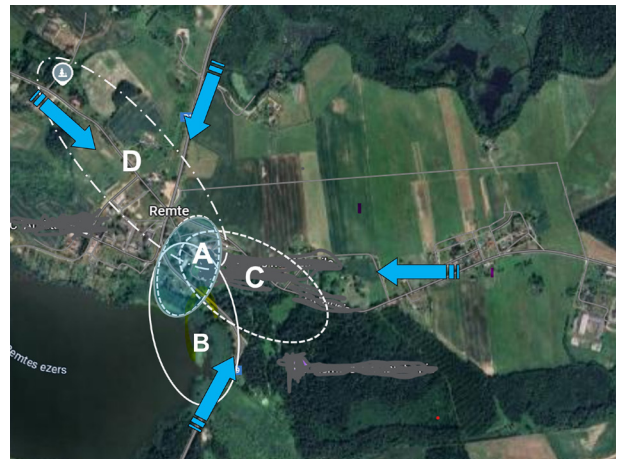


Fig. 3. The four main landscape spaces of the Remte Manor ensemble centre [author's drawing, 2024]

is a lake, and on the northern side – the farm buildings of the manor – stables, barns, barns, fields, pastures, etc.

700m from the castle on the western side, there is the next hill, where a church with a cemetery and a rectory are located.

## Discussions and Results

The use of the comparative method vividly demonstrates the changes in the cultural space, both in terms of its functional and compositional structure. As already mentioned, this can be attributed to the 20th/21st century. The landscape park next to the manor house or even the castle begins with a central open space, which further develops into a park. The open space serves as a giant "green room" or foyer, prompting the visitor to choose whether to enter the building or the walking park. Continuing from the above, it is clear that as the meaning of the building changes and it is adapted, for example, to the needs of an educational institution, the open space acquires a function suitable for the educational institution – a playground, a sports area, a storage area for play elements. Flower beds or lines of shrub plantings are successively arranged, which separate children's activities and create an aesthetically educational environment for children. Thus, the cultural and historical is adapted to the needs of society. This is self-evident, as long as the castle does not provide historically informative content for the tourism infrastructure, simpler methods are used to maintain the cultural space. Castle buildings are usually large with spacious interiors, and their management is expensive for rural municipalities. Therefore, a dual approach to cultural and historical things is self-evident – they must be protected, but they must also be able to be managed economically. It is also necessary to evaluate the fact that the population in rural areas is rapidly decreasing today.

A similar situation exists for Remte Manor, whose unique visual expression of the landscape space lies in the geographical choice of the location. This is related both to the geomorphological nature of the site, which is formed by a pronounced relief elevation, and the curve of the lakeshore. This site is complemented by the crossroads of ancient highways by the lake - to Jaunpils - Gaiķi, Tukums - Saldus. The relief elevation, as the culmination point of the landscape space, gathers distant sight lines. This has determined the overall spatially functional and compositional structure of the manor.

The manor centre has experienced two construction periods. The so-called old manor house (17th-18th centuries) was located closer to the highway - with a parade courtyard on the eastern side and the end of the building facing the lake to the south. In turn, the longitudinal facade of the building

Fig. 4. Johann Friedrich von Medem

Fig. 5. Karl Friedrich Johann Ernst von Medem

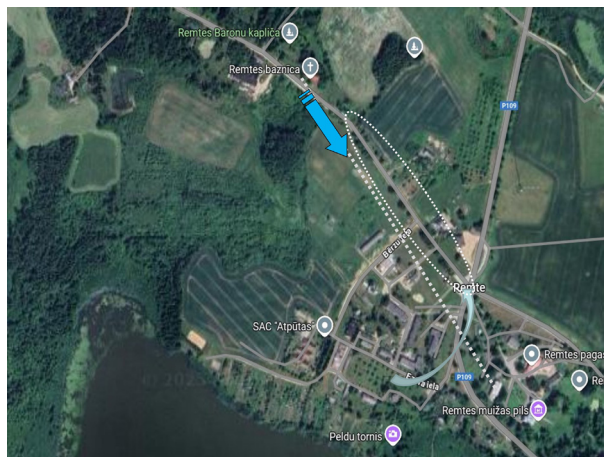Fig. 6.Helene Mathilde von Medem



Fig. 9. Sight lines in a large-scale landscape space. Historical axis, which compositionally united the church and the palace [author's drawing, 2024]
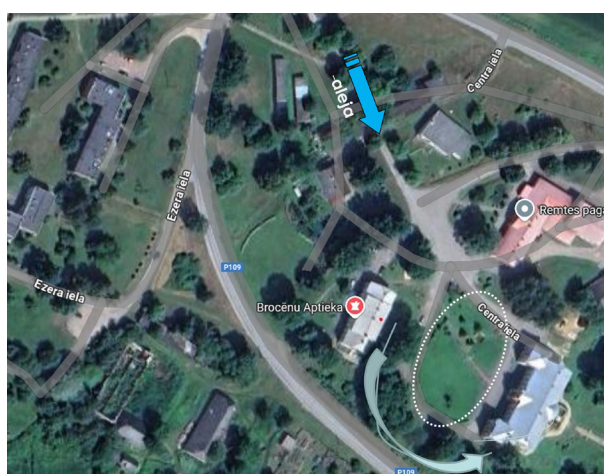


Fig. 7. Parade courtyard. View from the alley. 1930 [NCHB MDC]



Fig. 10. Historical alley from the highway to the palace parade courtyard. Main sight line to the palace [author's drawing, 2024]



Fig. 8. Burnt-out castle. Mantelpieces on the roof. 1905 [NCHB MDC]

faces the south and the main sight lines to the forest, later developing the park area. The farm section of the manor - on the northern side, not obstructing the sight lines to the lake in the south.

In the 17th century, the so-called old manor house of Remte Manor was located in the northern part of the parade courtyard, closer to the highway. The so-called new manor house or castle, built at the beginning of the 19th century, is located on the opposite side of the parade courtyard - closer to the eastern edge of the hill, thus obtaining a compositional solution for the park area with an open space and a staircase to overcome the slope. The park stairs lead to the castle's semi-circular staircase, the elegance of which ends at the glazed doors of the castle hall. There is a small terrace with expressive sight lines nearby.

The above is further used for landscape-spatial studies of Remte Manor on a larger scale.

The research evaluates 4 main landscape spaces for the Remte Manor ensemble [ Fig. 3]:

▪ Zone A - parade courtyard with perimeter tree line and chestnut alley connection;
▪ Zone B - castle and lake shore, slope near the highway;
▪ Zone C - castle volume with central open space, terraces and tree alley on the western side of the open space;
▪ Zone D - architectural and spatial context of the church and castle silhouette.

With its layout, rich cultural history, park buildings, which have analogues in many European countries. For a long time, this park was not properly appreciated, but in recent years, when individual park buildings have been restored, it has acquired a new sound and wide public recognition. It is of no less importance to trace the history of the manor owners, which is inextricably linked with the development of the manor ensemble.

The historical facade of Remte Manor has been preserved on the park side, as the courtyard facade was transformed in the eclectic (historicist) style between 1880 and 1900. Side wings were also added and the central risalit was given a neo-Renaissance look. The coat of arms of the Medem family was placed in the gable. In 1905, the manor was burned down, then restored. The burning of manors and castles during the revolution resulted in losses of cultural and historical values – libraries, porcelain, paintings, furniture, silverware, etc. The riding hall (19th century) has been preserved, with representations of horse heads on the pediment. This building was transformed into a community centre in 1922–1927. There was an elementary school in the manor, which has been liquidated for the third year and the castle is empty. Of the rest of the manor's buildings, the manager's house, servants' house, stables and other buildings have survived to this day.

The Remte Manor ensemble has a natural large-scale compositional structure. It is based on a central axis that connects the castle and the church, which is located 700m further north on a hill. The spatial expression of the compositional axis is enhanced by the tree alley of the Gaiķu highway [Fig.9]. From the viewpoint of the church, the alley does not obscure the silhouette of the castle.

**Zone A** - The parade yard with perimeter sight lines creates a strong compositional plot



Fig. 11. Part S of the parade yard ellipse [author's photo, 2024]



Fig. 12. View of the castle from the Wedge of the parade yard [author's photo, 2024]



Fig. 13., 14. Part N and E of the yard with a stable and alley [author's photo, 2024]

**Zone B** - Castle and lake shore, slope near the highway



Fig. 15. Sight lines from the palace terrace - to the lake, park and alley [author's drawing, 2024]



Fig.18. The central axis of the park`s open space with the castle terrace [author's photo, 2024]



Fig. 19. The axis connecting the park`s open space and the castle [author's photo, 2024]



Fig. 16. Lake near the manor's farm zone [author's photo, 2024]



Fig. 17. View from the castle terrace to the lake shore [author's photo, 2024]



Fig. 20. Granite steps from the terrace to the park's open space. 1902 [LSHA]



Fig. 21. Pavilion-rotunda in the park. 1930 [NCHB MDC]

The historic picket fence around the parade yard [Fig.7] has disappeared, but the newly planted linden trees clearly mark the old driveway. Unfortunately, a group of trees planted incorrectly at the beginning of the 21st century near the parade yard opposite the castle - in a few years will block the sight of the castle from the historic alley and the church.

The peculiarities of the geomorphological natural base and the intersection of highways near the lake with a hill make this place visually attractive. The impressive castle building on the hill with distant sight lines of both the park and the lake testifies to the ability to find the compositional location of the ensemble image in the natural base. This is attributable to the spatial understanding of the 18th/19th centuries, creating a common image for the centre of the ensemble, as well as perimeter corridors of sight lines.

The driveway through the alley to the oval-shaped northern part of the palace's parade courtyard is designed compositionally as a diagonal, connecting to the ancient crossroads. The asymmetrical composition of the parade courtyard in the western part of the highway is closed by trees and shrubs, obscuring the sight lines to the lake. In turn, revealing the sight points to the lake, a garden area with greenhouses on the shore opens up, which indicates the

lack of visual harmony of the historical outdoor space. This side of the parade courtyard was once fenced by a stone fence. Recently planted small linden trees elegantly mark the historical ellipse of the parade courtyard. On the other hand, a small group of trees on the western edge of the yard obscures the view of the castle.

The southern part of the castle ensemble by the lake, which was the most picturesque part, is the most visually damaged. Historically, in sight lines, the castle on a high hill was visible in a single picturesque expression with the lake. Currently, the

**Zone D** – Searching for the context of the church landscape and the silhouette of the manor centre



Fig. 22. View from the tree-lined avenue of Gaiķu Highway to the Remte Ev. Luth.Church; in the background – the building ensemble of the Remte Manor; beginning of the 19th century [NCHB MDC]

sight points are hidden behind the foliage and the building is not visible from the Pilsblīdene road. A huge continuous tree cover between the lake and the castle has visually deprived the perception of the landscape space in both close and distant views. This can be seen by comparing the current situation with K.J.R. Minkelde's drawing from the first half of the 19th century.

In turn, the reeds on the lake shore cover the water surface. Nearby - greenhouses of small gardens. Overall, this leads to the absolute disappearance of the historical cultural space, because the palace, the parade courtyard, the park open space and the expression of the relief slope are hidden, and there is no historically unified context with the lake.

**Zone C** - castle volume with the central open space, terraces and tree alley on the western side of the open space (Fig.3) [11].

Each of the landscape spaces or zones around Remte Castle examined in the research has a visually multifaceted character. Under the influence of the aforementioned transformation process, the expression of the landscape spaces around the castle has been dampened. However, within the research process, landscape architects can very well read the cultural and historical traces that have still been preserved. One of them is the most picturesque sight line from the castle terrace across the central open space to the landscape park. It forms a peculiar axis of symmetry of the park, which is reinforced by heavy granite stairs with flower beds on the sides. The emphasis on the difference in levels between the castle and the open space is achieved with the compositional axis of symmetry or path, dividing the foreground of the landscape space conditionally into 2 parts: the western part, which includes distant views of the lake, and the eastern part, in which the avenue of trees obscures the views of the former farm zone of the manor.

In the background – a landscape park with the meanders of the Viesata River, a small pond, canals, a play of small architectural forms (a rotunda, where on the base there is a marble bust of Count Christoph Friedrich von Medem (1763 – 1838), a round, artificially processed table made of granite and an Empire-style white marble urn). In the 18th century, under the influence of forgotten sentimentalism and romanticism, the Swimming Tower (1820) on the shore of the lake (a red brick building) and the Hunting Tower (1890) in the park returned in the 19th century, both of which are in neo-Gothic forms. The so-called Bear's House (around 1900) also belongs to the Romantic period. The riding horse

cemetery with tombstones is quite unique. The improvement of the park and the addition of plantings continued at the end of the 19th century and the beginning of the 20th century. This is evidenced by the production of the nursery of the horticultural commercial firm C. W. Schoch, which, at that time, was received as a special order by Countess von Medem and gardener J. Šūmanis [15].

In the foreground of the sight point – the terraced palace hall with wrought iron railings, thus giving the sight line a dose of romanticism. On the eastern side wing – an alley of trees, which obscures the former farm area of the manor. On the western side wing – tree growth, which obscures the sight lines to the lake. The exposure of the landscape park's open spaces to sunlight both in the morning and evening sun with the foliage of various trees makes the park visually more expressive and richer. Therefore, the removal of excess trees in the park must be considered very carefully.

It is interesting to look at the memoirs of the painter, art historian and cultural worker Julius Dering (1818 – 1898) from 1851, in which he describes the Remte Manor Park. *The park adjacent to the house is also quite famous, and is indeed very beautiful. Although it cannot be said that it is completely overgrown, it is not well-kept. It has many lovely formations with water, islands, waterfalls, hills, grottoes, temples of various shapes with busts and inscriptions, the brass letters of which have mostly been stolen, as well as a Gothic tower, a hermit's residence and finally the so-called bard's grove, which I took from afar to be a beehive, because the half-lying granite blocks – each of which has the name of a famous poet carved into it – look very similar to the carved wooden blocks that are used as beehives in Courland* [6].

The reason for the lake's overgrowth is simple. Warm winters do not form a layer of ice for the water to cut through the reeds. They are very valuable, because historically they have served as roof coverings for farm buildings, which are located next to the shore, thus conveniently watering livestock.

The location of the castle at the highest point of the relief, the architectural expression of the building and the sight lines to the lake - create a strong landscape expression within a radius of approximately 200m. Especially in autumn and spring, when the landscape is characterized by transparency and the sight lines are longer. The above applies to the western part of the landscape. The picturesqueness of the place is complemented by the sight lines at sunset. The relief difference between the highway and the end facade of the castle is formed by a small boulder retaining wall, the lake shore is gradually overgrown with reeds. Warm winters exist in recent years. In these climatic conditions, the lake does not freeze and the reeds cannot be cut.

**Zone D** – Searching for the context of the church landscape and the silhouette of the manor centre [9].

The approximately 30ha landscape area with long sight lines from the Gaiķu highway to the hills of the Remte church (1779-1780) and the silhouette of the Remte Manor buildings emotionally moved everyone who came. The expressiveness of the landscape area was complemented by the slightly undulating relief. Comparing and putting together old engravings and photographs, it is clear that the landscape spatial and compositional structure played an important role in the construction of the manor ensemble in the 18th/19th centuries. Today, the historical sight lines are obscured by tree growth, preventing a seamless perception of the foreground and background of the cultural landscape.

In the future, greater attention should be paid not so much to individual objects, but rather the overall landscape. With the special environment constantly changing, the quality of

the development becomes essential, and we should worry less about alterations that are required by the quality of life. Preservation of the culture heritage is a discussion about the quality of human life and it is impossible to develop this discussion without a dialogue professional ethics, as well as extensive consulting with the public.

It is not possible to draft a law every life situation, therefore the heritage protection matters should be handled by professional, active, interested, development- focused and positive-minded professionals and officials who mindfully apply the law understanding its objectives. In any situation it is not the formal approach that is important, but rather a reasonable proportionality and sense. Public administration needs more creativity. Laws will never be ideal and mutually consistent. If everything is predetermined, creativity will suffocate. It is constant development- a well intended idea becomes obsolete sooner than we can imagine. On the other hand , not everything should be subject to standards , sometimes we should leave some space for creativity,goodwill and belief that essentially a person does not want to make mistakes and intentionally act bad. Theres no sucht law that would be better than a clear conscience. Excellence must be honoured more. The soviet regime in Latvia destroyed free and talented personalities just because they were able to mobilise society. Outstanding persons raise the society out of the daily routine. We ary In the future, greater attention should be paid nots o much to individual objects, but rather the overal landscape. With the special environment constantly changing, the quality of the development becomes essential, and we should worry less about alterations that are required by the quality of life.

Preservation of the culture heritage is a discussion about the quality of human life and it is impossible to develop this discussion without a dialogue, professional ethics, as well as extensive consulting with the public. We are a small country with little human capital; therefore it should be used reasonably . The most talented should be protected and defended and conditions should be created for their talent to be used efficiently. Experience , knowledge and skills are crucially important [4].

## Conclusion

The summary of the research material makes it clear that the process of restoring the rural cultural and historical landscape will be complex and long, as it is influenced by financial, internal economic issues and the structure that is currently being formed in rural local government territories. When drawing conclusions from the study, it is necessary to acknowledge both positive and negative aspects:

1.  The centre of Remte Manor was not affected by the devastation of World War II, although the front line of the Kurzeme Cauldron was very close by. Remte was on the side of the Russian army in 1944, when there were heavy battles in the Courland Cauldron in the autumn and winter. Only the church bell tower and roof were damaged, which were deliberately burned by the Russian army, in a peculiar salute to victory on May 9, 1945. The buildings from the collectivization period have not encroached on the protection zone of historical buildings. It is located on Tukums Road, and the buildings are obscured by rows of trees. Therefore, the construction of apartment buildings is not noticeable in the main sight lines.

2.  The Remte Castle building is in a satisfactory condition, as the rooms are heated in winter, and the building has acquired a new tin roof covering. Unfortunately, the school in the castle has been liquidated and only

a few rooms in the southern part have been adapted for the needs of a kindergarten. With the heating remaining, there is no change in the microclimate, which can contribute to the deterioration of lime plaster and wooden structures.

3.  As the building loses its status as an educational institution, the maintenance of the park part is becoming less regular. Therefore, SIA "Latvijas valsts meži" has developed a park development project, which includes the recovery of historical open spaces, assessment of tree and shrub overgrowth, and cleaning up the line of the banks of the Viesata River.

4.  Over the decades, the edge of Lake Remte opposite the castle has gradually become overgrown with trees and reeds. The sight lines of the water body is one of the most picturesque landscape elements of the manor ensemble, which was appreciated during the construction of the castle building in the early 19th century. By losing the visual connection with the lake, the visual aesthetic quality of the manor centre will be lost.

5.  The rapid growth of trees and shrubs around the castle not only obscures the sight lines, but also leads to an increase in humidity levels, which is caused by the foliage and the deposition of green chlorophyll onto the lime mortar plaster of the exterior walls, as well as an increase in the amount of leaves in autumn. The possibilities of ventilation of the castle walls and maintaining humidity levels are reduced. This is particularly noticeable on the western facade of the castle.

6.  The 3 landscape spaces around the castle examined in the research are the most important, as they the most visually significant solutions for the preservation of cultural landscape: the lake shore, the parade courtyard, and the central open space with terraces.

ABREVIATIONS
NCHB MDC - National Cultural Heritage Board, Monument Documentation Centre
LSHA - Latvian State Historical Archive

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## Kopsavilkums

Remtes muiža (Remten) atrodas Saldus novadā. Iespaidīga ir muižas pils, bet it īpaši ainavu parks, kas bagāts ar dažādām parka būvēm. 1506. gadā Livonijas ordeņa mestrs Volters fon Pletenbergs (Plettenberg) to izlēņojis Ludvigam fon Butlaram (1480 – 1531, Buttlar). 1696. gadā Magnuss Butlars muižu pārdeva kapteiņleitnantam Magnusam Ernstam fon der Brinkenam (Brincken). 1723. gadā Remti nopirka leitnants Frīdrihs Kazimirs fon Brukens - Foks (Brucken - Fock), kura meita Agnese Elizabete 1767. gadā stājās laulībā ar Johanu Frīdrihu fon Mēdemu (Medem, 1722 – 1785). 1779. gadā viņš ieguva grāfa titulu un pēc sievas nāves mantoja Remtes muižu. Viņu laulībā bērnu nebija un tāpēc īpašumu mantoja J. F. fon Mēdema dēls no otrās laulības – Karls Johans Frīdrihs fon Mēdems (1762 – 1827). Tieši viņa ierosmē 1800. gadā celta jaunā kungu māja klasicisma stilā. Pils fasāde saglabājusies parka pusē, jo pagalma fasāde laikā no 1880. līdz 1900. gadam pārveidota eklektisma (historisma) stilā. 1905. gadā pils nodedzināta, bet pēc tam atjaunota. Saglabājusies arī manēža (19. gs.), kas 1922. – 1927. gadā pārveidota par tautas namu pārējās muižas apbūves līdz mūsu dienām saglabājusies pārvaldnieka māja, kalpu māja, stallis un citas ēkas. Pēdējais muižas īpašnieks bija Karls Frīdrihs Johans Ernsts fon Mēdems (1886 – 1958) ar sievu Helēnu Matildi fon Mēdemu (1888 – 1958).Remtes muižas parks, domājams, veidojies 19. gs. sākumā vienlaicīgi ar jaunās pils celtniecību. Parkam, kura teritorija ir aptuveni 20 ha liela, ir brīvs plānojums, tajā atrodas kanālu sistēma un dīķi, aiz pils izvērsta terasēta nogāze, no kuras paveras jauks un romantisks skats uz tuvējām parka daļām. Par Remtes muižas parka sākotnējām parka būvēm liecina paviljons rotonda kas dēvēts arī par lapeni (19. gs. sākums). Paviljonā uz pamatnes atradies grāfa Kristofa Frīdriha fon Mēdema (1763 – 1838) marmora krūšutēls, kurš gājis bojā 1915. gadā. 2013. gadā izstrādāts paviljona jeb lapenes arhitektoniski mākslinieciskā inventarizācijas, izpētes un konservācijas projekts. No paviljona bija saglabājušās tikai kolonnas un tās jumta konstrukciju metāla enkuri. Paviljons neapšaubāmi bija kultūrvēsturiski vērtīga 19. gadsimta sākuma parka būve. Konservācijas projektā tika ieteikts nosegt kolonnu galus saglabājot enkurus un konservēt kolonnu stāvus, kas arī tika izdarīts. Bez tam parkā atradies apaļš, mākslīgi apstrādāts galds no granīta un ampīra stila balta marmora urna uz postamenta (saglabājies tikai postaments), kas bija kā piemiņa parka veidotājiem no pateicīgajiem pēcnācējiem.

# COMPARISON OF GARDEN PAVILIONS' SITE SELECTION IN CHINA AND ITALY

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**Abstract. This study examines Chinese and Italian garden pavilions through a comparative approach, systematically exploring the similarities and differences in their site selection and the underlying cultural motivations. Chinese garden pavilions are profoundly shaped by the philosophy of "the unity of man and nature," emphasising harmony with natural landscapes and adaptable layouts. Techniques such as situating pavilions by mountains and water bodies are employed to achieve an organic integration of architecture and environment. In contrast, Italian pavilions embody geometric order and rational aesthetics, characterised by axial symmetry and the deliberate terrain modification to shape structured spatial sequences. Through an analysis of philosophical concepts, locational characteristics, and spatial organisation, the research reveals both the commonalities and differences in the siting of pavilions on elevated grounds, by water, on flat terrain, and in compositional groupings, while providing an in-depth examination of their relationships with topography, water features, vegetation, and other architectural structures.
Keywords: Chinese gardens, Italian gardens, garden architecture, pavilions, site selection**

## Introduction

In Chinese, pavilion architecture within gardens is referred to as "ting" (亭) or "yuan ting" (园亭), denoting roofed, wall-less structures designed for rest and shelter. In Western contexts, such structures are generally called pavilions, while terms like gazebo describe open-sided park structures, and kiosk refers to small booths for selling goods. This study focuses on pavilions within classical Chinese and Italian gardens that primarily serve for rest and landscape appreciation, so it uniformly refers to them as pavilions. The selection of a pavilion directly influences the spatial layout and visual hierarchy of the garden, and an appropriately positioned pavilion enhances the garden's overall cultural resonance and aesthetic coherence. Such importance is underscored by Ji Cheng, a Ming dynasty scholar and garden designer, in The Craft of Gardens (Yuan Ye), the first systematic treatise on Chinese garden design, where he noted, "All constructions must begin with selecting and establishing the site"[9].

Chinese gardens (as representative of Eastern natural-style gardens), European gardens (as models of Western formal gardens), and Islamic gardens (characterised by enclosed courtyards) together form the three major garden systems in the world, holding significant positions in garden history. Due to the differences in cultures, the evolution of pavilion architecture, and notable distinctions in geographical environments, aesthetic concepts, and building materials, classical Chinese and Italian gardens, as typical representatives, present starkly different philosophical ideas and design strategies in pavilion site selection. However, in expressing seclusion and poetic sentiment in Chinese gardens or the symbolism of power and order in Italian gardens, pavilions become indispensable garden elements thanks to their unique form and integration with the surrounding environment. Therefore, exploring how different philosophical concepts influence pavilion site selection and the relationship between pavilions and their surrounding environment is an essential issue in landscape creation, aimed at revealing the dual nature of pavilions as both viewing and scenic elements. The evolution of classical Chinese garden pavilions has developed in parallel with the broader tradition of garden art. Consequently, numerous scholarly works have addressed pavilion design from various angles, with some specialised studies dedicated entirely to pavilions. These works cover multiple aspects, including function, site selection, form, aesthetics, and construction, often supplemented by rich imagery and case studies (e.g., Gao, Z. M., & Qin, L., Chinese Ancient Pavilions, (1994), Lu, R., Analysis of Garden Pavilions, (2004), and Zhu, J. Z., The Art of Chinese Pavilions, (2008)).

Compared to monographs, journal articles offer more in-depth and broader research, spanning topics from the origin and development of pavilions[8][17] to functional layout[7], design principles[11][12], the creation of atmosphere[18], and even detailed structural techniques[1]. Throughout these studies, pavilion site selection remains a central issue, with one of the representative works being Gu Kai's research. Based on historical literature, Gu argues that the significance of pavilions in gardens as viewing spaces far outweighs their role as objects of observation[4]. Furthermore, he explores the architectural concepts and cultural symbolism behind the mountain summits' pavilions, revealing the connection between pavilion site selection, scenic views, artistic atmosphere, and garden layout[5].

The development of Italian pavilion architecture has been profoundly shaped by Western culture, philosophy, and artistic movements. Its functions extend beyond mere viewing, often integrating decorative elements such as sculptures and fountains to create a harmonious and unified landscape[15]. In Roman villa gardens, pavilions served as leisure and social spaces, with their locations strategically chosen to harmonise with the natural surroundings. During the Renaissance, gardens inspired by classical ideals emphasised geometric symmetry and unity[6], focusing not only on visual aesthetics but also on creating a solemn and harmonious spatial experience through axial and symmetrical layouts (e.g., the Organ and Dragon Pavilions at Villa d'Este). In the Baroque and Rococo periods, pavilions in royal gardens adhered even more strictly to axial planning, showcasing unmatched grandeur. During the 17th and 18th centuries[10][13], cross-cultural exchanges facilitated the dissemination of Chinese garden art to Europe, particularly through the writings and images of Jesuit missionaries who lived in China and extensively toured its gardens [16]. These texts and images inevitably influenced European pavilion designs and contributed indirectly to developing iconic garden imagery [2]. Scholars have also examined how traditional Chinese garden architecture specifically has impacted the design of small-scale European structures[11].

Although previous studies have analysed the construction characteristics of Chinese and Italian garden pavilions from multiple perspectives, such as history, function, and design principles, systematic analyses of the factors influencing pavilion site selection and spatial configuration remain insufficient. Moreover, there is a lack of cross-cultural comparative studies examining the similarities and differences in pavilion site selection and their cultural motivations. Therefore, this study

TABLE 1

Pavilion Samples and Selection Criteria [created by authors]

| Garden/Site | Pavilion | City, Country | Type | Description |
|---|---|---|---|---|
| Jingyi Garden (Xiangshan) | Tayun Pavilion | Beijing, China | Elevated | Situated at the terminus of a mountain ascent, it exemplifies the elevated siting strategy characteristic of imperial northern gardens. |
| Yuyuan Garden | Wangjiang Pavilion | Shanghai, China | Elevated | Positioned atop an artificial rockery, it illustrates the southern private garden approach to elevated siting and long-distance viewing. |
| Villa Cicogna Mozzoni | Waterside Pavilion | Varese, Italy | Elevated | Located at the end of a monumental water staircase, it exemplifies the Renaissance use of pavilions to terminate axial perspective sequences. |
| Villa Monastero | Lakeside Pavilion | Varenna, Italy | Elevated | Integrated into a terraced composition with statues and stairways, it demonstrates the role of elevated lakefront pavilions in scenic focal design. |
| Keyuan | Boat-shaped Pavilion | Suzhou, China | Water | As a shoreline structure oriented toward the waterscape, it represents the Jiangnan tradition of integrating pavilion form with waterfront leisure. |
| Humble Administrator's Garden (Zhuozheng Yuan) | Hefengsimian Pavilion | Suzhou, China | Water | Entirely surrounded by water, it serves as a canonical model of island siting frequently cited in classical garden scholarship. |
| Villa Monastero | By Lake Upper Pergola-linked Pavilion | Varenna, Italy | Water | Open on three sides and connected to a pergola, it illustrates panoramic waterfront siting combined with architectural linkage. |
| Villa Durazzo Pallavicini | Waterside Pavilion | Genoa, Italy | Water | Placed as a focal element within a theatrical water sequence, it reflects the ornamental and exotic character of Romantic landscape design. |
| Huanxiu Villa | Crabapple Pavilion | Suzhou, China | Flat | Embedded in a flat-terrain setting with seasonal blossoms, it highlights the integration of architecture with horticultural display and multisensory experience. |
| Giardini di Villa Melzi | Simple Conical-Roof pavilion | Bellagio, Italy | Flat | Set on flat ground within a botanical garden, it represents the simple leisure function of shade-providing pavilions in nineteenth-century contexts. |
| Temple of Heaven Park | Double-Ring Pavilion | Beijing, China | Composition | Formed by two interlocking structures, it exemplifies compositional siting with symbolic and ceremonial connotations. |
| Castello di Celsa | Rooftop Pavilion | Siena, Italy | Composition | Positioned atop the main building, it illustrates the compositional use of pavilions as vertical accents enriching architectural silhouettes. |

focuses on three key aspects: philosophical concepts, site characteristics, and layout principles. The aim is to uncover the core principles of pavilion site selection within different garden traditions, deepen the understanding of Chinese and Italian garden design principles, and provide theoretical support and practical insights for contemporary garden design and cross-cultural landscape studies.

**Materials and Methods**

This study adopts a cross-cultural comparative approach, based on field investigation of twelve representative pavilions— six from Chinese gardens and six from Italian gardens ( Table 1). The analysis focuses on their siting characteristics, visual axes, circulation patterns, and integration within the overall spatial layout of the gardens. Cases were purposively sampled to cover the four siting types summarised in the literature— elevated, water-related, flat-terrain, and compositional—with at least one representative example of each type in both cultural contexts. Selection criteria required that each case (i) contained a clearly identifiable pavilion structure, (ii) was accessible for photographic documentation, and (iii) was representative within specific site types and cultural traditions. For instance, the Hefengsimian Pavilion in Suzhou's Humble Administrator's Garden exemplifies the water-surrounded island arrangement characteristic, while the pavilion terminating the water staircase at Villa Cicogna Mozzoni

demonstrates the Renaissance use of elevated siting within an axial perspective sequence. Concise justifications for all twelve cases are provided in the Table. 1.

In addition to the twelve core cases, several further pavilions are referenced in the layout analysis to illustrate differing siting concepts in Chinese and Italian traditions. Diagrammatic analysis was employed to reconstruct plan views of the pavilions and their surrounding elements, enabling a visual examination of spatial positioning and landscape organisation. These supplementary cases serve solely as contextual illustrations and are not included in the comparative dataset described above.

**Philosophy concepts**

Gardens are a dialogue between humans and nature, with different interpretations of nature giving rise to distinct garden expressions. In Dualism and Polarities: The Structure of Architectural and Landscape Discourses in China and the West, Feng, S. D. and Jackson, M. compare the Western and Chinese perceptions of the human-nature relationship. In Western thought, humans and nature are regarded as a mutually independent "dualistic" relationship. At the same time, traditional Chinese garden culture emphasises its interdependence and transformation, akin to the dynamic balance of Yin and Yang in the Tai Chi symbol. This conceptual difference directly impacts pavilion architecture's spatial

presentation and site selection. Chinese pavilions are sited to harmonise with nature, often near mountains and water, or hidden among trees and flowers, blending into the natural surroundings. In Italy, pavilions are strategically placed using geometric symmetry and precise layouts, reflecting rational planning and spatial control to create meticulously crafted spaces.

Furthermore, the spatial aesthetic cultures of China and Italy also influence the selection of pavilion sites. The Taoist philosophy of "mutual generation of emptiness and solidity" is extended in garden design and fully embodied in the design and placement of pavilions.

For instance, open-sided pavilions are often situated by water or atop mountains, where the expansive presence of water and sky serves as an abstract spatial backdrop that accentuates the pavilion's tangible form, while simultaneously creating an immersive sense of openness for visitors within the confined structure. At times, pavilions are partially concealed within the landscape, allowing glimpses of their form to spark the viewer's imagination of the hidden surroundings, thus extending the perception of space beyond what is immediately visible.

Classical culture and Renaissance ideals profoundly shaped the spatial aesthetics of Italian gardens. The pursuit of rational beauty greatly influenced the placement of pavilions: while they are often located beside water features or pathways for viewing purposes, and more characteristically placed at key points along axes or geometric intersections, frequently in combination with terraces or staircases, to emphasise spatial sequence and visual focus.

Therefore, Chinese garden pavilions focus on harmonising with nature and creating a poetic ambience, valuing spatial fluidity and symbolism. On the other hand, Italian garden pavilions highlight human intervention in shaping nature, emphasising spatial order and ceremonial qualities.

## Site location characteristics

Despite significant differences in the design philosophies of Chinese and Italian pavilions, certain commonalities in site selection are evident. A comparative analysis of typical case studies reveals four main types of pavilion placement:

### Terrain High Point

In Chinese and Italian gardens, pavilions are commonly placed on hillsides, mountain peaks, or elevated ground, providing expansive views of the surrounding landscape while enhancing spatial hierarchy. In Chinese gardens, such positioning reflects the cultural emphasis on achieving harmony between the structure and natural scenery, highlighting their close

interdependence[5]. This approach is particularly evident in natural scenic areas and extensive northern imperial gardens, where pavilions at mountain summits abound. For example, the "Tayun Pavilion" in the Jingyi Garden at Xiangshan (Fig. 1) crowns the ascending terrain, acting as the visual terminus of the garden space and enriching the mountain's silhouette. Even in urban gardens without natural topography, artificial rockeries are constructed to form elevated sites for pavilions, such as the "Wangjiang Pavilion" atop the Grand Rockery in Yuyuan Garden, Shanghai (Fig. 2). The frequent use of names like "Wang" (to gaze) or "Guan" (to view) suggests that their primary function is scenic appreciation, especially of distant views.

Italian terraced gardens, developed by leveraging the country's unique topography, occupy a distinctive position in global landscape architecture. Elevation differences allow garden pavilions to effortlessly incorporate borrowed scenery beyond the garden boundaries, expanding the perceived spatial scope. Italian garden design vividly manifests the classical notion that beauty lies in harmonious proportion. Clear visual axes are typically established through the strategic arrangement of stone structures, such as steps, sculptures, grottoes, niches, columns, pavilions, in combination with water features —such as canals, cascades, fountains, and waterfalls, as well as meticulously maintained plant elements like clipped shrubs, labyrinths, and potted specimens. For instance, the pavilion at Villa Cicogna Mozzoni is situated at the terminus of the terraced garden and aligned with the perspective axis of a 16th-century water staircase (Fig. 3). A double row of cypress trees directs the viewer's gaze.

In contrast, water meanders down the steps, reinforcing the garden's spatial depth and formal order. Although the siting of pavilions often prioritises views, their compositional role within the landscape is equally emphasised. At Villa Monastero, located on the eastern shore of Lake Como and originally a convent, renovations during the 19th and 20th centuries introduced a pavilion within its botanical garden (Fig. 4). This structure exemplifies the Italian tradition: symmetrical stairways, statues, and stone columns are harmoniously integrated with the pavilion, establishing it as a focal point within the terraced composition.

### Water-friendly

Waterfront pavilions can be categorised into two types: those with one to three sides facing water and those surrounded by water. Though both emphasise proximity to water, they create distinct visual and atmospheric effects—pavilions by the water's edge offer open spaces for viewing and leisure. For instance, the boat-shaped pavilion in Keyuan, Suzhou



Fig. 1. Tayun Pavilion in Jingyi Garden, Beijing
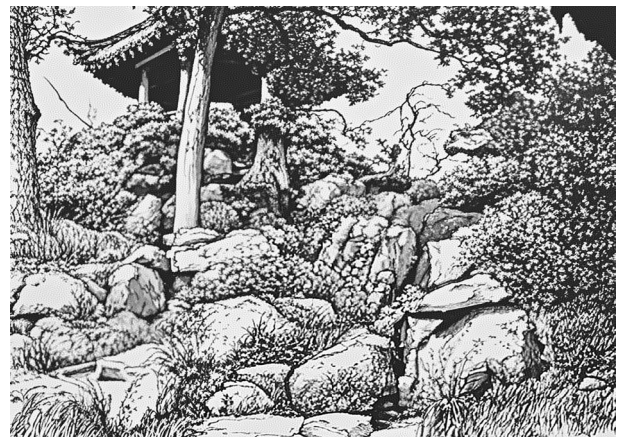[Illustration by Ning Liu]



Fig. 2. Wangjiang Pavilion in Yuyuan Garden, Shanghai
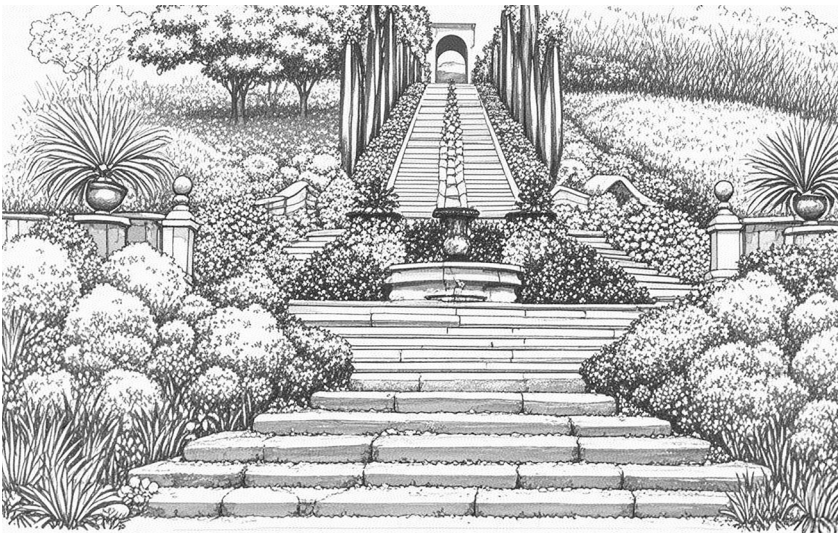[Illustration by Ning Liu]

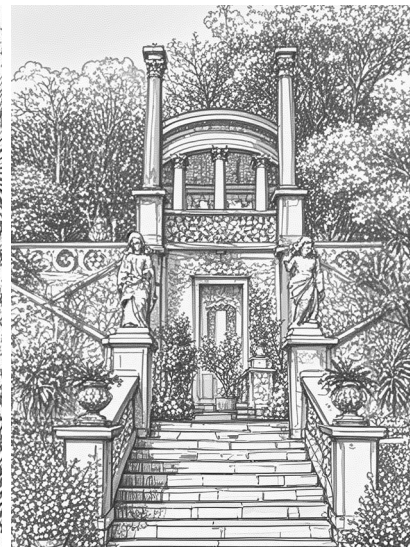Fig. 3. Pavilion in Cicogna Mozzoni, Varese
[Illustration by Ning Liu]



Fig. 4. Pavilion in Villa Monastero, Como
[Illustration by Ning Liu]



Fig. 5. Pavilion in Keyuan Garden, Suzhou
[Illustration by Ning Liu]



Fig. 6. Hefengsimian Pavilion in Zhuozheng Garden, Suzhou
[Illustration by Ning Liu]



Fig. 7. Pavilion in Villa Monastero, Como
[Illustration by Ning Liu]



Fig. 8. Pavilion in Villa Durazzo Pallavicini, Genova
[Illustration by Ning Liu]

(Fig. 5), faces east and features stone tables and drum-shaped stools inside, with a "Wuwangkao" (a kind of chair) by the railing for visitors to lean on and enjoy the waterscape [18]. Pavilions surrounded by water, however, form independent scenic centres. The "Hefengsimian" pavilion in the Humble Administrator's Garden (Fig. 6) appears like a floating island, spatially independent yet visually connected to its surroundings through water reflections, showcasing the Chinese garden pursuit of contrast between reality and illusion and the creation of poetic imagery.

In Italian gardens, waterfront pavilions are often built beside natural lakes or rivers, emphasising openness and scenic views. The pavilion at Villa Monastero by Lake Como (Fig. 7) features three open sides and a roof connected to a second-level pergola, which visitors can climb for elevated views. It offers panoramic vistas of Lake Como, serving as a resting spot and an integral part of the lakeside scenery, enhancing the harmony between the garden and its natural environment. Pavilions placed within the water in Italian gardens tend to serve as visual landmarks rather than functional spaces. At Villa Durazzo Pallavicini, for example, the waterside pavilion (Fig. 8) functions primarily as a visual focal point within the spatial sequence. Notably, this garden also includes a Chinese pagoda-inspired structure. Though it adopts features of traditional Chinese architecture, such as a multi-eave roof and upturned ridges, decorative details like volute ornaments and hanging bells reflect a romanticised European interpretation of exotic culture.

*Built on flat terrain*

Building pavilions on flat terrain is the most common layout in Chinese gardens, usually appearing in two forms. The first is a pavilion set amid specific scenery, such as flowers or groves, where visitors within the pavilion can enjoy a distinct view. The Crabapple Pavilion in Huanxiu Villa (Fig. 9) is a classic example, nestled among crabapple blossoms to create a multisensory experience of sight and fragrance. The second type is a roadside pavilion, often numerous and accompanied by trees, with stone tables and stools for rest, thus prolonging visitors' stay and enriching the dynamic garden experience.

By contrast, pavilions on level ground in Italian gardens emphasise formal independence and clearly defined leisure functions. In the Giardini di Villa Melzi, for example, stepping stones lead to a simple pavilion with a woven conical roof surrounded by tall trees (Fig. 10). Its unadorned form harmonises with the natural setting while providing shaded rest, enhancing the spatial depth and richness of the landscape.

*Scenic compositions*

In addition to standing alone, pavilions are often integrated with other structures to create cohesive scenic compositions. In Chinese gardens, this integration is particularly distinctive. The Double-ring Pavilion in the Temple of Heaven Park, Beijing (Fig. 11), comprises two identical circular pavilions interlocked to form an embracing structure. The "Fulang Pavilion" in Geyuan Garden, Yangzhou, showcases another combinatory method, where the pavilion intertwines with winding corridors and jagged rockeries, complemented by seasonal flora to create an evolving spatial sequence. These combinations embody the principle of "constructing pavilions according to the terrain."

Italian gardens, by comparison, focus more on aesthetic integration with ornamental structures. Functioning as standalone focal points within the garden's layout, often combined with niches or sculptures to enhance visual appeal. Others serve as architectural appendages at or alongside main buildings to enhance spatial layering and scale. The pavilion atop the main building of Castello di Celsa (Fig. 12) not only occupies a commanding height for panoramic views but also enriches the building's silhouette through its integrated design.

**Layout analysis methodology**

The siting of pavilions reflects the aesthetic interest and embodies the overall planning principles of garden design. Although the Chinese and Italian gardens differ in cultural philosophy, both emphasise harmony with the surrounding environment. Whether by adapting to the terrain, being complemented by vegetation, or integrated with other architectural elements, pavilions consistently serve as key nodes in shaping the spatial order of the landscape.

**(1)** *Relation to topography*

The topography directly influences the layout of pavilions, as different landforms determine their siting and construction methods. Owing to the flexibility of Chinese pavilion designs, in addition to common shapes such as squares, circles, and polygons, more figurative forms like fans or plum blossoms are also adopted, or the design is adjusted according to the terrain. For example, in the Zhuozheng Garden in Suzhou, a fan-shaped pavilion is extended outward over convex terrain (Fig. 13-1). At the same time, in the Summer Palace, the Yangrenfeng Pavilion adopts a concave fan-shaped layout to fit its sunken foundation (Fig. 13-2). In more



Fig. 9. Pavilion in Villa Huanxiu, Suzhou
[Illustration by Ning Liu]



Fig. 10. Pavilion in Giardini di Villa Melzi, Como
[Illustration by Ning Liu]



Fig. 11. Pavilion in the Temple of Heaven Park,
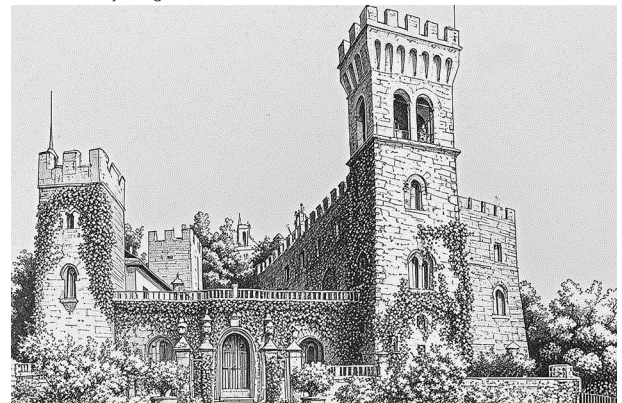Beijing [Illustration by Ning Liu]



Fig. 12. Pavilion in Castello di Celsa, Siena
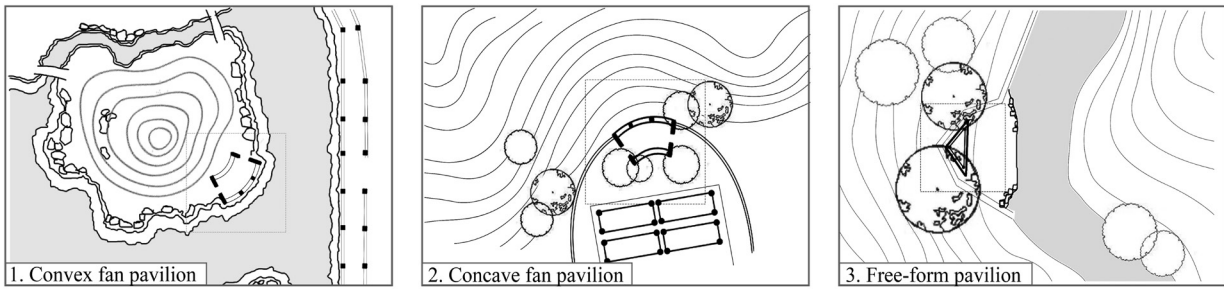[Illustration by Ning Liu]

Fig. 13. Chinese garden pavilions and topographical treatments [Elaboration by Ning Liu]
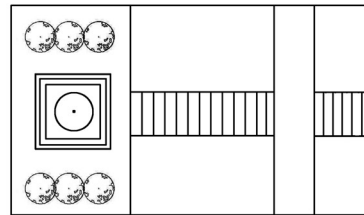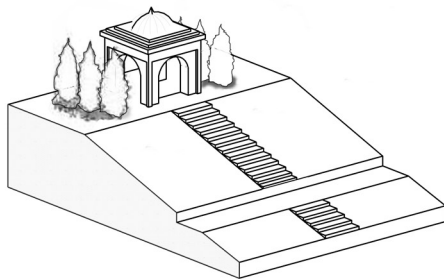




Fig. 14. Italian garden pavilions and topographical treatments [Elaboration by Ning Liu]

complex terrains, pavilion forms even transcend geometric conventions, being determined instead by existing features such as rocks and trees, as seen in the Aoyi Pavilion at Qingcheng Mountain[14] (Fig.13-3). This design flexibility enables a richer integration of Chinese pavilions with the terrain. Moreover, in mountainous gardens, pavilions are typically arranged along natural slopes, incorporating native rocks and undulating landforms with minimal topographical alteration. Such an approach highlights the exceptional adaptability of Chinese pavilions to their environment.

Similarly, Italian terraced gardens use existing topographical conditions for pavilion construction but tend to emphasise spatial control and a sense of order. When dealing with height differences, the terrain is often levelled or broadened to create regular platforms for pavilions, which are connected through orderly elements such as flat steps and terraces (Fig.14). Pavilion forms are predominantly regular, such as circles or rectangles, with design choices primarily driven by visual composition to ensure coherence with the overall spatial layout and precise control of perspective relationships.

**(2)** *Relationship to water*

By leveraging the characteristics of water, pavilions create rich visual effects while contributing to ecological functions such as air humidification and temperature regulation. Despite their shared affinity for waterfront locations, Chinese and Italian pavilions exhibit distinct design methodologies and spatial arrangements. In Chinese gardens, the spatial relationship between pavilions and water can generally be classified into three types—near, extended, and cross—according to their proximity and orientation to the water surface (Fig. 15)[3]. Pavilions built along the shoreline (near) are typically placed with one side facing the water, capturing reflections and incorporating the boundless water scenery into the confined space of the pavilion. Pavilions extending over the water (extend) are positioned with one side connected to the shore and three sides surrounded by water, blurring the boundary between land and water. This creates an impression of the pavilion hovering over the water, as seen in the Shanshuijian Pavilion of the Ouyuan Garden, where the structure spans a narrow pond and opens to the water on three sides, giving the illusion of endless water extension. Pavilions within the water body (cross) are placed at the centre of the water and typically connected to the shore by bridges or stepping stones, immersing visitors in a waterscape experience. Additionally, Chinese gardens feature pavilions built on islands or above bridges.

By contrast, Italian pavilions are predominantly positioned near the water, whereas extended and cross configurations are seldom seen. Compared to Chinese gardens, which use small artificial lakes or ponds to foster a more intimate and serene atmosphere, Italian pavilions are more commonly positioned alongside vast natural water bodies like lakes or coastlines, highlighting spatial openness and continuity. Moreover, cross-type pavilions are exceptionally rare in Italian gardens and generally function as ornamental features within water scenes rather than as actual spaces for human occupation. This contrasts with the Chinese design philosophy, which treats pavilions as spaces for viewing and touring.

**(3)** *Relationship to vegetation*

In Chinese gardens, the choice of plants around pavilions goes beyond aesthetic and ecological purposes, carrying rich cultural symbolism. Species are often chosen for their
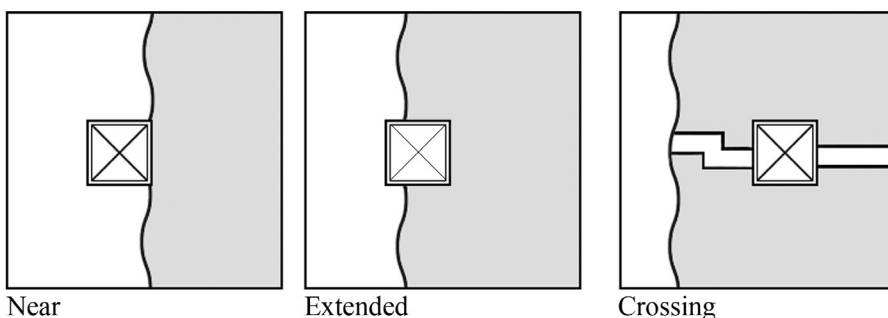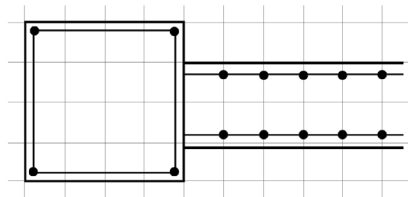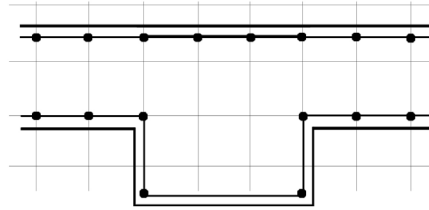


Near       Extended       Crossing

Fig. 15. Garden pavilion with water treatment [Elaboration by Ning Liu]

Fig. 16. Two combinations of
pavilions and corridors
in Chinese gardens
[Elaboration by Ning Liu]

I - Pavilion ending a corridor

II - Pavilion as part of a corridor

poetic associations or symbolic meanings, fostering a dialogue between the pavilion and its vegetative setting that deepens the garden's cultural expression. For instance, in Suzhou's Humble Administrator's Garden, each of the four pavilions is paired with distinct plantings to reflect seasonal transitions: peonies beside Xiuqi Pavilion to evoke the vitality of spring; lotuses encircling Hefengsimian Pavilion to fill the air with summer fragrance; orange trees and maples around Daishuang Pavilion to capture the essence of autumn; and wintersweet near Xuexiangyunwei Pavilion, its blossoms likened to fragrant snow in winter. Seasonal enjoyment is further enhanced by the ripening of fruits, such as tasting loquats in spring, harvesting lotus seeds in summer, and picking oranges in autumn, allowing the pavilion to serve both as a viewing platform and a space for experiencing the rhythms of nature.

In contrast, the plants in Italian gardens, shaped by geometric principles, primarily serve to define spatial boundaries, reinforce axial alignments, and elevate the ceremonial character, rather than merely providing decorative greenery. Common plants include symmetrically arranged trees (e.g. cypresses, lindens, chestnuts), neatly trimmed hedges (e.g. boxwoods, laurels), enclosed flower beds (e.g. roses, lavenders), and occasional climbers (e.g. ivy, wisteria). Pavilions are typically placed at the termini of tree-lined vistas or framed by symmetrical plantings to establish clear spatial focal points. The formal arrangement of vegetation emphasises order and directs visual flow, ensuring a cohesive relationship between the pavilion and the landscape.

**(4)** *Relationship with other structures*
The divergent development of standalone architecture in China and the West significantly influences how pavilions are integrated with other architectural elements. In China, a dispersed layout strategy is adopted, allowing pavilions to be flexibly embedded within garden spaces and combined with various structures such as other pavilions, corridors, etc. Among these, the combination of pavilions and corridors is particularly prevalent, typically realised in two configurations (Fig.16), pavilions positioned at the termini of corridors or incorporated directly within the corridors themselves. A representative example of the first configuration is the fan-shaped Pavilion at the turning point of the climbing corridor in the Shizilin Garden, where the pavilion is chamfered into a circular form, and a small eastern space is reserved for plantings of banana trees and bamboo. This layout enables the pavilion to receive cool breezes from the east, west, and north, while shielding it from the warmer southern wind. The returning airflow along the corridor and enclosing walls amplifies the sound of the wind within the pavilion, creating a seamless integration of name and experience. The Long Corridor of the Summer Palace exemplifies the second configuration, in which the corridor extends outward to incorporate a pavilion, thus interrupting the monotony of its otherwise continuous linear spatial composition.

In contrast, Italian architecture adopts a centralised spatial strategy, wherein the main building is the dominant focal point

that orchestrates the entire garden composition. Pavilions are typically arranged symmetrically on either side of the main structure or placed atop it as architectural embellishments, thereby preserving visual order and compositional balance. For instance, the pavilion atop the Castello di Celsa's main building enhances the visual experience's vertical extension. Furthermore, due to fundamental differences in construction materials and structural systems, Chinese pavilions—primarily constructed of timber—are lightweight and readily combined with corridors, bridges, and other elements, facilitating a fluid and dynamic spatial experience. Italian pavilions, typically constructed from masonry, tend to adopt more stable yet constrained configurations, functioning primarily as integrated extensions of the main building that reinforce its architectural coherence and contribute to the overall unity of the garden composition.

**Conclusion**

An analysis of the conceptual principles, locational characteristics, and construction methods of pavilions present in Chinese and Italian gardens reveals that, although both traditions share certain similarities—such as the preference for elevated positions or waterfront settings—the differences in siting philosophy, spatial articulation, and integration with surrounding elements remain the defining features.

The divergence in traditional cultural and philosophical foundations profoundly shapes the perceptions of nature and spatial aesthetics in China and Italy, thereby influencing the siting strategies of garden pavilions. In Chinese classical gardens, deeply rooted in Confucian and Daoist philosophies such as "the unity of man and nature" and "following the way of nature", pavilions are arranged in harmony with the environment, resulting in spatial layouts marked by fluidity and variability. In contrast, Italian gardens, shaped by geometric principles and an aesthetic of order, prioritise proportion, symmetry, and spatial control. Italian gardens, shaped by the principles of geometry and the aesthetics of order, strongly emphasise proportion, symmetry, and spatial control. Consequently, pavilions function primarily as ornamental focal points or as devices for reinforcing geometric composition, rather than as expressions of seclusion and harmonious integration with nature, as seen in Chinese gardens.

Although Chinese and Italian pavilions are sited on elevated terrains, their design philosophies diverge significantly. Chinese pavilions follow the natural topography, aligning with the slope to harmonise with the surrounding environment. In contrast, Italian gardens typically involve modifying and levelling terrain to create platforms for pavilions. The design of Italian gardens generally entails reconfiguring and levelling the terrain to accommodate pavilion construction on flat platforms.

Regarding the interaction between pavilions and water, Chinese pavilions engage in multi-dimensional interactions with water, situated along shorelines, extending over water surfaces, built on bridges, or even directly within water bodies. Italian pavilions, however, are predominantly positioned near water to enhance spatial depth through borrowed scenery.

Using pavilions that cross over water is comparatively rare and primarily decorative, focusing on visual extension rather than functional engagement.

Regarding planting design, vegetation surrounding Chinese pavilions emphasises cultural symbolism to enhance the intended atmosphere. In contrast, Italian pavilions adhere to geometric aesthetics to establish a sense of order within the landscape.

Regarding relationships with other architectural elements, Chinese pavilions, characterised by their light wooden structures, are frequently combined with different features such as corridors and bridges to create fluid spatial experiences. Italian pavilions, generally constructed as masonry structures, serve mainly as architectural appendages to the main building, reinforcing the compositional balance of the overall design.

Chinese pavilions are strategically positioned to interact with the natural environment, producing a dynamic viewing experience in which changing perspectives continuously reveal new spatial layers. Italian pavilions emphasise a static viewing experience while creating open and orderly spaces for contemplation. These contrasting approaches reflect the fundamental differences in Eastern and Western perceptions of nature and spatial aesthetics, which have shaped the evolution of their respective garden arts and ultimately fostered distinct cultural and landscape experiences.

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## Kopsavilkums

Pētījumā tiek salīdzināti Ķīnas un Itālijas dārzu paviljoni, sistemātiski analizējot to līdzības un atšķirības izvietojuma izvēlē un pamatā esošajās kultūras motivācijās. Ķīnas dārzu paviljonus dziļi ietekmē filozofija par "cilvēka un dabas vienotību", kas uzsver harmoniju ar dabas ainavām un elastīgu plānojumu. Tiek izmantotas tādas metodes kā paviljonu novietošana kalnu un ūdenstilpju tuvumā, lai panāktu organiska arhitektūras un vides saplūsmi. Savukārt Itālijas paviljoni iemieso ģeometrisku kārtību un racionālu estētiku, ko raksturo asiālā simetrija un apzināta reljefa pārveidošana, lai veidotu strukturētas telpiskās sekvences. Analizējot filozofiskos konceptus, izvietojuma raksturlielumus un telpisko organizāciju, pētījums atklāj gan kopīgās iezīmes, gan atšķirības paviljonu novietojumā uz paaugstinājumiem, pie ūdens, uz līdzenas zemes un kompozicionālās grupās, vienlaikus padziļināti izpētot to attiecības ar reljefu, ūdens elementiem, veģetāciju un citām arhitektoniskām struktūrām.

# IMAGES OF ESCHATOLOGY OF ANTANAS VIVULSKIS' (1877-1919) SAINT MARY APPARITION CHAPEL IN ŠILUVA

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**Abstract. The aim of this article is to discuss, through the method of hermeneutic analysis, the nature of Christian eschatology as a observer's choice in perceiving architectural objects and how this process expands the semantic meanings of an original architectural creation. These meanings may have been implied by the architect but not necessarily intentional. To explore this issue, the study focuses on the only surviving architectural work by the Lithuanian-Polish architect Antanas Vivulskis—the Chapel of the Apparition of the Blessed Virgin Mary in Šiluva (1903–1924)—and the visual solution from the Šiluva Pilgrimage Center's communication campaign: the conceptual architectural work titled The Cube.**
**Keywords: Antanas Vivulskis, eschatology, conceptual architecture, Šiluva, hermeneutics**

## Introduction

The relation between architecture and eschatology can be traced back to building the very first structures made by ancient humans [13]. In this text we will emphasize on the issue of Christian Catholic eschatology distinctly just to expound the whole concept, however in the text we remain with a general concept of this definition, mostly expressing theological and philosophic concern of a final destiny of the World, that transcends physical limitations of [corpo]reality. Thus, the question could be raised immediately if architecture and eschatology could ever be harmoniously linked.

In this monography named "Total city" K. Rudokas (2023) has emphasized that initial moment of building a very first structure – the seeking to enclose from nature – can be considered as both: an act of metaphysical thinking and, at some degree, seeking to act in eschatological way. Moreover, B. Hillier (1984) has championed that ancient-like and primitive structure such as the yurt of Mongol, by deep aspiration to include cosmic structure into a simple yurt's design and mimic it, is eschatology-wise effort to experience living in total univocity with surrounding. And by doing that – Mongol – to some extent, sustains, redeems and causes cosmos to exist [22; 6].

Moreover, other prominent thinker of architecture and urbanism – Ch. Alexander (1977) noted that even the most holy or sacred object to be found in particular urban fabric has been eschatology-like only in one case if it affects transformations of its surrounding [1]. V. Ganiatsas (2011) championed that every architectural heritage object must be considered as an ethical imperative to its urban surroundings. Thus the building temporal perspective now it has been shifted from merely being an attribute of the past in to the realm of the future [4].

Eschatology here, is to be understood as a very profound contradiction to what heritage professionals call authenticity. The best case of this contradiction, in western tradition, can be perceived in early monasteries of Benedictine rule – by applying eschatological images of New Heavenly Jerusalem (which will be topic of this paper), mostly described in the last book of Holy Scripture – the Apparition to John, fraters had sought to mimic structure of that unearthly city, however, by imposing universal urban layout they, unintentionally, denied authenticity of form and design in the grand scale of planning [23].

In this paper I will argue that eschatology can be compatible in one particular building in both domains of architectural language. First off, the artistic form, intentionally or intuitively, can be hermeneutically perceived as having images and motifs linking architectural design to eschatological realm. Nevertheless, the reception, being second domain of architectural language, of the building due to its functional purpose and ability to shape both physical and mental surroundings can confirm and foment visual eschatological elements of architecture and design forms.

The aim of the research is to find and discuss eschatological images and motifs in the only intact architectural work of prominent Lithuanian-Polish architected and sculptor Antanas Vivulskis the St Mary Apparition chapel in Šiluva (project 1903-1906, completed and consecrated 1924 after death of the author), Lithuania. The place itself is of mayor importance of Catholic faith and tradition in Lithuanian since it has been believed that the pivotal moment took place in 1608, when St Mary appeared in the fields of Šiluva holding baby Jesus. The chapel was built on the exact spot 300 year later. Therefore, the genius loci of the place itself have been pervaded by the presence of miracle and, to some extent, eschatological presence since the miracle itself is the most crucial and ultimate event in history of the Shrine. We will use the method of hermeneutic thinking to achieve our objectivity – to harmoniously link architecture and the concept of eschatology.

## Brief spiritual history of Šiluva

The history of town dates back to the mid of 15th century with regard to the first Catholic church being built there. However, with the advent of the Reformation movement the Calvinist denomination strengthened and by the beginning of 17th century almost entire town was in hands of the Calvinist, who, as claimed, illegally expropriated catholic lands and only very few catholic had left [35].

The pivotal moment took place in 1608 when St Mary appeared on the stone, crying and holding baby Jesus, in the fields of Šiluva. First off, she appeared to two little shepherds who saw a girl dressed in clothes that had unearthly splendor of its colour and fabric. Being scared, children asked for Calvinist pastor and teacher to come and investigate the case they had seen. When they arrived, St Mary had been there and kept crying. The pastor asked her why she was crying. She responded: "Earlier, my Son was worshiped here, but now it is plowed and sown." After having said these words, she vanished.

From that particular moment, the spiritual history of Šiluva has extended into many domains of importance, both metaphysical and historical.

First off, Šiluva has been known as place of miraculous healing since Our Lady of Šiluva  holds title of the Health of the Sick [33]. Soon after the apparition Šiluva was made into the most important sanctuary in Lithuania [8]. In two books printed during the interwar, there was emphasized that since the apparition until the 19th century all the miraculous events had been precisely recorded and investigated confirming the verity of those events. However the record book that was mentioned in these two prints had been lost therefore the first written authentic testimonies reach our days since the end of 19th century [32].

Second aspect relates to historical events that have been

taking place in the town. During Russian occupation in both period of tsardom and later of Soviet Union, Siluva had been significant place of resistance being one of the core points of book bringers or partisan resistance during Soviet occupation. Despite its being tiny town in urban scale the faith that has been present here, catalysed various action of resistance during unfavorable history of Lithuanian people [32].

The current communication strategy of the Šiluva Shrine also relies on the use of faith heritage and tradition. Since 2019, in collaboration with various governmental institutions, arts and cultural organizations, and the higher education sector, the concept of "Living Pilgrimage" has been developed. The communication message of the "Living Pilgrimage" is based on the methodology of pilgrimage as an inclusive and comprehensive way of life and organizational approach to activities that even had little to none relation to religious practises. Its goal is to use a wide variety of events not only to encourage deeper knowledge of Šiluva's history and culture but also to integrate aspects of evangelization into seemingly unrelated activities. These range from scientific conferences to contemporary art performances and interdisciplinary events [24].

During the Grand Feast of Our Lady of Šiluva that takes place every year in September, and this tradition is being alive for more than 400 years, every year there gather more than 50 000 pilgrims and worshipers from Lithuania and the rest of Catholic world.

### Eschatology and its presence in Šiluva.

### Metaphor of one cup and two cups

To define the issue of Catholic eschatology we will rely of Joshep Ratzinger's notion of eschatological time, or say, a manner of being already within eschatological realm. First off, Ratzinger notes that eschatological presence has twofold structure and is superpresent in two different dots in historic time line. The first eschatological moment is Incarnation of Jesus Christ. His passion and death upon the Cross were a significant moment that transfigures spiritual and corporeal history of all the creation [17]. However, the complete salvation is also yet to come at the End of World, during the Second coming and last judgement day. Thus, the being in eschatological state is yet present meanwhile needed to be waited about [11; 30].

This suggests that to reach the complete eschatology person needs to put efforts to it [19]. David DeSilva (2014) argues that the concept called "once saved – always saved" regarding to redemption performed by Christ, we still need to ask: "when saved". Here we are required to emphasize that being completely saved or redeemed means to be in eschatological state. Now returning briefly to the context of the Apparition of Šiluva, it can be argued that Mary's message, emphasizing the essence of worshiping the Son within the framework of everyday utilitarian work, serves as a more or less direct invitation to participate in the work of one's own salvation. This work is not merely physical but spiritual, however not overestimating the spiritual domain. In other words, it is a reminder that, on the one hand, no one can earn an eschatological state through their efforts alone, as the possibility of entering Heaven (the eschatological city—the New Heavenly Jerusalem) is attainable solely through God's mercy. On the other hand, it underscores the importance of earthly life and the pursuit of salvation here on Earth through worship of the Son.

The "When" occurs when a person, by assuming the being

of creation [5], simultaneously embraces an intention to step partially beyond the being of creation itself. While such an effort in earthly life does not guarantee an immediate vision of the New Jerusalem, a person's free decision to live in the longing for redemption renders him, in a sense, immortal. This is due to, as J. Ratzinger suggests, a unique connectedness to God. The Spanish mystics such as Teresa de Avila argued that fulfilment of human being while on Earth, is possible due to its validated effort to only remain the thought in Trinity's mind, at that particular moment in eternity when God stopped, took a break and decided to make human according image and likeness of their own [23].

The above mentioned reduction of corporeal human doesn't diminish the idea of everyday life that everyone has experienced on earth [19]. According to Rudokas (2023:55) this implication, to only remain the thought in Trinity's mind, allows one to see a path to what he calls 'the whole human being'. The 'whole human being' has not yet achieved eschatological state nor has been redeemed completely. But by contemplating himself/herself in following formulae that:

> 'Whole human being' [equals] all the humanity [minus] that one particular human being

that one particular human being is on his/her way to achieved close-to-eschatolocal state of being in the that way, that was noted by Ratzinger. He emphasizes that Heaven, or the City of New Jerusalem, represents a unified body of Christ in which individuals and even the universe exists as a single entity. This unity, however, preserves the distinct personhood of each being rather than merely binding them together in a collective.

Therefore, we can conclude that eschatology is such a state of being or such a space of events taking place, where human being is totally whole. By claiming 'totally whole' we could emphasize it by suggesting that, in given terms, human being is in the state of superposition, where he/she is distinct person meanwhile being totally integral part of body of Christ who himself is Heaven – ultimate entity. To clarify that, we can add a metaphor of one cup that paradoxically has been able to contain the volume of two cups of the same size of that initial cup.

### From Christian eschatology

### to the [non]possibility of eschatology in architecture

As it was elaborated by Phillip Sheldrake (2014), architecture and the city which is made out of distinct architectural elements, operates in a similar manner like that one of Heaven. To add more clarity we can note that urbanism, in general, represents ontic ability to juxtapose to different temporal points [buildings] in the same space [urban complex], which basically means that two or more buildings of different eras can be standing close to each other or even make integral urban complex [24]. However, the objectivity of any particular city is different from what we have elaborated above. A city is object of practical action and the nature of these action imply that even by transforming and altering physical or social aspects of urbanism, classical urbanism does not offer anything that would transcend physical or phycological needs [28].

An architectural object, even one considered an exceptional cultural property, can be fully authentic when it has completely

Fig1. Figure 1 The Apparition chapel in Šiluva (1903-1924).
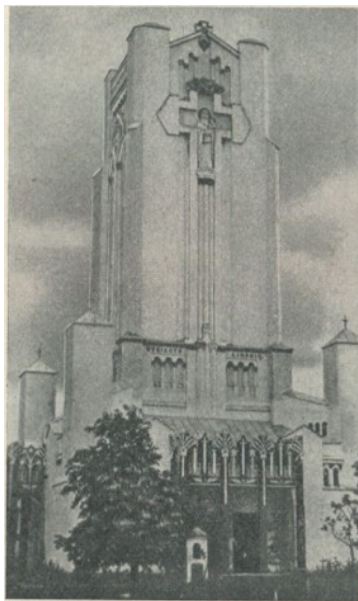Architect Antanas Vivulskis



Fig. 2. Historic photo depicts wooden portals that haven't been preserved. Portals were lost during the reconstruction in 1958.

faded, signifying that it has undergone all phases of existence, with fading being one of them [14]. Even if this statement could be argued by many scholars emphasizing the 'here and now' existence and authenticity of any particular building or urban complex, we could note that within the limits of our own civilizational progress we observe a pervasive nature of alteration of any property. As elaborated by Rudokas (2021), both the semantic and physical qualities of buildings are subject to change, as any social, infrastructural, technical, or paradigmatic alterations in society inevitably influence a building's form, perception, and reception. Moreover, the building changes in terms of influence of its function, of its status and of its geographic location in the city.

Therefore, fading, to a greater or lesser degree, is an inevitable destiny, which could potentially lead society to its teleological state -although this is highly doubtful, as all utopias that have long since fallen were grounded in the notion of creating a heaven on Earth - or to some approximation of a teleological state. However, eschatology would never be the focus in this context.

However, in the introduction, the opposite aspect of the architecture was mentioned, suggesting that even the earliest settlements established by indigenous peoples embodied both - eschatological elements and a sense of transcendental activity. This occurred as a result of their inherent drive to transcend the limitations superimposed upon humanity by nature. In the Judeo-Christian view, the 'Otherly Other' would be considered akin to 'the Most Sacred' chamber in the Tabernacle of Moses or the tabernacle present in every Catholic church. However, for the most sacred inner space of a building to exist, the perceiver must be willing to accept that reality - or, in terms of physics, must choose to observe this particular reality for it to manifest [9]. Indeed, the first action of enclosure from the nature, was nothing more than determination to choose to, first observe different reality than that provided by nature, and then to shape it, to call it to physical manifestation.

Within the Catholic tradition and teaching, the innermost space of the church or chapel is regarded as a place of mystery, where the Word is redeemed through the deeds of Christ, yet remains a promise yet to be fulfilled, in the sense of being transparently manifested. Indeed, since the identity of the first builder of the very first structure will remain unknown forever, we can only imagine their lack of explicit knowledge and the sense of uncertainty they must have felt when beginning the construction of that particular structure. Neither the Christian, the believer, nor the traditional Catholic, without a living faith, can truly comprehend what is contained within the tabernacle. Thus, an eschatological architectural object, if such an object exists, cannot undergo decay like other architectural objects due to the presence of the eschatological entity 'here and now,' as its reality has not yet fully manifested.

### The Apparition Chapel of Our Lady of Šiluva.
### Optional eschatology?

As our study has demonstrated, we can establish a connection between architectural action and the concept of eschatology, to some extent, as an ambivalent relationship. On one hand, general urban theory denies the possibility of eschatology occurring or manifesting explicitly. However, the origins of constructing artificial structures are deeply rooted in humanity's vocation for eschatological action. Moreover, eschatology 'can' occur only if the perceiver opts to observe this ambivalence as a state of superposition – already having been manifested and yet still being a matter to be awaited. In the following case study, we aim to highlight the extent to which the Apparition Chapel (Fig 1.) - the first made and only intact building by the renowned Lithuanian-Polish architect Antanas Vivulskis - can be hermeneutically interpreted by the observer as an eschatological entity.

The architectural and conceptual framework of the Apparition chapel of Our Lady of Šiluva was examined by notable Lithuanian [11; 12; 25].and Polish scholars [15]. The general consensus agrees on that this building features with hardly coherent qualities and yet nonetheless the architect A. Vivulskis was able to achieve architectural harmony. Having been trained both as an architect and as a sculptor in Austria and later in France he has always sought to achieve the transcendent form and sense in his works [12]. It is worth noting that the author, a devout Catholic who sought to follow the example of Jesus Christ not only in his career but in his life as a whole, sacrificed his life to save a friend from military service while fighting the Bolsheviks in Vilnius during the winter of 1919, despite being the leading architect of the largest church construction project in Vilnius at the time.

The inspiration to seek for mystic and metaphysical appearance has always been a task to be achieved in his works like in the field of architecture as well as in sculpture. Beginning an examination of the architectural language of the Apparition Chapel, it is important to note that most Lithuanian scholars agree this building can be regarded as the only example of Lithuanian 'protomodernism' in architecture, showcasing a subtle coherence between innovation and tradition [10].

Fig. 3. Picture of model of angel's sculptures. 24 of those must have decorated the interior of the chapel according to the initial concept of A. Vivulskis



Fig. 4. The Cube. Ground view. Representation of Heavenly City - The New Jerusalem merged with a work of Antanas Vivulskis. Emphasis has been put on the superposition of God's concealment and revelation [authors Kęstutis Vaišnoras (architect), Kastytis Rudokas (consultant), 2024]

Later, Kaunas modernism of the interwar period would evolve into a significant architectural epoch in Lithuanian history and, by 2023, was recognized as a UNESCO World Heritage Site. The four following features could be noted to describe uniqueness of this masterpiece:

*1. The Unveiling of Innovation of Architectural Language*

Innovation is achieved subtly and unconventionally by incorporating a diverse linguistic range of historical and archetypal architectural styles into the composition. Researchers emphasize that elements of French and English Gothic, ancient Egyptian column motifs, Byzantine and Eastern church art motifs, motifs of ethnic Lithuanian architecture as well as the stylistic features of Art Nouveau, can be observed here [10]. The novelty in architecture is not based on the rejection of historical tradition, as seen in the work of modernist pioneers like Peter Behrens. Rather, Vivulskis seeks new forms by embracing, rather than discarding, historical styles. In fact, one could compare the work of Antanas Vivulskis with that of Otto Wagner and the renowned Slovenian architect Jože Plečnik [29]. A. Vivulskis' innovation does not rely on the mere citation or sole reference to history but is instead grounded in a Christian eschatological understanding of history, where history is unified within a singular entity – Heaven-like structure. It represents a kind of metaphysical effort to not change, cite, or interpret history, but to complete and, to some extent, redeem it.

*2. Similarity and juxtaposition of figures*

Architectural harmony of form is achieved through the use of various stylistic citations, as well as the subtle integration of open and solid planes within the overall composition and individual facades. A large scale is often juxtaposed with unusually small details, creating what might be called a 'hyper-contrast' effect. Another important aspect is the compatibility of pointed-arch windows and facade openings with the extensive use of semi-circular arch motifs. This effectively merges classical orders—symbolizing the human sphere of influence -with the language of medieval architecture, representing a sort of divine domain. However, the most subtle innovation introduced by A. Vivulskis lies in the fusion of the tower as an architectural element and the cross as a sculptural motif into one integrated whole.

If Antonio Gaudí's architectural invention can be considered the introduction of the parabolic arch into the language of architectural mass [7], then in Vivulskis' architecture, the tower becomes the sculptural cross. The clear and unprecedented synthesis of sculpture and architecture in the region stands as the author's primary innovation, achieved with full intentionality. Lithuanian koplytstulpis—a symbol and sculptural element deeply significant to the country's ethnic culture and Catholic tradition could be seen as inspirational source for chapel's project [10].

One could argue that Vivulskis achieves what later Bauhaus or De Stijl masters in Germany and the Netherlands would strive for: the complete synthesis of the arts in architecture. Such aspirations are also evident in the larger project of the Vilnius Church of the Most Sacred Heart of Jesus, especially in the design of its tower. To some extent, he foresaw the future by embracing the historic architectural language, demonstrating how the future could have unfolded if this tradition had not been seen as an obstacle, but rather as a profound source of innovation for creating something beyond.

*3. Conceptualizing Lithuanian Identity*

Vivulskis is a conceptual architect whose primary aim was to convey the spirit of Lithuanian identity by drawing on the expressive means of Lithuania's ethnic architectural traditions. It is significant that the architect and sculptor did not employ specific forms characteristic of ethnic architecture but sought to capture the essence of Lithuanian identity through the heavy mass of the main façade, which simultaneously functions as a sculptural object a cross. A particularly distinctive element was the now-lost wooden portals (Fig. 2), which originally adorned all four façades of the chapel. These were replaced with new masonry portals during the 1958 reconstruction project. The porticos were expressive and picturesque, achieving a subtle interplay of wooden and masonry architecture reminiscent of the famous balconies of Lima. A key feature of the wooden porticos was the depiction of seraphim and cherubim, as well as sword motifs. According to A. Vivulskis's vision, the chapel's interior was to include sculptural bas-reliefs depicting an army of angels armed with swords (Fig.3) encircling the entire perimeter of interior.

The angel - understood as a spiritual being capable of beholding God directly - was employed here as a herald of freedom for Lithuania, which at the time was under Russian imperial occupation. Despite the unfavorable political circumstances of the period (1903–1906) for expressing ideas of freedom, A. Vivulskis was already firmly convinced that Heaven had decreed Lithuania's liberation. This conveys an eschatological intuition, where the signs of change remain absent in the corporeal world, yet the decisive event that ensures this transformation has already occurred.

*4. The Cuboid and the Heavenly City*

The connotations of Lithuanian identity, as noted by some scholars, are also evident in the overall architectural composition of the building, where certain researchers [9] identify motifs resembling the Pillars of Gediminas - a symbol of the ancient royal lineage of Lithuania.

However, when discussing the architecture of the chapel in the context of Christian eschatology, the lower segment of the building's volume reveals an implied cuboidal form. The pilasters at the four corners of the building create a nearly perfect cubic volume, which is followed by the rising tower-sculpture [which was also called The White Tower of David, one of many titles of St. Mary [27]. From a hermeneutic perspective, the cuboid evokes the image of the Heavenly City - the New Jerusalem - described in the Book of Revelation as the ultimate paradise.

It is important to note that the Book of Revelation mentions that, despite the fact that the city of the New Jerusalem is described as being "entirely new"- emphasizing its descent from heaven to Earth and its incomprehensibly vast scale - it will also house the treasures and riches of the nations. In the eschatological context, Vivulskis's sensibility for the synthesis of different arts and the harmonization of diverse architectural styles acquires an even greater artistic intensity, enriching the conceptual and symbolic depth of his work.

Suppose the above mentioned architectural solutions, with their innovative yet tradition-absorbing elements, could be regarded as intentional expressions of the architect's vision, then the image of the New Jerusalem emerges as the result of the architect's intuitive sensibility. This imagery, uncovered through hermeneutic analysis and conceptual architectural inquiry-project, now strengthens the eschatological narrative underpinning the communicative strategy of the Shrine of Šiluva.

Having delineated these four foundational aspects of the Šiluva Chapel - namely: (a) the innovations introduced by A. Vivulskis, and (b) their contextualization within the Catholic eschatological framework - we can draw an interim conclusion that the eschatological specificity of the building is manifested through its bidirectional communicative capacity in terms of temporal reach.

First, the Chapel of the Apparition of the Blessed Virgin Mary engages with the past, encompassing the broadest possible archetypal, historical, architectural, and cultural dimensions while simultaneously serving as a temporal marker of its era - the early 20th century. Second, this cultural landmark, shaped by A. Vivulskis's eschatological intuition, is also an object oriented toward the future.

Primarily, this forward orientation suggests that the building is dynamic in the sense that it remains open to interpretive-hermeneutic augmentation by its perceivers. In a certain sense, the object is entirely complete, yet it possesses a distinctive kenotic quality. This kenosis can be understood as an attempt to emulate the reality of God, whereby, in this case, the eschatological reality of the New Heavenly Jerusalem unfolds well after the building itself was created.

## The Cube – conceptual architectural extension of eschatology of Apparition Chapel

The eschatological dimension of A. Vivulskis's architectural language, particularly the embodiment of the New Jerusalem - the Heavenly City - within the design of the Apparition Chapel, has been accentuated in the conceptual work The Cube (Fig. 4) by Kęstutis Vaikšnoras and Kastytis Rudokas. This abstract cuboid form represents the eschatological city described in the Book of Revelation [chapters 21 and 22] and delineates the lower section of the chapel. As previously highlighted, the cuboid is suggested not only through its architectural mass but also through the lack of it. These voids [space that is not filled with physic architectural mass] can be interpreted as a moment of kenosis - a form of self-limitation or emptying - leaving space for potential future creation. In The Cube, two planes of reality are intentionally merged:

a) A. Vivulskis's original architectural language and design are preserved and emphasized; b) This is now overlaid with the reality of the Divine City.

Thus the project draws upon Revelation 21:26: "The treasure and wealth of the nations will be brought there." Accordingly, The Cube echoes the fundamental principle articulated by the Virgin Mary during her apparition in Šiluva in 1608: that the history and outcome of salvation are not solely within the domain of Divine action but require active human participation.

In this interpretation, human effort is understood as an active existence in prayer and worship of Jesus Christ. According to the teachings of the Catholic Church, the concept of superposition—where two natures coexist within a single person—is a recurrent structural theme. For instance, Jesus Christ is both fully God and fully human (hypostatic union). Similarly, God the Father and God the Son are united in essence (gr. homoousios), yet remain distinct persons. Moreover, in the eschatological context, St. Paul's letters emphasize a critical principle: the Church, as humanity, is both the Body of Christ and His Bride, while the entirety of Christ (totus Christus) includes both Christ and the Church [2].

In The Cube, this principle is expressed through the eschatological condition of fulfillment: the necessity of human participation and the predestined presence of human creativity in the Heavenly City. This aligns with the theological understanding that the completion of salvation involves not only divine action but also requires active human engagement. Such engagement is envisioned as humanity's integral role in the co-creation of the New Jerusalem, manifesting the dual realities of divine and human cooperation in the final eschaton.

## Heterarchy as a Feature of Apparition Chapel, The Cube and the Eschaton

The Pilgrim Center of Šiluva will base its 2025 communication program on an invitation for pilgrims and tourists to reflect on the concept of eschatology and humanity's role in striving for this transcendent reality. The Cube project is specifically designed to serve this purpose. This communication effort, supported by various activities, emphasizes an appeal for individuals to actively engage in prayer and contemplation, reflecting on humanity's importance in God's plan as both a creation and a participant.

Building on the architectural language of the Apparition

Chapel, which reflects a synthesis of artistic forms and temporal dimensions including the future - The Cube project can be interpreted as a non-hierarchical representation of Heaven's reality. Within this vision of Heaven, a significant portion of human artifacts, expressed through A. Vivulskis's architectural language, are given a prominent place. This project, which aims not to depict what is physically possible but rather to reveal what transcends physical limitations, can be compared to the works of the renowned American conceptual architect Lebbeus Woods. L. Woods (1992) himself describes his works as representations of what humanity could achieve if freed from the impositions of physical reality [34].

Woods refers to his conceptual architectural approach as heterarchy (ibid.). Heterarchy does not reject hierarchy but introduces a dynamic element into the typically static notion of hierarchy. It represents a form of hierarchy where, depending on the needs of the moment, the hierarchical relationships between components of a unified structure can shift freely and adaptively. Heterarchy can also be identified in the content of St. Paul's letters, particularly in his discussion of the Church as the Body of Christ, both in its organizational principles on Earth and in its ultimate realization in Heaven as well as it can be felt in architectural work of A. Vivulskis.

## Conclusions

The potential for linking Christian eschatological ideas with architectural language remains an open question for further research. However, it can be argued that the eschatological nature of a building largely depends on how the observer chooses to perceive reality. On the other hand, both the choice of architectural language and the architect's intentions in selecting certain forms of formal expression can increase or decrease the immaterial content that may arise in the viewer's consciousness.

In the case of the Apparition Chapel of the Blessed Virgin Mary of Šiluva, designed by A. Vivulskis, the synthesis of styles, the attempt to reveal national and Lithuanian cultural-archetypal elements, as well as the integration of the arts (marking the first historical fusion of architecture and sculpture in Lithuanian architectural history), achieves a form of architectural expression that could be described as architectural singularity.

This means that the global treasury of architecture is condensed into a single spatial unit, creating immense architectural-artistic tension. The fact of Apparition of the Virgin Mary in 1608, understood as an eschatological event in physical reality, reinforces this sense of singularity. Therefore, the eschatological dimension of this building - or rather the possibility of perceiving it is inseparable from the semantics dictated by its function.

The impression of the New Jerusalem, which is less a deliberate intention of A. Vivulskis and more an intuitive manifestation of his creative sensibility, was chosen as a focus for the conceptual architectural project "The Cube." It is symbolic that exactly one hundred years after the consecration of the Apparition Chapel, this first conceptual architectural object (which nonetheless remains grounded in historically grounded architectural forms) has become the subject of communication strategies based on artistic interpretation.

It was discussed that the pursuit of eschatology neutralizes the traditionally perceived concept of authenticity in heritage theory and practice. Eschatology does not aim to create new, unique forms but rather seeks to endow what already exists with a renewed, redeemed reality. The "Cube" project, while seemingly violating the formal authenticity of the Chapel, serves as a reference point for previously unexplored qualities of A. Vivulskis's architectural work.

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## Kopsavilkums

Raksta mērķis ir, izmantojot hermeneitiskās analīzes metodi, apspriest kristīgās eshatoloģijas raksturu kā novērotāja izvēli arhitektūras objektu uztverē un to, kā šis process paplašina sākotnējā arhitektoniskā darba semantisko nozīmi. Šīs nozīmes var būt arhitekta netieši ietvertas, taču ne vienmēr apzināti iecerētas. Lai izpētītu šo jautājumu, pētījumā tiek analizēts vienīgais saglabājies lietuviešu–poļu arhitekta Antana Vivulska arhitektūras darbs - Svētās Jaunavas Marijas kapela Šiluvā (1903–1924) un vizuālais risinājums no Šiluvas svētceļojumu centra komunikācijas kampaņas, konceptuālais arhitektūras darbs ar nosaukumu "Kubs".