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INTRODUCTION

This scientific volume addresses key issues in ecology, cultural landscape conservation, and the professional contribution of landscape architects to society and the economy. Its studies encompass both urban and rural environments.

Research on green spaces among residential blocks in Nitra, Slovakia, reveals the interaction between modernist planning, social change, and decades of spatial adaptation. In Latvia, the development of energy communities in multi-apartment buildings is constrained by limited experience of collective action, highlighting the role of municipalities in coordinating initiatives, providing institutional support, and strengthening public trust.

A historical overview of Latvian school architecture from the nineteenth to the twenty-first century demonstrates how political and economic conditions have shaped architectural styles. The transformation of rural landscapes within former manor territories is similarly marked by contrasts between carefully restored heritage sites and historic buildings undergoing gradual decay.

Studies of architectural practice emphasise that digitalisation should not replace freehand drawing. Sketching helps preserve authenticity, supports interdisciplinary cooperation, and connects historical heritage with contemporary design solutions.

The volume also examines cultural identity and representation. Topics include iconographic interpretations linking heritage, ecological awareness, art, education, and digital media; decorative wooden panels in Kurzeme as elements of architectural representation; and Ukrainian Hutsul folk art as expressed in Paraska Plytka-Horytsvit's handmade books, Christian imagery, craftsmanship, and use of dialect to preserve cultural memory.

Environmental research focuses on constructed wetlands and the interaction of hydraulic, biochemical, and ecological processes. It also addresses the ecological, spatial, and social importance of urban water bodies, many of which are threatened by pollution and declining water quality. Related concerns emerge in research on grapevine diseases, which affect both the visual quality and ecological condition of rural landscapes in the context of climate change.

Finally, an assessment by Lithuanian architects indicates that Soviet totalitarian legacies and persistent professional stereotypes continue to influence architectural identity. Differences between architects' status in society and within the design and construction sectors reflect the unequal distribution of cultural, economic, and social capital.

PRIEKŠVĀRDS

Zinātniskais izdevums aptver aktuālus jautājumus ekoloģijā, kultūrainavas saglabāšanā, arhitektūrā un ainavu arhitektūrā, aplūkojot gan pilsētvides, gan lauku ainavtelpas attīstību. Pētījumā par dzīvojamiem rajoniem Nitrā analizēta zaļo teritoriju attīstība no pēckara modernisma plānošanas principiem līdz mūsdienu telpiskajam un ekoloģiskajam stāvoklim. Savukārt Latvijā enerģijas kopienu izveidi daudzdzīvokļu ēkās kavē ierobežota kolektīvās rīcības pieredze, uzsverot pašvaldību nozīmi iniciatīvu koordinēšanā, institucionālā atbalsta nodrošināšanā un sabiedrības uzticēšanās veicināšanā. Vairāki pētījumi pievēršas kultūrvēsturiskajam mantojumam. Analizēta Latvijas skolu arhitektūras transformācija 19.–21. gadsimtā politisko un ekonomisko pārmaiņu ietekmē, kā arī lauku ainavu attīstība bijušo muižu teritorijās, kur līdzās atjaunotiem kultūras pieminekļiem saglabājas arī apdraudēti un degradēti objekti. Arhitektūras mantojuma saglabāšanā akcentēta brīvrokas zīmējuma nozīme, kas arī digitalizācijas laikmetā veicina autentiskumu, starpdisciplināru sadarbību un projektēšanas kvalitāti. Kultūras mantojuma interpretācija aplūkota arī saistībā ar mākslu, izglītību, digitālajiem medijiem un ekoloģisko apziņu. Pētīta dekoratīvo koka paneļu jeb pildiņu izplatība Kurzemē kopš 18. gadsimta, kā arī Ukrainas hutsulu kultūras identitāte Pļitkas-Horickvitas rokraksta grāmatās, izceļot amatniecību, kristīgos motīvus, sievietes–radītājas tēlu un hutsulu dialektu kā kultūras atmiņas nesēju. Ekoloģijas un vides inženierzinātņu pētījumos analizēti mākslīgie mitrāji kā ūdens attīrīšanas sistēmas un pilsētvides ūdenstilpju ekoloģiskās, telpiskās un sociālās funkcijas, īpašu uzmanību pievēršot piesārņojumam un ūdens kvalitātei. Savukārt vīnogulāju slimības aplūkotas ne tikai kā ekoloģisks apdraudējums, bet arī kā lauku ainavas vizuāli estētiskās kvalitātes degradācijas faktors klimata pārmaiņu kontekstā. Izdevumu noslēdz pētījums par Lietuvas arhitektu profesionālo identitāti, atklājot padomju perioda vēsturiskā mantojuma, sabiedrības stereotipu un kultūras, ekonomiskā un sociālā kapitāla ietekmi uz arhitekta statusa uztveri mūsdienu sabiedrībā un profesionālajā vidē.

Aija Ziemeļniece
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THE ARCHITECT'S DRAWING IN REVITALISATION OR RENOVATION PROJECTS AND THEIR DIGITALIZATION PROCESSES IN THE 21ST CENTURY

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Abstract. This article explores the importance of freehand drawing in the processes of architectural revitalisation and reconstruction, in the study of historical buildings and in the development of restoration strategies. The Latin verb revidere means 'to see again', 'to re-examine', or 'to review'. In this study, drawing is understood as a means of 'seeing again' and 're-examining' architectural heritage. One of the practices of the 21st century is adapting modern functional and technological requirements in reconstruction and renovation projects while simultaneously preserving cultural heritage. Architects redraw former project drawings with freehand sketches, generate ideas, study the historical context, apply new functions to existing elements and apply technologies to improve buildings.

The study is based on a case study of two revitalisation projects and used observation and comparison methods in the project documentation of the Hanza perons and Riga Castle, and participatory observations in the development of ideas for an international revitalisation project BIP ReUso2025. The cultural and historical objects were selected because they were visited in person during the restoration process and during the architects' excursions with direct experience stories in both cases. In order to gain a deeper understanding of the role of drawing in both objects, in September and October 2025, the Riga Construction Board studied the drawings of the Riga Castle and the Hanzas Perons, freehand drawings, site surveys and restoration documentation, BIM and CAD materials, historical photographs and digital models, and the oldest drawings of the Riga Castle in the Latvian State Archives, interpretations after J. K. Brotze (18 Century). The reliability of the study is based on direct semi-structured interviews with architects who were responsible for the restoration projects. To ensure the reliability of the results, methodological triangulation was used, comparing archival, interview, observation and project documentation data. The case study confirms the value of the architect's sketch in conceptual design, development of restoration details and interpretation of the historical presence. The aim of the article is to show how freehand drawing contributes to the preservation of authenticity, interdisciplinary collaboration and design quality. At the same time, it should be noted that the analysed projects represent two samples of Latvian restoration practice, and the interpretation of the sketch is to some extent influenced by the professional experience of the researcher and the context of the project. The discussion emphasizes that freehand drawing retains its significance in the digital design environment when the architect conducts in-depth research. The results indicate that it is advisable to systematically integrate it into the design process as a means of linking historical heritage with contemporary architectural solutions.

Keywords: freehand drawing, renovation, reconstruction, revitalisation, cultural heritage, architectural research

Introduction

The preservation and sustainability of cultural heritage is a topical topic, and with growing interest in the role of heritage in revitalization and renovation processes, freehand drawing is an active element in practice as a means of spatial [18] exploration, creative ideas, and effective design communication. This study examines the impact of hand drawing on 2D and 3D project drawings, BIM software, and the creation of artistic visualizations in virtual environments. The trend toward principles of sustainable spatial design is reinforced by European-level initiatives, including the New European Bauhaus, which defines aesthetics not as formal visual quality but as the depth of human experience and the culturally inspired quality of space. This perspective raises the question of the architect's creative methods, particularly the role of freehand drawing, which helps capture the atmosphere of a space, the authenticity of materials, and the nuances of the historical environment.

A renovation and revitalisation project can be considered sustainable when it complies with these principles while respecting history [10] adapts hand-drawing skills and successfully implements digital processes, while maintaining a balance between the principles of sustainability and the current value of cultural heritage for visual aesthetic enjoyment throughout the project's workflow - from sketching to visualisation in a virtual environment. In recent years, discussions on architectural theory and practice have increasingly focused on the interplay between cultural heritage preservation, sustainable development, and digital transformation. In the processes of restoring and renewing Historic buildings, the question of the role of traditional design methods in today's digital environment - particularly the significance of the architect's freehand drawing - has come to the forefront. Although CAD and BIM technologies offer high precision and extensive data processing capabilities, it is increasingly emphasized in professional circles that sketching is not merely a method of representation, but rather a tool for spatial thinking, analysis, and creative interpretation. In the study of historic sites, where an understanding of authentic details, materials, proportions, and the character of the site is essential, freehand drawing continues to play a significant role. It allows architects to establish a direct connection with the object under study, document their observations, and interpret the cultural-historical environment in a way that digital design tools cannot fully replace. Research from the 21st century confirms that sketching is an essential part of an architect's cognitive process. In his work "Sketching as a Thinking Tool", Goldschmidt (2014) emphasizes that sketching stimulates visual thinking and promotes creative problem-solving. Lawson (2017), in the book "The Design Student's Journey", notes that freehand drawing helps architects interpret complex spaces [5], particularly in historic buildings, where digital data is often incomplete. Studies on cultural heritage restoration, such as Pallasmaa's (2012) "The Thinking Hand", underline that manual work and sketching provide a "tactile understanding" of materials and details, which is critical to the quality of restoration. In contemporary conservation practice [15], sketches are employed not only during the conceptual phases but also

during on-site construction supervision, where the architects are often required to respond to unforeseen discoveries and conditions. De Jonge & Nordin (2020) write about this in the Journal of Architectural Conservation, noting that freehand drawing is the fastest way to document and interpret newly discovered historical elements.

Taking these aspects into account, the relevance of this study stems from the need to systematically identify and analyze how an architect's hand-drawn sketches influence the quality of historic building restoration projects, decision-making, and the graphic documentation of revitalisation efforts. This topic is particularly significant in Latvia, where several large-scale restoration projects have been carried out in recent years. The drawing, as the object of study, is examined within the context of local and international collaborative projects.

Research Process and Methods Used

The study was conducted over a two-year period (2024–2026), with the work structured into several sequential phases that provided both a theoretical foundation and the collection and analysis of empirical data. The research process began with a literature review that identified 21st-century studies on the role of freehand drawing in architectural practice, including Goldschmidt (2014), Pallasmaa (2012) and (2025), Lawson (2017), De Jonge & Nordin (2020). Archival research was conducted, including the analysis of measurements of historic buildings, restoration documentation, and graphic materials in Latvian archives and the repositories of architectural offices (Sudraba Arhitektūra and AIG). During the second phase of the study, a detailed analysis of the renovated sites was conducted by visiting the buildings and documenting the use of freehand drawings in the design and construction process. On-site architect-led tours of the Hanzas Perons and Riga Castle [30] provided qualitative insights and generated quantitative data on the frequency, functions, and integration of sketching into project workflows.

In the third phase, interviews and surveys were conducted, and data was compiled using a graphical analytical approach to analyze the stylistics of architects' sketches, their thought patterns, and the function of drawing in the design process. Interviews with practicing architects provided an empirical basis for the importance of sketches in resolving unforeseen situations on the construction site, including the decision to design the bar layout in the shape of a train, reffering to the freight station's previous function at the Hanzas Perons [14]. The methods used and their application in this study are clearly analysed.

1. Literature Review and Analysis of Archival Documents. Scientific articles, monographs, and archival materials were analyzed to understand the theoretical foundations and historical practice of freehand drawing. For example, the "thinking hand" emphasized by Pallasmaa (2012) was used as a theoretical basis for analyzing restoration processes. Pallasmaa and Gimeno (2025) emphasize that freehand drawing is essential to an architect's senses, sense of space, and understanding of materials. They write that freehand drawing provides "an interaction between sensations, play, and careful observation," which is often lost in the digital environment [25]. This work is particularly significant because it examines drawing in the context of the digital age, emphasizing that aesthetic experience and the perception of space arise precisely through hand movement and the sense of materials. Leblanc, T. (2015) [16] and Goldschmidt (2017) argues that freehand sketching is a cognitive tool that stimulates idea generation and design thinking. She writes that sketching is essential in the "front-end" design phase because "it offers cognitive benefits that digital tools cannot replace" [12]. This study is one of the most frequently cited works on the importance of sketching in architecture.
2. Empirical Methods. Quantitative Data Analysis: The number of sketches in the Vidzeme market revitalization projects as of June 2025 was analyzed, along with their types, functions, and frequency of use at various stages of project development; surveys were conducted among project participants representing 8 countries, and the data was compiled for further research. Qualitative analysis: Interviews with architects, the content of sketches, and design situations in which sketches played a critical role were interpreted; the role of freehand drawing in the idea-generation stages and in historical research materials was analyzed.
3. Comparative Method. Various renovation projects were compared by analyzing how freehand drawings are used in the restoration of industrial, residential, and cultural sites. For example, the use of sketches of the Hanza Perons was compared with the contents of the construction project and, later, with the completed structure, while the restoration process of the Riga Castle Convent was characterized by drawings, measurements, and detailed drawings created over several years through the observations and research of various architectural firms, which could be compared and interpreted in light of the results of the restoration process.
4. The Semiotic Method. The sketches were analyzed as visual signs, interpreting their symbolic and communicative functions in design. The study examined how the language of sketches helps architects communicate with restorers, clients, representatives of national and local governments, contractors, craftsmen, and engineers.
5. Morphological Method. The formal structure of the sketches lines, proportions, and spatial accents and their impact on design decisions were analyzed.
6. Graphical Analysis Method. The data from the interviews and surveys were analyzed, focusing on the architects' drawing styles, the characteristics of their handwriting, and how these relate to their design thinking.

Drawing in the Graphic Design process for Architectural Renovation and Reconstruction Projects

Within the contemporary architectural research community, increasing attention is being devoted to the coexistence and complementarity of analogue and digital design methods in design practice and in architectural education [1]. Renovation and reconstruction projects for historic buildings have become a significant platform for these debates, as they require balancing the preservation of authenticity, the principles of sustainable development, and the opportunities offered by digital technologies. In this context, there is growing interest in the role of freehand drawing as a method of architectural research and thinking. Architectural researchers and practitioners note that sketching fosters a deeper understanding of space, materials, and the cultural-historical context, while also serving as a vital tool for formulating ideas and professional communication. Thus, freehand drawing has maintained its relevance in contemporary architectural practice, evolving into a complementary methodology that supports analytical, creative, and communicative processes within digitally [2] supported design environments.

Freehand drawings are based on graphic representations. The process begins with identifying historical data, cultural-historical materials, and related documentation and drawings, followed by conducting repeat measurements, archaeological research, and data comparison. The study of details encompasses artistic and architectural analysis, conceptual planning, and the depiction of engineering details. Project visualizations illustrate objects within their setting. Authors will examine some of these types in this article. An architect's drawing is primarily a means of communication with the client. In renovation projects, this involves processing historical data and creating reconstruction drawings, as well as planning outdoor spaces, sketching floor plans, and communicating engineering solutions.

Indicators in the study:

- Perceptual: How Drawing Influences (the Perception of Space) in a Project's Graphic Identity.
- Social: How Design Can Promote an Inclusive Environment (solutions for environmental accessibility, ergonomic research).
- Functionality: How Design Structures Usability and Accessibility.

The study is based on the analysis of a range of drawings and freehand sketches relevant to the research topic:

Riga Castle Reconstruction Project: Lead architects of the project: Reinis Liepiņš, "Sudraba arhitektūra" SIA, "MARK arhitekti", and architect Artūrs Lapiņš, "Arhitektoniskās izpētes grupa" SIA; historical reconstruction (interpretation) [6] drawings by Johann Christoph Brotze (Brotze; 1742–1823), Reinhold Guleke (Guleke: 1834–1927); research and modern-era reconstructions (20th and 21st centuries) by architects Pēteris Blūms and Ilmārs Dirveiks. (Chief Engineer: Jānis Prauliņš ("Būve forma" SIA)). Architect I. Dirveiks notes that over the centuries, researchers have interpreted the reconstructions, and the most recent cultural-historical [21] building drawings were created by historians, architects, and artists Archaeological excavations and drawings of lost or restorable sites are carried out by architectural research teams and artists, who, together with historians and conservators, take photographs and create reconstruction drawings of the site. In recent times, digital measurements photometry and laser scanning have also been employed. After compiling the data, architects create drawings and develop reconstruction proposals in site plans, floor plans, longitudinal sections, and details [13], and evaluate the physical properties of the site's components based on the architectural research and the restorers' recommendations. The construction project takes shape in drawings that depict building volumes, exterior spaces, interior elements, and details of historical features. This article examines the development processes of sketches and drawings, while also providing insight into the role played by the visualization of the building.

Authors of the Hanzas perons reconstruction project: Architecture, Restoration: Reinis Liepiņš, Ilze Liepiņa, Ainārs Plankājs, Ieva Landmane, Mārtiņš Ostaņēvičs, Jurģis Prikulis, "Sudraba arhitektūra" SIA, Landscape design: Madara Lezdiņa, Ģirts Runis, et al.

Case study in specific focus groups within the framework of a revitalization project was used in July 2025, RTU ADI organized an international blended intensive training program, BIP ReUso2025, during which proposals for a revitalization project were developed. As part of the projec t, an international group of students and faculty members, working in teams, surveyed the historic building complex of the Vidzeme (Matīsa, formerly Aleksandra) Market, designed by Reinholds Šmēlings (1840-1917), and developed revitalization proposals in two phases first by sketching freehand and mapping out ideas on paper, and then by digitally developing the revitalization proposals. The authors conducted observations and, following the successful completion of the project, surveyed the participants about the usefulness of their drawing skills in the project. 85% of those surveyed confirmed that drawing skills were very useful during the idea-generation phase and that freehand drawing skills were very useful for capturing details on-site while creating measurement drawings.

It is concluded that an architect's hand-drawing skills and experience enable them to achieve the goals set for renovation projects in a respectful, aesthetic, and resourceful manner, while taking sustainability into account. The use of freehand drawing skills and techniques is essential in the processes of preserving cultural heritage, renovating buildings, and seeking aesthetic solutions.

Results and Discussion

1. Types of Drawings in Historical Documents.

For architectural objects, regardless of the century of construction, primary sources are sought, which are the original drawings of the site. In Latvia, drawings and objects are stored in the State Historical Archives, the Riga Construction Board Archive, the Latvian Museum of Architecture and are available at the Museum of History and Navigation. Historical data is compiled by a team of researchers, which includes architects, historians and artists. Historical data can be found in state or other country archives [27], collection repositories and private collections. Sketches, measurement notes, long-term visual graphics in graphite pencil, watercolor, ink graphics on paper are reconstructions by other researchers, interpretative drawings (see Fig. 1 and 2) and descriptions. These are engravings, woodcuts, paintings and other types of artwork by artists. In the 20th century, there are surveys conducted by students or architects with measurements of the objects at that time. Surveys provide in-depth insight into a specific period in detailed drawings,

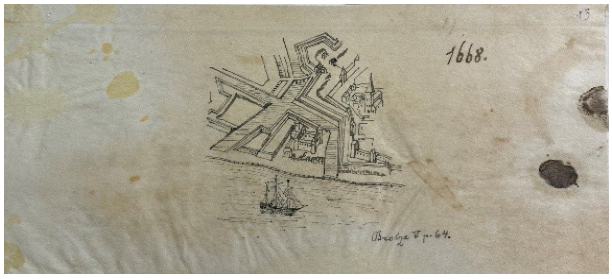


Fig. 1. J. F. Brotze. Site plan of Riga Castle; drawing of the 1668 reconstruction, graphite pencil on tracing paper. LVAA-2748-1-61 [photo: E. Vatuļina]

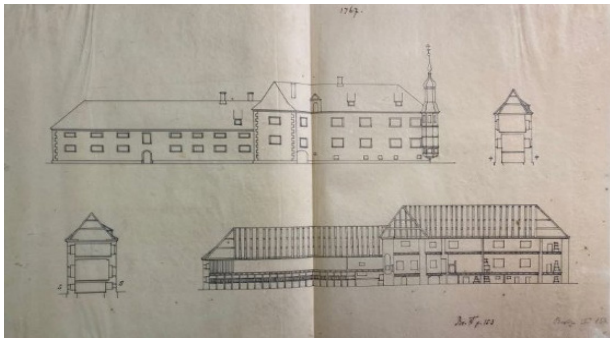
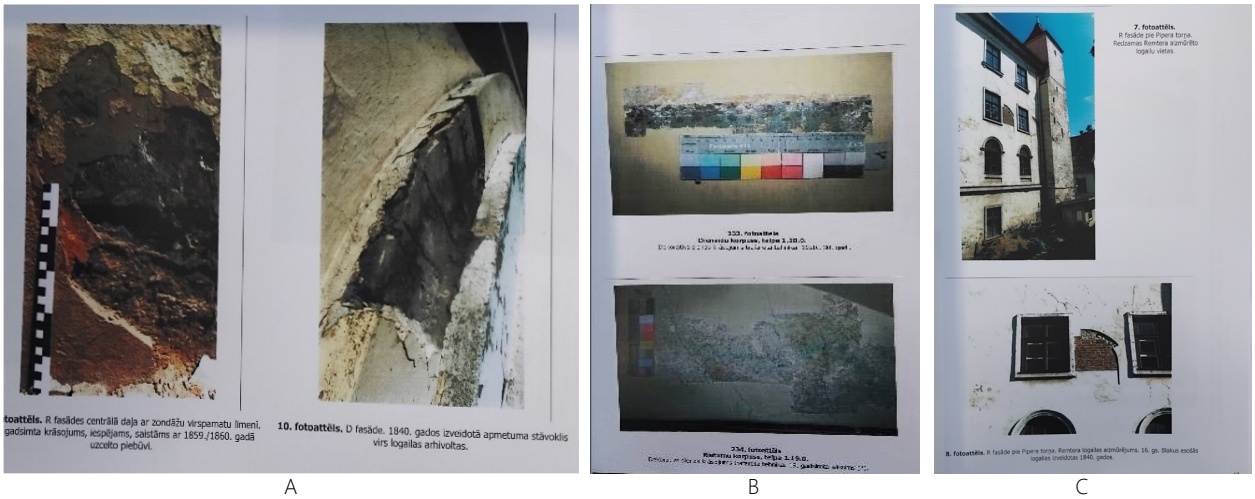


Fig. 2. J. F. Brotze. Site plan of Riga Castle; drawing of the 1763 reconstruction, graphite pencil on tracing paper. LVAA-2748-1-61 [photo: E. Vatuļina]



A B C

Fig. 3. Sections A, B, and C. Riga Building Board Archives. Doc. No.: 1.5.2.a. Restoration and reconstruction of the Riga Castle Convent at 3 Pils Square, 18. 19. 20. p. Phase II: Architectural and Artistic Survey [photographic documentation, 2016]

including archaeological research and photo documentation. Survey materials from the RTU Institute of Architecture and Design collection, scanned by the National Cultural Heritage Board, were identified. The collection includes site plans, facade and section surveys, detail drawings, graphic representations of flooring and ornamentation, as well as environmental visualizations. Survey drawings from the Cultural Heritage Board and the digital collection were examined, comprising nearly 18,000 scanned document pages with detailed metadata descriptions. Data from the Latvian Museum of Architecture's digital collection were also identified. The collections can be viewed in the digital image repository, which is partially accessible to the public in accordance with copyright regulations. The Riga Castle survey drawings section [23] contains 469 images. The volume of numerous interpretive markings indicates the stages of conservation, and for architects, the drawing often reveals new details, which are then verified in the building under the guidance of an architectural research team.

1.1. Environmental Studies Using Site Visits.

The architect visits the site and develops sketches on site, documenting the spatial structure, materials, proportions, building construction and details. In addition, the architect photographs the exposed historical frescoes and other relevant information and compares the actual data with the historical data (see Fig. 3). This helps to fix the current situation and predict the possibilities of restoration or reconstruction.

Documented measurements with numerical data and other notes are measurement documentation [16]. For historic buildings, if they have survived, they are used as a basis for renovation and reconstruction projects, determining the state of preservation of individual details or for the creation of replicas. Environmental sketches help to understand the existing context, for example, how the building fits into the urban environment or natural landscape, and when planning new visions or revitalisation recommendations. A real-life example: by sketching the facade of a building in the old city, an architect can highlight historical elements that should be integrated into the new project.

1.2. Environmental Studies Using Photogrammetry and Digital Documentation.

In modern reconstruction and renovation projects, digital methods photogrammetry and/or 3D laser scanning are used to capture the volumes of buildings, in addition to hand-drawn sketches [6]. The obtained data are compared with historical drawings and notes of architects and historians, which allows to assess the possibilities of preservation and conservation (see Fig. 4 and 5 - Pietro Azzola, 3D Surveying for Landscape Architecture and Engineering: Integrating Laser Scanning and Photogrammetry Technologies* - Examples of photogrammetric sketches from the BIP ReUso lecture on June 16, 2025).

Historically, freehand drawings were created based on sketches, using rulers to scale on glass plates or tracing paper to see through multiple layers. Today, these methods are combined by digitally layering the drawings and ensuring accuracy by visually adapting the historical drawings to the digital environment. The combined image with the historical allows for reconstruction and editing in the virtual and digital environment from all angles, both inside and out. A digitally created virtual model of a building is called

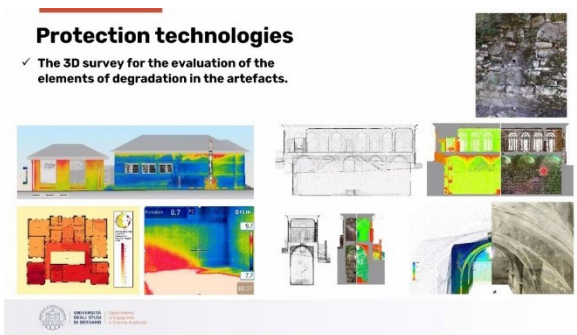


Fig. 4. Pjetro Azzola, 3D Surveying for Landscape Architecture and Engineering: Integrating Laser-Scanning and Photogrammetry Technologies, Protection technologies [20]

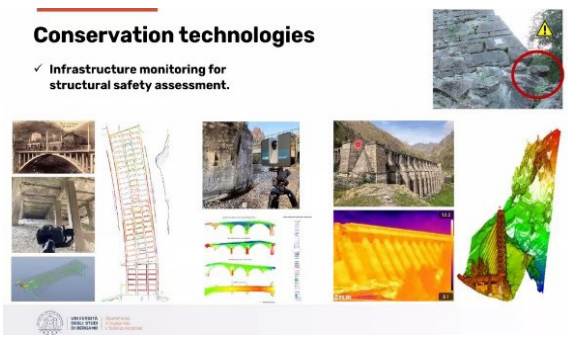


Fig. 5. Pjetro Azzola, 3D Surveying for Landscape Architecture and Engineering: Integrating Laser-Scanning and Photogrammetry Conservation Technologies [20]

a digital twin. Recent international studies increasingly describe digital twins as dynamic digital copies of physical heritage values that integrate geometric, historical, technical and monitoring data throughout the life cycle of the building [22]. Unlike analog three-dimensional models, digital twins allow for data updates, condition monitoring, simulation of interventions and long-term conservation planning.

2. Idea Development and Conceptual Sketching.

Architects and researchers in renovation projects study and determine the volume and appearance of buildings and details based on specific historical descriptions or archaeological finds. In revitalisation projects, changes or additions are proposed by consulting with restorers and researchers to develop aesthetically and effectively technical drawings that include engineering proposals. These initial ideas are subsequently developed into CAD drawings. In interviews, architects admit that in revitalisation projects they sketch conceptual maps of new solutions on copies of existing floor plans. The observations compared examples from two stages of the conceptual sketching process of Vidzeme Market conceptual ideas and actual drawings on site. When conceptualizing the visual proposal, the architects rarely used previously created hand drawings in digital visualisations; in some cases, they were included as an attractive addition to the digital collage. The findings suggest [29] that hand-drawn designs played a significant role in the formation and development of several architectural movements throughout the twentieth century, when drawing was used and, with the advent of copying techniques, photo collages. Observations of current practice show that even today, architects use the digital collage method in their visualisations but no longer draw or sketch by hand. Hand-drawn elements include complement the vector-based presentation, creating a more engaging and artistic aesthetic. Trends in research methodology in the last decade have been marked by efforts to combine artistic and scientific-analytical approaches to visual modeling in both art [29] and architecture and urban planning. This integrated research approach is called architectural modeling methodology [24].

3. Drawing as a Means of Communication.

Freehand sketches serve as an effective means of communication, allowing clients and stakeholders to understand design ideas without requiring specialized technical knowledge in the early stages of a project. Freehand sketches are also useful in the design process when it is necessary to quickly draw an idea – be it a specific detail or an overall view, the location of the building on the plot, the materials to be used or their cooperation. Architects often must defend their design solutions in construction meetings and illustrate them using simple sketches, often on unsuitable types of paper, such as napkins or newspaper edges, but later, historically, these drawings have survived and even ended up in museum collections.

Free hand drawing enables the rapid development of new engineering solutions or the adaptation of existing concepts. When translating initial sketches into vector-based technical drawings, students in the BIP ReUso program were required to respect the existing spatial structure and develop a user-oriented design, while simultaneously addressing wayfinding, noise levels, and lighting management to tailor the cultural space primarily to the needs of the local community. The digital drawings produced during the process facilitated communication and collaboration among all participants. The result was compiled and presented as a digital presentation outlining the proposed concept.

4. Drawings of Restoration Details.

Historic buildings require precise sketches of ornaments, windows and doors, which are used in restoration [1]. Freehand drawings help to document and interpret original architectural details that are difficult to perceive with conventional measurement methods alone. AIG lead researcher A. Lapiņš created visual interpretations using watercolor technique, using colors to create a sense of space and details of Riga Castle I. Dirveiks created interpretations (2023) of plans and sections by Bortze drawings in 1590.

In an interview and on-site tour (2025), the architect stated that Hanza Perons sketches were used to combine the new function (e.g., a concert hall) with the existing architecture, respecting the historical structure. A conceptual drawing of a carriage was realized as a spatial structure, organically linking it with the existing architecture and respecting the historical. The architect used a creative approach to revitalize the historical environment, transforming the industrial heritage into a modern cultural space. The architectural studio "Sudraba arhitektūra" and Reinis Liepiņš demonstrated in this project several ways in which freehand sketches, conceptual thinking images, and detailed restoration survey drawings are used in the reconstruction [14].

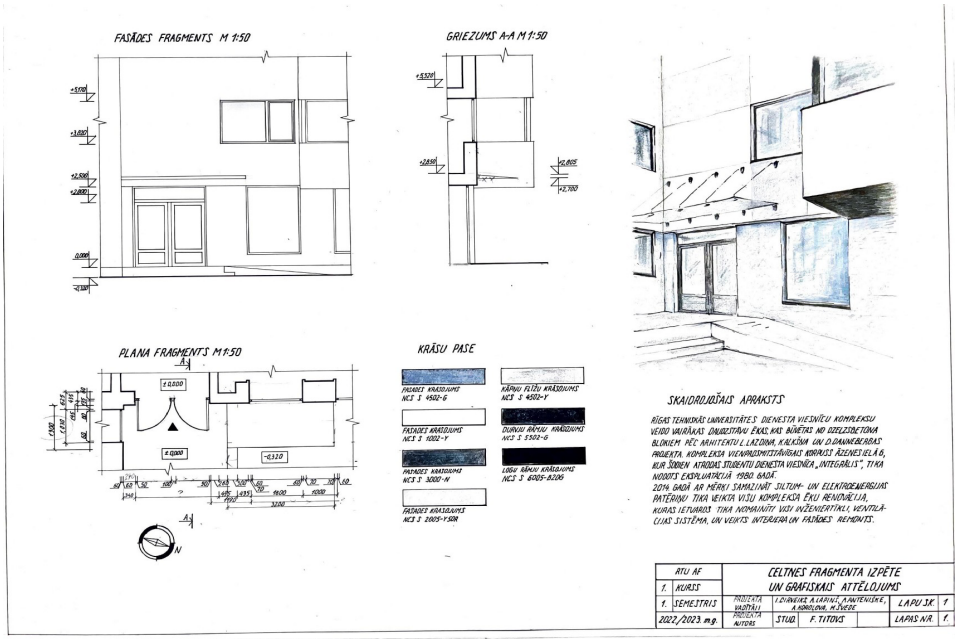


Fig. 6. Types of measurements and explanations; drawing of a building's entrance area. F. Titovs, RTU, AF 2022.

5. Measurement Drawing of Building.
Creating a building model in CAD programs or drawings, measurements (see Fig. 6) and all methods described in 1.1, 1.2, 1.3 are used, which are then transferred to the digital environment [11] for submitting projects to the Building Board for approval or when applying for tenders.
6. Visualizations of Cultural Heritage Preservation Projects.
Documenting cultural and historical objects [17] and introducing the working group to the architectural heritage [16], freehand drawings are a tool for exploring the place in a spatial sense and determining historical facts and boundaries. The graphite imprint on the site allows you to preserve the silhouettes and material structures of details and interpret the correspondence to certain historical periods, to study historical prototypes [21]. The drawing can also be used to perform objective interpretive and emotionally subjective visualization or to create a style appropriate to the era. However, for historically older buildings, there are several such interpretations, and therefore, without a deeper understanding of the evidence of the era in chronological order, they can be misleading. Digital visualizations are dominated by vector graphics or technical precision with photorealism, for example, CAD models or digital photo collages, which are often works that may lack the expressive qualities associated with freehand representation, with the help of which the identity, atmosphere and contextual relationships of the place can be effectively conveyed (see Fig. 7 and 8). An example of this approach can be seen in the watercolor drawings of the Riga Castle complex by architect and painter Artūrs Lapiņš, in which the architectural object is not depicted merely as a building. The drawings reveal the palace's historical atmosphere, the character of the Daugava riverbank landscape, the interplay of light and shadow, seasonal changes, and the human presence in space. These works demonstrate that watercolor can combine documentary information with an emotional message, creating a multi-layered interpretation of the cultural-historical environment. A. Lapiņš's watercolors of Riga Castle confirm that freehand architectural drawing is much more than a means of representation. It is simultaneously a research method, a tool for documenting cultural heritage, a form of creative interpretation, and a means of public education. An empirical approach demonstrates that such drawings foster a deeper understanding of cultural-historical sites, strengthen the emotional connection to the cultural landscape, and make a valuable contribution to both renovation processes and the development of cultural life.
The architect's freehand visualisation reveals several key aspects that digital modeling cannot always fully reflect:

1. *Deeper understanding of the place*. The drawing process requires prolonged observation before the drawing begins. The architect analyzes the object [10], its proportions, perspective, material textures, landscape elements, and the object's relationship to its surroundings. This leads to a deeper understanding of the identity and technical quality of the cultural and historical object.
2. *Reflection of atmosphere and emotions*. Freehand drawing has the ability to convey the atmosphere of a place, its historical character, and the empirical properties of space. The viewer perceives not only the form of the object, but also its emotional message. In the context of Old Riga, this is especially important, as Riga Castle is not only a cultural symbol of Old Riga, but also a fortress of the Livonian Order, one of the main centers of political and military power in the city, which developed into a significant [3] cultural center of the Hanzas Perons.
3. *Author's interpretation*. Each drawing also reflects the artist's own skills and individual perspective. By choosing a specific angle, lighting or emphasis on certain details, the architect creates his own story about the object. In this context, drawing skills are crucial, and the artist's mastery in depicting the historical patina, light and shadow, as well as materials, provides insight into the state of the historical building (see Fig. 7). Both drawings should be considered imaginative representations [19] based on the artist's interpretation. Also, the bird's-eye view of the Riga Castle complex with the designations of the main sections (see Fig. 8) provides more precise information about the complex spatial arrangement of the building, in which the bird's-eye view highlights the structure of only one section.
4. *Documentation of intangible cultural heritage values*. In addition to the properties of materials, drawings document the atmosphere of the place, human activities and expressions of cultural life – elements that often cannot be accurately depicted in technical drawings. The drawings of Riga Castle depict the landscape as it looked in 2012. As the quality of greenery changes in later years or the spatial structure of streets develops in the future, this landscape will serve as documentary evidence of a specific historical period, while also functioning as a work of art, rather than a technologically perfect aerial photograph. Fostering creative thinking.
5. *Freehand drawings* also play an important role in renovation and restoration processes. Their primary function documentation is the one most actively utilized. A visual survey of the site is conducted prior to the design phase. Sketches help capture architectural details, damage, spatial relationships, and the scenic context. The next most important function is the analytical one. Through drawing, the architect identifies elements to be preserved during restoration and determines the most valuable cultural and historical qualities by analyzing and selecting what is valuable from the layers of less valuable material that have accumulated over time. By analyzing historical documents, decisions are made whether to return to the original design (or its specific details) or to preserve more recent changes. For significant cultural and historical sites, approvals are sought from the State Agency for Cultural and Historical Heritage. In analyzing A. Lapiņš's watercolors of Riga Castle, the following serve as perceptual indicators: compositional balance, the depiction of scenic depth, color tonality in the watercolor technique, a sense of historical atmosphere, and people's emotional reaction to the depicted environment. The communication function, where an architect's drawing skills are crucial for making quick decisions on-site or when communicating with the public and presenting detailed drawings. Freehand visualisations are frequently more accessible to non-specialist audiences than technical drawings or complex digital models. They facilitate discussions with the public, clients, and cultural heritage experts.
6. *Design function*. In the early stages of design, sketches are used to test ideas and evaluate solution options without creating strict technological limitations that tend to arise when working directly in a digital environment. Hand drawing as a symbol of the cooperation of thought and hand and precise detailing was professionally necessary until the end of the 20th century, when architectural projects were developed freehand and

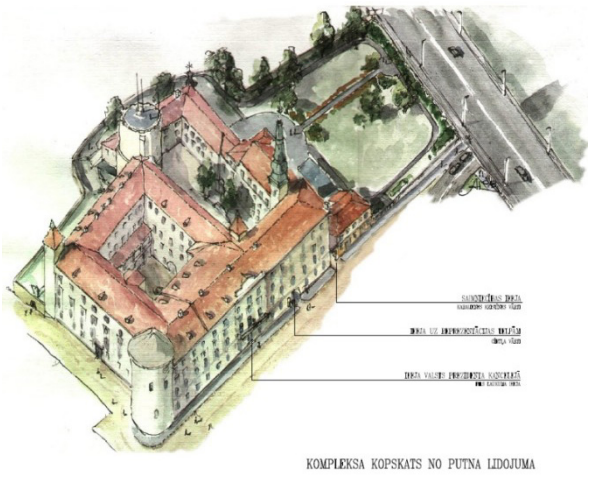


Fig. 7. Drawing created by the Architectural Research Group (AIG) for visualization drawing by architect A. Lapiņš,2012. [19]

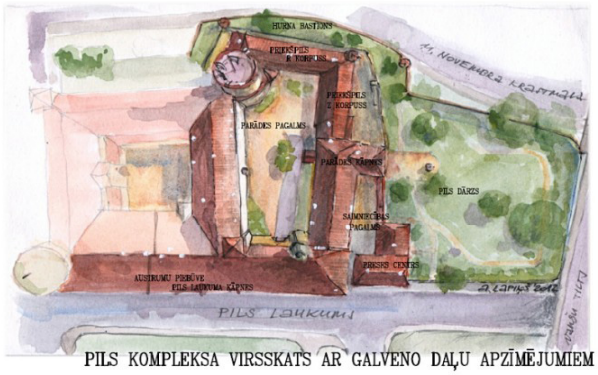


Fig. 8. Aerial view of the Riga Castle complex created by AIG. A. Lapiņš, 2012. [19]

with various tools such as a ruler, compass, stencils, T-protractor and others. Today, architectural design software allows for very precise, clean and fast professional design work, while maintaining sketching as a cognitive process in the early stages of a project or reviewing the development of specific nodes or parts, but losing the direct emphasis of the hand in the final work.

7. *Drawings*. Architectural design drawings of the 20th century were not merely technical documentation but also a form of individual professional thought and artistic expression. Until the widespread adoption of computer-aided design (CAD) in the late 20th century, an architect's primary tools were the pencil, technical pen, ruler, tracing paper, heavy drawing paper, India ink, and watercolor. Design drawings simultaneously served as vehicles for developing ideas, communication, and construction documentation, revealing the author 's personal style, graphic sensibility, and professional experience.

20th-century architectural design drawings were not only technical documentation, but also a form of individual professional thought and artistic expression [30]. Until the widespread introduction of computer-aided design (CAD) in the late 20th century, the main tools of the architect were pencil, ink pen, ruler, tracing paper, thick drawing paper, ink and watercolor. Design drawings simultaneously served as a means of developing ideas, communication and documentation of construction, revealing the author 's personal style, graphic sense and professional experience. During the design process, sketches, perspective views or axonometric drawings, sections, floor plans, facades and roof plans were developed in a sequential creative process. The drawing was not just the result of the project, but a reflection of the architect's thought process [16]. Each line, strikethrough or addition, documented the development of ideas and provided insight into the project's progress, changes, variations and scale. The architect's handwriting style was clearly recognizable, for example, in projects of the functionalist, modernist, and later postmodernist periods, it is possible to identify a graphic language characteristic of the particular author, which included: line thickness and rhythm, composition, and expression of drawing as shading techniques; watercolor tonality; depiction of human figures and landscape elements, and their relative proportions; the relationship between text and graphics; text typefaces and drawing layout.

Drawings reflected not only the object itself, but also the architect's interpretation of space, environment, and human interaction with architecture [26]. Today, 20th-century drawings have become important cultural heritage evidence. They allow researchers to analyze design methodology, the evolution of architectural styles, the architect's professional thinking, and sometimes unrealized architectural ideas or even entire projects, as well as the impact of technology on the design process. Unlike digital files, historical drawings contain a lot of additional information – notes, corrections, analysis of color relationships, for example, in facade color passports or visualisations of objects in the urban landscape. Although contemporary architectural practice is predominantly shaped by digital design environments, including CAD (Computer-Aided Design) and BIM (Building Information Modelling) technologies freehand drawing remains an important methodological tool. Its value is particularly evident in renovation and heritage conservation projects, where direct observation, the interpretation of historical fabric, and the exploration of design interventions often benefit from sketch-based analysis and visual thinking. The advantages of CAD drafting in renovation and restoration projects are undeniable, as these projects demand exceptional precision and involve working with existing historic structures (see Fig. 9) where the values to be preserved cannot be exposed to the risk of errors inherent in the human factor.

Precise documentation of the existing condition of historical sites requires integration into a CAD or BIM environment to create an accurate digital model. This enables the recording of even minor deformations, structural settlements, and historical details that might otherwise go unnoticed during manual surveying. In restoration projects, modifications are frequently made whether based on directives from cultural heritage authorities, expert assessments by structural engineers or conservators, or new information emerging from fresh archival research. CAD systems allow for the rapid adjustment of drawings while maintaining the consistency of all associated plans, sections (see Fig. 10), and elevation drawings. Digital platforms facilitate the coordination of work among all specialists within a unified environment [4] and enable the timely identification of potential points of conflict. The benefits revealed through the analysis of cultural-historical layers are particularly noteworthy.

In a BIM environment, it is possible to model various stages of a building's development starting with its initial massing

and to quickly incorporate layers representing historical alterations and later modifications by toggling layers within the software [24]. This enables the modeling of different restoration scenarios or proposals for functional solutions. This approach is particularly significant for castles, manors, historic public buildings, and industrial heritage sites.

Digital tools enable the creation of high-quality photorealistic visualisations and facilitate, for instance, virtual tours for public engagement during the public consultation phases of a project, as well as for use in museum exhibitions and educational processes. This significantly improves public understanding of the planned changes.

Despite the dominance of digital technologies, freehand drawing retains several unique functions in architectural practice. When studying a site or building, architects often produce sketches of details and structural junctions, record decorative elements, document landscape views [18], and take spatial measurements of interiors. This process yields a much deeper understanding of the subject than photography alone. The next stage, as previously discussed, involves developing the project concept; in the initial design phase, ideas most frequently emerge through sketching.

Freehand drawing allows for the rapid testing of spatial ideas, free and confident experimentation, the exploration of various options, and the avoidance of becoming constrained by technical limitations too early in the process. When making restoration decisions regarding specific architectural details such as window profiles, door portals, decorative elements (columns, windowsills, trim, ceiling cornices or moldings), or stair structures and their historic railings analytical sketches are still produced, enabling a focus on the most essential characteristics.

Through public consultations, the authors concluded that freehand perspective drawings often inspire greater public trust than computer-generated images, as they are perceived as interpretations rather than definitive promises regarding the outcome.

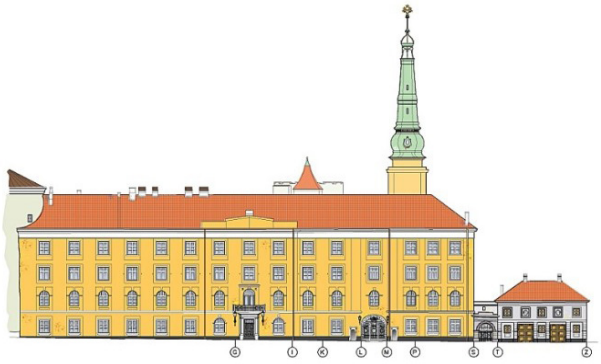


Fig. 9. Digital drawing of the Riga Castle facade. P/S Pils Projekts; Lead Architect for Research: Artūrs Lapiņš the Architectural Research Group (AIG); Chief Engineer: Jānis Prauliņš (Būve forma SIA) [15]



Fig. 10. Detailed digital drawings for the restoration of Riga Castle. Drawings by the architectural firm "Sudraba arhitektūra", lead Architect: Reinis Liepiņš [14]

Comparative analysis of findings and international context

The results show that freehand drawing is present in all the projects studied. Sketches functioned as cognitive tools that support observation, interpretation, communication and decision-making. This finding is consistent with Goldschmidt's understanding of sketching as a cognitive mechanism for design and confirms recent [11] international studies that emphasize the continuing importance of analog thought processes in digital design environments. A comparison of the case studies reveals significant differences in the use of sketches. In the Hanzas Perons project, sketches mainly supported conceptual development and the integration of contemporary functions into the industrial heritage structure. In contrast, the restoration of the Riga Castle Monastery relied heavily on analytical and documentary drawings to interpret historical evidence, archaeological finds and architectural stratification. These differences indicate that the role of sketches varies depending on the project objectives, the significance of the heritage and the available documentation. The findings also suggest that sketching improves interdisciplinary communication when digital drawings could not sufficiently explain complex spatial situations, as indicated by the architects interviewed. Similar observations have been reported in recent studies on heritage conservation and BIM-supported restoration [11] workflows. When compared with recent international studies, the results confirm several common trends. Choi et al. (2023) demonstrate that historical architectural sketches still have practical value and are increasingly becoming the subject of digital restoration and machine learning applications. Ferro et al. (2023) emphasize the importance of scan-to-BIM workflows in heritage documentation, while Cascone et al. (2024) highlight BIM-based approaches [8] as essential tools for building restoration and building management. The current study complements these findings by showing that freehand drawing remains an important source of information even before digitisation and BIM integration.

Conclusions

The comparative analysis shows that the methods used in Latvian Cultural Heritage restoration and revitalisation projects are in line with international trends in Italy, Portugal, France and the United Kingdom. In all the studied examples, an integration of analog and digital methods is observed, where freehand sketching serves as an initial research, interpretation and communication tool, while BIM, CAD, photogrammetry ensures precise technical implementation. The study complements scientific literature in several aspects. First, it demonstrates that freehand drawing is a design tradition and an important tool in restoration decision-making and interpretation of cultural and historical information also in the 21st century. Second, the study confirms the role of sketching in communication with partners and the public in technical solutions and in strengthening the sense of community belonging. Third, it shows that even in highly digitalised work

processes, analog visual thinking retains its importance as a cognitive mechanism that helps identify cultural and historical values and develop sustainable restoration solutions in the 21. century urban [28] landscape. Thus, the results of the study expand on the conclusions of international research, emphasizing that successful cultural heritage preservation is based not on the competition between analog and digital methods, but on their mutual complementarity.

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Kopsavilkums
Šajā rakstā tiek pētīts brīvrokas zīmējums arhitektūras revitalizācijas un rekonstrukcijas procesos, vēsturisko ēku izpētē un restaurācijas stratēģiju izstrādē 21. gadsimtā un to transformācijā digitālajās projektēšanas metodēs. Pētījuma mērķis ir noskaidrot rokas zīmējuma lomu kultūrvēsturiskā mantojuma saglabāšanas, arhitektoniskās izpētes, projektēšanas un digitālās modelēšanas procesos, kā arī izvērtēt tā nozīmi mūsdienu BIM, CAD, fotogrammetrijas un lāzerskenēšanas tehnoloģiju kontekstā.
Pētījums balstās uz divu revitalizācijas projektu analīzi; tajā izmantotas novērošanas un salīdzināšanas metodes, analizējot "Hanza perona" un Rīgas pils projekta dokumentāciju, kā arī līdzdalības novērojums studiju procesā izstrādājot idejas starptautiskā revitalizācijas projektā BIP ReUso2025, kuros novēroti brīvrokas zīmējumi, objektu apsekojumu materiāli, restaurācijas dokumentācija, BIM un CAD faili, vēsturiskās fotogrāfijas un digitālie modeļi, kā arī senākie Rīgas pils zīmējumi Latvijas Valsts arhīvā un J. K. Broces (18. gs.) interpretācijas. Pētījuma ticamība balstās uz tiešām daļēji strukturētām intervijām ar arhitektiem, kuri bija atbildīgi par restaurācijas projektiem. Rezultātu ticamības nodrošināšanai tika izmantota metodoloģiskā triangulācija, salīdzinot datus no arhīviem, intervijām, novērojumiem un projekta dokumentācijas. Gadījumu izpēte apliecina arhitekta skices vērtību konceptuālajā projektēšanā, restaurācijas detaļu izstrādē un vēsturiskās klātbūtnes interpretācijā. Raksta mērķis ir parādīt, kā brīvrokas zīmējums veicina autentiskuma saglabāšanu, starpdisciplināru sadarbību un projektēšanas kvalitāti. Vienlaikus jāatzīmē, ka analizētie projekti pārstāv divus Latvijas restaurācijas prakses piemērus un skices interpretāciju zināmā mērā ietekmē pētnieka profesionālā pieredze un projekta konteksts. Diskusijā tiek uzsvērts, ka brīvrokas zīmējums saglabā savu nozīmi digitālajā projektēšanas vidē, ja arhitekts veic padziļinātu izpēti. Tādēļ ieteicams to sistemātiski integrēt projektēšanas procesā kā līdzekli vēsturiskā mantojuma un mūsdienu arhitektūras risinājumu sasaistei.
Pētījums ļauj secināt, ka ilgtspējīgā renovācijas un revitalizācijas praksē efektīvākais risinājums ir tradicionālo zīmēšanas prasmju un digitālo tehnoloģiju integrācija. Arhitekta rokas zīmējums saglabā būtisku lomu kultūras mantojuma interpretācijā, estētisko risinājumu veidošanā un projektēšanas kvalitātes nodrošināšanā, veicinot Jaunā Eiropas Bauhaus principiem atbilstošu līdzsvaru starp ilgtspēju, estētiku un kultūrvēsturisko vērtību saglabāšanu.

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ENERGY COMMUNITY DEVELOPMENT MODEL FOR MULTI-APARTMENT RESIDENTIAL BUILDINGS IN LATVIA

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Abstract. The European Union regards energy communities as an important instrument for advancing the energy transition, promoting citizen participation, and expanding renewable energy production. However, despite the legal and policy framework established by the European Union, the practical development of energy communities in Latvia remains limited.

Although previous research has examined energy community governance models and the legal, institutional, and social factors influencing their development, there is still a lack of studies that define a governance model for energy communities adapted to Latvia's institutional, legal, and social context, including the roles of institutional actors and spatial planning aspects influencing their practical implementation. Therefore, this study aims to empirically validate a conceptual model for the development of energy communities in Latvia by identifying the key institutional actors, their roles, and the preconditions required for generating the common good and enabling the practical implementation of energy communities.

The proposed model was developed by integrating the findings of a series of interrelated studies addressing the legal, institutional, and social preconditions for energy community development in order to identify the factors essential for their implementation within the Latvian institutional and regulatory context. To validate and refine the proposed model, a focus group was conducted involving representatives of the principal stakeholders in energy community development, including national public authorities responsible for energy and spatial planning policies, municipalities and municipal representative organisations, residential building managers, and an existing energy community. The discussion focused on the appropriate scale of energy communities, governance arrangements, and the roles of institutional actors, providing recommendations for further refinement of the proposed model.

The findings indicate that the development of energy communities in Latvia is constrained by limited experience in collective action under democratic market conditions and insufficient institutional capacity. Consequently, municipalities should participate alongside citizens as institutional members of energy communities. The study demonstrates that municipalities can play a crucial role in defining the common good, providing institutional support, coordinating local energy community initiatives, and strengthening public trust and cooperation. These findings contribute to the development of a governance framework for energy communities that is better suited to the Latvian context and may support their successful implementation at the local level.

Keywords: energy community, energy transition, common good

Introduction

The Member States of the European Union have committed to reducing greenhouse gas emissions by at least 55% by 2030 compared with 1990 levels, with the objective of making Europe the world's first climate-neutral continent [26]. At the same time, the European Union seeks to ensure access to affordable energy for all citizens while enabling their active participation in the clean energy transition [25]. To achieve these objectives, the European Parliament and the Council have promoted the establishment of at least one energy community in every municipality with more than 10,000 inhabitants by 2025 and require municipalities with more than 45,000 inhabitants to assess the role of energy communities in local heating and cooling plans [28].

European policymakers view energy communities as a mechanism through which citizens collectively manage investments and generate, consume, and share renewable energy using technologies such as photovoltaic systems, wind turbines, and district heating systems [1, 24, 37]. According to the European Commission [24], energy communities could increase the installed renewable energy capacity owned by citizens by as much as tenfold by 2030, enabling 25–30 million households across Europe to produce renewable energy. In Latvia, the residential building sector accounts for approximately 30% of total final energy consumption [41], indicating substantial potential for energy communities to contribute to national energy efficiency and decarbonisation objectives.

The scientific literature identifies energy communities as an important mechanism for advancing energy democracy by redistributing decision-making power from large energy corporations to citizens through collective ownership and management of renewable energy resources [38, 50, 53]. Energy communities are therefore regarded as ideal organisational structures in which citizens actively participate in energy-related decision-making processes [53]. Citizen participation in energy communities is considered essential for achieving climate mitigation and sustainable development goals [17]. Nevertheless, energy communities depend heavily on civic engagement and voluntary contributions and frequently face technical, financial, and organisational constraints [12, 23, 32]. Previous studies also highlight challenges associated with limited community capacity, low levels of trust in public institutions [10], maintaining long-term citizen participation, and scaling successful local initiatives [19].

Although numerous successful examples of energy communities have emerged across Europe [25], the literature suggests that their full potential has not yet been realised and that their long-term contribution to the energy transition remains uncertain [11, 54]. In particular, their contribution will largely depend on their ability to expand beyond niche initiatives and become embedded in mainstream energy governance [11]. Similarly, Broska et al. [13] argue that, if current trends persist, a citizen-led energy transition based on energy communities is unlikely to achieve its expected transformative potential.

Although previous studies have extensively examined the governance models of energy communities and the legal, institutional, and social factors influencing their development, there remains a lack of research defining an energy community

governance model adapted to Latvia's institutional, legal, and social context, including the roles of institutional actors and the mechanisms for creating the common good. This research gap is particularly relevant in countries with limited historical experience of collective action in the energy sector, where governance models described in the international literature cannot be directly transferred without adaptation to local institutional conditions. Therefore, the aim of this study is to empirically validate a conceptual model for the development of energy communities tailored to the Latvian context by identifying the key institutional actors, their roles, and the preconditions necessary for generating the common good and facilitating the practical implementation of energy communities.

Over the three decades following the restoration of its independence, Latvia has transformed its planning system from one characterised by Soviet-style centralised governance to a democratic planning framework supported by a comprehensive national legal system and increasingly ambitious policies promoting citizen participation and local initiatives [8, 40, 49].

The restoration of Latvia's independence in 1991 created the preconditions for the development of democratic governance and public participation [31]. However, at the initial stage, no institutional framework existed to ensure the active involvement of residents in planning processes. A significant turning point occurred in 1994, when the Cabinet of Ministers adopted Regulation No. 194 On Spatial Planning [15], introducing a four-tier planning system and, for the first time, delegating planning responsibilities to local governments. This marked the beginning of the decentralisation of planning and created the foundations for the development of local democracy. Nevertheless, public participation during this period remained largely limited to the publication of planning documents and formal public consultations.

The next stage of development was associated with the adoption of the Law on Spatial Development Planning in 2002 [44], which was substantially revised in 2011 [47] to establish minimum legal requirements for public participation in planning. Public participation became a mandatory component of the planning process [2, 48], facilitating a gradual transition from merely informing citizens towards broader involvement in decision-making. Increasingly, participation came to be understood not simply as informing residents about completed planning proposals but as engaging them from the earliest stages of the planning process through dialogue between municipalities and local communities.

As democratic governance evolved, so too did the role of civil society in planning. Initially, participation was dominated by specialised non-governmental organisations representing environmental protection and cultural heritage interests. Subsequently, as local identity and civic engagement strengthened, neighbourhood associations and other place-based community initiatives increasingly emerged and became institutionalised as non-governmental organisations [51]. These developments marked a transition towards broader and more organised public participation, with local communities becoming not only consultees but also active partners in territorial development planning. Consequently, over the past three decades Latvia's planning system has evolved from a centralised, procedure-oriented approach towards a more democratic governance model that increasingly emphasises collaboration, co-creation, and the active participation of local communities [29, 40].

The development of democratic governance and local community participation has also created favourable conditions for new forms of collective action, including the establishment of energy communities. Unlike traditional forms of public participation, which primarily seek to influence public decision-making, energy communities involve citizens directly in the governance of shared energy resources and in pursuing common economic, social, and environmental objectives [7, 30]. Their establishment therefore requires not only an enabling legal framework but also a well-developed culture of collaboration, mutual trust, and sufficient institutional capacity.

In the Latvian context, the development of energy communities is constrained by citizens' limited experience with voluntary collective action in the energy sector and the absence of a historical tradition of energy cooperatives—the predecessors of today's energy communities. This challenge is not unique to Latvia but is characteristic of post-socialist countries more broadly [36].

Although smaller-scale collaborative initiatives, such as the joint management of multi-apartment residential buildings and building renovation projects, have demonstrated the potential of collective action [42], their success has largely depended on the initiative of individual apartment owners and support provided by municipalities. The establishment of an energy community, however, represents a considerably more complex undertaking, requiring the creation of a dedicated legal entity, the organisation of long-term cooperation, and the coordination of the interests of multiple stakeholders.

As noted by Dóci [21], energy communities may initially succeed through the efforts of a small group of committed citizens. However, as the scale and organisational complexity of these initiatives increase, institutional and organisational support becomes increasingly important. Similarly, Djinlev et al. [20] argue that, compared with other forms of collective action, the establishment of energy communities involves more demanding legal, institutional, and procedural challenges. Consequently, the development of energy communities should not be viewed solely as a technological or economic innovation but rather as the next stage in the evolution of democratic governance and community participation. Their successful implementation depends not only on citizen initiative but also on the active involvement of municipalities, public authorities, and intermediary support organisations.

The European Commission has emphasised that local governments play a crucial role in supporting and collaborating with citizens, while also recognising that municipalities are often insufficiently involved in policy design and lack the authority and resources necessary to implement measures for the benefit of local communities [24]. Nevertheless, participation in policy-making represents only one of the four principal ways in which citizens can contribute to the energy transition. Citizens also participate directly by becoming members of energy communities [55].

Directive (EU) 2019/944 of the European Parliament and of the Council on common rules for the internal market for electricity explicitly allows municipalities to participate in citizen energy communities alongside residents [27]. Municipal involvement is particularly important in addressing energy-related conflicts, which constitute a specific category of common good conflicts—that is, situations in which tensions arise between competing public goods or between common goods and other collective objectives, stakeholder interests, or institutional norms [56, 57]. Given that public opposition to renewable energy projects most frequently emerges at the local level [43], municipalities are well

positioned to facilitate dialogue with local communities, strengthen public participation [9], and enhance the social acceptance of renewable energy projects [10].

Against this background, the present study argues that the development of energy communities in Latvia should be understood as an institutionally coordinated process of collective action, in which, alongside citizen initiatives, the involvement of various institutional actors plays a crucial role. In this process, municipalities may assume a significant role by coordinating stakeholders, linking energy community activities with local development objectives, and facilitating the emergence of the common good. This perspective provides the conceptual foundation for the proposed energy community development model, which is empirically validated in the following sections.

Materials and Methods

The study employed a comparative analysis of scientific literature and policy documents, including an assessment of relevant policy planning documents and regulatory frameworks. These sources were analysed in relation to the findings of previous scientific research and compared with the current practical context of energy community development. The empirical data were collected through a focus group conducted using purposive sampling. The participants represented the key stakeholder groups involved in the development of energy communities, including representatives of public administration institutions responsible for energy policy and development planning, municipalities and organisations representing municipal interests, managers of multi-apartment residential buildings, and representatives of energy communities. The characteristics of the focus group participants are presented in Table 1.

The focus group participants were introduced to the research design of the study "Development Model of Energy Communities in Multi-Apartment Residential Buildings in Latvia" (Figure 1). The detailed findings of the study are presented in a series of thematically related publications [43, 44, 45, 46, 47, 48], which collectively provide a sequential analysis of the elements constituting the energy community development model for multi-apartment residential buildings in Latvia.

The focus group discussions were organised to empirically assess the conceptual energy community development model developed within this study. The discussions were structured around the key elements of the proposed model:

- the optimal scale of energy communities;
- the role of multi-apartment residential building managers in the establishment and operation of energy communities;
- approaches to the formation of energy communities;
- the role of municipalities as institutional actors within energy communities in defining the common good and coordinating development processes;
- the contribution of energy communities to the implementation of the energy transition.

Table 1. Characteristics of the focus group participants [created by the authors]

No.	Organisation	Field of activity	Position
1.	Ministry of Climate and Energy	The leading state administration institution responsible for environmental, energy, and climate policy.	Head of a structural unit
2.	Ministry of Economics	The leading state administration institution responsible for industrial and service policy and entrepreneurship policy.	Head of a structural unit
3.	Ministry of Smart Administration and Regional Development	The leading state administration institution responsible for regional development, municipal development and supervision, development planning, and land management.	Head of a structural unit
4.	Union of Local Governments of Latvia	An association that brings together municipalities of the Republic of Latvia.	Expert
5.	Union of Local Governments of Latvia	An association that brings together municipalities of the Republic of Latvia.	Expert
6.	Riga Energy Agency (municipal agency "Rīgas enerģētikas aģentūra")	An agency responsible for sustainable energy and climate planning, management, and coordination in Riga City Municipality, as well as for implementing sectoral policy planning documents.	Head of a structural unit
7.	Riga Energy Agency (municipal agency "Rīgas enerģētikas aģentūra")	An agency responsible for sustainable energy and climate planning, management, and coordination in Riga City Municipality, as well as for implementing sectoral policy planning documents.	Expert
8.	Riga Energy Agency (municipal agency "Rīgas enerģētikas aģentūra")	An agency responsible for sustainable energy and climate planning, management, and coordination in Riga City Municipality, as well as for implementing sectoral policy planning documents.	Expert
9.	First Energy Community	Energy community	Manager
10.	Latvian Association of Building Managers and Administrators	An association representing companies operating in the real estate management sector.	Manager
11.	Building manager	Management of multi-apartment residential buildings	Expert
12.	Building manager	Management of multi-apartment residential buildings	Expert

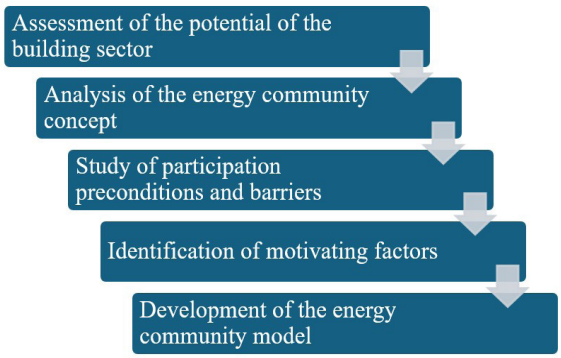


Fig. 1. Research design scheme of the study "Energy Community Development Model for Multi-Apartment Residential Buildings in Latvia"

The focus group results enabled an assessment of the model's applicability within the Latvian institutional context, the identification of potential areas for further refinement, and the clarification of interrelationships between the individual elements of the proposed model.

Results

The research results confirm that the development of an energy community development model is highly relevant, while its practical implementation depends on several institutional and social preconditions. At the same time, the focus group discussions revealed the following key aspects related to the proposed energy community development model.

The focus group discussions identified several interrelated issues that may influence the establishment and practical functioning of energy communities. These issues concern the understanding and definition of energy communities, the roles and capacities of key stakeholders, the involvement of municipalities and spatial planning considerations, as well as the economic rationale for their development. The participants' views were analysed and grouped into key thematic areas, with corresponding solutions proposed to address the identified barriers and support the implementation of the energy community development model. The main findings and proposed solutions are summarised in Table 2.

Discussion

The energy community development model proposed for Latvia assumes the establishment of energy communities at a larger scale than a single multi-apartment residential building, as a single building may already implement collective self-consumption models recognised by Latvian legislation. Through such arrangements, apartment owners can participate in the energy transition [55] and contribute to achieving its objectives [22]. However, collective self-consumption should be clearly distinguished from energy communities, as the latter represent a more complex form of collective action requiring the establishment of a specific legal entity and a broader governance framework.

Unlike collective self-consumption models, energy communities involve not only the joint use of energy resources but also long-term cooperation among different stakeholders, collective decision-making processes, and the definition of common goals and common goods. Therefore, the development of energy communities is closely linked to the evolution of democratic governance, local participation, and new forms of collective resource management.

The focus group results confirmed that a common understanding of the distinction between energy communities and other decentralised energy production models has not yet been established among citizens, building managers, and some market actors. Similar challenges have also been identified in the scientific literature, where the conceptual ambiguity between energy communities, collective self-consumption, and other forms of distributed energy generation is recognised as an important barrier to their development [18]. Therefore, national-level methodological support should be considered, including guidelines, explanatory materials, infographics, model agreements, model statutes, and other practical tools. Such support would help potential participants identify the most appropriate decentralised energy production model according to their objectives and available capacities.

Previous studies indicate that energy community initiatives are most likely to emerge in local communities with prior experience of cooperation and collective action [21, 33]. However, in the Latvian context, such experience remains limited, particularly in the field of collective energy resource management. Although democratic governance has significantly developed in Latvia over the last three decades and local communities have become increasingly involved in planning and territorial development processes [2, 3, 29], energy communities represent a relatively new form of participation requiring a higher level of cooperation, trust, and institutional capacity.

Given that Latvian legislation does not prescribe a specific geographical scale for energy communities [45], this study suggests that the municipality level represents an appropriate scale for their development, with municipalities participating as institutional actors within energy communities. This approach is supported by international research demonstrating the important role of municipalities in managing energy community pilot projects, facilitating their scaling-up, and mediating between potentially conflicting stakeholder interests [11].

The focus group discussions highlighted the municipality's role as one of the most significant aspects of the proposed energy community development model. Participants demonstrated broad agreement that municipalities should assume the role of institutional actors by linking energy community objectives with territorial development priorities and contributing to the definition of common goods at the local level. Municipal involvement would also encourage a more integrated assessment of local renewable energy opportunities and potential restrictions affecting small- and medium-scale energy production facilities. Such an approach would allow municipalities to evaluate not only potential risks but also local benefits associated with energy projects, thereby supporting more context-sensitive decision-making.

Municipal participation in energy communities could also strengthen public acceptance of renewable energy projects. Since municipalities are among the public institutions most closely connected with residents' everyday experiences, their involvement can contribute to trust-building and increased legitimacy of local energy initiatives. This perspective corresponds with broader trends in democratic governance development, where municipalities increasingly act not only as providers of public services or regulatory institutions but also as coordinators of local cooperation and facilitators of co-creation processes [14, 52]. In this context, energy communities can be understood as instruments of participatory governance that extend the relationship between municipalities and citizens from consultation

Table 2. The main findings and proposed solutions[created by the authors]

Key issues	Focus group participants' views	Proposed solutions
Distinguishing energy communities from other decentralised energy production models	Citizens, building managers, and individual market participants alike still lack a common understanding of energy communities. Energy communities are often confused with self-consumption, collective self-consumption, or peer-to-peer trading. The development of energy communities is also hindered by uncertainty regarding procedures and documentation.	National-level template documentation and guidelines are needed that could reduce initial uncertainty, unify terminology, and facilitate cooperation among the parties involved.
Involvement of building managers in the establishment of energy communities	Building managers could explain to apartment owners the contribution of energy communities to building renovation: energy communities can serve not only as a mechanism for optimising electricity consumption but potentially also as an additional financial flow for the building's shared needs. Building managers' capacity and knowledge regarding energy efficiency and the benefits of participating in an energy community vary considerably.	Training, methodological materials, and institutional support for building managers need to be ensured.
The municipality as an institution trusted by residents that can coordinate the processes involved in establishing an energy community within its administrative territory	The municipality is the most important institutional participant in an energy community, because it plans the territory in the context of renewable energy, sets territorial development objectives, and provides public services. The municipality is also a public institution trusted by residents. The municipality's institutional role is closely linked to spatial planning and the possibilities for siting renewable energy infrastructure. Spatial planning requirements can create situations in which the interests of renewable energy development come into contact with landscape protection and other land-use interests.	Municipalities should provide support during the process of establishing an energy community and define the common good at the local level, so that residents understand the significance of energy communities. The municipality should review the restrictions set out in spatial plans on installing renewable energy production equipment, since these affect not only large-scale commercial projects but also small- and medium-capacity solutions – for example, wind turbines ranging from 20 kW to 2 MW – which should be regarded as an obstacle to the development of energy communities. Municipal involvement in an energy community would also allow a qualified economic assessment of the energy community's operation to be carried out; energy managers should be involved in preparing such an assessment.
Economic rationale for establishing an energy community	The advantage of an energy community is that it provides long-term predictability and price stability. An energy community is a mechanism for reducing long-term risk, not an instrument of short-term price competition. Electricity traders are reluctant to cooperate with energy communities. This indicates that the economic viability of energy communities depends not only on the community's members but also on other electricity market participants and the electricity distribution system operator. The conceptual energy community development model prepared in this study may be useful in preparing a study on the economic rationale for establishing an energy community.	An assessment of the economic rationale for establishing an energy community needs to be carried out at the municipal level.

towards joint management of resources and collective value creation.

At the same time, multi-apartment residential building managers may become important information intermediaries in the development of energy communities. According to Latvian legislation, building managers represent apartment owners' associations as their legal representatives [46]. However, as indicated during the focus group discussions, the knowledge and capacity of building managers regarding energy efficiency, renewable energy production, and the benefits of participation in energy communities are often insufficient.

Therefore, improving the education and professional development framework for building managers should be considered an important prerequisite for successful energy community development. Professional training programmes should provide building managers with theoretical and practical knowledge regarding the possibilities for apartment owners and apartment owners' associations to participate in electricity generation, collective energy management, and energy community initiatives. Strengthening the role of building managers would allow them to act as intermediaries between residents, municipalities, and other energy community stakeholders.

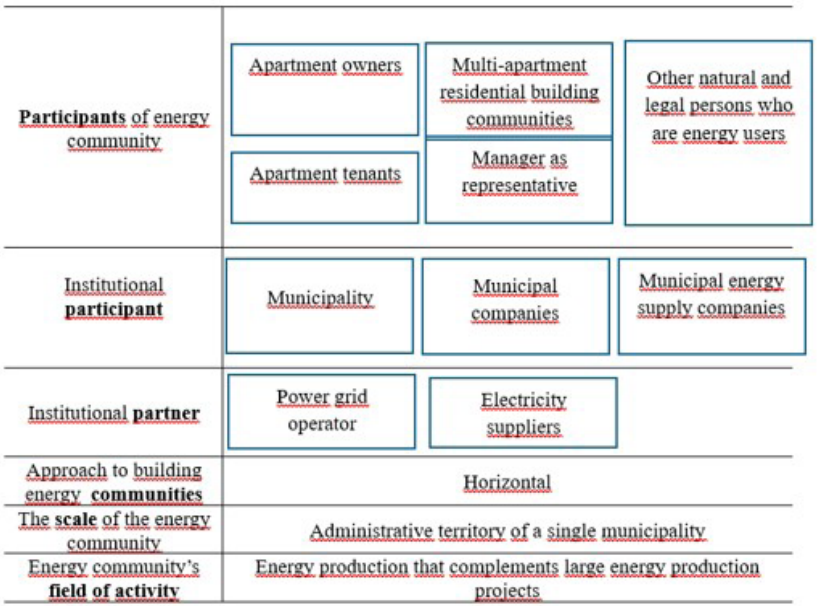


Fig. 2. Energy community development model in Latvia [created by the authors]

The proposed model also highlights the importance of other institutional actors, including electricity distribution system operators and electricity traders, whose involvement is determined by the Latvian regulatory framework [16]. Their cooperation is essential for ensuring the technical feasibility, market integration, and long-term sustainability of energy communities.

Overall, the research findings contribute to the refinement of the conceptual energy community development model for Latvia (Figure 2). The model demonstrates that energy communities should not be understood solely as technological solutions for increasing renewable energy production, but rather as institutional arrangements that integrate energy transition objectives with democratic governance, local participation, and the creation of common goods. The findings indicate that the successful implementation of energy communities in Latvia requires coordinated cooperation among citizens, municipalities, building managers, public administration institutions, and energy market actors. The refined model presented in Figure 2 summarises the identified institutional relationships, stakeholder roles, and key preconditions necessary for the development of energy communities within the Latvian institutional and socio-economic context.

The focus group results also highlight the distinction between the present study, which focuses on developing a conceptual energy community development model, and studies aimed at assessing the economic feasibility of establishing specific energy communities. The energy community development model provides a conceptual framework for understanding energy communities, including their formation approach, appropriate scale, scope of activities, potential participants, and the rationale for municipal involvement as an institutional actor. In contrast, economic feasibility assessments should be conducted at the level of individual municipalities, taking into account their specific technical, socio-economic, and institutional conditions.

Therefore, research on the energy community development model in Latvia and studies assessing the economic feasibility of establishing energy communities at the municipal level should be considered complementary but distinct research directions. Their sequential and integrated application provides a comprehensive foundation for the sustainable development and practical implementation of energy communities within municipalities.

Conclusion

The results of the study confirm that the development of energy communities in Latvia requires a conceptual development model that defines the scale, institutional structure, participants, and operational principles of energy communities while clearly distinguishing them from other models of decentralised energy generation. The developed model provides an institutional and organisational framework for the development of energy communities in the Latvian context and serves as a basis for their practical implementation.

The findings indicate that the development of energy communities in Latvia should be understood not only as an instrument of energy policy but also as a continuation of democratic governance and the development of local community participation. The successful establishment of energy communities depends not only on the regulatory framework and economic conditions but also on the culture of cooperation within local communities, mutual trust, and institutional capacity, which have gradually developed in Latvia over the past thirty years alongside the consolidation of democratic planning practices.

A crucial prerequisite for the development of energy communities is the establishment of a common understanding of their nature, operating principles, and distinction from other decentralised energy generation models. The study results highlight the need for state-level methodological support, including guidelines, model agreements, model statutes, and other methodological materials, which would reduce interpretative differences and facilitate the practical establishment of energy communities.

Municipalities have been identified as key institutional actors within the energy community development model, as they are able to coordinate relevant stakeholders, link energy community activities with local development objectives, and promote citizens' trust and participation. In the Latvian context, municipal involvement is particularly important because it compensates for the limited experience of citizens in collective action in the energy sector and creates institutional preconditions for the development of locally based energy communities.

The results also emphasise the importance of property managers in the development of energy communities, while highlighting the need to strengthen their professional competences in the fields of energy efficiency and energy

communities. Property managers can become important intermediaries between apartment owners, municipalities, and other energy community stakeholders by facilitating information exchange and promoting citizen engagement.

The study further demonstrates that the conceptual energy community development model and the economic justification for establishing energy communities represent complementary but methodologically distinct research directions. The conceptual model defines the institutional and organisational framework of energy communities, whereas economic feasibility assessments should be developed at the level of individual municipalities, taking into account local socio-economic and technical conditions.

The developed conceptual model of energy community development addresses the identified gap between the principles of energy community development described in international literature and their application within the Latvian institutional, legal, and social context. Thus, the study contributes theoretically to the research on energy community governance while also providing a practical foundation for the implementation of energy communities in Latvia.

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This study involved human participants through interviews conducted in accordance with established ethical standards. Participants were informed about the purpose of the study, their voluntary participation, and their right to withdraw at any time. Informed consent was obtained, and anonymity and confidentiality were ensured. All data were handled securely and used solely for academic purposes.

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Kopsavilkums

Eiropas Savienība uzskata energokopienas par nozīmīgu instrumentu enerģētikas pārkārtošanās veicināšanai, iedzīvotāju līdzdalības sekmēšanai un atjaunojamo energoresursu enerģijas ražošanas paplašināšanai. Tomēr, neraugoties uz Eiropas Savienības izveidoto tiesisko un politikas ietvaru, energokopienu praktiskā attīstība Latvijā joprojām ir ierobežota.

Lai gan iepriekšējos pētījumos ir analizēti energokopienu pārvaldības modeļi, kā arī juridiskie, institucionālie un sociālie faktori, kas ietekmē to attīstību, joprojām trūkst pētījumu, kuros būtu definēts Latvijas institucionālajam, tiesiskajam un sociālajam kontekstam pielāgots energokopienu pārvaldības modelis, tostarp ņemot vērā institucionālo dalībnieku lomas un telpiskās plānošanas aspektus, kas ietekmē energokopienu praktisko īstenošanu. Tādēļ šī pētījuma mērķis ir empīriski validēt konceptuālo energokopienu attīstības modeli Latvijā, identificējot galvenos institucionālos dalībniekus, to lomas un priekšnoteikumus, kas nepieciešami kopējā labuma radīšanai un energokopienu praktiskās īstenošanas nodrošināšanai.

Piedāvātais modelis tika izstrādāts, integrējot savstarpēji saistītu pētījumu rezultātus, kuros tika analizēti juridiskie, institucionālie un sociālie priekšnoteikumi energokopienu attīstībai, lai identificētu faktorus, kas ir būtiski to īstenošanai Latvijas institucionālajā un normatīvajā kontekstā. Lai validētu un pilnveidotu piedāvāto modeli, tika organizēta fokusa grupas diskusija, kurā piedalījās galveno energokopienu attīstībā iesaistīto pušu pārstāvji, tostarp valsts pārvaldes institūciju pārstāvji, kas ir atbildīgi par enerģētikas un telpiskās plānošanas politiku, pašvaldību un pašvaldību pārstāvošo organizāciju pārstāvji, dzīvojamo ēku pārvaldnieki, kā arī esošas energokopienas pārstāvis. Diskusija bija vērsta uz energokopienu atbilstoša mēroga, pārvaldības mehānismu un institucionālo dalībnieku lomu izvērtēšanu, sniedzot ieteikumus piedāvātā modeļa turpmākai pilnveidei.

Pētījuma rezultāti liecina, ka energokopienu attīstību Latvijā ierobežo ierobežota pieredze kolektīvās rīcības īstenošanā demokrātiskas tirgus ekonomikas apstākļos, kā arī nepietiekama institucionālā kapacitāte. Tādēļ pašvaldībām būtu jāpiedalās energokopienās līdztekus iedzīvotājiem kā institucionālajiem biedriem. Pētījums parāda, ka pašvaldībām var būt būtiska loma kopējā labuma definēšanā, institucionālā atbalsta nodrošināšanā, vietējo energokopienu iniciatīvu koordinēšanā, kā arī sabiedrības uzticēšanās un sadarbības stiprināšanā. Šie secinājumi sniedz ieguldījumu tāda energokopienu pārvaldības ietvara izveidē, kas ir labāk pielāgots Latvijas kontekstam un var sekmēt to veiksmīgu īstenošanu vietējā līmenī.

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ARCHITECTS' STATUS IN DECLINE: GENERATIONAL PERSPECTIVES FROM THE LITHUANIAN PROFESSIONAL COMMUNITY

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Abstract. The paper focuses on architects' professional status in society and in the construction industry, as perceived by architects themselves. It uses status as a lens to explore contradictions between occupational prestige and actual rewards, expectations and practice, the impact of cultural stereotypes, and evolving professional narratives. The study examines Lithuanian architects' expectations, perceptions, and experiences of professional status through their self-reflections. This qualitative sociological research is based on a thematic analysis of semi-structured in-depth interviews with 33 prominent Lithuanian architects, considered ideological leaders and representing three professional generations. The results are interpreted through interdisciplinary theory and contextualized within an international framework. Sociological methods and theoretical framework contribute to architectural knowledge by explaining contradictions among societal stereotypes, professional narratives, and lived realities. Although grounded in a local context, the findings offer insights that are both representative and internationally relevant. Architecture's prestige and societal stereotypes foster expectations of high status, similar to those of doctors and lawyers, which often clash with professional realities. Architects place great importance on professional status and express particular disappointment over its decline, which is more pronounced in the construction industry than in society and is felt most acutely by senior members of the profession. Senior architects tend to hold higher expectations of leadership, while younger professionals increasingly reject outdated notions of superiority. Differences in architects' status between society and the design and construction industries stem from the uneven distribution of cultural, economic, and social capital, in Bourdieu's terms. Society emphasizes architects' accumulated cultural capital – creativity, erudition and aesthetic judgment – thereby producing an elevated image of the profession as a socially reproduced myth. By contrast, the construction industry focuses on architects' professional power as part of their economic and social capital, and often perceives them as reactive among other actors, and as relatively powerless contributors within team-based practice. For architects with often inadequate financial incomes, status serves as an internal reward and compensation for highly responsible work and a vulnerable professional position, contributing to career satisfaction. Professional status also helps them navigate challenging relationships with clients, developers, and engineers in the pursuit of architectural quality. Architecture's promise of prestige and leadership, shaped by 20th-century Modern Movement ideals and reinforced by the totalitarian past of Soviet Lithuania, often clashes with the realities of contemporary collaborative practice. Outdated stereotypes fuel frustration, highlighting the need for a more flexible professional identity.
Keywords: occupational prestige, social standing, architects' identity, leadership in the construction industry

Introduction

Status in architects' profession is a controversial phenomenon, both in professional self-perception, and in its public interpretation. This controversy arises from the gap between the prestige attributed to the profession by society and the actual rewards it offers [49], by confusion of long established conventional stereotypes of architects image, and its revaluation facing new role norms in actual practice [53], by differences of status in professional narratives, in reflections within the construction industry, and in society in general [47], and by diversity of standings among the professionals, perverted by the minority of starchitects [46]. Outside the profession, studies prove that general public doesn't understand the professional position and role of architects [46; 47] and rely on media attention to ambitious and egocentric geniuses and glamorous architectural life-styles portrayed in books, films, and magazines, both creating the illusion of a successful charismatic personality of an architect [14].

Status plays an important role in shaping the professional identity of architects as perceived by the general public. Despite a general lack of awareness about what architects actually do, public assumptions about their status remain strong, as shown in numerous opinion polls. Major surveys of occupational prestige consistently place architecture in a high social-class position. In the United States, the 2016 Harris Poll ranking of the most prestigious professions, architects were listed after doctors, scientists, firefighters, military officers, and nurses [12]. Similarly, a 1989 survey by NORC at the University of Chicago ranked architects just below physicians, lawyers, scientists, teachers, and engineers [36]. International studies show similar trends. The 2018 GfK Verein Trust in Professions study, covering 20 countries, ranked architects 12th in public trust, following firefighters, doctors, paramedics, nurses, teachers, pharmacists, farmers, engineers, pilots, soldiers, and craftsmen [20]. A 2020 international YouGov survey across 16 countries asked respondents whether they would be happy if their child held a certain job; architects ranked as the third most respected profession, after scientists and medical doctors [57]. Paradoxically, despite their high prestige, architects are absent from rankings of the highest-paid professions. In Europe [37] and the United States [56], rankings of median earnings of occupations place architects well below doctors and lawyers, beyond what their professional status would suggest. Nor is there optimism for the future: over the past two decades, Architects' Council of Europe sector studies indicate that architects' earnings have only recovered after crises or merely kept pace with inflation [2].

The superiority of clergy, law, and medicine over other professions is well established in sociological literature. Due to their commitment to public service, educational requirements, and specialised knowledge, architects in their narratives strive for a position equal to that of these learned professions, traditionally considered as distinct and associated with elite status and power. Bourdieu classifies theology, law, and medicine as "higher" fields aligned with economic power

and hierarchy, and capable of exerting "the strongest and most durable influence on the people" [7, p. 62]. However, architecture stands outside these fields, as it faces unique challenges rooted in its inherent tension between artistic ideals and practical constraints [49].

In spite of that, status is one of the key factors contributing to the magic of architecture, attracting young people through the image of a prestigious profession. A sociological study of Lithuanian architects found that prestige of a profession is the second most significant motive for choosing a career in architecture – ranked just after personal artistic and creative talent [43]. The same study observes that the longer an architect's career spans, the more likely they are to perceive a decline in their social status, often leading t o disillusionment [43].

Acknowledging the importance of professional status in shaping architects' identities and recognizing its contradictory manifestations, this study poses the following research questions: To what extent do architects' expectations of professional status align with their actual experiences? Why does status differ between public and construction industry contexts and change over time in response to political, social, and economic conditions? What are the reasons for the contradictions surrounding their professional status? The study aims to examine architects' expectations, perceptions, and experiences regarding their professional status by analysing self-reflections within the Lithuanian architectural community, which architects perceive as one of the most disregarded by the public and clients compared with other European countries [1]. The selection a sample of prominent Lithuanian architects is grounded in the premise that a profession operates according to the values of its ideological leaders [54, p. 120]. The paper relates to earlier research on prominent Lithuanian architects from the Soviet period (1940–1941 and 1944–1990), highlighting their nostalgia for a former status as public figures and cultural elites [31; 16]. The study extends the analysis to two younger generations and examines generational differences. These findings are contextualized within a broader international and interdisciplinary research framework. Although grounded in a local context, the analysis offers insights that are both representative and internationally relevant.

This paper seeks to contribute to a deeper understanding of the preconditions and contradictions surrounding architects' professional status, enabling to mitigate disillusionment within the profession and enhance job satisfaction and well-being. The research adopts an interdisciplinary approach, integrating sociological theories and methods to augment the architectural perspective.

Sociological background of architects' professional status

Sociological research views occupational hierarchy as a key basis of social stratification in modern societies, reflected in levels of income, power, and other ranked social privileges [50, p. 74]. Occupation is considered more influential in determining an individual's position in society than religious or political affiliation, personal character, or ancestry [55]. In sociological literature, the social status assigned to individuals based on their occupation is referred to as occupational prestige [23], defined as society's perception of an occupation's overall desirability.

Studies show that occupational prestige is primarily shaped by three factors: required education, income level, and a qualitative social dimension – variously described as occupation's moral nature or social utility [28, p. 244], value to society or service to the community [55, p. 117], functional importance, and job complexity [50, p. 76]. This multifaceted social factor aligns with psychological research suggesting that perceived benefit generation to others is the primary basis for human status attribution [18].

Measures of occupational prestige are based on subjective evaluations of occupations [50, p. 74], following long established conventional stereotypes [53]. As Krueger, Ebner, and Rohrbach-Schmidt [28, p. 244] note, "raters rely on their beliefs about pay and education, which usually do not correspond to the actual values in these occupations." Recent research shows that individual prestige ratings are not uniform but are influenced by the social position of the raters [28, p. 245]. Rejecting a single collective logic in rating the occupational prestige, Valentino [52, p. 1412] study proves the heterogenic nature of rating concluding that "a person's social position – in particular their race, gender, education, income, age, religion, and geographic region – shapes which logic they are most likely to use when perceiving the occupational hierarchy". The multiplicity of rating logics explains the nature of occupational prestige scores as the aggregated average across entire populations [52, p. 1398].

Professional status is a subset of occupational status. Occupations become professions through professionalization, a collective strategy aimed at gaining and securing social and economic advantages. This process involves labour market control, monopolization of expert knowledge, educational barriers through credentialing systems, social closure, and ethical standards [29]. Professional groups seek to enhance their closure by "restricting the supply of job seekers and monopolising their consumption of ideal, social and economic goods, duties and lifestyles. The smaller and more exclusive the occupational group is, the larger the prestige attached to membership of this group; the wages could be effected positively as well" [26, 6].

Law and medicine are regarded as the most successful and prestigious professions, and architecture is often measured with them, although unsuccessfully [49, p. 24]. While high-prestige occupations generally command high wages, "a typical occupation at the higher wage spectrum with high prestige but relatively low wage would be an architect" [27, p. 572]. Based on Bourdieu's theory of economic, cultural, social, and symbolic capitals, architectural sociologist Stevens attributes the profession's weak economic position, despite its high prestige, to the lack of a monopoly over expertize, an unstable and competitive market, and a reliance on cultural capital and elite networks rather than financial dominance [49].

Traditionally considered a male-dominated field, architecture has sought to position itself among the higher-status professions in the occupational prestige hierarchy [50, p. 75]. Stevens refers to the architectural profession as "the favored circle," noting that it attracts privileged students from upper-class backgrounds, distinguished by significant cultural and economic capital, and a much higher percentage of those educated in private schools [49].

Architects' status is closely linked to their professional authority or power within complex interdisciplinary teams and their mediating role among clients, builders, users, and the state. While architects hold authority as great creators or intellectuals, their professional power in building industry is symbolic and discursive, since they often lack control over budgets, timelines, and regulatory frameworks [49]. Since the post-war period, architects' professional power and control have been threatened both internally,

by excessive self-importance, aesthetic preoccupation, and social experimentation, and externally, by marketization, technological change, and state regulation [48]. Piganiol distinguishes between statutory power of architects – the autonomy and exclusivity in professional practice, and their relational power, which emerges through occasional alliances and finding new forms of influence [41].

Materials and Methods

This study of architects' professional status is based on qualitative sociological research conducted with a sample of Lithuanian architects, segmented by generation and primary professional activity. The analysis of their self-reflections yields findings that, while locally grounded, offer insights of broader, internationally relevant significance.

The sociological study draws on semi-structured, in-depth interviews with 33 prominent Lithuanian architects, recognized by the professional or academic community as ideological leaders in the field. Participants were selected based on their prominence, leadership positions, notable projects, major awards, and availability at the time of the interviews (2015–2021). The sample comprises three generational cohorts: nine from the eldest generation, who obtained their architectural education between 1950 and 1969 (I); twelve from the senior generation, educated between 1970 and 1989 (II); and twelve from the younger generation, educated between 1990 and 2009 (III). Each generation is evenly distributed across three professional profiles: practitioners designing urban, architectural, or landscape architecture projects (P); academicians teaching in higher education institutions who are also active in design practice (PA); and academicians teaching in higher education institutions who engage in research or activism (RA). Interviewees are coded by generation, activity type, and sequence number (e.g., II-RA-3). As graduates and as academics, they represent all Lithuanian higher education institutions offering architecture programs during the relevant periods. The participants' architectural practice spans projects diverse in functional typology and complexity, across various places in Lithuania. To enrich and refine the material obtained from the 33 interviews, statements by prominent architects in public media interviews were also incorporated into the analysis.

Semi-structured, in-depth interviews were conducted face-to-face or online using a set of questions addressing topics such as the purpose and motivation behind architects' work, their professional roles and status, and the skills and knowledge required. Qualitative data from the transcripts of 33 interviews, supplemented by public interviews with prominent architects in the media, were investigated using the method of thematic analysis. Focusing on meanings across the transcripts of interviews, this method enabled the identification of shared experiences and interpretations relevant to architects' professional status. Through active and interpretative engagement, codes were generated and themes constructed from the interview content [8, p. 57–71]. This approach allowed for the identification and articulation of meanings, ideas, and experiences shared by the professional group concerning the status of architects.

Results

Architects' expectations and ambitions

The Lithuanian architects interviewed generally perceive their profession as high status, describing it as elite (II-P-2), prestigious (II-PA-2), privileged (II-P-3), and even as a means to stand out socially (II-PA-1). Many believe this elevated status is inherited from earlier historical periods, when architects were powerful decision-makers in ancient Egypt (II-PA-4; III-PA-1), were influential during Antiquity, the Renaissance, and the Modern period (II-P-3), and were respected during the interwar years (II-P-2). While older generations tend to accept the profession's prestige without question, younger architects express more scepticism. As one noted, "others see us as a prestigious profession, but we no longer see ourselves as a prestigious profession" (III-P-2). Younger interviewees are more likely to compare architecture's societal value with that of other professions, not only high-prestige ones like doctors, but also computer programmers or kindergarten teachers. As one interviewee remarked: "I wouldn't say that we are exceptionally important [...]. An architect should really be an equal member of society like other occupations" (III-PA-3).

Architects from the eldest, and to some extent the senior, generations describe their role as authoritative leader in direct and ambitious terms: "a great architect is everything" (I-P-3), "architecture is an extraordinary profession" (I-P-2), and "an architect designs life" (I-PA-3). These attitudes are encouraged by both the modernist ideology dominant during the peak of their careers and the professional recognition they received within the broader Soviet context. Lithuanian architects won medals in Moscow exhibitions (II-P-2), and their projects gained international attention – "in 1964, a British architectural magazine published my first school project" (I-P-2). As one recalled: "Moscow architects said the Baltics know how to design" (I-P-1).

The ambitions of intermediate senior generation were shaped by their teachers – respected masters, whose passion and leadership as city chief architects left a lasting impression (I-P-3; II-P-1; II-RA-4). In contrast, the younger generation, along with some senior architects, reject such leadership ideals as outdated. "The older generations are a little bit inadequately self-important" (III-PA-4), one said, while another criticized the attitudes of the omnipotent architect as if "he knows, he can do everything, he controls everything, and he's a self-important character" (III-RA-3). Younger interviewees express more cautious ambitions, while some still aspire to societal influence: "the architect always wants to be more important" (III-P-3). One admitted: "I want to shape ideology. My ambition is greater" (III-PA-1), while another considers the extent to which their ego should be indulged or controlled: "what should the Architect be: a god, a demigod, a hero? Or maybe a member of the football team?" (III-P-4). This self-reflection extends to their concern about professional resilience. Unrealistic expectations can lead to frustration: "if the expectations for self-fulfilment are too high, the unheard professional is crushed" (III-PA-2), and under the pressure of unrealized ambition, "it is very easy to get lost" (III-PA-4). While warning themselves that "the temptation of power and authority is very strong" (II-PA-1), they remind themselves that "it's not the architect who is important, it's our profession" (III-PA-3).

Recognising that professional status depends on three key factors: the length and complexity of education, the societal value of the service, and income level, it is revealing to see how architects themselves justify their profession's high status. Rather than emphasising the demanding duration of studies and challenges of establishing a career, interviewees highlight the outcome of education: the architect's erudition. They describe architects as "broad-minded people with strong opinions" (II-PA-2), intellectuals (II-PA-3), "members of the cultural elite" (III-PA-4), or "erudite critical global thinkers" and "multi-instrumentalists" (III-PA-1), featuring a "multifaceted approach" (III-PA-3), and the ability to

consider space from multiple perspectives – social and beyond (III-RA-1). Rather than focusing on difficulties in education, respondents emphasize the personal struggles encountered while performing professional tasks. They consistently describe architecture as extremely demanding (I-PA-2), requiring long hours of meticulous work to achieve results that appear effortless (II-P-4). The profession often consumes family and leisure time, and young professionals face critique and pressure from senior colleagues (II-PA-3). As architect Natkevičius observed, professionals struggle with "both self-criticism and accepting criticism, and constantly competing with ideas" [10].

Regarding the second factor – the societal value of architectural work – interviewees highlight that it produces the most visible form of art, used by the public (II-P-4), adds value to the environment and can "make a person very unhappy or very happy" (III-P-4). This deep impact justifies the profession's regulation (II-PA-2) and aligns it with socially vital fields like medicine and education.

The third condition for high professional status – high income – was notably absent from the architects' responses. Instead, some emphasized the profession's inadequate financial rewards: "what we create for the environment is far more valuable than we will ever receive in return" (III-PA-1). Highlighting this imbalance between responsibility and income, Biekša described the architect as "an absolutely pathetic persona" [44].

Reflecting on society's perception of the architect's status and prestige

There is no consensus among the interviewed architects on how the public values and respects their profession, with particularly wide variation among younger interviewees. Some describe positive reactions: "when I say I'm an architect, everyone looks at me with respect" (III-RA-2), others feel that "architects seem to be semi-deified. Being an architect is very tough" (III-RA-4). One architect humorously recalled learning of the profession's prestige through watching Latin American soap operas with his mother and discovering that architects ranked among the top five most desirable grooms (III-PA-4). A university lecturer noted that many students view architecture as a pathway to leadership position: "a director, in the broad sense [...], not a civil servant" (III-PA-2). However, others in the same generation highlight negative perceptions: "architects are not valued enough" (III-P-1), "architects are poorly regarded in society [...] mostly because they're associated with results that cause conflict. Most people see architects as arrogant bastards" (III-RA-3).

There is a clear tendency that the more experienced the architects, the more critically they assess current societal attitudes toward architects. The senior generation expresses pessimism: "the architect is undervalued these days. He is not respected now" (II-P-3), "there is no real status" (II-P-1). The eldest generation is the most frustrated: "the status of the architect in society has fallen to a critical state. It has never been as weakened as it is now" (I-PA-2). Many compare the current situation to the Soviet period, recalling a time when architects were treated with respect: "in the Soviet times the profession of architecture was valued" (I-PA-1); "I worked on a kolkhoz, and they didn't call me by name – just 'architect,' like 'doctor'" (I-PA-2). From a more recent perspective, status is not seen as in steady decline but as shifting with time: "the pendulum swings one way or the other" (II-P-4), shaped by a changing environment and evolving demands (III-RA-3). Interviewees also note the diversity of public perceptions: "there are all sorts of images of architects in society" (III-RA-4) and that status can vary drastically depending on whether it is measured by economic success or cultural contribution: "economic success and cultural success are fundamentally different, and so are these types of statuses" (III-RA-3).

The architects interviewed offered several reasons why their societal status is lower than they believe it should be. They see this as part of a broader trend, as Palekas notes, a decline in the value of creative and intellectual work and diminishing trust in professionals [4], a view echoed by others: "in today's society, I don't see any room for the evaluation of professionalism" (I-P-3). Several architects pointed out that contemporary society tends to value politicians and businesspeople more highly than professionals (II-P-1; II-P-3; II-PA-4). Another recurring explanation was public misunderstanding of the architect's role: "everyone knows what a doctor or a lawyer does. But not everyone understands what an architect is" (III-PA-4). One architect illustrated this gap through a client's comment: "you design museums, but do you know how to design houses?" (III-PA-2). Due to limited public understanding, people's attitudes are shaped by a largely negative media discourse: "if you hear about architecture anywhere, it is mostly negative" (Balčytis 2020); "most of the messages in the media scold architects – this bad thing, that bad thing..." (III-PA-2). As a result, "nowadays, the figure of the architect is associated with development. An architect is no longer seen as a visionary; in the eyes of society, they no longer create squares, schools, or public spaces. Instead, they design apartment blocks under my window and amass piles of money" (III-PA-1).

The architects interviewed express frustration over what they see as a lack of public respect, especially when compared to artists in other creative fields. They point to examples like national culture and art prizes, where architects have been unrecognized for years (I-PA-2), and frequent presentation of completed buildings in the media without crediting the architect (Balčytis 2020). Interviewee II-PA-2 notes that the insufficient recognition of the architect as author is not only a contemporary issue but has persisted historically. However, not all interviewees share this grievance; one suggests architects may overestimate their claim to public recognition: "you'll never be as visible or famous as an actor – you have to accept that" (I-P-3). Still, their call for respect is their call not about vanity, but grounded in comparisons with other cultural contexts. It was recalled that architects, along with other artists, were more highly regarded during the Soviet period (II-PA-1). Those who earn recognition, report feeling "more respect and being listened to" (III-P-3). Respondents admire how Nordic countries elevate their architects: "the Finnish national hero, Alvar Aalto, represents a high standard; he embodies the nation's ideals and inspires its people" (II-P-2); "in Denmark, BIG (Bjarke Ingels Group) is already a national product" (III-PA-1). That is why it is hard to accept the fact, as Ambrasas stated, "today we are still a country of farmers, builders, and IT specialists – but not architects" [25].

Experiencing the architect's position and status within the construction industry

The professional culture, role, and status of architects in the construction industry differed significantly between the Soviet occupation (1940–1941 and 1944–1990) and the period of re-established independence in Lithuania (since 1990), shaped by the country's political and socio-economic systems.

Soviet occupation. The Soviet occupation brought state control, central planning, and the elimination of private property to Lithuania. The state and its agencies became the sole clients, with design centralized in state institutes

and implemented through standardized mass construction. Architects interviewed noted that totalitarian leaders like Hitler and Stalin understood architecture's ideological power (I-PA-2), giving architects the chance to "set the scene for their world-staging" (II-PA-1) and realize their visions (II-PA-4). Without private ownership, architects became dominant figures – "dictating specialists" (I-PA-2) and were granted powers "which would not otherwise belong to them" (II-PA-1). Those who worked during this period attribute their privileged status to the nature of totalitarian governance rather than to the modernist ideals of the time that elevated the architect's leadership.

In the memories of the eldest interviewees, the city master plan was a key instrument of architectural leadership. Guided by the city's chief architect, it was developed collaboratively by urban, transport, landscape, and energy planners (I-P-2) and approved by the Council of Ministers. Chief architects were seen as conductors (I-P-2; I-PA-2; I-RA-2), empowered among various professionals to take responsibility for the city master plan and to lead urban development, while being shielded from political officials' demands: "we had a master plan and we worked according to the master plan, and nobody could order us" (I-P-1).

The professional mindset of the senior generation is rooted in the belief that "the architect must lead the construction" (I-P-2), a view shaped by the Soviet regime and state commissions. "It was not the client who dictated, but the architect himself, because he knows what is needed. [...] They always consulted the architects when preparing the programme for a new building" (I-PA-2). Architects expressed pride in their leadership roles: "we were able to run the House Building Plant" (I-P-1), which produced standardized components for block housing, and architects often were the directors of large multidisciplinary design institutes (I-P-2). The vast construction sector and the empowered role of architects enabled the emergence of strong personalities, like talented designers or city chief architects, who earned public respect. The power gained in design, production, and construction processes under the totalitarian regime is viewed as a mark of professional status by respondents from the eldest generation – the prominent architects of that time. However, they provide no detailed comments on how this status was manifested in their collaborations with engineers, builders or contractors, likely due to the time that has passed.

Period of independent Lithuania. Lithuania's independence from the Soviet regime in 1990 brought neoliberal ideology, a free-market economy, and the restoration of private property, fundamentally reshaping the actors in the construction industry and the relationships among them. State commissions were replaced by business and private clients, and large design institutes fragmented into small, competing firms. This shift drastically altered architects' roles and status: once authoritative creators and decision-makers, they became service providers to private interests (I-PA-1; I-PA-2). The first post-Soviet years are remembered as particularly challenging, with politicians and businessmen casted architects aside: "the architect was only there to put signatures, formally, and then to keep quiet" (III-PA-4); "the best architect was the one who knows how to punch through what is wrong to punch through" (I-P-3).

Opinions on the current position, power, and status of architect within the construction industry vary according to the period that dominated their professional careers: "we might not even agree with the different generations on what that status is" (III-RA-3). Soviet-era architects are the most frustrated. They view the present in contrast to their past and often express nostalgia for a time when they held real authority, now feeling side-lined to a service-provider's role (I-PA-1; I-PA-2) or being reduced to mere bureaucratic functionaries (I-RA-1). They also regret the diminished power of chief city architects, who now must obey to the city council rather than lead it (I-P-1).

Representatives of the senior generation, who began their careers during the late Soviet years, express regret over the decline in architect's prestige and status within the construction industry. They lament the devaluation of architecture as art form, now seen as subordinate to engineering and construction: "it was left as an appendix to engineering, to reinforced concrete, to construction" (II-P-2). This devaluation of architecture and the diminishing role of architect as an artist has enabled a power shift toward developers, engineers, and builders: "when projects are publicized, the developer always comes first, but never the architect. [...] Nowadays, the builder's opinion, the politician's opinion is more important. [...] The builder can change architecture" (II-P-3). This shift of power is reinforced by engineers and real estate developers, who "seek to enable construction engineers to perform the work of architects. In their view, architects are incapable of calculation and are merely capricious artists" (Ambrasas 2016). The real estate developers prioritize cost savings over design value, as "builders like to save money, leaving no room for architecture to generate money" (II-P-2), while architects lack the financial lever to assert influence (II-P-3). Though there is potential for positive change through competition within the construction sector and the replication of good practices (II-P-4). Many critique the contemporary client-architect relationship. Clients are often portrayed as controlling, choosing architects who act as obedient executors of their visions (II-P-2), however poor in quality: "they often feel they know better, maybe even 'would draw it themselves', but they need a signature" [4]. This exploitative dynamic is blamed for poor-quality architecture (II-PA-4), as investors are typically concerned only with profitability: "How many square metres will be available, how much will the technical design cost, and when will they get the building permit" [3].

The younger generation, having no experience with Soviet-era design practices, views the architect's current power and status under current neoliberal conditions more objectively and less emotionally. They acknowledge the profession's diminished standing compared to the Soviet or modernist periods: "the architect is becoming more and more invisible, [...] one of the important actors in shaping the environment, just one of them" (III-PA-4), because "the architect doesn't have the tools to be so important" (III-RA-4). Still, in the design process, architects retain some authority, as "the architect sets the tone, and that influence puts you somewhat ahead of others. It comes from the power of the profession over the rest of the team" (III-P-2). Another respondent adds: "there is a moment when someone has to say the last word – 'it will be this way.' The architect is most likely to say it" (III-PA-2). In larger projects, however, power struggles are evident: "you realize there are other powerful forces that can ignore your opinion or push you aside" (III-P-2), "with corporate clients, you really feel like a screw in the machine. You fight for a higher position, because if you don't, you'll be pushed to the bottom – and that directly affects the quality of the architecture" (III-PA-4). Even with private clients, a similar imbalance can occur if the client lacks trust in the architect's expertize, making it difficult to determine "where and why the architect is right" (III-PA-2).

Striving to reclaim professional status

Despite generational differences in experience and attitude, interviewees unanimously express a strong determination to elevate the architect's diminished status in society. Calls for action include: "efforts must be made to raise the importance of the profession in society" (I-PA-2), "the status of the architect must be very high" (II-RA-3), "prestige must be built up in a democracy" (II-PA-4), and "how to raise that authority, how to nurture it" (III-PA-2). It has been proposed to increase occupational closure, as an oversupply of specialists undermines the profession by attracting less talented individuals, intensifying competition, and reducing earnings (II-PA-2). Disillusioned with state inaction, many no longer expect external support and see this as the responsibility of national professional bodies like the Architects' Union and the Chamber of Architects (II-RA-4).

Interviewees emphasize public education as key to change – clarifying the architect's role, linking architecture to culture and art rather than merely construction (II-RA-4) [25], fostering respect for "the art of a harmonious environment" (III-PA-4), and reshaping the profession's image (III-RA-4). As architects lack financial power, persuasion and rational argument remain architects' primary tools of influence (III-PA-4). Yet, a self-critical perspective is also voiced: "when we stop complaining that society doesn't respect us enough, doesn't pay us enough, or doesn't allow us to express ourselves enough as creators, and think about what we can give to society instead, believe me, all the conditions for our self-realisation will appear" [24].

Discussion

Discrepancies, preconditions and significance of architects' professional status

Lithuanian architects interviewed expressed a clear expectation for higher social status within the stratified structure of society based on occupation. According to Bourdieu's theory of capitals [6], they perceive themselves as possessing an advantage through accumulated cultural capital – education, erudition, and broad outlook – and symbolic capital gained through creative mastery, authority, and leadership. They see these forms of capitals as sources of professional power. Conversely, architects interviewed do not appear to perceive themselves as superior in terms of economic capital. This aligns with Stevens' argument that architects rely heavily on cultural capital rather than economic dominance, resulting in a culturally prestigious but economically weak professional standing [49]. U.S. polls show different importance of capitals in shaping public perceptions of professional prestige, explaining why architecture is seen as prestigious despite low earnings: "based on the responses, it seems like the average American considers prestigious jobs to be ones that require either a fairly high level of education or a fairly high level of public service" notably not equating prestige with fame, money, or employability [22]. The self-reflection of Lithuanian architects supports the sociological observation of a "high prestige but relatively low wage" gap [27, p. 572], though respondents focused more on status than on inadequate income. This may be influenced by the fact that the interviewees were renowned architects and not average practitioners. Numerous social scientists and psychologists note that the evaluation of one's sense of worth, status, and achievement is a thoroughly relational matter, a direct effect of comparisons with others, particularly in creative professions such as architecture [51].

Besides cultural capital, the literature highlights higher social background of entrants to profession as another key factor contributing to a profession's high status. Status may be ascribed, that is, assigned to individuals at birth, or achieved, requiring special qualities and gained through competition and individual effort [9]. In architecture, ascribed and achieved forms of status often intersect: high-status professions tend to attract individuals from privileged backgrounds – white, private schools leavers, with college-educated parents [49]. Interpreting Bourdieu theories, Fowler and Wilson [19, p. 105] note that "a dialectic of consecration and recognition means that the elite architectural school chooses those who have chosen it, and confers on them its aura," a pattern also observed in other prestigious professions such as medicine, law [26, p. 20], and male-dominated professions more broadly. However, Lithuanian architects, likely due to the class-flattening effects of the Soviet regime, did not mention this correlation.

Another precondition for architects' distinctive status is the Modern Movement's ambition to establish architecture as an elite profession. An architect of this era was claimed "as an independent artist and creative genius who refuses to sully his or her profession in any act of artistic compromise" [14, p. 40]. This artistic ideal and the emphasis on architecture as a vehicle for social welfare fostered a sense of professional exceptionalism and a detachment from practical human needs – a stance later widely criticized [49, p. 13–14; 46]. While elder Lithuanian architects still see the role of visionary artist as central to the profession's identity, passing this ideal to younger generations with different values has led to intergenerational conflict [34]. Moreover, under Soviet occupation (1940–1941 and 1944–1990), hegemony of Lithuanian architects was impacted in complex ways by totalitarian regime. In design practice, architects' professional status was reinforced by centralized power, state commissions, and the absence of private clients, which granted them strong leadership roles [33; 31]. As Eisenman observed, "the more centralized the power, the less compromises need to be made in architecture" [42]. Furthermore, Soviet rule conferred respect, privileges, and cultural-elite status on prominent Lithuanian architects [31; 16] via occupation-based social stratification.

The literature survey identified two main reasons why status is so important for architects. First, it serves as a strategy of resistance, compensating for the complexity, responsibility, and significance of the work in contrast to its often inadequate rewards. Caven and Diop emphasize intrinsic rewards such as professional power, status and recognition, and also professional identity, creativity, and the positive networks of stakeholders that compensate for the poor salaries and job insecurity particularly prevalent in the profession [13, p. 514]. These factors generate satisfaction and help retain individuals in architectural careers. Second, status in society, and particularly within the construction industry, enables architects to exert greater influence in complex relationships with clients, developers, and engineers, especially in decision-making and negotiations. Piganiol describes status as a new form of power: a resource that strengthens or defends the legitimacy of architects' choices, alongside other factors such as social relations and strategic alliances [41]. The Lithuanian architects interviewed mostly emphasized this second rationale (Figure 1).

Contradictions in architects' status in society

Perhaps the most painful theme to emerge from the interviews was the perceived devaluation of the architect's role. The frustration of elder architects is intensified by the contrast between the recurring image of the powerful, influential modernist architect of the totalitarian regime –

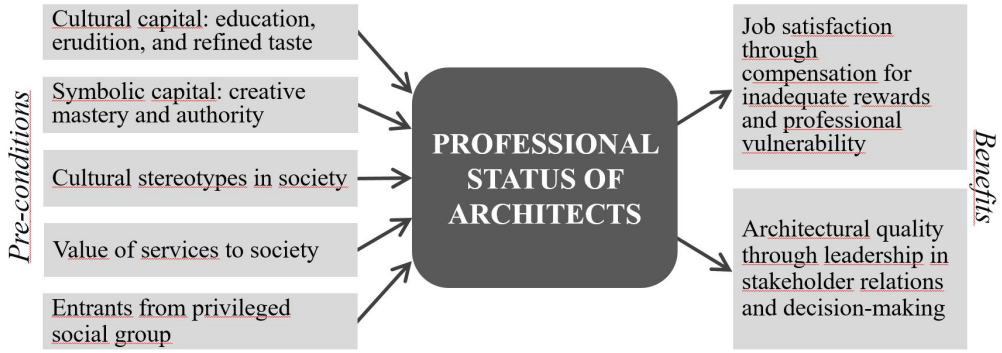


Fig. 1. Preconditions and benefits of professional status of architects [created by the author]

exaggerated by self-mythology, as described by Maciuika and Drėmaitė [31] – and the diminished role architects hold in today's neoliberal system. Younger interviewees without Soviet-era experience do not share this nostalgia, although they still struggle with the gap between society's perceptions and professional reality [34].

Sociological research shows that the devaluation of professional status, now affecting nearly all professions, is often linked to educational expansion and the transition from elite to mass higher education. Klein's study shows notes that "the association between educational attainment and occupational prestige decreased strongly in the phase of higher education expansion between the start of the 1980s and the mid-1990s" [26, p. 19]. While a growing share of university graduates was absorbed by the expanding salariat class and by women, educational attainment no longer guarantees the same economic and social rewards as in the past. Many professions, particularly traditionally high-status, male-dominated ones, have seen a decline in status in relation to their feminization, though other complex factors also play a role [11; 46]. Another contributing factor for professional decline is replacement of professionalism with managerial accountability for the sake of more detailed state control, regulation and transparency of professional practice. Unintelligent forms of accountability damage authority of and trust for professionals [40]. In architecture, the lack of prestige and status associated with the profession is under threat from less qualified project managers, as they appropriated the role of the chief coordinator of projects [13, p. 519] (Figure 2).

International literature repeatedly asserts that the status ascribed by society, along with the powers, attributes, and aims assumed by architects are at odds with the realities of practice [38; 46]. As society places value exclusively on cultural capital, it tends to maintain stereotypes about architects' creativity, exceptionalism, and charisma. Though often poorly grounded, these stereotypes strongly influence students' decisions to enter the profession [32; 39]. This is not a new trend: "the subject attracts clever and lively young people [...] since the early days of architectural schools in eighteenth-century Paris, when more young men sought jobs designing things than the market could supply" [45, p. 9]. Cultural stereotypes foster unrealistic expectations among new entrants. Recognizing that "actual social status may not be as important as perceived social status" [47, p. 308], those with high expectations for their professional standing often experience a more painful gap between illusion and reality. A psychological study found that architects who strive to belong to a particular professional stratum or group primarily for its high social prestige adapt less effectively to changing realities and new tasks than those who are work-task oriented and more open to new information [53].

The frustration expressed by Lithuanian architects over their eroded professional status is followed by a search for strategies to raise it, what Stevens ironically calls an attempt "to diagnose and remedy this situation, hoping to elevate the profession to its rightful place" alongside medicine and law [49, p. 24]. Interviewees suggest educating the public about the significance of architecture, echoing Sang's observation that misunderstanding amongst the general population leads to a confused status [47, p. 265]. As in Lithuania, architects in other countries believe that professional organisations, such as RIBA, should play a role in enhancing the profession's standing [13; 47]. Nevertheless, sociological research, as previously noted, links occupational prestige to occupational closure, that is, institutionalized barriers to entering particular occupations. In architecture, the field is monopolized via educational certificates and licensing, through professional self-regulation, ensuring strong market shelters against external competition and market forces [26].

Contested architects' status and self-positioning in the construction industry

The correlation between social status, based upon honour or prestige, and professional status in a hierarchy of the construction industry, based on leadership over other specialists, is complex. Sang notes that architects' status is perceived more negatively within the construction industry than in society at large [47] – a pattern also observed in Lithuania. This discrepancy aligns with de Graaf's observation: "as a profession, architecture presents a paradox. In economic terms, it is mainly a reactive discipline, a response to preformulated needs; in intellectual terms, it is the opposite: a visionary domain that claims the future, aspiring to the agenda and precede needs" [21, p. 4]. Referring to Bourdieu's theory of capitals [6], society emphasizes accumulated cultural capital and portrays architects as great creators, intellectuals, and visionary leaders, thereby reinforcing an enduring stereotype [49]. By contrast, the construction industry focuses on architects' professional power as part of their economic and social capital and often perceives them as reactive among other actors involved, and relatively powerless contributors within team-based practice.

Self-positioning of architects in professional narratives is often inadequate. The idea of the architect's "clear superiority over the rest of the construction team" was escalated by the Modern Movement, which promoted architect as a hero and genius [14, p. 40]. This perception persists among the public and students, who often see architects as autonomous creators with full control over the design process [47, p. 265]. Among Lithuanian architects, this belief in professional superiority in design and building industry is especially strong among those who practiced during the Modernist period under Soviet rule.

The younger Lithuanian architects experience what Samuel [46, p. 43] calls an "increasing intolerance of architects' outdated claim to professional exceptionalism in design

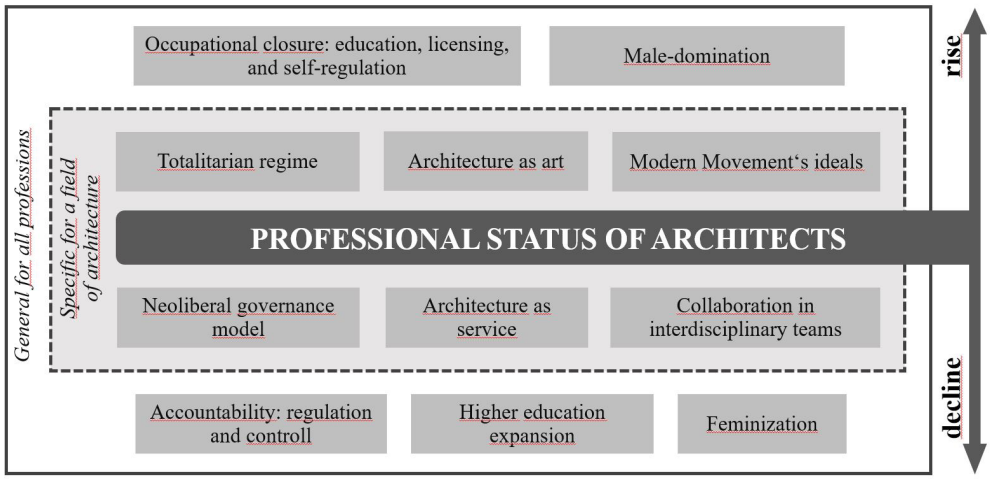


Fig. 2. Reasons for rise and decline dynamics of professional status of architects [created by the author]

leadership". In a profession traditionally dominated by men – who are often more motivated by impact, power, and prestige [32, p. 17] and more likely to follow traditional paths of influence and authority [15, p. 54], the feminisation of the field has introduced greater flexibility and diversity of approach among the younger generation [35].

Architects' self-positioning as powerful leaders in the design and construction industry is increasingly outdated, disbalancing, and frustrating. The younger interviewees' rejection of traditional leadership role aligns with calls in the literature for architects to position themselves as equal members of interdisciplinary teams. Samuel argues that destroying the mythology of the architect as visionary is a necessary step [46, p. 57]. Charlesworth critiques the notion of architecture as a solo act, which has little to learn from other major fields [14, p. 48]. Latham emphasizes the need to empower clients by positioning architects as extensions of the client [30, p. 40]. As Duffy puts it, "no one discipline can possibly comprehend the totality of the built environment. The chance of any one profession monopolizing the built environment, or even the production of the built environment, is nil" [17, p. 567].

Limitations of study and future research

Focusing on prominent Lithuanian architects as professional leaders limited the sample; therefore, the findings may not be applicable to the entire professional community. Generalisations about Lithuanian architects' status are generally similar across Central and Eastern Europe, although differences may emerge in countries with distinct political, economic and social contexts. These sample and contextual limitations indicate the need for further research on diverse architectural communities, examining status, self-positioning, and reflections on practice in relation to motivation and job satisfaction. The question of whether a disillusioning professional status drives architects toward marginal activities within architecture or prompts them to leave the profession, possibly with gender and generational bias, remains open. The architect's controversial professional position would also be a relevant subject of research for disciplines such as the sociology of work and psychology, and could be taken into account in counselling processes.

Conclusions

A sociological study of prominent Lithuanian architects revealed the high importance they place on professional status and their disappointment over its decline, felt most acutely by elder members of the professional community. Interviewees reported a greater drop in status within the design and construction industry than in society. The study also found that the more senior the architect, the higher their expectations for professional status.

One of the basic causes of professional contradictions lies in the uneven distribution of cultural, economic, and social capital, as described by Bourdieu. Through prolonged education, erudition, and refined taste, architects accumulate considerable cultural capital, which is converted into symbolic capital – authority and respect, recognized by society. However, they tend to be weak in economic capital, creating a painful gap between occupational prestige and actual income. This shortfall is often compensated by professional status. For architects, status is not merely about narcissistic recognition. Personally, it helps compensate for modest financial reward for demanding, high-responsibility work and a vulnerable professional position, functioning as an internal reward and contributing to career satisfaction. In the design and construction industry, professional status functions as a tool for architects to navigate complex relationships with clients, developers, and engineers while striving for architectural quality.

The general public and occupational communities working along in the design and construction industries assign different professional status to architects due to differing perspectives.

Society tends to assess status primarily through cultural capital, emphasizing architects' creativity, erudition, and charisma rather than their economic and social capital, thereby producing an elevated image of the profession as a one-sided stereotype far from reality. The profession's prestige and reputation become a learned concept, a socially reproduced myth. Its fragility is revealed by the lack of expected status in design and construction practice, where the construction industry views architects as one of many actors involved and attributes their status according to their actual power, contribution to teamwork, and impact on creating the built environment.

For those who choose architecture as a career, the profession's prestige and prevailing societal stereotypes create the expectation – almost like a promise – of high social status and leadership in the design and construction industry. In the 20th century, these ideals were amplified by the Modern Movement and, in Lithuania, reinforced by the political and socio-economic conditions of the totalitarian regime. Today, these ungrounded stereotypes and outdated professional narratives often clash with the realities of practice, leading to disillusionment, frustration, and dissatisfaction with the career. The architectural community's rigid and often oversubscribed self-image calls for revision toward a more

flexible model that reflects the collaborative nature of design and aligns more closely with contemporary professional practice, better equipping architects to meet the changing conditions of the built environment and society.

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Kopsavilkums

Rakstā analizēts arhitektu profesionālais statuss sabiedrībā un būvniecības nozarē, pamatojoties uz pašu arhitektu skatījumu. Profesionālais statuss izmantots kā analītiska perspektīva, lai izpētītu pretrunas starp profesijas prestižu un faktiski saņemto materiālo un nemateriālo novērtējumu, starp gaidām un profesionālo praksi, kā arī kultūras stereotipu ietekmi un profesionālo naratīvu attīstību.
Pētījumā, balstoties uz pašrefleksijām, analizētas Lietuvas arhitektu gaidas, priekšstati un pieredze saistībā ar viņu profesionālo statusu. Šis kvalitatīvais socioloģiskais pētījums balstīts uz tematisku analīzi, izmantojot daļēji strukturētas padziļinātās intervijas ar 33 ievērojamiem Lietuvas arhitektiem, kuri uzskatāmi par profesionālās domas līderiem un pārstāv trīs profesionālās paaudzes. Pētījuma rezultāti interpretēti, izmantojot starpdisciplināru teorētisko ietvaru, un aplūkoti starptautiskā kontekstā. Socioloģisko metožu un teorētiskā ietvara izmantošana papildina arhitektūras nozares zināšanu bāzi, skaidrojot pretrunas starp sabiedrībā pastāvošajiem stereotipiem, profesionālajiem naratīviem un arhitektu ikdienā piedzīvoto realitāti. Lai gan pētījums veikts konkrētā vietējā kontekstā, tā rezultāti sniedz gan reprezentatīvas, gan starptautiski nozīmīgas atziņas.
Arhitektūras profesijas prestižs un sabiedrībā nostiprinātie stereotipi veido priekšstatu par arhitektiem kā augsta statusa profesionāļiem, pielīdzinot viņus ārstiem un juristiem. Tomēr šādas gaidas bieži nonāk pretrunā ar profesionālās darbības realitāti. Arhitekti profesionālajam statusam piešķir būtisku nozīmi un pauž īpašu vilšanos par tā pazemināšanos. Šī tendence būvniecības nozarē izpaužas izteiktāk nekā sabiedrībā kopumā, un vissāpīgāk to izjūt vecākās paaudzes arhitekti. Pieredzējušākajiem arhitektiem raksturīgas augstākas gaidas attiecībā uz vadošo lomu profesionālajos procesos, savukārt jaunākās paaudzes speciālisti arvien biežāk noraida novecojušos priekšstatus par arhitekta profesionālo pārākumu.
Tā kā arhitektu finansiālais atalgojums bieži vien nav samērīgs ar veicamā darba apjomu un atbildības līmeni, profesionālais statuss kļūst par iekšēju atalgojuma un kompensācijas formu. Tas palīdz līdzsvarot augsto atbildību un profesionālās pozīcijas ievainojamību, vienlaikus veicinot apmierinātību ar karjeru. Profesionālais statuss arhitektiem palīdz arī risināt sarežģītās attiecības ar klientiem, attīstītājiem un inženieriem, tiecoties nodrošināt arhitektūras kvalitāti. Ar arhitekta profesiju saistītais prestiža un līderības solījums, ko veidojuši 20. gadsimta modernās kustības ideāli un pastiprinājusi Padomju Lietuvas totalitārā pagātne, bieži nonāk pretrunā ar mūsdienu sadarbībā balstītās profesionālās prakses realitāti. Novecojušie stereotipi veicina neapmierinātību, tādēļ nepieciešams veidot elastīgāku un mūsdienu profesionālās prakses apstākļiem atbilstošāku arhitekta profesionālo identitāti.

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BETWEEN THE BLOCKS: HISTORICAL DEVELOPMENT OF GREEN SPACES AT THE CHRENOVÁ HOUSING ESTATE IN NITRA, SLOVAKIA

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Abstract. The landscapes of socialist housing estates represent one of the most extensive yet least understood layers of the urban environment in Central and Eastern Europe. Originally conceived as functional green spaces ensuring light, air, and recreation for modern urban life, these inter-block areas now reveal a complex interplay between modernist planning ideas, social transformation, and decades of spontaneous adaptation. Focusing on the Chrenová housing estate in Nitra, the study examines how its green system evolved from the original post-war design intentions to its present spatial and ecological condition. Archival drawings, historical maps, early planning concepts, and contemporary field observations from the basis for reconstructing the estate's initial landscape structure and for analyzing the shifts that occurred during subsequent decades. Findings show a pronounced divergence between the ambitious 1972 recreational concept and its implementation, a surprising persistence of selected architectural elements such as sculptural wayfinding panels, and the absence of systematic realization of later renewal proposal. The resulting landscape has evolved incrementally rather than strategically, shaped largely by ad-hoc adaptations and everyday use. By situating Chrenová within broader discussion on socialist-era landscape heritage, the study highlights both the lasting spatial potential and the systematic vulnerabilities of these open spaces, underscoring their relevance for contemporary green-infrastructure strategies in post socialist-era cities.
Keywords: housing estates, post-war city, landscape architecture, green infrastructure

Introduction

Urban green spaces have long represented a key component of healthy and socially functional cities, yet their form and purpose have been repeatedly reshaped by changing planning ideologies. In contemporary planning discourse, their relevance is further reinforced by global and European strategies, which position green infrastructure and nature-based solutions as essential tools for building resilient and sustainable urban environments [32]. One of the earliest influential visions was the Garden City Movement, which sought to create a more harmonious integration of the city and countryside through a balanced relationship between housing, open space, and everyday amenities. Originating as a visionary response to the overcrowded and industrialized urban environments of the eighteenth and nineteenth centuries, the movement emphasized that rapid urban growth had proceed "without any effort to give that combination of building with open space which is necessary to secure adequate light and fresh air for health", as highlighted first by Unwin [34], further conceptualized by Howard [15], and reaffirmed in contemporary scholarship by Tyrchyn [33]. Although the full realization of this utopian ideal was rare, its core principles, decentralized settlement, mixed-use functions, generous green belts, human-scale planning, significantly shaped subsequent urban and suburban developments throughout twentieth century [37].

While drawing on the Garden City's emphasis on greenery, health, and access to open spaces, modernist planning reinterpreted these principles through functional zoning, rational circulation systems, and large-scale mass housing, operationalizing greenery as structured inter-block spaces within high-density environments. These ideas became especially influential in the mid-twentieth century, when prefabricated housing estates, mass-housing, and zoning-driven planning integrated open courtyards and communal green areas to secure access to light, air, and public greenery even under intensified urban densities [31, 24]. These trajectories set the background against which post-war socialist housing estates emerged and later transformed. In parallel, contemporary planning discourse increasingly emphasize multifunctional, systematically designed nature-based solutions capable of addressing intertwined environmental and social challenges [4].

Since the political transformation of the early 1990s, cities in Central and Eastern Europe have undergone profound socio-economic restructuring that has reshaped their spatial organization and influenced access to urban green spaces. These transformations have generated new socio-spatial inequalities, intensifying debates on environmental justice and the uneven distribution of urban amenities [7]. Income has become one of the primary determinants of residential location and of the degree which different groups can benefit from urban services, including greenery [8]. As a result, green regeneration has emerged as a strategy for improving living conditions in disadvantaged or shrinking neighborhoods, although the functions and pressures on green spaces change substantially in growing cities [1].

The legacies of socialist urban planning play a decisive role in how contemporary green structures have evolved. In several cities destroyed during the Second World War, post-war reconstruction became an opportunity to reshape urban form according to modernist ideas, including functional zoning and extensive green wedges, consistent with principles articulated in the Athens Charter [30]. The post-war decades saw the rapid construction of prefabricated housing estates across socialist countries, where supporting recreation, microclimatic regulation, and everyday social life [2]. Over time, these spaces developed their own typologies, from small neighborhood greens to larger residential parks, reflecting changing planning paradigms and socio-economic constraints [19].

After 1990, post socialist cities experienced fragmented privatization and informal land-use practices that significantly transformed these open spaces. Many green areas were converted to parking lots, built over with temporal structures, or redeveloped according to shifting local political and economic priorities [12]. At the same time, numerous municipalities faced persistent barriers such as limited funding and insufficient institutional capacity, preventing the implementation of planned green infrastructure and contributing to the degradation of existing systems [25].

These processes have made green spaces among the most vulnerable elements of the urban fabric, particularly in areas experiencing suburbanization, redevelopment pressure, or demographic decline [5].

Despite these challenges, the green infrastructure of post-war housing estates remains vital for biodiversity conservation, climate regulation, and the quality of life of large urban populations [11]. In dense residential districts, open spaces such as playgrounds and inter-block greenery play an important role not only in supporting everyday recreation but also in contributing to the resilience of urban landscapes facing the effects of climate change [18]. Comparative studies demonstrate that the ecological potential of these environments varies widely, depending on spatial structure, management, and historical development [38].

Recent urban transformations in several Central and Eastern European cities have shown that reinvestment in public space and green infrastructure can significantly enhance urban sustainability and improve living conditions [28]. However, to integrate these areas into contemporary green-infrastructure strategies, a deeper understanding of their historical development, original design intentions, and post-socialist transformations is necessary. Housing estate landscapes represent a unique intersection of modernist planning ideals, socio-political change, and everyday practices, making them a critical yet underexplored component of the post-socialist urban environment.

Within the Slovak context, the post-war development of housing estates followed broader socialist planning principles, yet their green infrastructures evolved under specific local conditions. In cities such as Nitra, particularly in neighborhoods like Chrenová, Klokočina or Čermáň, residential blocks were arranged to reserve generous open areas that could later accommodate vegetation, although these spaces were officially designated as flexible zones for potential additional construction rather than as protected green areas [27]. Despite the presence of landscape architects in many design teams, the overall quality of exterior spaces often remained limited due to financial constraints, typified building designs, and pressures arising from national housing standards [20]. Early planting practices relied on small, vulnerable young trees, which contributed to inconsistent vegetative structure over time, while the generous green standards of the 1970s, commonly 15-20 m2 per resident, produced some of the largest open spaces found in Slovak housing estates today [27]. Subsequently analyses show that certain estates, such as Klokočina in Nitra, even exceed these historical norms in their current state [3].

During the 1980s, debates on the "humanization" of mass housing highlighted the need to improve the livability of residential environments, including barrier-free access, public amenities, and more meaningful forms of urban greenery [23]. Although the concept appeared already before 1989, its implementation was limited largely to sporadic tree planting, often without adequate long-term maintenance, which ultimately contributed to further degradation of the open spaces [17]. After 1990, attention shifted from construction to the transformation of existing estates. Numerous architectural and urban-design proposals sought to enhance public spaces and introduce a more human scale, yet most remained unrealized due to economic constraints and complex ownership structures [36]. These processes led to gradual, often spontaneous adaptations shaped by residents' everyday needs, reinforcing the fragmented and dynamic character of green spaces in Slovak housing estates.

Materials and Methods

The methodological framework of this study integrates historical inquiry, spatial analysis, and interpretative evaluation to examine the evolution of green open spaces within the Chrenová housing estate in Nitra. The research process began with an extensive field survey, which provided a necessary empirical foundation for understanding the estate's current spatial, ecological, and social conditions. On-site documentation included systematic photographic recording, sketch-based spatial observation, and an assessment of vegetation structure. Since the research seeks to understand both the original design intentions and the subsequent transformation of the estate's landscape structure, the approach combines archival materials, morphological assessment, and qualitative interpretation of contemporary conditions. The methodology is therefore structured around three interconnected components.

- Historical-Archival analysis

The study begins with a review of original plans, planting schemes, and historical photographs of Chrenová, which reveal the intended spatial composition and landscape concepts of the design team led by Michal Maximilián Scheer. Archival sources also serve as a baseline for evaluating the extent to which planned green areas, recreational spaces, and circulation systems were implemented or subsequently altered.

- Morphological and Typological Assessment

Chrenová is classified through established principles of urban morphology, focusing on the spatial logics that define its structure. The classification serves to situate Chrenová within broader post-war development patterns and to clarify how its open urban fabric shape current landscape performance and the use of public space.

- Research on Design Evaluation

While no new design is proposed, the study uses the interpretative dimension of Research by Design [9] to compare original and current spatial configurations. This includes assessing how design intentions were preserved or transformed and identifying challenges such as maintenance gaps.

Together, these methods establish a coherent analytical framework that allows for a nuanced understanding of Chrenová's historical development, its present-day landscape structure, and the implications of these findings for future resilience and stewardship of open space in post socialist housing estates.

Case Study

The Chrenová housing estate [Fig. 1] is one of the most distinctive post-war residential areas in Nitra, shaped during the city's rapid expansion in the 1960s. Its development was closely tied to demographic growth and the construction of major institutions on the left bank of the Nitra River. These interventions accelerated the need of new housing areas, prompting the preparation of comprehensive urban concept for Chrenová.

The overall design was prepared by architect Michal Maximilán Scheer, whose approach differed significantly from the earlier, rectilinear housing schemes built in Nitra. Chrenová I-III was conceived as a large residential ensemble combining several building types. This mixture created a distinctive spatial composition with altering heights and irregular geometries, producing a more open and dynamic urban structure than the earlier housing developments.

A defining feature of Scheer's concept was the system of generous inter-block open spaces, oriented primary toward

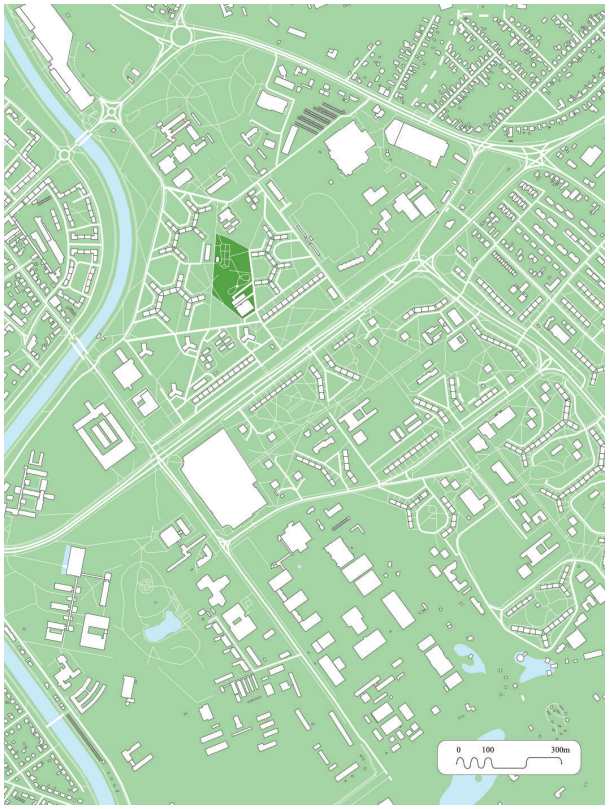


Fig. 1. Current state map of the Chrenová housing estate [author's digitization]

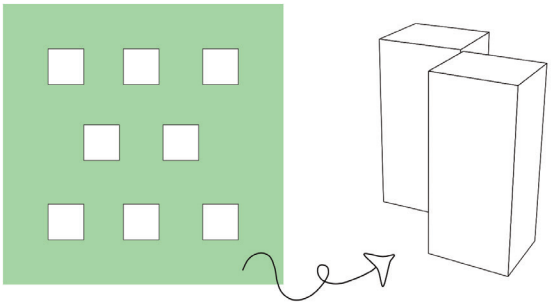


Fig. 2. Point development interpretation [author's digitization]

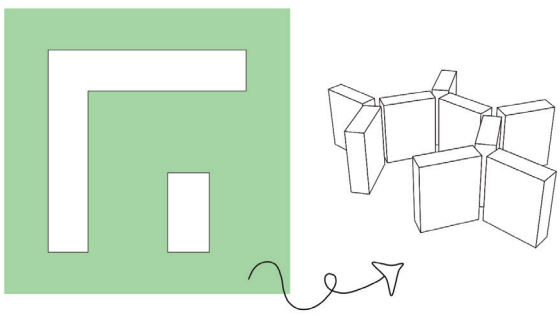


Fig. 3. Open structures interpretation [author's digitization]

the river and intended to serve as everyday recreational areas for residents. Although these zones were formally classified as flexible open areas "potentially available for future expansion" as Supuka and Halajová [27] stated, they were conceived as part of a continuous green framework integrating the housing estate into the wider urban landscape. Scheer paid particular attention to long-distance views, permeability, and organic transition between the new development and the established silhouette of the historic city.

A field survey was conducted in September 2025 to document the present spatial, functional, and environmental characteristics of the Chrenová housing estate. The district is located on the left bank of the Nitra River and represents one of the largest residential areas in the city. Urbanistically, it is defined by medium-to-high-density development with a dispersed open-block structure typical of Slovak socialist-era housing. Its spatial composition combines point developments with open structures, the latter forming the prevailing morphological pattern. The estate contains extensive inter-block green areas that form continuous vegetated spaces throughout the neighborhood. These include lawns, mature tree stands, informal walking routes, and several small communal pockets. In multiple locations, resident-driven appropriation is visible. The presence of small front gardens adjacent to ground-floor apartments remains characteristic of the original residential arrangement.

Recreational elements include several playgrounds retained from the socialist period, integrated into the larger open green matrix. Although the neighborhood is composed of open structures, the arrangement of residential blocks often creates visually enclosed courtyard-like zones. Parking capacity is insufficient, leading to improvised parking between buildings and partial encroachment onto pedestrian areas, which affect the everyday use of outdoor spaces.

Morphological and typological assessment

In urban morphology, typological classification represents a well-established tradition, offering a structured way to understand how different spatial configurations and development models shape residential environments [35], and to trace their development rationales that underpin them, as described by Conzen in 1970 [6] and Moudon in 1997 [22]. Building on this theoretical foundation, typological approaches have been widely applied to post-war urbanism in Centra Europe, where large housing estates typically fall into a limited number of recognizable structural forms. For this purpose of this study, the morphological assessment [Fig. 2, Fig. 3] of Chrenová was guided by the typological system defined in the CIDEP project [21] methodological framework, which visually and analytically clarifies the characteristic spatial structure of post-war residential environments. According to this classification, open structures and point developments form the dominant morphological patterns of the Chrenová housing estate. Open structures consist of freestanding residential buildings arranged around shared open areas, creating a flexible and permeable urban fabric, in contrast point developments are stand-alone vertical buildings with compact footprints, whose height and orientation influence shading and the enclosure of nearby green areas. In Chrenová, the interplay of these two typologies forms a spatially yet visually coherent housing environment with extensive green areas.

Historical-Archival Analysis and Research on Design

The historical and archival analysis forms the empirical core of this study, enabling a reconstruction of Chrenová's

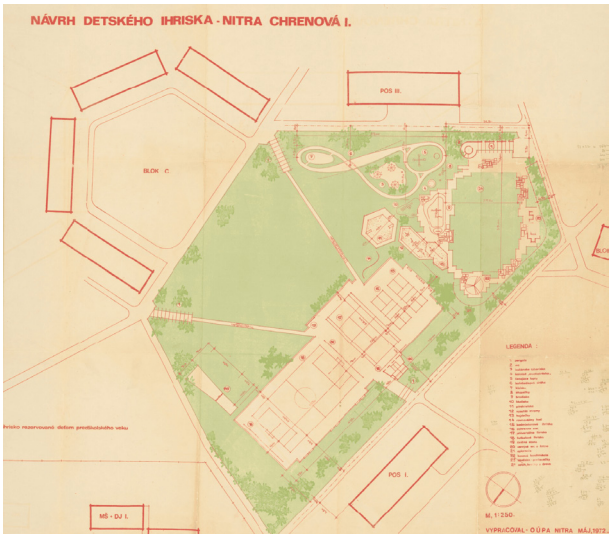


Fig. 4. Documented historical study of the design of the children's playground [SNG public documentation] https://www.webumenia.sk/dielo/SVK%3ASNG.A_183



Fig. 5. Historical photograph taken right after the playground was completed [SNG public documentation] https://www.webumenia.sk/dielo/SVK:SNG.A_117-6



Fig. 6. Current state of the playground, now functioning as a traffic playground [TUZVO orthophoto map] https://mapy.tuzvo.sk/hofm/



Fig. 7. Historical photograph of the orientational-map component [SNG public documentation] https://www.webumenia.sk/dielo/SVK%3ASNG.A_117-7

original design intentions and an evaluation of how these intentions materialized in the build environment over time. By combining archival sources, including masterplans, early photographs, project documentation, with systematic field survey, the analysis situates the current landscape structure of the housing estate within broader temporal development.

The earliest documented design [Fig. 4] for the central recreational are of Chrenová, prepared in 1972, proposed an unusually ambitious neighborhood landscape. The plan included a pergola, public restrooms, and ice rink, a scooter track, a maze, various playground structures, a carousel, a badminton court, and a football field. Although created by an architect rather than a landscape architect, it is also incorporated a basic vegetation concept, aiming to provide a comprehensive and age-differential recreational environment. Notably, Scheer even marked "dry trees" in the drawing, indicating early ecological awareness.

A historical photograph [Fig. 5], likely taken shortly after construction, shows that only the primary asphalted elements were initially implemented. Several features, such as the pergola and some playground equipment, were absent, the playground's orientation differed from the original plan, and the proposed tree plantings were not realized.

Today [Fig. 6], the space functions as a children's traffic playground, replacing most of the original program. The former sports fields now serve as a traffic education routes, while planned elements such as the pergola, public restrooms, the so called "practice wall", and water-play features were never completed, or they have been removed. Mature vegetation is present, but often accompanied by non-conceptual, ad-hoc plantings. Some modernist play elements were added, yet the current layout only partially reflects the integrated recreational vision of the 1972 design.

Among the distinctive landscape elements preserved in Chrenová I are the sculptural wayfinding panels [Fig. 7] designed by Scheer. These objects positioned at key pedestrian nodes throughout the estate, represent an unusual synthesis of information design and urban art, typical of late-modernist housing estates in Czechoslovakia. Despite their age, these panels remain in surprisingly good condition, which indicates their robust materiality as well as a certain level of local recognition. Their visual language characterized by geometric and minimal forms, reflects the late-functionalist design tendencies of the 1970s, where wayfinding and orientation were conceived not merely as technical tools but also as integral part of the public-space identity.

In the current landscape of Chrenová, these panels [Fig. 8] serve as key witness of the original design philosophy-linking orientation and identity. Their preservation adds cultural depth to the estate's open spaces and underscores the thoughtful integration of architectural detail that characterized Scheer's approach. As such they represent a valuable component of the estate's material heritage, and their continued maintenance should consider part of broader strategy of recognizing and safeguarding significant elements of socialist-era urban landscapes.

A specialized urban-architectural study [Fig. 9] of humanization prepared by architects Cifra and Kňažek in 1993 proposed a comprehensive redesign of public spaces, greenery, pedestrian connections, and recreational functions within Chrenová. Although conceptually coherent, no evidence indicates that the proposal was implemented. Later planning documents, such as the 2003 Master Plan, reflect only isolated echoes of the original ideas, while the overall vision remained unrealized. To examine the unrealized elements of the



Fig. 8. Current state of the orientational-map component [author's own photo documentation]

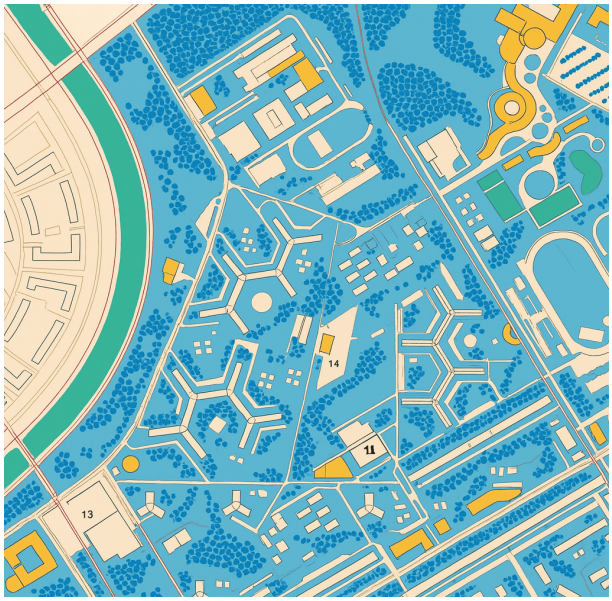


Fig. 9. Reconstruction of the 1993 proposal of humanization [author's digitization]

1993 humanization study, the original drawing by Cifra and Kňažek was digitally georeferenced and overlaid with current orthophoto map of Chrenová [Fig. 10]. This allowed for spatial comparison between the proposed interventions and the present-day built vegetated structure. The archival document lacks a full legend and uses simplified schematic symbols, the overlay was supplemented with visual interpretation of linework. The method enabled the identification of areas where new programmed spaces had been intended, as well as zones where vegetation or public-space restructuring was proposed, providing a basis for evaluating the degree of implementation.

Results and Discussion

Analysis of archival drawings and early photographs shows that the recreational core of Chrenová was conceived as a highly programmed multifunctional open space. However, only a reduced version of this concept materialized. Central sports and asphalted circulation surfaces were implemented, while most architectural and landscape elements remained unrealized. The current form of the open areas demonstrates a long-term shift in function. Vegetation development occurred largely independently of the original design, resulting in mature but compositionally inconsistent greenery. The spatial layout therefore differs considerably from Scheer's integrated version and represents a gradual narrowing of programmatic diversity. This trajectory is further visualized in the evolution curve [Fig. 11], which traces the shift from Scheer's ambitious 1972 concept to its partial realization and later functional simplification. The curve also highlights how the current traffic-playground configuration represents the endpoint of steady loss of programmatic complexity. Unlike the recreational landscape, Sheer's concrete wayfinding panels have retained their physical presence and legibility. Field observation confirm that they continue to function as orientation devices and simultaneously contribute to the visual identity of the estate. Their abstract geometry, durable material, and clear spatial representation give them a surprising level of contemporary relevance.



Fig. 10. Comparison of the 1993 design and the current state of the Chrenová housing estate [author's digitization, TUZVO orthophoto map] https://mapy.tuzvo.sk/hofm/ - base map edited by authors

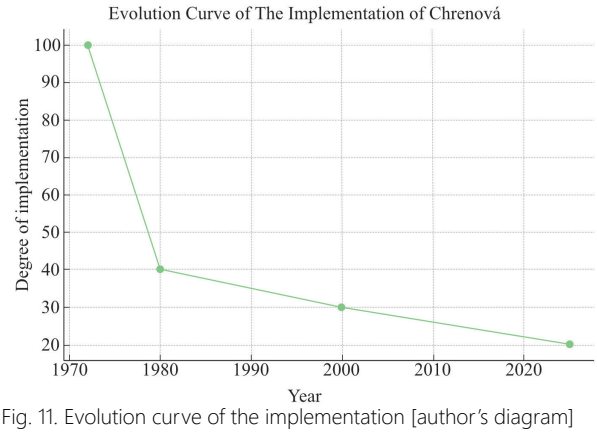


Fig. 11. Evolution curve of the implementation [author's diagram]

From a modern viewpoint, these objects are neither obsolete nor tied exclusively to socialist design languages. They align with broader European post-war modernist traditions and today carry a retro-modern aesthetic comparable to sculptural informational elements.

The comparison of the 1993 humanization study with present conditions indicates that the proposal was never implemented as a coherent project. Although selected ideas resurfaced later in municipal planning documents the transformation of public spaces, recreational structures, and greenery remained fragmented. The nearly unchanged physical structure of the estate over several decades, persistent parking pressure, and the presence of underuse open areas all point to the absence of coordinated renewal strategy. Fields evidence further shows that improvements have occurred only sporadically, without addressing structural issues. These patterns reveal a trajectory typical for many post-socialist housing estates, but an incremental landscape evolution shaped more by necessity and ad-hoc interventions than by strategic planning.

A spatial overlay of the 1993 drawing with current orthophoto map confirms this gap between concept and implementation, with several planned elements, highlighted in yellow, remaining unbuilt and their intended function unverifiable due to missing legend information. This overlay analysis reinforces the conclusion that the 1993 humanization concept did not translate into coordinated spatial improvements and the subsequent landscape development.

The analysis of Chrenová reveals a pattern typical for many post-socialist housing estates, while the spatial framework established during this period has remained structurally resilient, the programmatic and ecological layers have changed unevenly. Similar observations have been made in post socialist cities, where large open spaces endure but their intended functions often diminish due to fragmented governance and maintenance gaps [29, 14]. Chrenová generous inter-block greenery confirms arguments that socialist planning, despite its ideological constraints, often provided spatial conditions favorable for climate adaptation and biodiversity [16, 13]. However, the comparison between the 1972 design and the current state shows a significant loss of recreational complexity, echoing broader findings that post-socialist transformations frequently led to functional simplification of open spaces [26]. The unrealized 1993 humanization study reflects structural challenges such as limited municipal budgets, fragmented property relations, and shift in planning priorities toward traffic and infrastructure rather than public-space renewal. These findings align with contemporary research stressing that effective improvement of socialist-era open spaces requires not only design interventions but institutional capacity and long-term stewardship frameworks, as emphasized also by the EU Green Infrastructure Strategy [10]. Overall, Chrenová demonstrates both the enduring potential and the systematic vulnerabilities of socialist-era open spaces. Its landscape structure provides a strong foundation for future adaptation, yet its long-term quality will depend on integrating design heritage, maintenance, and contemporary nature-based strategies into a coherent governance model.

Conclusion

Chrenová demonstrates that even after decades of post-socialist transformation, large housing estates can retain a remarkable spatial potential. Its open urban structure, extensive inter-block landscapes, and largely unchanged morphology form a resilient framework capable of supporting contemporary ecological and social functions without requiring radical redesign. What emerges most clearly is the contrast between this generous physical structure and long-term absence of coordinated management, programming, and maintenance.

Rather than demanding new construction, the estate benefits far more from working intelligently with what already exists, strengthening green-space stewardship, revitalizing underused areas, and clarifying how public spaces are intended to function. Chrenová thus stands not only as a historically significant urban ensemble but also as an example of landscape where the latent capacity exceeds its current level of use. Its future development will depend on whether municipal and community actors can recognize this value and translate it into gradual, well-targeted interventions that reinforce everyday quality of life while respecting the original spatial logic.

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Kopsavilkums

Sociālisma perioda dzīvojamo masīvu ainavas veido vienu no telpiski plašākajiem, taču vienlaikus vismazāk izpētītajiem pilsētvides slāņiem Centrāleiropā un Austrumeiropā. Sākotnēji starp daudzdzīvokļu ēku kvartāliem esošās teritorijas tika veidotas kā funkcionālas zaļās zonas, kuru uzdevums bija nodrošināt mūsdienīgai pilsētas dzīvei nepieciešamo dabisko apgaismojumu, gaisa apmaiņu un rekreācijas iespējas. Mūsdienās tās atspoguļo sarežģītu mijiedarbību starp modernisma plānošanas idejām, sabiedrības sociālajām pārmaiņām un gadu desmitiem ilgu spontānu telpisko pielāgošanos.

Pētījumā, pievēršoties *Chrenová* dzīvojamajam masīvam Nitras pilsētā, analizēta tā zaļās infrastruktūras sistēmas attīstība no sākotnējām pēckara perioda projektēšanas iecerēm līdz mūsdienu telpiskajam un ekoloģiskajam stāvoklim. Arhīvu rasējumi, vēsturiskās kartes, sākotnējās plānošanas koncepcijas un mūsdienās veikto lauka apsekojumu dati veido pamatu dzīvojamā masīva sākotnējās ainavas struktūras rekonstrukcijai un turpmākajās desmitgadēs notikušo pārmaiņu analīzei.

Pētījuma rezultāti atklāj izteiktu neatbilstību starp vērienīgo 1972. gada rekreācijas koncepciju un tās faktisko īstenošanu, kā arī pārsteidzošu atsevišķu arhitektonisko elementu, piemēram, skulpturālu orientēšanās un virzienu norāžu paneļu saglabāšanos. Vienlaikus konstatēts, ka vēlāk izstrādātie teritorijas atjaunošanas priekšlikumi nav sistemātiski īstenoti. Rezultātā dzīvojamā masīva ainava ir attīstījusies pakāpeniski, nevis stratēģiski, un to lielā mērā ir veidojuši fragmentāri, konkrētām situācijām pielāgoti risinājumi un teritorijas ikdienas izmantošana.

Aplūkojot *Chrenová* dzīvojamo masīvu plašākā sociālisma perioda ainavu mantojuma kontekstā, pētījums atklāj gan šo atklāto publisko ārtelpu noturīgo telpisko potenciālu, gan to sistēmiskās ievainojamības. Tādējādi tiek uzsvērta šo teritoriju nozīme mūsdienu zaļās infrastruktūras stratēģiju izstrādē postsociālisma pilsētās.

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VINE DISEASES AS AN UNCONVENTIONAL SOURCE OF VISUAL AESTHETICS IN LANDSCAPE ARCHITECTURE

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Abstract. In the continuously changing landscape of ecological challenges, rural regions face not only functional but also aesthetic transformations triggered by climate-related stress factors. One of the most severe threats in viticultural landscapes is the grapevine trunk disease Esca, which damages vineyards and threatens the cultural and economic foundations of winemaking regions. However, the disease also generates a unique spectrum of chromatic variations on vine leaves, which, although symptomatic of decline, constitute a striking visual phenomenon.
This study aims to determine whether the chromatic transformations induced by Esca in grapevine foliage can be systematically documented, translated into standardized design references, and applied as a novel aesthetic resource in rural landscape architecture. The research is situated within Slovak viticultural regions, which represent nine significant wine-growing areas with strong ties to national cultural identity. Methodologically, we trace the temporal dynamics of leaf colour transformation caused by Esca, documenting the sequence of chromatic changes, and translating them into standardized Pantone colour palettes. These palettes are further evaluated as design tools and tested in case studies of rural public spaces, where the transfer of disease-induced colouration is examined as an element of spatial identity.
The results demonstrate that environmental degradation, while destructive, can also provide novel aesthetic resources that enrich contemporary approaches to rural landscape design. By framing Esca not only as an ecological threat but also as an aesthetic reference, the research highlights the paradoxical role of nature and entropy as relentless yet generative forces. The proposed approach opens a critical discussion about the role of colour in the age of climate crisis where design cannot yet mitigate environmental decline, but can reflect and aesthetically integrate its presence into the cultural landscape.
Keywords: landscape architecture, viticultural landscape, Esca disease, leaf colour dynamics, Pantone

Introduction

Cultural landscapes represent a distinctive layer of the Earth's surface, shaped by the long-term interaction between humans and their environment. It reflects the cumulative imprint of human activity over historical periods, carrying traces of cultivation, architecture, symbolic structures, and spiritual expressions embedded in space [23]. Each generation leaves its own signature on the land a palimpsest of human presence that continuously rewrites the original ecological matrix. As Gong et al. [9] emphasize, cultural landscapes are dynamic systems shaped by ongoing interactions between human activity and natural environments, reflecting continuous co-evolution rather than static design. The result of such cultivation is the emergence of a characteristic cultural landscape structure, in which natural and anthropogenic elements co-evolve [27]. Within this framework, traditional land-use mosaics such as vineyards, agrarian fields, and mining landscapes represent essential cultural and ecological phenomena. These historical landscapes embody vernacular knowledge systems and spatial configurations of exceptional national and international value [28]. As Zacharová et al. [29] note, such traditional agricultural landscapes serve as living records of human-environment coexistence and preserve region-specific identity and ecological functionality as part of Europe's bio-cultural heritage. Building on the perspective, recent landscape research emphasizes that "colour is the soul of landscape design, its significance extends beyond the material level of visual perception to the spiritual dimensions of cultural symbolism, ecological adaptability, and emotional experience" [16]. In this sense, chromatic variation is not a superficial phenomenon but a vital expression of local identity, directly tied to the landscape's ecological and cultural functions. Agrobiodiversity further enriches this relationship, as "it represents a system of biological organisms that contribute to agri-food production" [3]. Its expression within the rural mosaic connects productive, ecological, and aesthetic dimensions, reinforcing the understanding of cultural landscapes as living systems where natural and human processes intertwine. In recent decades, however, the accelerated pace of environmental change has profoundly altered the structure, function, and perception of rural landscapes across Europe [2]. Climate instability, soil degradation, biodiversity loss, and the spread of plant diseases have converged into a complex web of ecological pressures, challenging the resilience of traditional agricultural regions [11]. Viticultural regions long celebrated as emblematic cultural landscapes where nature and human craftsmanship intertwine belong to the most sensitive territories under these transformations. Their visual, ecological, and economic integrity depends on a fragile balance between biotic conditions, cultural management, and climatic stability [12, 5]. When this equilibrium is disrupted, the resulting changes manifest not only in ecosystem functioning but also in the material and aesthetic dimensions of the landscape. Slovakia provides a representative examples based on Act No. 313/2009 Coll., which defines nine officially recognized viticultural regions: Malokarpatská, Južnoslovenská, Nitrianska, Stredoslovenská, Hontianska, Východoslovenská, Tokajská, Záhorská, and Tatranská—form a diverse cultural mosaic where environmental pressures increasingly shape both production and visual identity. These regions encapsulate centuries of adaptation between human cultivation and the natural substratum of Central Europe, yet today they stand at the intersection of tradition, ecological stress, and aesthetic transformation. From the theoretical perspective of cultural landscape studies, ecological degradation does not necessarily entail the loss of meaningnit often signals its transformation. Each environmental disturbance whether drought, disease, or erosion inscribes new visual and semantic layers into the rural fabric [11]. In this sense, Esca disease functions as a marker of change, an ecological phenomenon that simultaneously embodies decline and visual expressiveness [5]. These processes exemplify self-organizing dynamics of nature that transcend human control yet remain deeply aesthetic in their manifestation. Grapevine trunk

diseases (GTDs), including the Esca syndrome, represent one of the most severe challenges to global viticulture [7], leading to considerable yield losses and remarkable decline in grapevine quality [14]. This complex disease, caused by a consortium of wood-decaying fungi, is particularly acute in arid and warm regions precisely those most suitable for Vitis vinifera cultivation [1]. In some localities, more than 150 fungal species have been identified colonizing vine wood [11]. The chronic form of Esca produces characteristic foliar symptoms irregular chlorosis and necrosis described as tiger stripes while its apoplectic form leads to the sudden dieback of entire vines. Internal cross-sections reveal sectorial necroses and soft rot in the trunks, particularly in older plants [15, 6]. Although not expressed every growing season, these foliar symptoms typically appear between mid-July and September [26], creating a striking, temporally dynamic chromatic pattern across the vineyard canopy. Traditionally, the perception of degraded or diseased landscapes has been associated with narratives of loss of fertility, order, and visual harmony [25]. Yet contemporary environmental aesthetics suggests that decay and disorder can generate new forms of aesthetic value. Concepts such as aesthetic resilience, entropic beauty, and the poetics of transience challenge the assumption that aesthetic appreciation must depend on ecological health or human control [10]. As Nassauer [18] argues, "What may appear as disorder in ecological terms can be made legible and meaningful through culturally informed design." In viticultural landscapes, where colour traditionally signifies fertility and ripeness, disease-induced chromatic deviations subvert established narratives of abundance. The resulting palette–a mosaic of greens, yellows, purples, and browns creates a visual field that is at once tragic and compelling [20]. These chromatic patterns reveal the hidden aesthetics of ecological processes, transforming decline into a form of environmental expression. Colour represents one of the most potent yet underexplored dimensions of biodiversity within the landscape. In public and rural spaces, chromatic phenomena arising from natural processes seasonal transitions, soil variations, or plant pathologies create a continuously evolving visual identity that strengthens the sensory and emotional relationship between humans and their environment [18, 8]. In this context, the "colour of biodiversity" operates not merely as an aesthetic variable but as a medium of ecological communication. Through deliberate colour composition using palettes that emerge from natural phenomena such as decay, regeneration, or stress designers can translate biological dynamics into legible visual narratives [24]. This approach challenges the dominance of artificial chromatic harmonies in urban design and reintroduces ecological temporality into public space. Colour thus becomes more than decoration; it is a semiotic and ecological instrument signalling transformation, imbalance, or resilience [17]. In landscape architecture, colour functions simultaneously as an interpretive and aesthetic tool, translating the invisible complexity of biodiversity into visible, emotionally resonant experience. Integrating these subtle chromatic dynamics into rural and public environments not only enriches visual culture but also fosters a deeper awareness of ecological interdependence and the urgency of biodiversity conservation [19]. Despite this recognized significance of colour in landscape architecture, the specific chromatic potential of plant-disease-induced transformations remains largely unexplored as a design resource, and this study addresses that gap. It is important to clarify that the proposed approach does not advocate for the preservation or deliberate propagation of Esca-infected vines, nor does it minimize the disease's agricultural severity. Rather, the research proposes that the chromatic data generated by an already-occurring ecological process can be systematically captured and translated into design references, independent of any management decisions regarding infected plants.

Material and Methods

The methodological framework of this research was designed to explore the aesthetic potential of colour transformations induced by the grapevine trunk disease Esca in Slovak viticultural landscapes. The process was structured into four sequential phases: (1) the selection of study areas and documentation of foliar colour changes on affected vines; (2) the monitoring of temporal dynamics in symptom development; (3) the digital extraction and conversion of chromatic data into standardized Pantone shades; and (4) the creation and conceptual evaluation of the ESCA Colour Palette as a digital tool. Each phase contributed to bridging biological observation with visual and aesthetic synthesis, allowing the translation of ecological decline into an interpretable design language.

The field research (1) was conducted in the Nitra viticultural region of Slovakia, one of the country's nine officially recognized wine-growing areas. All 100 monitored specimens were located at a single site: the outdoor vineyards of the Institute of Horticulture at the Slovak University of Agriculture in Nitra. Esca is a chronic grapevine trunk disease caused by a consortium of wood-decaying fungi, most notably species of the genera Phaeomoniella, Phaeoacremonium, and Fomitiporia. It presents in two principal forms: a chronic form, characterized by interveinal chlorosis and necrosis of the leaves (the so-called "tiger stripe" pattern), and an apoplectic form, leading to sudden whole-plant dieback. There is currently no curative treatment; vineyard management typically combines preventive pruning hygiene with monitoring, and heavily symptomatic vines are generally removed. Monitoring in this study took place during the period of full foliage, from mid-May to the end of September 2025, when the visual manifestations of the disease are most distinct. Specimens were not selected to represent a single disease stage; rather, vines were monitored across the full vegetation season so that all stages of symptom development were represented in the dataset. A total of 100 individual vines (*Vitis vinifera L.*) were selected for systematic observation. Each specimen was visually monitored throughout the vegetation season to record foliar symptoms and their progressive chromatic transformations. Attention was given to the characteristic interveinal "tiger-striping" pattern, one of the most recognizable symptoms of Esca [Fig. 1]. Observations focused on capturing the sequence of transitions from healthy green tones through yellow, orange, and red hues to necrotic brown patches associated with leaf decline and plant dieback. The visual documentation phase (2) aimed to ensure consistent and comparable chromatic data across all monitored specimens. Systematic photographic documentation was carried out on a weekly basis, employing standardized lighting conditions, uniform camera settings, and consistent viewing angles. All photographs were taken in the morning between 9:00 and 11:00 a.m. under natural daylight; only images captured under clear-sky conditions were retained in the dataset, and photographs taken on rainy or overcast days were excluded. This phase emphasized the sensitivity of visual recording techniques, maintaining a close connection between observation, materiality, and the vineyard's environmental context. The documentation aimed to capture not only the physiological changes of the



Fig. 1. Leaf of Vitis vinifera L. exhibiting symptoms of Esca disease [author: Tímea Žolobaničová]

leaves but also the subtle aesthetic expressions emerging from the interaction between plant pathology and the rural landscape. Following field documentation, colour data (3) were extracted from high-resolution digital images using Adobe Photoshop and complementary open-source libraries for colour sampling. For each image, dominant hues were identified and quantified, with their RGB values converted into corresponding Pantone Matching System (PMS) shades to ensure standardization and reproducibility. For every leaf sample, both primary hues and secondary accent tones were determined, forming a structured database of chromatic variations linked to specific symptom stages. These data were visualized through temporal colour maps, which illustrated the gradual progression and proportional relationships between hues throughout the disease cycle. This analytical step allowed for a precise understanding of the chromatic evolution of Esca within its environmental context. The final phase (4) of the research involved the synthesis of collected chromatic data into the ESCA Colour Palette, a standardized visual tool derived from Pantone references. The palettes were composed into coherent sets representing distinct aesthetic identities that emerge from the natural process of disease-induced transformation. Rather than serving as applied design instruments, the palettes were developed as conceptual resources intended to support future explorations in rural landscape architecture. In this form, the ESCA Colour Palette provides a foundation for interpreting the chromatic character of Esca-affected vineyards as a potential marker of spatial identity and as a medium for communicating the broader relationship between ecological transformation and cultural landscape expression. Alongside the digital analysis, in situ "soft" techniques were employed as a complementary methodological strand, including manual pigment blending, watercolour sketches, and material sampling. These tactile and sensory practices facilitated direct engagement with the landscape, foregrounding atmospheric variables such as light, humidity, and texture that shape chromatic perception.

Results and Discussion

The Chromatic Development of Esca Symptoms

Systematic observation of *Vitis vinifera* foliage affected by Esca revealed a coherent temporal pattern of chromatic transformation throughout the 2025 growing season (from mid-May to late September). The progression followed a gradual transition from saturated chlorophyll greens towards increasingly intense yellows, ochres, and carmines, culminating in deep brown tones characteristic of tissue necrosis. The foliar manifestation commonly referred to as "tiger striping" appeared with individual variation among specimens yet retained a recognisable rhythm reflecting the physiological decline of the vine.



Fig. 2. Leaves of Vitis vinifera L in its Vitality phase displays predominantly photosynthetically active green leaves, illustrating the initial stage of Esca colour progression before the onset of chlorotic and necrotic symptoms [author: Tímea Žolobaničová]



Fig. 3. Leaves of Vitis vinifera L. in the Chlorotic phase exhibits intermediate yellow to golden leaves, reflecting early physiological stress and the transitional stage between full vitality and tissue degradation [author: Tímea Žolobaničová]



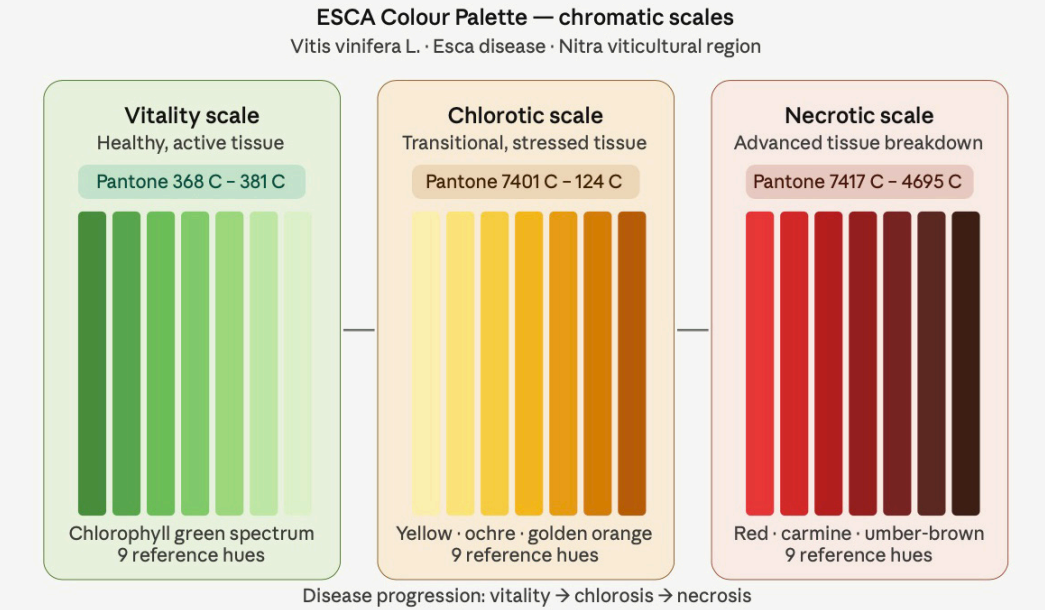
Fig. 4. Leaves in the Chlorotic (Degenerative Transition) phase display yellow, ochre, and golden hues, representing the intermediate stage of physiological stress between vitality and necrosis

Photographic documentation combined with direct colour sketching enabled precise mapping of these chromatic shifts in relation to leaf age and disease intensity. What emerged was a striking visual metamorphosis, a translation of pathology into a chromatic narrative inscribed within the viticultural landscape.

Vitality, Chlorotic and Necrotic Chromatic Scales

Three principal chromatic scales were identified within the Esca colour progression [Fig. 2, 3, 4]: the Vitality Scale,

Table 1. Dominant Chromatic Scales and Their Associated Pantone Intervals in Esca Foliar Progression [created by the authors]



representing photosynthetically active tissues; the Chlorotic Scale, denoting the transitional phase of physiological stress; and the Necrotic Scale, embodying the terminal stage of tissue degradation. Together, these gradients articulate a complete ecological narrative – from vitality through entropy to renewal.

Vitality (Photosynthetically Active) Scale

Corresponds to healthy, functional leaf areas sustaining active photosynthesis Dominant hues: vivid, cool greens with high chlorophyll content Typical Pantone range: 368 C – 381 C. Ecological significance: symbolises equilibrium, productivity, and the regenerative energy of the vegetative cycle.

Chlorotic (Degenerative Transition) Scale

Represents the intermediate stage between vitality and degradation Dominant hues: yellow, ochre, and golden shades, occasionally tinged with orange Typical Pantone range: 7401 C – 124 C Ecological significance: a visible indicator of physiological stress – reduced photosynthesis, metabolic shifts, and early infection symptoms.

Necrotic (Degraded / Entropic) Scale

Marks the advanced phase of disease where tissue death occurs. Dominant hues: dark red, carmine, burgundy to umber-brown. Typical Pantone range: 7417 C – 4695 C. Ecological significance: embodies ecological entropy – decomposition, transformation, and reintegration of organic matter into natural cycles.

Digital Extraction and Translation into a Colour Palette

Digital colour sampling and analysis, conducted using Adobe Photoshop in conjunction with dedicated extraction software, identified distinct chromatic clusters corresponding to various stages of foliar degradation. In total, 128 colour samples were standardised via the Pantone Matching System (PMS) to ensure consistency and comparability. The resulting ESCA Colour Palette [Fig. 5, 6, 7] captures the visual identity of pathological progression – from bright yellow green (Pantone 381 C), through warm ochres and carmines (Pantone 7417 C), to deep umber (Pantone 4695 C). These calibrated palettes provide measurable chromatic data while retaining their poetic quality, rooted in natural transformation. The Pantone translation thus functions not merely as documentation but as a bridge between ecological observation and design application. To further reflect the variability of leaves and symptom zones, the palette was subdivided according to characteristic leaf regions healthy green tissues, chlorotic areas, red-purple striping, and necrotic margins. This refinement enhanced the precision of chromatic mapping and its applicability to landscape-design interpretation.

Soft Techniques and Sensory Registration

Such analogue methods complemented the digital analysis by translating ecological change into perceptual experience. The resulting colour sequences [Fig. 8-12], emerging from ecological stress, informed material selection, surface treatment, and visual identity within rural design frameworks.

Colour as a Semiotic Medium in the Rural Landscape

In landscape contexts, colour operates not merely as ornament but as a semiotic system, signalling ecological health, transformation, or imbalance. Within cultural landscapes, colour becomes legible; it conveys stories of fertility, decline, and regeneration [17]. The Esca-induced chromatic transitions disrupt the conventional equation of green = vitality, reconstituting the vineyard's chromatic vocabulary to include fragility, temporality, and ecological tension.

As Bell and Bryman [4] observe, chromatic composition in agrarian environments is both perceptual and symbolic it communicates the rhythm and identity of place. The ESCA palette, therefore, enables designers to consciously integrate dominant tones (burnt ochres, rust reds) and accent hues (pale yellows) within landscape compositions, modulating contrast, and visual focus to evoke ecological narratives. Whereas colour changes caused by disease have conventionally been read as markers of decay, scholars such as Sun et al. [22] suggest they may also embody ecological entropy visual evidence of the evolving relationship between human activity and the environment.

Chromatic diversity generated by biological stress thus becomes an unintended yet profound visual archive of environmental transformation. By integrating disease-induced chromatic variability into the design process, this study reframes ecological degradation as an aesthetic and didactic

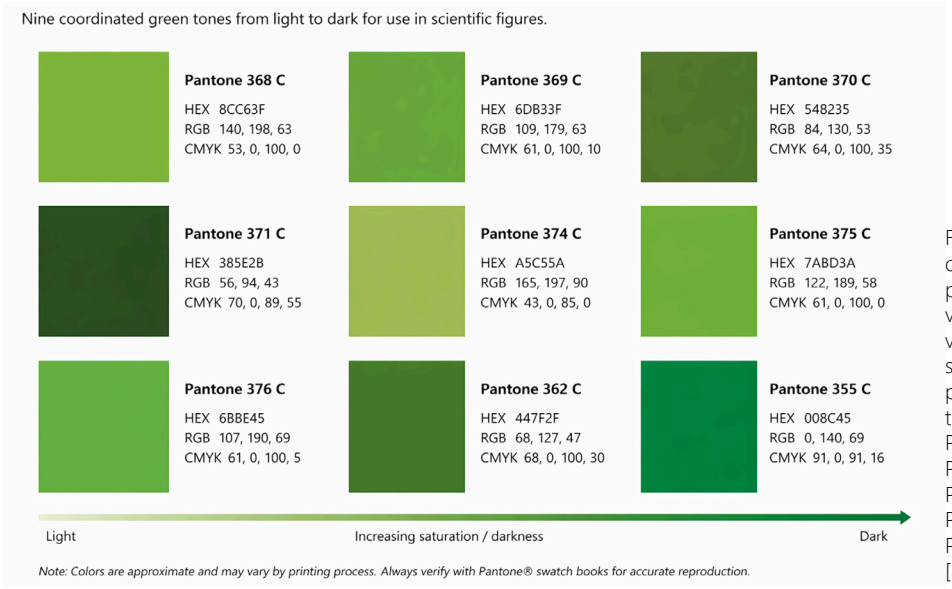


Fig. 5. Vitality Scale: chromatic range of healthy, photosynthetically active Vitis vinifera L. foliage, spanning from vivid cool greens to deeper saturated tones, representing photosynthetically active leaf tissue. Vitality Pantone range: Pantone 368 C, Pantone 369 C, Pantone 370 C, Pantone 371 C, Pantone 374 C, Pantone 375 C, Pantone 376 C, Pantone 362 C, Pantone 355 C.
[author: Tímea Žolobaničová]

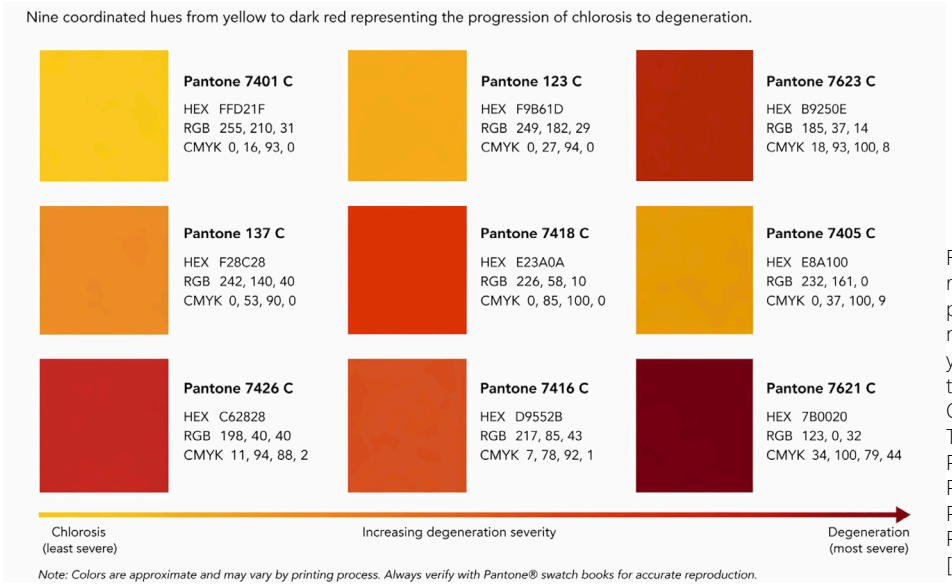


Fig. 6. Chlorotic Scale: nine hues representing the transitional phase between vitality and necrosis, progressing from pale yellows through golden and ochre tones to deep orange. Chlorotic Scale – Degenerative Transition range: Pantone 7401 C, Pantone 123 C, Pantone 7623 C, Pantone 137 C, Pantone 7418 C, Pantone 7405 C, Pantone 7426 C, Pantone 7416 C, Pantone 7621 C.
[author: Tímea Žolobaničová]

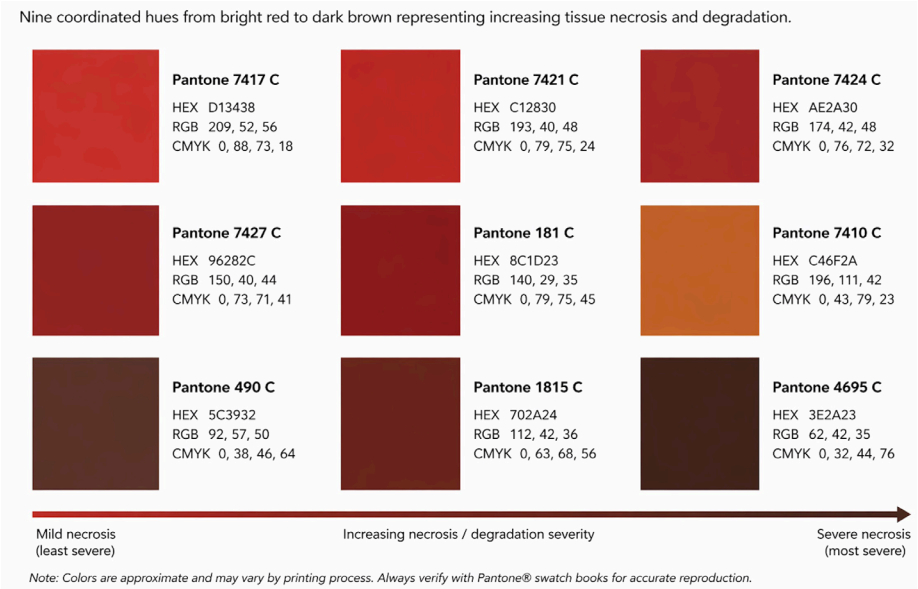


Fig. 7. Necrotic Scale: nine hues spanning from vivid reds through deep carmine and burgundy to dark umber-brown, representing advanced tissue breakdown in Esca-affected foliage. Necrotic Scale – Degraded / Entropic range: Pantone 7417 C, Pantone 7421 C, Pantone 7424 C, Pantone 7427 C, Pantone 181 C, Pantone 7410 C, Pantone 490 C, Pantone 1815 C, Pantone 4695 C.
[author: Tímea Žolobaničová]



Fig. 8-12. Soft-Technique Chromatic Studies. Soft-technique studies (watercolour and pigment blending) illustrating the chromatic progression from vital greens through chlorotic yellows to necrotic reds and browns [author: Tímea Žolobaničová]



Fig. 13. The Petri-dish colour studies. Demonstrate soft-technique pigment diffusion to model gradual chromatic transitions observed in Esca-affected leaves. Layered washes and controlled blending create radial gradients that replicate the shift from vital greens through chlorotic yellows to necrotic reds and browns, providing an experimental, laboratory-inspired visualization of progressive foliar degradation [author: Tímea Žolobaničová]

resource. The colour of decay becomes a communicative medium linking the observer with processes of time, entropy, and resilience inherent in rural landscapes. In practical terms, the derived palettes offer concrete applications across several design contexts: in rural landscape design, the ochre, rust-red, and umber tones can inform material selection, planting compositions, and surface treatments that resonate with the seasonal chromatic character of viticultural areas; in spatial identity design for wine-growing regions, they provide a locally grounded visual language; and in agri-tourism contexts, the ESCA palette can serve as an interpretive device, making ecological change legible and emotionally resonant for visitors. Colour-perception research examining affective responses to warm autumnal hues in natural landscapes [17, 18] supports the premise that the identified tonal range carries inherent aesthetic appeal independent of its pathological origin.

The Aesthetics of Entropy

The findings invite reflection on the paradoxical role of entropy in landscape aesthetics. While the Esca syndrome is biologically destructive, it produces a distinctive visual lexicon that challenges established notions of beauty, order, and vitality within rural environments. From the perspective of ecological aesthetics, degradation need not imply aesthetic loss but rather transformation. Translating natural entropy into the language of colour grants landscape architecture a means to express the temporal, fragile, and evolving character of ecological systems [18, 8]. The **resulting aesthetics of entropy** reconceptualise decay as an active design stimulus: an opportunity to cultivate awareness, empathy, and a renewed sense of connection between people and the ecological processes that shape cultural landscapes. This aligns with Spirn's [21] concept of the language of landscape, in which natural forms and colours act as communicative media linking humans with environmental reality. By translating these organic colour transitions into standardised design instruments such as Pantone palettes the research transforms ephemeral ecological phenomena into tangible aesthetic resources. While monitoring vineyard health remains essential to prevent Esca's spread [13], recognising its visual presence within the cultural landscape allows designers to harness its chromatic potential as a catalyst for new aesthetic vocabularies.

Conclusions

This research has demonstrated that the chromatic transformations induced by Esca disease in Vitis vinifera foliage follow a coherent temporal sequence that can be systematically documented, standardized into Pantone-referenced palettes, and translated into design resources applicable to rural landscape architecture. The three identified chromatic scales, the Vitality, Chlorotic, and Necrotic scales, each correspond to distinct phases of physiological change and together form a complete visual narrative of ecological transformation. The **ESCA Colour Palette,** derived from 128 standardized colour samples, constitutes a design instrument grounded in local ecological identity rather than generic aesthetic convention. Critically, this study does not propose the preservation or promotion of diseased vines; its contribution lies in demonstrating that ecological processes already occurring in the landscape can be systematically documented and transposed into design language. Viticulture, deeply embedded in the Slovak cultural landscape, provides a productive framework for this exploration. By translating the visual traces of disease into chromatic data and design language, the study bridges ecology, perception,

and spatial design practice. The resulting ESCA Colour Palette transforms a symptom of decay into a medium of ecological awareness, proposing a new mode of integrating environmental processes into rural design. The combined use of digital and tactile techniques proved essential for capturing both measurable and experiential dimensions of chromatic change the data and the atmosphere that together bind humans to their environment. This dual perspective reveals that landscape aesthetics are not static compositions but living phenomena shaped by time, entropy, and resilience.

Ultimately, the research advocates for an expanded understanding of rural aesthetics one that embraces ecological transformation not as a failure of control, but as an integral component of the landscape narrative. Future investigations will seek to apply the derived colour palettes directly within design interventions in rural spaces, r einforcing the theoretical premise through practice and deepening the dialogue between ecological processes and landscape form.

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Kopsavilkums

Pastāvīgi mainīgo ekoloģisko izaicinājumu apstākļos lauku teritorijas piedzīvo ne tikai funkcionālas, bet arī estētiskas transformācijas, ko izraisa ar klimata pārmaiņām saistīti stresa faktori. Viens no būtiskākajiem apdraudējumiem vīnkopības ainavās ir vīnogulāju stumbra slimība Esca, kas izraisa vīnogulāju bojājumus un apdraud vīnkopības reģionu kultūras un ekonomisko pamatu. Vienlaikus slimības ietekmē vīnogulāju lapās veidojas savdabīgs hromatisko variāciju spektrs, kas, lai gan liecina par auga veselības stāvokļa pasliktināšanos, rada vizuāli izteiksmīgu fenomenu. Pētījuma mērķis ir noskaidrot, vai Esca izraisītās vīnogulāju lapotnes hromatiskās transformācijas iespējams sistemātiski dokumentēt, pārveidot standartizētās dizaina krāsu atsaucēs un izmantot kā jaunu estētisko resursu lauku ainavu arhitektūrā. Pētījums veikts Slovākijas vīnkopības reģionos, aptverot deviņus nozīmīgus vīnkopības apvidus, kuriem ir cieša saikne ar valsts kultūras identitāti. Metodoloģiski pētījumā tiek analizēta Esca izraisīto lapu krāsas pārmaiņu temporālā dinamika, dokumentējot hromatisko transformāciju secību un iegūtos krāsu raksturlielumus pārveidojot standartizētās Pantone krāsu paletēs. Izstrādātās paletes turpmāk tiek izvērtētas kā dizaina instrumenti un aprobētas lauku publiskās ārtelpas gadījumu izpētē, analizējot slimības izraisīto krāsu transformāciju pārneses iespējas telpiskās identitātes veidošanā. Pētījuma rezultāti liecina, ka vides degradācijas procesi, lai gan pēc būtības ir destruktīvi, vienlaikus var radīt jaunus estētiskos resursus, kas paplašina mūsdienu pieejas lauku ainavu arhitektūrai. Interpretējot Esca ne tikai kā ekoloģisku apdraudējumu, bet arī kā estētiskas ierosmes avotu, pētījums aktualizē dabas procesu un entropijas paradoksālo lomu, tie vienlaikus darbojas kā neizbēgami destruktīvi un jaunas estētiskās kvalitātes ģenerējoši spēki. Piedāvātā pieeja rosina kritisku diskusiju par krāsas lomu klimata krīzes laikmetā - situācijā, kurā dizains vēl nespēj novērst vai būtiski mazināt vides degradācijas procesus, taču var tos reflektēt un estētiski integrēt kultūrainavā.

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TRANSFORMATION OF THE SPATIAL COMPOSITION OF RURAL MANORS. THE EXAMPLE OF SOUTH ZEMGALE

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Abstract. The processes of cultural and historical transformation of rural landscapes in manor territories at the beginning of the 21st century are dual in nature. It consists of historical sites that have been carefully renovated, maintaining parks, walkways, baronial graves and pond systems. Meanwhile, with the decline in the number of rural schools, parish houses, rural clinics, post offices, etc., which were located in manor houses, the old buildings are also inevitably falling into disrepair. These places are gradually being taken over by vegetation - trees, bushes, undergrowth. Much of the old buildings were destroyed by the Bermontians, two wars and collectivization. The study examines a small rural area in South Zemgale with a dense concentration of historic manors. These are areas with different characteristics – ruins, abandoned or disappeared historical buildings. And, of course, there are places that have gained a property manager. Each of them can be described differently.
Keywords: cultural landscape, spatial composition, sightlines, harmony, park area

Introduction

Latvia's cultural space has been affected by wars and socio-political upheavals. So many buildings and works of art have been lost that it is impossible to come to terms with a distorted image of the former cultural environment... As long as the image of a phenomenon lives on, it can continue to exist, at least in the spiritual realm. Thus, in the cultural space, one sometimes has to work with objects-ghosts, but only in this way is it possible to grasp the complex and complete cultural landscape of art [7].

Cultural heritage events reflect the dominant value system and historical consciousness of society, as well as the attitude of society towards its past. Historical consciousness, sometimes referred to as 'cultural memory' or 'social memory', refers to socially accepted perceptions of the past, whose purpose is to provide a meaningful explanation of historical experience [11].

It was the Latvian State Board of Monuments that played a key role during the interwar period, with its decisions to preserve cultural heritage based on a number of arguments. The activities of the Board of Monuments in the 1930s were part of Latvia's cultural policy, and were therefore influenced by the economic situation in the state and the ideological positions that were accepted to a greater or lesser extent by Latvian society [2]

In the 1920s and 1930s, these positions were linked to Latvian political nationalism. The influence of nationalist ideology on the priorities of monument preservation activity is evident in the budget structure of the Board of Monuments: archaeology and ethnographic monuments always occupied the top two places in budget expenditures, followed by the preservation of architectural monuments. Archaeological and ethnographic monuments were associated with Latvian national identity, in contrast to the so-called 'style architecture', which was identified with the historical presence of foreigners, mainly Baltic Germans, in Latvia. Thus, the activities of the Board of Monuments were characterized by an internal contradiction between the need to protect all of Latvia's cultural heritage and the ideologically motivated desire to highlight objects related to Latvian ethnic culture [3, 11].

The collapse of the Latvian state in the summer of 1940 meant changes in the life of the whole society and also in cultural policy. After the annexation of Latvia, the deliberate sovietisation of Latvia began. Control by trustworthy persons was ensured in the state administration system [11].

The terror against the Baltic German manor owners, which began in the 1920s-1930s, continued even more dramatically during the occupation, with the development of kolkhoz and sovkhoz sites in the manor centres, with new buildings in both the park and the parade ground. Church buildings, on the other hand, served as storage facilities for agricultural machinery and mineral fertilizers [1].

The occupation period determined the approach to cultural policy as a specific branch of production – to educate value producers in the spirit of communist ideology. Meanwhile, cultural heritage played a primarily illustrative role [11]. The objects that were deemed ideologically harmful or insignificant were destroyed or ignored.

Architectural monuments seemed particularly suspicious from the point of view of Soviet ideology, as they clearly demonstrated the historical influence of Western culture in Latvia to every citizen [11].

The list of state-protected monuments has always been regarded as a political document. The most significant reduction in the list was in the number of 19th century architectural monuments (MM page 179). From the 1960s onwards, there were restrictions on the names of manor complexes. Neutral names had to be used – historical parks or 'old country parks'. The term 'manor' was not allowed to be used.

During the occupation, Latvian rural manors were included in the lowest category of architectural monuments, known as C, where schools and retirement homes could be located. In turn, in the 1950s, with the establishment of collective farms (kolkhozes) and state farms (sovkhozes), collective farm offices, mechanical workshops, livestock and veterinary centres, mineral fertilizer storage facilities, sawmills, etc. could be located here [11].

Based on these documents, the study analyzes examples from South Zemgale that vividly reflect the political situation at that time.

The aim of the study is to assess the current situation as of the beginning of the 21st century – changes in the spatial composition of the manor complex in South Zemgale since the 1930s.

A number of objectives have been set for the study:

- researching transformation processes using archive materials;
- research into the landscape composition of the historic building complex, using digital information about the current situation and combining it with historical material;
- compiling the information obtained into graphic

material, taking into account the main sightlines in the landscape space.

Research method: compilation of archive materials, use of photographic documentation and field surveys as a comparative method.

The relevance of the study is based not only on the recognition of the historical landscape of rural manors, but also on their preservation (conservation, restoration, recovering the outdoor space) – the buildings of the manor complex, parks, pond systems, walkways, groups of trees, baronial cemeteries and memorial chapels. The rapid processes of cultural landscape transformation in the course of political change in the state prompt us to think about the shortcomings in the existing legislation. With the increase in large-scale agricultural land use at the expense of lost farmsteads and apple orchards, agricultural land use is beginning to spread in the direction of old manor parks.

Based on the research materials and the study of the current situation at specific sites, it is possible to summarize the results obtained.

Materials and Methods

The Latvian agricultural system was destroyed by the era of kolkhozes and sovkhozes. Every year, land reclamation plans included the demolition of 5,000 farms. Farmsteads were simply buried in the ground, destroying a long-established system: towns surrounded by manors, which were in turn surrounded by old farms, later supplemented by new farms. There was a clear logic that would have developed further, had it not been for the occupation. It was a huge tragedy for Latvia. The collective farm system ruined everything: the land, people's thinking, their attitude toward work and Latvia's landscape, cluttering it with villages and farms built from silicate bricks. It seems that the Soviet authorities displayed a particular hostility toward manor houses, consistently situating a two-storey silicate-brick building - or at the very least a water tower - adjacent to them ... As a result, it is virtually impossible to identify a vantage point from which a manor can be photographed without some intrusive element entering the frame. There was some kind of instinctive malice towards Latvia's perfect cultural landscape, which had been formed over centuries and was now destroyed beyond recognition [9]. The population of rural areas is declining at an ever-increasing rate, with infrastructure shrinking and encouraging people to move to cities. Agricultural technology is modernizing, and the amount of physical labour is decreasing. The increase in crop area promotes the growth of large-scale agricultural landscapes, while smaller-scale or mosaic landscapes are declining. This also applies to the fertile agricultural areas of the Zemgale region, which in the mid-20th century still retained the farming methods of the early days of collectivization, using horse power and small-capacity crawler tractors, combining them into small units or MTS (machine-tractor stations).

The study examines situations that characterize the economic fragility of Latvia at the beginning of the 21st century, which severely affects the preservation of cultural heritage values. A small area of South Zemgale (approximately 350 km^2) has been examined, which could even be defined as a preserve zone. The situations are very different. As already mentioned, from ruins to sparkling interiors. A striking example is the restored Lielvircava Manor (Gross-Wurzau) and its rooms, which have been furnished with furniture, paintings, porcelain, silverware, weapons, pianos and draperies. The early 21st century formed a new outline for the recognition of cultural and historical landscapes, which is linked to the nature of the



Fig.1. Network of rural manors in South Zemgale;

revival of various rural manor complexes. The statement can be divided into four distinct 'twists of fate':

1. the historic manor center, which retains its architectural and scenic authenticity; it is intensively managed and continues to thrive;
2. The ensemble of buildings, which has been maintained and used for schools, clinics, parish centres, etc. in the post-war years, is now being closed in accordance with the conditions of the approved administrative-territorial reform.
3. historical buildings that have not been maintained since the post-war years and have been abandoned for several decades, slowly falling into ruin and being taken over by trees, bushes and undergrowth, but whose spatial composition is still discernible;
4. The manor centre, which has completely disappeared due to the impact of two world wars and the Bermontians, and a new functional load (fields, pastures, engineering structures, etc.) comes in its place.

The compositional spatial structure of cultural-historical territories is examined in more detail.

1. the historic manor centre, which retains its architectural and scenic authenticity, and it is intensively managed and continues to thrive.

A striking example in South Zemgale is Blankenfeld Manor (Blankenfeld, Baron von Hahn) – the southernmost point of the region near the Lithuanian border – retains a large part of the historic manor complex – the manor house, coach house, servants' quarters, restored historic stone fence, tea houses. The symmetry axis of the old park is visible in relation to the overall compositional structure of the buildings – the parade ground, separate groups of trees, the avenue of the main road. The farm buildings on the western and eastern edges of the manor complex (barn, hayloft, brewery, cheese dairy, pheasant house, sheds) have been lost [4].

The compositional idea behind the manor complex is based on an octagonal arc shape with eight dominant features – three building entrances (the coach house, the manor house, the servants' quarters), three tea house locations, one gate to the farm area and one gate to the park. The composition is united by a circular path in the courtyard with individual trees. Several of them were destroyed during the storm. The composition is introduced by a highway with an alley, which can be seen when opening the outer doors of the manor house and the servants' quarters. The path continues through the central square of the park and ends after about a kilometre at the manor tavern. Presumably, this was a roadside inn. A few hundred meters behind the inn there are the barons' graves. In the post-war years, the landscape has been transformed and now consists of vast areas of fertile clay fields, and the location of the road is no longer discernible. The layout of



Fig. 2. Blankenfeld. Central axis of the park with groups of trees side scenes [photo by the author, 2024]



Fig. 3.Connection between the parade ground and the park alley [photo by the author, 2024]

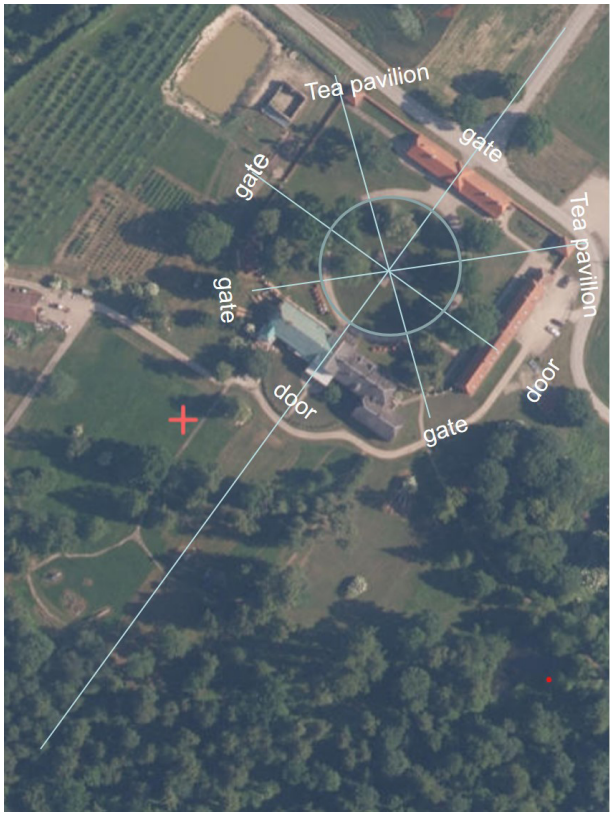


Fig. 4. Blankenfeld. Compositional structure of the manor complex [author's diagram]

the manor center clearly demonstrates the clarity of the compositional ideas of 18th/19th century architecture, taking into account both the spatial and functional structure. Thanks to the manager, the cultural and historical character of the buildings has been preserved. Evangelical Lutheran churches were located far away – in Augstkalne (30 km) or Sesava (26 km). It is possible that the Catholic church was closer to the Lithuanian side. The proximity of the church was of great importance to the people of the manor. Therefore, a small prayer room was set up in the manor house [5].

2. The buildings of rural manor complexes, which served educational or social purposes in the 20th century, in the context of contemporary economic policy and administrative-territorial reform – such functional changes are becoming increasingly common today, posing a threat to cultural and historical heritage.

A vivid example of this is the Svitenes estate (Schwitten, first owned by Anatol von Lieven) in the South Zemgale region, with its picturesque landscape alongside the Virsite River valley. Compositionally it is a well-thought-out building layout. The spatial composition consists of four main landscape areas:

- circular parade ground on the south side of the castle, possibly with flower beds;
- sightlines from the castle to the river valley and its floodplains on the north side, as well as groups of trees and shrubs on the opposite bank of the river; sightlines on the north side are shorter than on the south side of the castle;
- in the eastern part – a small bridge over the river valley to a small landscape park with a glade and a hill in the background, which may have served as a viewing platform with a pavilion and benches; part of the park with several walking paths that wind along the right bank of the river downstream to the north and lead towards the manor's service area. The park consists of several groups and rows of trees. The center of the glade is destroyed because it contains a school sports field.
- the western and southwestern parts of the castle – a spacious landscape park with rows of trees, an alley and walking paths, one of which leads to a memorial chapel.

The main axis of the composition of the Svitene Manor center is a 210 m long line from the castle parade ground to the alley, crossing a large field with groups of individual trees planted on the sides. The width of the field is also approximately 200 m, thus forming a landscape area of approximately 4 ha with tree avenues on the western side and in the background. The large glade has separate groups of trees on the sides. Compositionally, two guidelines can be discerned in the historical manor ensemble: a romantic, plastic landscape on the right or eastern bank of the river and a linearly precise compositional structure on the left or western bank. The historic highway to Bauska separates the castle and park from the manor's service area [8].

Unfortunately, in the 1970s, a kolkhoz administrative building was constructed on the main spatial compositional axis. A peculiar brutality and ignorance of cultural values, which clearly indicates a denial of cultural heritage. The long sightlines to the castle were blocked not only by buildings, but also by groups of trees. In turn, the closure of the school in the castle has created yet another serious challenge for the castle. Approximately one kilometer from the manor in the direction of Bauska, there is the Evangelical Lutheran Church of Berstele. This was a very important factor, as the proximity of the church kept the servants on the estate.

3. Historic buildings that are slowly collapsing and being



Fig. 5. Spatial composition of the Svitene Manor centre [created by the author]

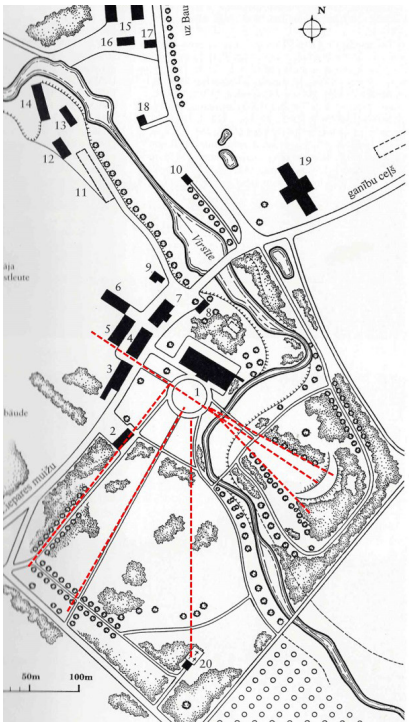


Fig. 6. The spatial axis of the manor centre [author's scheme]



Fig. 7. Walking areas on both banks of the river at Svitene Manor [photo by the author]

taken over by trees, bushes and undergrowth, but the spatial composition of the buildings is still discernible.

4. historical buildings that have not been paid any attention in terms of preservation of its engineering structures in the post-war years and have been abandoned for several decades, slowly falling into ruin and being taken over by trees, bushes and undergrowth, but whose spatial composition is still discernible;

This applies to Skursteņmuiža (Schorstadt).

The historical sketch reveals the spatial composition of the manor complex:

- East-west direction, which emphasizes the manor's domestic sequence – windmill with miller's house, alley to the manor house with park, servants' houses and farm buildings - barn, granary, stable, carriage house, orchard, planted spruce and mixed forest; the axis ends with a cemetery. A total of approximately 700 m long compositional axis connecting the Vircava River and the Oglaine Stream.
- Two cross-axes of the building composition in the north-south direction: one of them connects the rural school built by the baron, the Oglaine and Vircava manors, and the Lielvircava church. The other axis covers fields and pastures between two parallel country roads leading to Bauska.

A clear and laconic spatial structure, formed by massive, wide buildings with large, heavy tiled roofs and several chimneys for each building. It is possible that the name Skursteņmuiža Manor was also borrowed from here. The compositional form of the manor was still clearly visible in the post-war years. The buildings have not been maintained for several decades (except for fragments of the servants' quarters) [6].

The most visually striking feature of the manor until the 1950s was the windmill, which was demolished in the post-war years. Another dominant feature is the bell tower of the Evangelical Lutheran Church of Sesava, located 2 km away, symbolically emphasizing two important things in the rural cultural landscape – God and Work. An important criterion that strengthened people psychologically and emotionally. In the 20th/21st century, this assessment has lost its significance in rural culture. With the changing economic and political situation in the 1920s and 1930s, the Skursteņmuiža estate was liquidated and its properties redistributed. In turn, the period of collectivization from the 1950s to the 1980s destroyed what remained of the cultural heritage space. Skursteņmuiža manor is a striking example of how the skills needed to manage large rural areas and the cultural values acquired were rapidly lost.

5. The centre of the manor, which has completely disappeared due to the Bermontians, two world wars and the occupation, with only the park area remaining.

Similar to what was discussed earlier, with the changing economic and political situation in the 1920s and 1930s, several manor centres that had been destroyed during the Bermontian period were not restored, but the remaining manor properties were divided into new farms. The remaining part of the cultural heritage was destroyed by collectivization in the post-war years.

Berstele Manor (Gross-Bersteln) – a cultural space whose buildings have completely disappeared. In turn, the compositional structure created in the 18th/19th century can still be seen today. Using archival materials, the axes of the manor centre's buildings, the former parade ground and tree groups, rows of trees in the park, glades, etc. are marked in nature [4,5]. Shrubs and tree seedlings mark the locations of vegetation between old trees, which are around 100-120



Fig. 8. Post-war plantings that disrupt spatial harmony [photo by the author]



Fig.13. The alley between the barns and the manor house [2024]



Fig. 9. A row of trees along the old highway [photo by the author]



Fig. 14. Servants' house with several chimneys [2024]

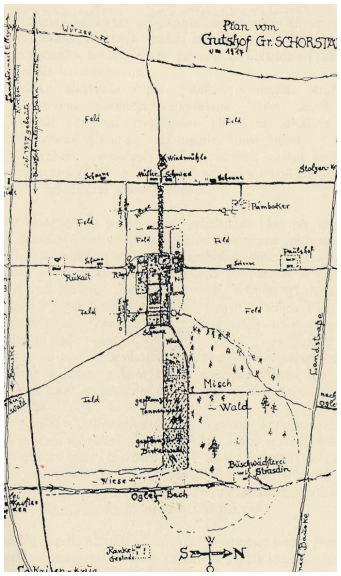


Fig. 10. Sketch of the Skurstenmuiža manor ensemble (1917) [Drawing by Baron von Conradi]

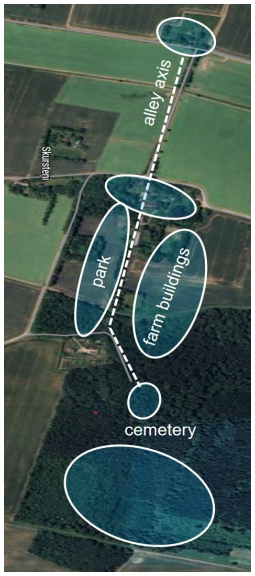


Fig. 11. Spatial length from the windmill to the cemetery [created by the author]



Fig. 15. Clay brick wall with lime plaster for a farm building [photo by the author]



Fig. 12. The end of the log building for servants [2024]

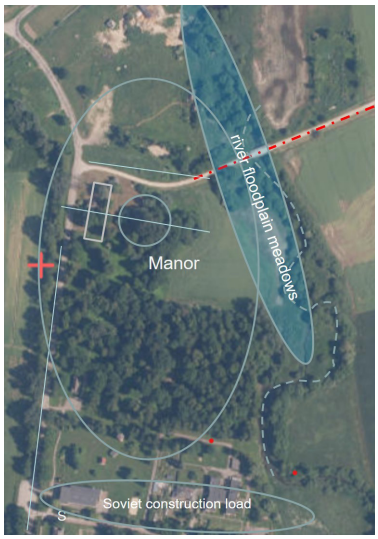


Fig. 16. Lost buildings and spatial structure [created by the author]

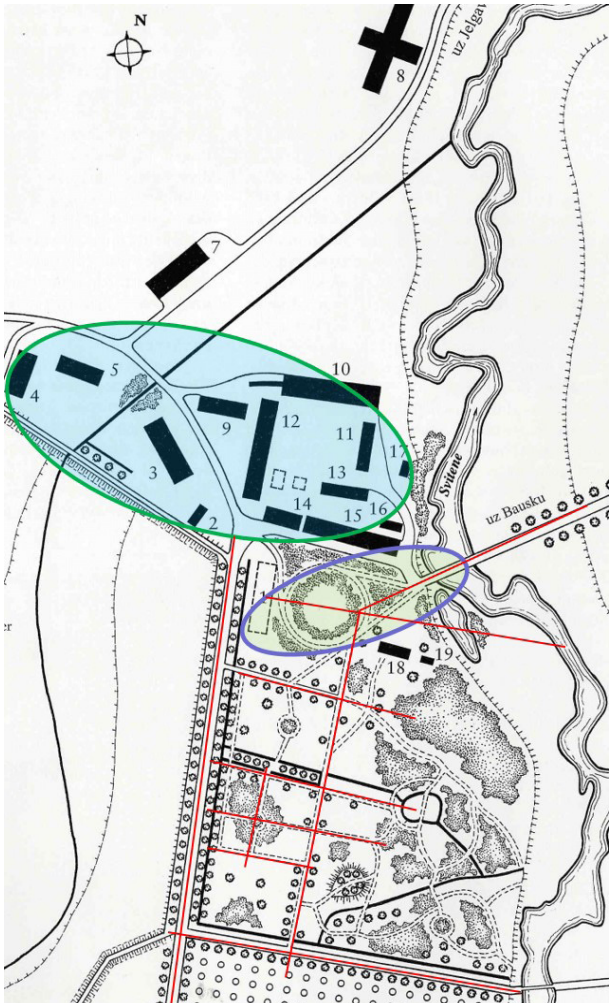


Fig. 17. The compositional structure of Berstele Manor [created by the author]

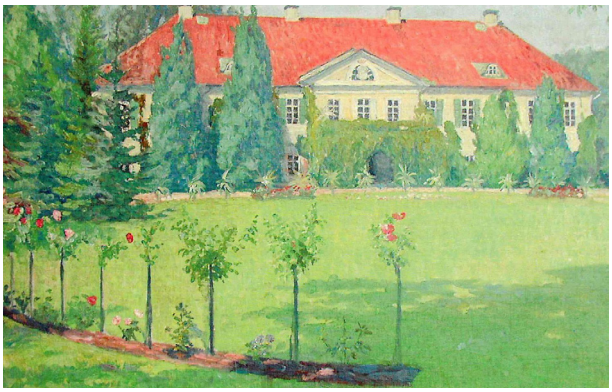


Fig.18. The facade of the parade courtyard of Berstele Manor [8]



Fig. 19. Fragment of the park with the composition axis [photo by the author]

years old. Since the former settlement is located next to a watercourse whose shoreline has not been straightened by collectivization-era land improvement, the location of the cultural landscape is easily recognizable.

The main sightlines or central axis of the Berstele Manor ensemble are located in the eastern part, on the old Bauska highway that crosses the Svitene River. The lost manor house and its park occupy a picturesque landscape between the highway alley and the floodplain meadows on the left bank of the Svitene River. The park's axis is parallel to the road alley, which is connected to several crossroads and leads to the river floodplain. Crossing points can be easily recognized by rows of trees or scattered groups of trees. The axes form small 'park rooms' with individual trees as dominant features. In the middle of the park there is a small ditch with a small pond and a former romantic system of winding paths. The southern part of the park is enclosed by a row of trees, behind which lies the manor's orchard. The gently undulating banks of the Svitene River and the spring flood season have given the park's composition a rich character [8].

The park's diversity is still evident today, even though much of the historical park's compositional structure was lost during the communist era's 'work-for-the-nation days', when hazel trees, bird cherries, wild roses, individual groups of flowering shrubs, etc. were cut down. The post-war understanding of historical values did not allow for a search for context in cultural heritage [5].

The tree-lined avenue leading to the centre of the manor ended with the farm buildings – barns, stables, a carriage house, a smithy, etc., creating a feature characteristic of Zemgale: the manor's farm buildings formed massive stone structures, but they contrasted with the fragile and playful part of the manor centre: a manor house with a parade ground, flower beds, a fountain and garden sculptures. The overall compositional space was enclosed by sightlines to the park field or the waterfront [10,12].

Results and Discussions

The assessment of the cultural space of the southern part of Zemgale is based on the ICOMOS (International Council of Monuments and Sites) document, which was approved by the Paris Declaration in 2011 on cultural heritage as a driver of development [13]. This document addresses national and local authorities, mentioning important aspects:

- to preserve the cultural environment, which is unique and irreplaceable, maintain the rural landscape, the scale and proportions of the agricultural environment, preserve forests, water bodies and aquatic plants;
- not to lose the rural heritage, while preserving the spatial layout and integrity of functional elements, strictly limiting the disproportionate development of urban loads that compete with the adjacent rural cultural landscape.
- to help adapt historic buildings to the requirements of modern living standards;
- the architectural and landscape heritage is unique, and a moratorium should be introduced immediately so that attention can be paid to the recommendations of experts and specialists;
- to raise awareness of heritage preservation, basing it on the context of promoting economic impact;
- summarize studies on the possible implementation of detailed solutions;
- to develop research on the contribution of cultural heritage to sustainable development and attracting investment;

- to consider how a multifaceted heritage can be managed so that its historical truth can be passed on to future generations.

Conclusions

South Zemgale, which covers an area of approximately 24 km x 14 km, with two churches and more than ten manors, each of which owned at least one semi-manor, an inn and a mill, forms a multifaceted cultural and historical heritage. Manor parks, pastures, fields, small forest patches, a dense network of small streams and rivers, as well as fertile clay soil have historically contributed to high agricultural development. The prevailing wind load on the plain encouraged the construction of windmills, which ensured good grain harvests, while the lush floodplain meadows could support livestock.

The division of the manor's compositional structure into the four groups mentioned above shows that half of them have disappeared or are in ruins, with only a small part of the old trees in the park remaining, allowing fragments of the former spatial compositional structure of the manor centre to be recognized. The other half of the manor complexes are maintained in satisfactory or good condition, with this applying more to the buildings. Assessing the historical compositional transformation of a specific cultural space, it can be concluded that:

- Trees planted in the 1950s-1970s in the manor parks or parade grounds disrupt the perception of the historical landscape by obscuring the main sightlines.
- The historical perception of spatial scale is disrupted by the buildings constructed during the occupation, which have become ingrained in the compositional structure of the manor complex;
- Dominant features in the landscape have disappeared (mills, alleys, rows of trees, parade grounds with hollow plantings, balustrades, park steps, garden sculptures, etc.), thus diminishing the perception of spatial accents and culminating points;
- The lost manor buildings, whose historical location can only be guessed at from the giant trees, can be carefully studied both for their dendrological characteristics and their location and age, giving an idea of the compositional concept of the historical plantings.
- In the management of manor complexes, serious attention is paid to the restoration of buildings, while outdoor spaces are left in a subordinate role, thus losing their connection with the overall compositional image of the ensemble.

The geographically compact location of the manors in South Zemgale, the quality of rural roads, tourism infrastructure, etc. are factors that promote the development of the region, which is also mentioned in ICOMOS documents.

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Kopsavilkums

Lauku ainavu kultūrvēsturiskās transformācijas procesiem muižu teritorijās 21. gadsimta sākumā ir duāls raksturs. No vienas puses, saglabājušās vēsturiskās vietas, kas ir rūpīgi atjaunotas, saglabājot un uzturot muižu parkus, pastaigu celiņus, baronu dzimtu apbedījumu vietas un vēsturiskās dīķu sistēmas. No otras puses, samazinoties lauku skolu, pagastu pārvalžu, lauku medicīnas iestāžu, pasta nodaļu un citu sabiedrisko funkciju skaitam, kas iepriekš nereti bija izvietotas bijušo muižu ēkās, vēsturiskās būves pakāpeniski zaudē savu izmantošanas funkciju un nonāk arvien sliktākā tehniskajā stāvoklī. Pamestās muižu teritorijas pakāpeniski pārņem veģetācija: koki, krūmi un pamežs, tādējādi mainot gan vēsturisko telpisko struktūru, gan ainavas vizuālo raksturu. Būtiska daļa vēsturiskās apbūves tika iznīcināta 20. gadsimta politisko un sociālekonomisko satricinājumu rezultātā, tostarp bermontiādes, abu pasaules karu un padomju perioda kolektivizācijas ietekmē. Pētījumā analizēta neliela lauku teritorija Dienvidzemgalē, kurai raksturīga salīdzinoši augsta vēsturisko muižu koncentrācija. Izpētes teritorijā sastopamas muižu vietas ar atšķirīgu saglabātības pakāpi un mūsdienu izmantošanas raksturu no drupām, pamestām teritorijām un pilnībā izzudušas vēsturiskās apbūves līdz muižu kompleksiem, kuriem ir izveidojies aktīvs apsaimniekošanas modelis un nodrošināta to turpmāka izmantošana. Tādējādi katra muižas teritorija atspoguļo atšķirīgu kultūrvēsturiskās ainavas transformācijas scenāriju, ko nosaka vēsturiskie procesi, mūsdienu apsaimniekošana, teritorijas izmantošana un dabiskās sukcesijas norises.

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TRENDS IN THE DEVELOPMENT OF THE ICONOGRAPHIC AND ICONOLOGICAL UNITY OF THE WORK OF ART IN MODERN CULTURE

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Abstract. The article discusses a methodological approach in art history that combines the idea of harmony between iconographic and iconological-interpretative unity. In attempting to understand the developmental tendencies of postmodern (PostMo) art, the research is oriented toward analyzing the historical origins of the deep essences of applied art objects that lie beyond the visible image of the artwork.

The analytical part seeks to address the proposed hypothesis that the iconographic and iconological-interpretative method of unity of art history is appropriate and can be applied not only to the analysis of historical works of art following Panofsky [33], but also to revealing the inner essences of contemporary postmodern applied art in fields such as urbanism, architecture, landscape architecture, and object of the material environmental design.

In developing the idea of harmony between iconographic and iconological-interpretative unity, the study relies on Panofsky's assertion that *"...a thing is not a given, its concept is not clear simply by seeing it. When we look at an object, we first discover its image, and only then do we come to know it as 'pure essence'..."*.

As the results of the research show, through the analysis of, for example, the landscape architecture object of "Birutė Park" in Palanga, it can be understood as an attempt to reread it not only as a physical landscape space, but also as a totality of meanings, symbols, and cultural layers, actualized in today's context.

In the concluding part, it is summarized that today the unity of iconographic and iconological interpretation can be understood through the relationship between heritage and contemporary use (tourism, cultural events), ecological awareness and landscape preservation, as well as new interpretations through art, education, or digital media.

In this way, "Birutė Park" becomes not only a historical object, but also a living, continuously reinterpreted cultural system in which visual form and deep meaning remain in dynamic harmony.

Keywords: landscape architecture, deep essences, applied art, iconographic and iconological-interpretative unity

Introduction

Gardening, as the utilitarian precursor of the applied art of landscape architecture (LandArch), is the result of the interaction between the anthropogenic and natural environment of early civilisations. According to scientific analytical sources, the introduction of fields for practical purposes and the development of horticulture before 10,000 B.C. shaped the distinctive iconographic character of the landscape, which eventually evolved into a phenomenological content based on "inner meanings". According to Gimbutienė [2], this phenomenological content, as the socio-cultural context of the feminine (matristic) prehistoric European social civilisation that existed around 6500–3500 B.C., was based on the worship of the one and only Goddess Nature, based on *'deep meanings*', considering this phenomenon as the beginning of all things, the source of all life, and the aim of spreading harmony of 'intrinsic goodness' among all living beings.

Thus, while aesthetic culture before the historical landscape was characterised by a reverent, emotional, sensual (material) world characteristic of the mythological world, with a syncretic perception of the environment, without excluding man from the totality of the environment, the culture of the modernity of the twentieth century was characterised by the culture of the modernity of the mythological world. In the first half of the 20th century, when the culture of the Mo era turned towards mass consumption and other forms of denial of traditional norms and ideals, as well as the implementation of the decadent ideas of the Material Environment Design (MED), the previous balance based on reverence for nature and man, which "was much more harmonious than the functioning of modern man" [37], was upset.

The thematic polemical direction of the "iconographic and iconological-interpretative unity" in LandArch and MED aesthetics in the article was prompted by the abundance of works by Western cultural theorists and Lithuanian landscape theorists and practitioners. These works emphasize the value-based significance of the unity of iconography and iconology in the material environment and applied arts as representations of "*inner essences*."

The aim of this study is to analyze the essence of the iconological–interpretative method in art history, formulated by E. Panofsky in the context of early twentieth-century modernity, to reveal the transformations in its development, and to propose a systematic algorithm for applying this method to the investigation of both the iconographic and iconological meanings of works of not only fine art but also applied art. In doing so, the study seeks to bring this method closer to the realization of an aesthetic and semantic "unity" within the applied arts, encompassing objects of architecture, landscape architecture, and environmental design, using the representation of Birutė Park in Palanga as a case study.

Building on Panofsky's concept, D'Alleva [10] posits that the logic of the iconological approach to art history hinges on the inseparability of iconographic art forms from their content. Line, colour, light, and perspective can be perceived as more than just visually appealing elements, forming an integrated image of the whole. Building on assertion that an image's impact depends on the quantity and quality of literature read – in other words, on the expert's intuitive understanding – the author of this article considers how the coherence of a work's iconographic and iconological elements can be defined.

E. Panofsky's art historical iconological-interpretive approach is presented in Holly's [19] study "*Panofsky and the Foundations of Art History*", which proposes that the interpreter-expert does not create or give meanings to the work, but discovers them. Attempts to grasp the culturally determined interactional states of art through artistic research, the ideas of "inner essences" behind the iconographic image of a work of art, are discussed by Western art critics Wittkower [40], Gombrich [15], Bialostocki [8], Alpers [2], and many other intellectuals. In Lithuania, the phenomenon of iconology is discussed by Michelkevičius [28], Aleksandravičiūtė [1], Mickūnaitė [29], Andrijauskas [6, 5, 4]. Also in the contemporary, PostMo culture, the historical features of LandArch and MED art creation, aesthetics, sustainability, complexity, principles of spatial structure development, public space formation, public

participation and value aspects of landscape urbanism are discussed by LandArch researchers Grecevičius at al. [16], Jakovlevas-Mateckis [25], Mocevičiaus [31], Jakaitis [22, 23, 24], Labeckis [27], Andrijauskas [6].

While developing a holistic approach, the iconological-interpretive approach is still considered a new and emerging phenomenon in art historical discourse, so the existence of the problem of the relationship between artistic and scientific research cannot be denied. It is also noticeable that while there is a lack of coherent data on the analysis of the subject, there is still a lack of fundamental works and artistic research projects that shed light on the subject. It is acknowledged that there have been instances of the application of the iconological method in the evaluation of architectural objects, but the number of such instances is not particularly large or methodologically structured. In architectural MED research, instances of the application of the 'iconographic and iconological-interpretive unity' construct the idea that buildings or other utilitarian objects are not only an iconographic representation of certain conceptual ideas in a work, but also an expression of value meanings and the socio-cultural context of a particular place and time.

According to André [3], practically *"...in order to create a park, we must choose an interesting landscape and look first of all for pictorial effects" (one must understand attractive natural iconography - author's note), which would allow us to create a work based on the phenomenological content of the "inner essence"*[1]*. Thus, the emphasis is not only on iconographic imagery (picturesque), but also on a phenomenological sensibility. Therefore, the study of landscape architecture cannot be limited to the statement of historical facts, the descriptive study of dendrological and geographical features, without delving into iconological interpretations, let alone their "iconographic and iconological-interpretative unity"*.

In this respect, the topicality of the topic can be described as an attempt to further discuss the methodology of "iconographic and iconological-interpretive unity" and its combinations for the study of LandArch and MED objects and the discovery of the symbols encoded in them, perceiving the artwork as a hierarchically integrated whole of various aesthetic components and functions, whose "*deep essence*" is revealed by penetrating into it. Thus, a work of art must be realised as the result of the expression of the main tendencies of the human spirit [6].

Thus, in the early modern period, Panofsky [32], in his study "*Meaning in the Visual Arts*", detailed the methodological concepts of iconography and iconology and revealed the links between medieval iconography and iconological content, building on the canonised representation of the content of medieval art symbols[2]. The Symbolists of the late 19th century proclaimed that only art could unravel the mysteries inherent in the objects and phenomena of life, and that its most important task was to reveal the invisible connections between man and the world. Iconological interpretation made it possible to decipher these symbols in a coherent way and to emphasise the role of the art critic-interpreter. On the basis of his erudition, insight and application of iconographic and iconological methodological concepts, the mid-twentieth century saw the emergence of the notion that the interpreter does not create or give meaning to the work, but discovers it. This naturally raises the discursive question of the quality of interpretative (expert) judgements and the reliability of the criteria of judgement. Finally, the question arises to what extent the different interpretations of the evaluation of the same work of art and the different views on the identity of the work of art are related to the final evaluation of the work of art in the public discourse, and to what extent the opinion of the interpreter/expert and his interpretation should differ from the value meaning of the work of art.

The author's existing work in the field of art criticism is important for the implementation of the research, as it allows him to make motivated insights and generalisations. This topic has been partially touched upon in the monograph "A discourse on the members of urban spatial formation under conditions of modern democracy" [22], or the article "The quality of landscape architecture as a result of contemporary development trends and societal activism" [20], the theoretical justification of the problem is expanded, as well as the artistic context and the aspect of case analysis based on the theoretical and artistic context of the case study of the most famous architect and designer of the 20th century, Warburg [39]. He developed the iconographic method of art criticism in the first half of the twentieth century, argued that the art critic must delve into areas that are quite unusual for art, developing the necessary competences, broader erudition and holistic knowledge of the socio-cultural whole. In this way, the "iconographic and iconological-interpretive unity", it could be argued, gradually becomes an "open" (in the broadest sense - author's note) art historical-methodological phenomenon for the general public, as it engages in the interpretation of art as a process of PostMo participatory art culture. In this context, the role of the interpreter's power, experience and intelligence in the choice of method in the discourse becomes a very important factor in the deconstruction and decoding of the iconography of the work in terms of the search for *"deep meanings"*.

The origins of the methodological concept of "iconographic and iconological-interpretative unity"

In discussing the methodological aspect of the "iconographic and iconological-interpretive (expert) unity" of art criticism, it is important to outline its concept, which is based on the general idea of the totality of the visual-sensual, or iconographic and phenomenological, as iconological experience. The article raises the question of the definition of terms, asking what is iconology and how it relates to iconography. The terminology of iconography and iconological interpretation has been well illustrated by the Dutch art historian Hoogewerff [20]. Drawing analogies from other sciences, he explained that *"...iconology is related to the good practice of iconography in much the same way as geology is related to geography: geography aims at clear description and is responsible for recording facts and identifying symptoms, without explaining or commenting on them. It is based on observation and limited to the features of*

[1]The concept of "*inner essence*", according to Roger [24], is described as one of the three stages of the iconological method of hierarchical structural conception of the work of art, where the understanding of each lower stage of the essence of the work of art provides the opportunity for further understanding of its *"inner essence"*. Interpretation penetrates into the inner essences of a work of art and identifies those fundamental principles that "...reveal the essential sentiments of a nation, an epoch, a class, a religious or philosophical essence as represented in a single work of art concentrated in one person" [13]. Following Husserl's [25] views on 'inner essences', Panofsky observes that there is a fundamental difference between ordinary seeing and phenomenological insight.

[2]According to Andrijauskas [15], the art critic E. Panofsky is known for his "... *knowledge of classical art, as a cryptographer of artistic plots and as one of the pioneers of an influential iconological method*, ... "as a pioneer in solving fundamental theoretical and methodological problems in art history". According to Hart [26], it was Panofsky's iconological theory of meaning exploration that made him famous in the world of art history.

the earth's surface. Geology, on the other hand, is concerned with the structures, the inner workings, the origin, the evolution and the interconnectedness of our Earth…".

The historical origins of iconography in the 4th and 5th centuries are marked by an empirically based, descriptive method of studying a work of art. Later, in the history of the new centuries, in order to go beyond the sensory experience, the phenomenological feeling of compassion, gratitude or other phenomenological feeling was raised, which even today is guided by the idea that consciousness denies the distinction between mind and body and claims that the thinking that takes place in the body (brain - author's note) is also sensory, and discusses the phenomenon of the visual sense and the expression of the totality of these senses.

In medieval culture, an iconographic approach was used to shape a narrative that seemed to point the way to the hereafter, based on symbolism. The systematic study and description of artistic texts and the interpretation of their symbolic attributes of meaning are obviously based on a strictly defined canon of iconographic representation of a particular plot. Thus, the doctrine of the Christian Church in the 13th century can be "read" as a continuous text, conveyed by images (iconographic), filled with inner (iconological) meanings. Until the end of the 14th century, Christianity sought to communicate the facts in such a way that even the unlearned could read the iconographic images and, by deconstructing them, understand and learn from them. Therefore, there is no work of medieval art that cannot be explained by the written sources available at the time. The iconological-interpretive idea of art history in Renaissance culture was already formed as a science of the interpretation and creation of visual symbols, personifications, whose origins in Western culture were associated with the canon of iconology, which explained symbolic meanings, published by Ripa [29]. It was used, for example, to decipher the interior mouldings of the Baroque Church of Sts Peter and Paul in Vilnius [38].

In the most recent modern history of the early 20th century, with the emergence of the modern methodological concept of iconography and iconological interpretation [39], in response to the then-dominant formalist artistic expressions, coined the term iconology in a new way, referring to it as the 'deep interpretation of images'. Warburg's search for the deeper meanings of a work of art was stimulated by the science of psychology Freud [12] and the development of Freudian psychoanalysis. Cassirer [2], a representative of neo-Kantian philosophy, formulated the theory of "significant form", arguing that images express the fundamental ideas of their own time, place and culture… Therefore, it can be said that in the modern period, the method of iconology, through iconographic research, sought to identify the meanings of images from a specific time and place.

The cultural modernity of the early 20th century, which sought to unite the sensory, emotional and spiritual worlds, came of age at a time when the question of philosophical being - of human individuality - was being raised. This helped to shape the aesthetic principles of the Romantic period. In early Mo culture, they were accompanied by a romantic, combined with a realist, symbolist or utilitarian narrative of the object environment, together with a suffering and hedonistic or artistic iconology of lies and the search for truth. The epoch that considered art as an absolute expression of individuality attributed imagination (iconographic representation) to the essence of the pure theoretical self, claiming that it was the basis of the true being of the world [13]. The idea of the duality of the unity was later developed in Late Mo culture into a structuralist one (the idea of the unity of binary pairs - author's note), which gradually took shape as the methodological concept of the "iconographic and iconological-interpretive unity" of art history.

References to it as a method of art criticism can be found in the writings of the art historian Warburg [39] in the first half of the 20th century, when he speaks of the principles of *"deep interpretations of images"*. They were recognised after the International Congress of Art Historians held in Rome in 1912, where Warburg presented an iconological interpretation of the frescoes of Francesco del Cossa. M. Heidegger [18] discusses the *'essence of the thing'*[3] as a signifying entity in modern culture. Furthermore, Heidegger, based on phenomenology, deals with the "meaning of being" in the human relationship with the world and has links with Panofsky's iconological-interpretive approach, which sought to delve deeper into the "meaning" of a work of art, searching not only for the formalistic elements of art, but also for the deeper socio-cultural and philosophical meanings. It can be argued that, despite the fact that Panofsky and Heidegger belonged to different academic traditions (Panofsky is more closely associated with neo-Kantianism and the Warburg School, while Heidegger is associated with phenomenology and existentialism - author's note), their methodological approaches to the analysis of cultural phenomena have common features - both sought a deeper (iconological) meaning "behind" the surface (iconographic) image.

The Application of the "Method of Iconographic and Iconological-Interpretative Unity" in Contemporary Art History

Panofsky [34], for example, proposed a three-stage structure for the study of art, based on Warburg's [39] key principles of art history, in order to uncover the "profound essences of a work of art" (Fig. 1). In the first and second stages, as an adjunct to iconological research, he proposes descriptive iconographic analysis and initial descriptions of the external formal elements of a work of art. In this way, knowledge about certain sensory experiences and iconographic peculiarities is formed. Moreover, Panofsky [32] argues that there is not only a sensory world (through the senses - smell, touch, hearing, sight or taste… - author's note), but also

[3]M. Heidegger, one of the 20th century's leading exponents of the philosophy of existence and phenomenological ontology, works with images, sometimes "slipping" from abstract thought into the concreteness of the artistic image… In his discourse on sensibility in the context of the perception of the pure object, he explains it in isolation from artistic form and content, describing it as an iconographically visual thing: *"… a block of granite is heavy, hard, large, massive, shapeless, rough, coloured, partly dull, partly shiny…"*. Everything that evokes the senses of hearing, sight, touch, everything that we feel as colour, sound, roughness, our own body, literally…" [34] and this is seen as a formalist (iconographic) analysis of the object. However, Heidegger's discussion of the object's contact with form suggests that aesthetic forms and materiality are predetermined by the object's purpose, i.e. iconography is associated with the functionalist iconology of the time, the environment of Mo's object [34]. The discourse on the *"essence of the thing"* is attributed to the necessary being of the pure thing as a thing-environment (to be understood as functional - author's note). Moreover, according to Heidegger, a work of art helps to find out what lies behind, for example, the iconography of a landscape-architectural object and what, thanks to the work of art, is revealed in the object's *"necessary being"*. The "deep meaning" of art is thus described as the embodiment of truth through the process of artistic creation. This raises the question: is it possible to have a non-aesthetic contact with a work of art as an object of the material environment?

a certain "a priori" innate phenomenological (iconological) world. I. Kant [36] called such phenomenological knowledge transcendent (inaccessible to experience). Panofsky [7], after a detailed discussion of the iconological-interpretive approach, attributed iconography to the branch of art history because it analyses the action in a way that is detached from the artistic content, and attributed this to formalist art history. On the other hand, deep meanings and their interpretations are usually formulated on the basis of knowledge of written sources, the culture of the region in which the work under study was created, factual knowledge of the customs of the time, and are evaluated by means of knowledge of the fields of art, philosophy, religion, and political, social, and economic history. It can be said that the results of a formalist analysis depend on the period and the socio-cultural and geographical context in which the object of study was created. And the culture of the period determines the iconographic variety of the work. For example, while Mo works are more concerned with the aspect of qualitative social change through a functionalist mindset, PostMo art is particularly concerned with conceptualist, abstract expressionist, participatory thinking in the artistic process, while MetaMo is concerned with the idea of harmonious coexistence with the environment. In a contemporary discussion of the late 20th century postmodern discourse on the relationship between E. Panofsky's "image" and "meaning", it follows that in the first stage of Panofsky's analysis (Fig. 1), the image is related to the recognisability of the image in the artwork and its iconographic description, which has nothing to do with phenomenological perception. The second stage of analysis reveals the *"inner meanings"* of the artwork in relation to a particular socio-cultural and temporal context, by understanding the interrelationship of forms and signs in relation to reality. Therefore, the third stage explores not only the recognition of the meanings of forms, plots, symbols and other rich elements of the artwork, but also the interpretative deconstruction of the meanings of the work.

The third step moves from the external description of the facts at stake to the presentation of the *"deep meaning"* encoded in the work of art and its scholarly interpretation. By penetrating into the "deep meanings of the work of art", the basic principles of the construction of the artistic text are established, which reveal the fundamental socio-cultural, religious or philosophical beliefs of the people of the time, focused on the work of art. The combination of the symbolic meaning of a work of art in the third stage of research with the systematisation of the criteria for assessing the quality of a work of art is obviously correlated with the erudition of the expert-interpreter, as well as with knowledge of the history of culture, the history of art, the psychology of art and a number of other subjects. To sum up, a work of art is interpreted as a result of the expression of the most important tendencies in the development of the human spirit and the quality of the work of art.

W. J. Th. Mitchell [30] supplements Panofsky's methodological idea that iconological interpretation is determined by the involvement, interest and participation of the viewer. A closer look at Mitchell's iconological approach, which aims to give back to images their potential to participate in a dialogue with the viewer and to analyse them in an ideological context, a tripartite methodological structure of analysis is constructed, similar to Panofsky's (Fig. 1), in which the first step refers to the "image" - corresponding to Panofsky's task of image recognition; the second step refers to the "text", which requires the identification of a theme; the third step refers to the "ideology", which defines the content of the socio-cultural interpretation. H. Belting, who has explored the iconological approach, also relates the object to the 'image' and asks: why is an image perceived as an image and why is it distinguished from the visual environment around the perceiver? Belting called his proposed way of interpreting images a 'new iconology' and, following the work of his predecessors, proposed a similar tripartite model of image analysis (Fig. 2).

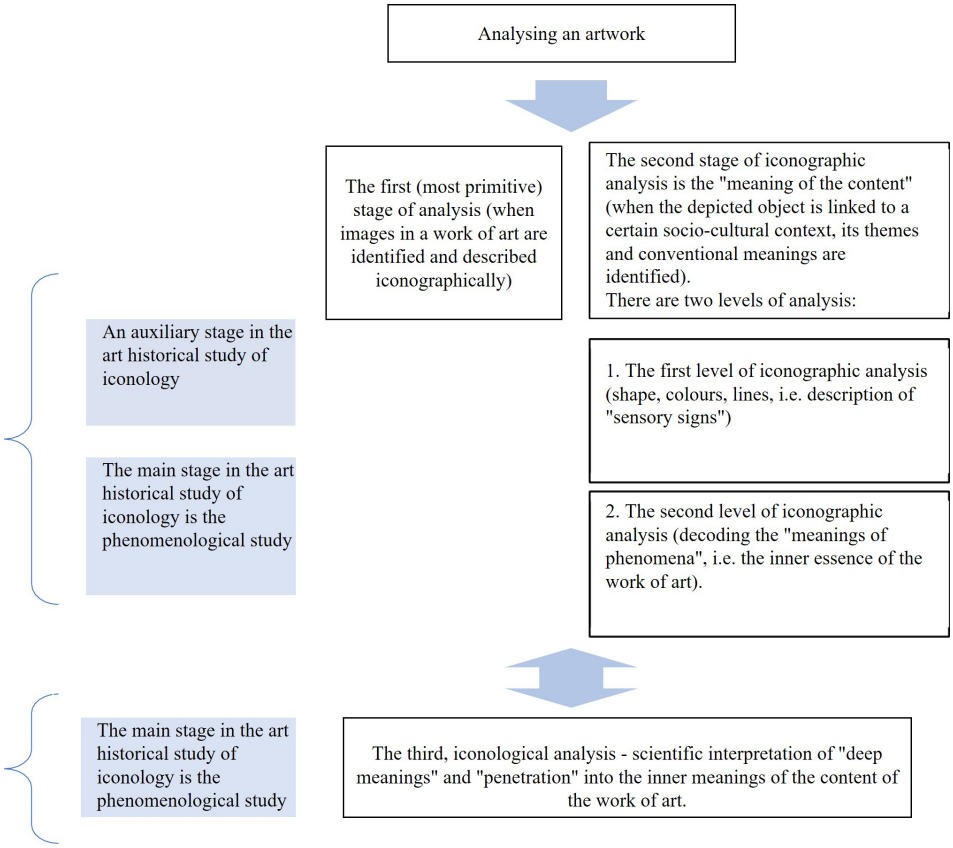


Fig. 1. Comparative interpretation of the model of the analysis of the work of art [according to E.Panofsky model is made by author]

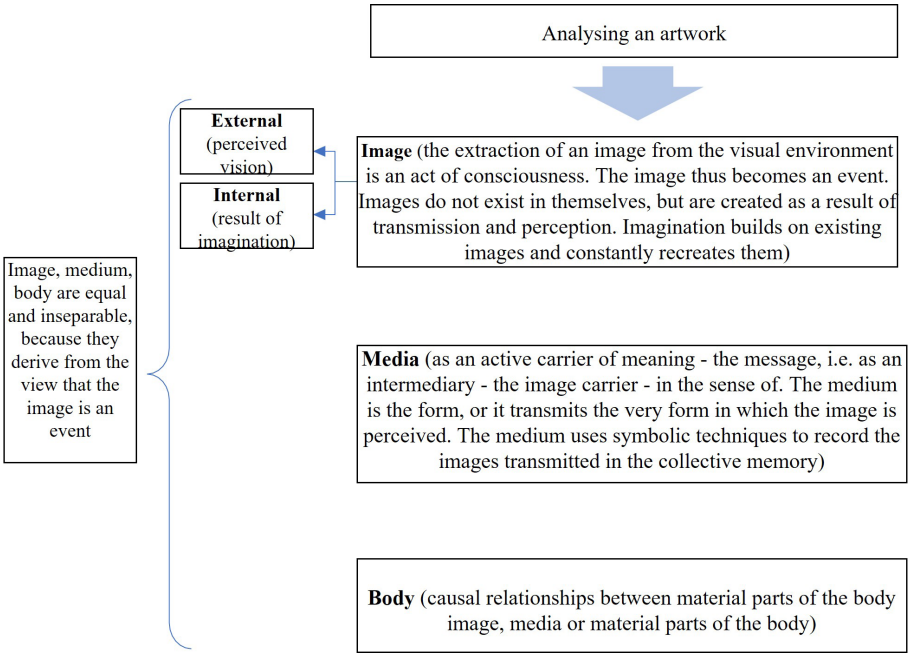


Fig. 2 Comparative interpretation of the model of the analysis of the work of art [according to H. Belting model is made by author]

Based on the concept of bodily consciousness, H. Belting argues that *"... no matter where in image analysis the image occurs, it obviously occurs in the consciousness of the perceiver, in his body. In order for an event of consciousness to become visible ... externally, it must leave the body and enter the medium"* (understood in both material and technological terms - author's note). In this way, Belting not only treats the image as a product of the imagination, but also links it to its creator, thereby justifying his practical research method. There are culturally specific, functional, unusual images that are based on pre-existing images (icons, prototypes, etc.) that are constantly being recreated. H. Belting [7] links the image, the medium and the body in a causal but not hierarchical relationship. His *"new iconology"* therefore seeks to uncover the causal relationships between images and to interpret them through deconstruction.

Thus, the idea of the "iconographic and iconological-interpretive unity" method is easily recognisable not only in art history, but also in art historical interpretations of abstract or applied art. When dealing with PostMo artworks with the characteristics of *"openness"* (the possibility of wider public engagement in art discourse - author's note), the *"iconographic and iconological-interpretive unity"* approach can be applied to the analysis of the participatory nature of contemporary culture. In conclusion, based on empirical art historical practice, the "iconographic and iconological-interpretive" method of analysis is particularly suited to the study of applied art objects through their deconstruction.

Practice of application of the method of "iconographic and iconological-interpretative unity and coherence"

The article constructs the concept of *"iconographic and iconological-interpretive"* analysis in terms of the aspects of the previous approaches, complementing it with the aspect of the *"coherence of the iconographic and iconological unity"*. Using the principle of *"unity and coherence"*, the relationships between the formalist image (iconographic) and the deeper iconological (phenomenological) meanings of the work are analysed. Analyzing the *"unity and coherence"* of these elements as a whole attempts to define the aforementioned methodological approach, which uses the "four-step" method proposed by the author to determine the extent of "unity and coherence". The author proposes doing this using concrete examples and a "four-step" art historical model (Fig. 3).

The choice of cases for analysis aims to take into account not only the theoretical provisions of Panofsky's theoretical approach to the study of "iconological-interpretive" in the fine arts, but also the socio-cultural contexts of the applied arts, the peculiarities of the time and place of creation, and to describe the multifaceted significance of the *"coherence of the iconographic and iconological unity"* in terms of the development of changes in the artistic environment of the objects.

The case studies are analysed in order to support the hypothesis that every socio-cultural phenomenon, including applied art objects, is based on the search for *"inner meaning"* and *"the coherence of the iconographic and iconological unity"*:

Stage 1 is the image recognition stage. This is a pre-iconographic (formalist) study involving the analysis of sensory signs, materiality, colours, shapes and other visual phenomena. This stage of the study identifies the object of applied art by assessing the formal and utilitarian aspects of the artwork, or the functional applicability of the artwork, as well as the significance of the symbolic content in the culture of the time.

Stage 2 is the representational phase. This is an iconographic analysis carried out in conjunction with an iconological (phenomenological) study. In this stage of research, the meanings of the symbols are decoded in order to assess their significance, and the content of the artwork and its socio-cultural environment are explored in depth.

Stage 3 is the iconological interpretation of the "deep meaning" stage. This is an iconological study by an art expert that moves from the analysis of a specific work of art to a broader socio-cultural assessment. This stage examines the 'deep meanings' of the artwork in the light of the contemporary socio-cultural context and scholarly interpretations.

Stage 4 is the stage of identifying and summarising the harmony between the sensory (iconographic) and the phenomenological (iconological). At this stage, an art expert evaluates the "coherence of the iconographic and iconological unity" of the work.

Based on the results of the study, scientific conclusions are drawn for the development of a new quality of the built

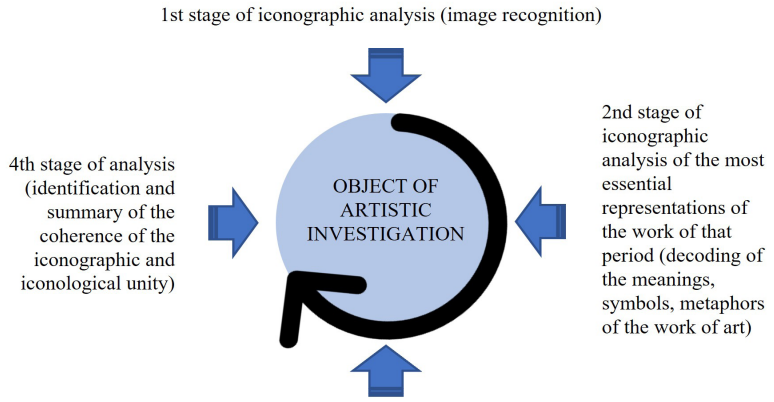


Fig. 3. A four-step applied art research model [created by the author]

environment. The evaluation is carried out according to the pre-developed methodological provisions of the "coherence unity" (the presentation of the methodology is the subject of another, separate discourse, which has already been partially presented at the LKAS scientific Journal of Landscape Architecture - author's note).

The method of art criticism tries to reveal the "coherence of the iconographic and iconological unity" in different cases of research (in terms of time, culture, place, artistic genre) in order to underline the universality of the method of "coherence of unity". The article analyses the case of E. André Park in Palanga as an object of landscape architecture and applied arts of the historicist period in Lithuania.

The case study (one of several)

Introduction. The work of E. André, as a representative of Lithuanian early modern historicism, was influenced by the romantic culture of the time. The iconographic forms, materiality, decorative, dendrological, aesthetic, functional and spatial composition of the environment were dictated by the diversity characteristic of historicism. Birutė Park in Palanga is an exceptional object of applied landscape architecture in Lithuania. The park is not only an example of natural and architectural harmony, but also a rich example of iconographic and iconological harmony. According to J.N.L. Durand [11], each element of the park should be analysed separately (by deconstructing it) and the question should be answered as to which iconographic aesthetic form of Romanticism corresponds more closely to the iconological unity of "inner meaning". The result of E. André's 19th century park as an object of applied art will be analysed according to the algorithm presented in (Fig. 3):

Stages 1 and 2. The stage is where image recognition and meaning decoding take place.

The iconography of Birutė Park consists of the following main elements:

a) Landscape structure: the park is based on the Romantic landscape park model, characterised by a loose, natural imitation of natural elements, a mixture of natural and anthropogenic elements, winding paths, artificial ponds and expressive plant groups.

b) Functional and decorative elements of landscape architecture and DAD:

- Birutė Hill - a historical, mythological object, the inclusion of which in the park structure shows links with national romanticism.
- Pergolas, sculptures, gazebos - decorative elements of classicist and historicist parks, corresponding to the functional requirements of 19th century European garden art.
- Birutė Villa and Palace - dwellings integrated into the natural landscape, reflecting the utilitarian lifestyle of the aristocracy.

Stages 3. The stage of iconological analysis and interpretation of the "deep meaning" of a particular work of art for a broader socio-cultural study, which includes:

a) Harmony of historicism and national romanticism:

- The park was created as a luxurious part of the Tiškevičius Counts' residence, but at the same time it incorporates elements of ancient Lithuanian mythology and history.
- Birutė Hill - associated with the legend of Princess Birutė, which symbolises the sacredness of the nation's history and nature.

b) Synthesis of landscape (English-style) park tradition and local identity:

- The design of the E. André Park seeks harmony between the man-made and the natural environment. While conveying the ideals of European horticulture, it also creates an integrated perception of the Lithuanian landscape. E. André Park's artificial rocks, artificial bodies of water and stone edging of paths (Parc des Buttes-Chaumont) create an iconography of a moderate relationship with the natural environment (Fig. 4).
- The iconography of framing, or fragmented composition, is based on the opening up of views and images in order to enhance the iconographic qualities of the decorative, pictorial (fr: pittoresque), in conjunction with the iconological - the interpretation of 'inner essences'. Gradually approaching the perfect iconographic image (Fig. 5), the romantic style of the park is developed [23] and symbolic meanings are deciphered.
- E. André [3], influenced by the ideas of romantic historicism, applied the principles of ensemble, unity and total diversity in his theoretical treatise "The Art of Gardens. A general treatise on the composition of parks and gardens" *(fr: 'L'art des jardins. Traité général de la composition des parcs et jardins')*, he stressed the importance of each element of a park. The principle of the ensemble, the formation of the whole, was based on the desire for a comprehensive diversity, balancing the natural and anthropogenic environment and ensuring its iconographic and iconological unity.

c) The park as a work of applied art:

- The park reflects the aesthetics of 19th century historicism, when architecture and landscape design updated the



Fig. 4. Man-made boulders in Palanga Park created by E. André's team [photos by the author]



Fig. 5. The principle of "framing" images in the work of E. André in Palanga Park [photos by the author]

styles of the past and romanticised nature. The park is characterised not only by the anthropogenic culture of the Romantic period, but also by its recreational functionality in order to achieve the utilitarian goals of the period.

- The functional zoning of the park and the principles of creating an elevated space are based on the elevation of the central part of the park at the entrances, with a clear iconography of geometric shapes (parterre, flower beds, flower beds, paths). Moving away from the central part, where the landscape elements begin to predominate, the farm, the garden, the greenhouses are somewhat detached from the park as a whole, while maintaining the harmony of the utilitarian nature of the "iconographic and iconological unity".
- The principle of public use and public participation, which began to emerge in the early twentieth century (e.g. the hotel next to Lentvaris Park (another work by E. Andre - author's note) with the famous Riviera Café in Lentvaris (Lithuania), an oasis of entertainment), is characteristic of the participatory art culture of the PostMo. Thus, the architecture of the former residence of the Counts Tiškevičius and the iconography of the parks, in harmony with the interpretation of the iconological 'inner essence', reflect the transformation of the iconological content of the EarlyMo object of LandArch into a PostMo object for the public and the general public.

Stages 4. Stage 4. The stage of identifying and summarising the "coherence of the iconographic and iconological unity":

A more detailed study, analysing iconographic (formalist) and iconological (phenomenalist) aspects, shows that Palanga's Birutė Park is a unique example of the *"coherence of the iconographic and iconological unity"*. The park is not only a masterpiece of 19th century landscape architecture of the EarlyMo, but also a national and cultural symbol where nature, history, art and function merge. It is:

- Formally (iconographically) combines the Western tradition of landscape park design with local landscape and historical elements.
- Deeply (iconologically) conveys cultural, historical, mythological and functional meanings relevant to contemporary culture.

Conclusions

To sum up, the basis of Panofsky's iconological methodology is a systematic historical-comparative interpretative art historical method, which allows the development of the art historical methodological idea of the *"coherence of the iconographic and iconological unity"*. The method is used to decipher the symbols encoded in a work of art and is based on synthesis rather than analysis, reflecting the socio-cultural context of a given epoch and the level of development of a civilisation, which not only determines the knowledge of the art of a given civilisation, but also expands the possibilities of studying the applied art of our time. The application of the method of *"iconographic and iconological-interpretive unity"* makes it possible to reveal the extent of the integral harmony of the various components and functions of the work in the search for the "profound meanings" of applied art.

Despite the fact that modern iconography and iconology can be traced back to the beginnings of symbols interpretation in the 16th century, interpretive iconology only emerged at the beginning of the 20th century as a response to the stylistic and formalist art forms that dominated at the time. The iconological studies of A. Warburg, E. Panofsky, W. J. T. Mitchell or H. Belting are obviously linked to the local culture of their time and location.

The hypothesis that iconological interpretation as an art historical method can be applied not only to the analysis of historical works of art, but also to the interpretation of the "deep meanings" of contemporary objects of the PostMo applied art environment, is correct. Moreover, the method is not only suitable for use by art history professionals, but also for improving the skills of students in an academic environment in the field of art history. The peculiarities of this method have been successfully applied in the author's lectures at Vilnius Tech (Lithuania), Florence (Italy), Minho (Portugal), Bauhaus (Germany), Palermo (Italy), and other universities.

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Kopsavilkums

Rakstā aplūkota mākslas vēstures metodoloģiskā pieeja, kurā apvienots ikonogrāfiskās un ikonoloģiski interpretatīvās analīzes vienotības princips. Cenšoties izprast postmodernās mākslas attīstības tendences, pētījums ir vērsts uz lietišķās mākslas objektu vēsturisko izcelsmes avotu un dziļāko būtību analīzi, kas sniedzas ārpus mākslas darba tieši uztveramā vizuālā tēla. Pētījuma analītiskajā daļā tiek pārbaudīta izvirzītā hipotēze, ka mākslas vēsturē izmantotā ikonogrāfiskās un ikonoloģiski interpretatīvās analīzes vienotības metode ir piemērojama ne tikai vēsturisku mākslas darbu analīzei atbilstoši Panofska [1] pieejai, bet arī mūsdienu postmodernās lietišķās mākslas iekšējo nozīmju un būtību atklāšanai tādās jomās kā urbānisms, arhitektūra, ainavu arhitektūra un materiālās vides dizaina objekti. Attīstot ikonogrāfiskās un ikonoloģiski interpretatīvās vienotības ideju, pētījums balstās Panofska atziņā: „... lieta nav vienkārši dota, un tās jēdziens nekļūst skaidrs tikai ar tās ieraudzīšanu. Raugoties uz objektu, mēs vispirms atklājam tā tēlu un tikai pēc tam nonākam pie tā izpratnes kā 'tīras būtības'...". Pētījuma rezultāti liecina, ka, analizējot, piemēram, ainavu arhitektūras objektu: Birutes parku *(Birutė Park)* Palangā, to iespējams interpretēt ne tikai kā fiziski un telpiski organizētu ainavu, bet arī kā savstarpēji saistītu nozīmju, simbolu un kultūrvēsturisko slāņu kopumu, kas tiek aktualizēts mūsdienu sociālajā un kultūras kontekstā. Šāda pieeja ļauj parku uztvert kā kultūrainavu, kuras vizuālā un telpiskā struktūra vienlaikus ietver vēsturiskas, simboliskas un mūsdienās no jauna interpretējamas nozīmes. Pētījuma noslēgumā secināts, ka mūsdienās ikonogrāfiskās un ikonoloģiskās interpretācijas vienotība var tikt skatīta, analizējot attiecības starp kultūras mantojumu un tā mūsdienu izmantošanas formām, tostarp tūrismu un kultūras pasākumiem, starp ekoloģisko apziņu un ainavas saglabāšanu, kā arī starp vēsturiski veidotām nozīmēm un to jaunām interpretācijām mākslā, izglītībā un digitālajos medijos. Tādējādi Birutes parks interpretējams ne tikai kā vēsturisks ainavu arhitektūras objekts, bet arī kā dzīva un nepārtraukti no jauna interpretējama kultūras sistēma, kurā vizuālā forma, telpiskā struktūra un dziļākie semantiskie slāņi atrodas dinamiskā savstarpējā mijiedarbībā.

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WOODEN PANEL INTERIOR FINISHING IN THE 18TH CENTURY IN COURLAND

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Abstract. In Europe, in the 18th century, a common type of decorative interior wall finish of interior walls was wood paneling with gilded wood carvings. This fashion trend came from France, where it began to develop in the 17th century and spread rapidly until the end of the 18th century in wider Europe [21]. Today, in the territory of Latvia, the Baroque, Rococo, and Classicist decorative woodwork characteristic of the 18th century has mainly been preserved in church interiors and in the door leaves of residential buildings. In turn, the decorative interior wall finishing with wood panels has been preserved mostly from the 19th and early 20th centuries with the wood paneling characteristic of the Historicist style on the walls and ceilings of rooms. The spread of wood panels in Courland can be traced back to the second quarter of the 18th century, when the importance of military defense in the construction of masons' houses diminished and more attention was paid to the representativeness of buildings. In Courland during this period, it is possible to trace the development of wooden panels within the framework of three general artistic styles and stylistic directions by analyzing the available information from building inventory descriptions found in archival documents and preserved panel samples in cultural and historical buildings.
Keywords: wall decoration wooden panels, wood carvings, representativeness, spatial compositional structure

Introduction

The most important function of using wood panels in interior decoration was to create the aesthetics of the room and to confirm the social status of the owner. However, the practical function was no less important, covering the stone masonry walls, promoting thermal insulation in the room and creating a cozy environment. One of the most common problems of masonry buildings to this day is the accumulation of moisture in the lower part of the walls, or plinth, which contributes to the release of salts and the deterioration of the decorative paintwork of the walls. To eliminate this problem, one of the practical solutions was to create decorative decoration of the plinth of the walls of the rooms, or the lower part of the wall, from the floor to a height of approximately one meter above the skirting board, with wooden paneling. The rest of the wall up to the ceiling, by painting or covering it with fabric. This type of paneling is called "dado" [2]. The plinth paneling fillings, depending on the artistic style, could be decorated with wood carvings. In Latvia, expressive mid-18th-century Baroque ornamented wooden wall panels at the plinth level have survived in several rooms in the interior of the Beļava Manor House.

The aim of the study is to evaluate the certainty of decoratively representative elements of wood decoration in interiors that reflect the artistic stylistic language of form characteristic of the 18th century.

Less common in Latvia, but historically widespread in Europe, is the method of wood paneling, that covers the walls in the entire plane from floor to ceiling. This type of paneling is designated by the French word "boiserie". Wooden panels on the wall plane were more often divided into three or two horizontal levels. The paneling also included stoves and fireplaces in the room, doors, windows, and shutters on the inside of the windows. The vertical division of the wall panels depended on the size of the room the number of doors and windows. Sometimes a place was also provided above the doors for decorative paintings, called supraportes, as well as frames for mirrors or separately mounted consoles.

In order to obtain the results of the research, the research tasks are related to

- architectural and artistic research of wood paneling, seeking connections with the structure of the formal language and evaluating the tonality of the paint in the interiors of historical manors and churches, and comparing the obtained data;
- research of the interior compositional and architecturally functional structure of the room, evaluating the spatial compositional context or harmony of the wall paneling – scale, proportions, tonality, ornamental structure, etc.

Materials and Methods

Baroque interior decorative wood panels

Baroque features began to appear more intensively in housing design in the 1730s and 1740s, when the political situation had stabilized and an active process of building castles, manor houses, and churches had begun [15]. The period from the 1730s to the 1760s is traditionally considered the High Baroque, when the features of this style were most clearly manifested [3]. Evidence of the decorative decoration of rooms in the 18th century can be found in descriptions of building inventories, but very little original material evidence of Baroque and Rococo period decorations in the territory of Latvia has survived to this day. [15]. One such example with wooden paneling on the plinth has survived in the Tāši Manor House, which can be considered one of the oldest examples of this type of wooden paneling in the territory of Latvia. The paneling has survived from the time the building was built in 1734. The paneling is in the shape of a horizontal rectangle and has been painted in a dark gray, almost black colour. After small fragments of fabric fastenings were discovered, it was concluded that the upper part of the walls of the room was upholstered with fabric [22]. The panel fillings are in the shape of a simple horizontal rectangle with rounded inner corners.

The research work is based on scientific methods based on the collection of source materials on selected objects in archives. The in-depth archival material is compared with examples of interiors belonging to specific architectural style (churches, manor houses, houses of wealthy citizens, etc.). The data obtained through the comparative method are specified by using photofixations, descriptive material and graphic material in the study, which allows for a more detailed understanding of the nature of the woodcarving compositional line both for individual element and for the overall architectural spatial structure.

The second known example of wooden panels from the first half of the 18th century comes from the inventory list of Svitene Castle dated 1736. The wooden panels of Svitene Castle mentioned in the documents have not survived to this day, but the descriptions indicate that they were made in



Fig. 1. The interior plinth decoration of the Tāši Manor House with wooden paneling has survived from the time the building was constructed in 1734 [photo dienvidkurzeme.travel.]



Fig. 2. Rundāle Palace: The Duchess's dressing room, where the panels are made of oak, walnut, and cedar [photo by the author]



Fig. 3. Rundāle Palace: Duke's Parade Bedroom window alcove intarsia panel from the first construction period of the palace [photo by the author]



Fig. 4. Rundāle Palace: The Duchess's dressing room, where the panels are made of oak, walnut, and cedar [photo by the author]



Fig. 5. Rundāle Palace: Duke's Parade Bedroom window alcove intarsia panel from the first construction period of the palace [photo by the author]

white and blue [10].

With the construction of Rundāle Palace, which began in 1736 and was completed by 1740, an increasing number of craftsmen arrived in Courland, who were able to offer the local nobility decorative works of European standard, primarily observed in the interiors of churches [8]. In Courland, the most luxurious examples of Baroque interior decoration were formed under the influence of the culture and art of the court of the Duke of Courland, during the building the Rundāle and Jelgava Palaces. The scope of the Duke of Courland's construction ambitions and financial capabilities allowed him to strive for the most current European interior models. Therefore, the most luxurious decorative decoration of walls and floors at that time was chosen for the interiors of the Rundāle and Jelgava palaces, executed in certain rooms using the wood marquetry technique with joints of various noble woods, arranged in decorative pattern structures. Such fragments of wooden wall panels have survived in Rundāle Palace in the window frames of the Duke's parade bedroom from the first construction period of the palace (1736-1740) and in the lower parts of the walls, window, and door openings of the Duchess's toilet room, where the panels were made of oak, walnut and cedar [5].

In the second construction period of Rundāle Palace (1764–1768), all the elements of the first period were incorporated into the new decoration, with the natural wood painted white and supplemented with gilding [5]. In the rooms on the second floor, where stucco or artificial marble wall decoration was not planned, the lower parts of the walls were intended to be decorated [5].

In order to ensure the production of carpentry products necessary for the interior decoration of Rundāle and Jelgava castles, on April 3, 1737, master carpenter Jacob Baptist Eger began working at Svitene Manor under the leadership of a brigade of eight carpenters [11]. However, a large part of the carpentry products of Rundāle and Jelgava Palaces, including wall panels, was sent ready-made from St. Petersburg [11], and in July 1737, 84 door leaves, wall panels, and window frames arrived in Rundāle [6]. The report of the carpenter Eger dated July 6, 1738, mentions that oak panels for 33 rooms of the interior of Rundāle Palace were made, and a year later, in the report of October 1739, it is mentioned that wall panels for 23 rooms of Jelgava Palaces were completed [11].

In addition to the already mentioned inlaid wooden panels, four more types of painted softwood panels with different profiles can be found in the interior of Rundāle Palace. The type of wall panels was with infills, a profiled strip in the upper part and a profiled plinth board in the plinth part. Two types of panels can be attributed to the first construction period, their profiles are identical to the profiles of the infills of some of the original door leaves on the first floor and to the profiles of some of the door openings in the central body of the second floor [5]. In the Porcelain Cabinet near the Golden Hall, the wooden panelling of the lower part of the walls and the window sill from the 1760s has survived intact, and partly also in the room next to the Duke's Parade Bedroom. Separate fragments of two types of wooden paneling have survived in the room near the Golden Hall [5].

Results and Discussion

A combination of late Baroque and Classicist wooden panels

In the Pope Manor House, a series of rooms has been preserved in which the interior decoration consists of wooden wall panels of various periods and styles, the oldest of which date back to the third quarter of the 18th century.



Fig. 6. A room in Rundāle Palace with wooden paneling on the plinth and fabric covering the rest of the wall [photo by the author]



Fig. 7. A room in Rundāle Palace with wooden paneling on the plinth and fabric on the upper part of the wall [photo by the author]

A document drawn up in 1728 provides approximate information about the possible earliest period of the interior decoration of the Pope Manor House, which included furniture sets and satin and velvet purchased in Jelgava and Liepāja [12]. However, an invoice drawn up in 1740 already indicates specific interior decoration works, in which the carpenter received 38 spruce boards for the large room – battens, moldings, cladding, boxes, and other works known to him [13]. In the Pope Manor House, with wooden panels characteristic of the mid-18th century, the plinth level is decorated in a room located at the end of the dining room. The wooden panel fillings are designed with rounded frame corners, while the upper part of the paneling, extending to the ceiling, is designed in a different style with wood carving characteristic of Classicism. In the center of the upper panel fillings, a rectangular frame is designed with small square frames in its corners and a vertically stretched rhombus in its center. A 1935 photograph of the interior of this room,



Fig. 8. The room at the end of the dining hall in the Pope Manor House with decorative wooden panel walls [early 20th century photo]



Fig. 9. Fragment of a wooden panel from the dining room of the Pope Manor House [photo by the author]

preserved at the Herder Institute in Marburg, records that the paneling incorporates Baroque panel doors, dating to the 1770s, when the Pope Church and the semi-manor in Ance were built. The door leaves of the Pope manor house in Ance are identical to the door leaves of the Ance manor house. Three have survived in Pope – two in the manor house, one transferred to the Doctor's House (National Art Monument No. 4640). In the Ance Manor, eight door leaves have survived, one of which has a filling on one side without the Baroque form. (National Art Monument No. 4600). The original color of the paneling has not yet been determined. It is possible that this example of the combination of panels in different styles aligns with the assessment expressed by the art historian Dainis Bruģis that in the second half of the 18th century we can speak of early Classicism, which only at the end of the century prevailed over the Late Baroque style [4]. It is possible that the initial interior decoration of this room in the Pope Manor was created with the wooden paneling on the plinth characteristic of the baroque period and only at the very end of the century was the part above the plinth supplemented with panels corresponding to the Classicist style. Similar panels in the plinth, the corners of which are decorated with semicircular rounding, semicircular cuts in the corners of the filling or straight corners, were popular in the Late Baroque period and during the transition to classicism. Such examples have been found in the Kaucminde Manor, built around 1780 [7].

Rococo style wood paneling

In the Late Baroque phase (1760s–1780s), Rococo ornament was widely used in interior design, gradually being replaced by the Classicist style [18]. The most expressive and only example



Fig. 10. The interior of Puze Manor House at the beginning of the 20th century [photo Rundāle Palace Museum]



Fig. 11. Wall panels from Puze Manor House before being transferred to the Rundāle Palace Museum. Photo from 1977 [photo from the Rundāle Palace Museum collection, negative no. 2497/7]



Fig. 12. Wall panels from Puze Manor House in the Rundāle Palace Museum exhibition [photo by the author]



Fig. 13. Wall panels from Puze Manor House in the Rundāle Palace Museum exhibition [photo by the author]

of Rococo interior decoration with wooden paneling in Latvia has survived from the 70s at the Puze manor house built by Johann Ewald von Mirbach (1749-1818). The panels are made in a horizontal three-level division and are painted green, with silver-plated profiled moldings and Rococo carvings. Similar examples of carvings have survived in the interiors of the Cīrava and Zlēku churches. The eaves at the top of the upper part are made in the form of a silver-plated wavy woodcarving ribbon. Woodcarving consoles are attached to the corners, while the middle of the paneling above the plinth is filled with vertical mirror frames. The author of the panels of the Puze Manor is considered to be the Courland sculptor and woodcarver Joseph Slawitzek, who worked in Courland from the mid-18th century and was the court sculptor of the Duke of Courland from 1770 to 1772 [11].

From the memoirs of the owner of the Pope Manor, Karl von Behr (1836–1909), it is known that around 1770, the interior decoration of the walls of the Pope Manor semi-manor in Ance, the manor house, was made of wooden panels made of oak and silver-plated woodcarvings [1]. The chronological framework and description suggest that the paneling of the Ance Manor could have had stylistic features similar to those of Puze Manor.

Classicist style interior decorative wooden panels

At the end of the 18th century, a type of panel filling with a straight corner cutout, in which a rosette is often incorporated, appeared. Panels of this shape were created under the influence of the collection of engravings by the architect Jean-Francois de Neufforge (1714–1791) published in France, "Recueil élémentaire d'architecture".

Panel fillings with rosettes were found in the Bērzmuiža manor house, Bauska region, built around 1800 [7]. The entrance door leaves of buildings in Ventspils and Vadakste Manor are also made according to this principle. Classicist door leaves with rosettes incorporated into rectangular cutouts have survived – in Ventspils, Plosta Street 6 (art monument of regional significance No. 4581.), and in Vadakste Manor from the old manor house. The only full-scale classicist interior decorative wood paneling in Latvia has survived in the library room of the Pope Manor House. Wooden panels cover the walls to their full height, from floor to ceiling. The panel decor consists of a T-shaped frame or a frame with ears, where a carved mill-wing rosette is incorporated into the frame protrusion, the direction of rotation of which is directed outwards. Such identically shaped rosettes with eight wings have been found on the panels of the hall of the Spāre Manor House and on the leg supports of the Valdgale Manor stove installed in the Rundāle Place Museum – Inv. No. 8625/1-102. Small pendants or drops, which are called guttae in Latin, are formed on the lower part of the frames and under the protrusions. The panels are divided into two horizontal levels – the lower part at the base and the upper part up to the ceiling. The vertical division is of various sizes, depending on the compositional position in the room. A vestibule with door leaves is built into the northern wall of the room, which was created at the same time as the wooden panels of the room. Losses and alterations of the panels can be found at the place where double door leaves to the adjacent room were built into the room around 1860. After conducting colour tests, it was concluded that the panels and vestibule doors were repainted with oil-based paint in five layers with different shades. The original color was green with silver frames and wood carvings [20].

The Rococo-style wall panels of the Puze Manor House and the Classicist-style wall panels of the Pope Manor House library are made in the same colour tonality, with a green background and silver carvings. Although they are chronologically separated by about 30 years and artistically represent different styles, they still have some mutual connection. This choice of colors for the panels of both manors can probably be explained by the fact that Chatrina Dorothea (1747–1839), the foster daughter of the owner of the Puze Manor, Johann Ewald von Mirbach (1749–1818), married the owner of the Pope Manor, Ulrich Johann Ernst von Behr (1772–1831), in 1799, and for the first years after



Fig. 14. The walls of the library room of the Pope Manor House are decorated with Classicist wooden panels. Early 20th century photo [photo Rundāle Palace Museum]



Fig. 15. Fragment of a wooden panel from the walls of the library room of the Pope Manor House [photo by the author]

their marriage, they lived with her husband in the Puze Manor, where their first children were also born. From this it is possible to conclude that at the very beginning of the 19th century, major reconstruction works of the manor house took place in the Pope Manor, with interior modernisation in the Classicist style, including wall panels, and the inspiration for the colour of the panels came from Puze Manor.

The exact date of manufacture of the wall panels of the Pope Manor library is unknown; however, they can be dated to the very end of the 18th century. The basis for this assumption is the fragments of identical woodcarving panels found in the interior of the Spāre Manor manor house, built in 1790, which have survived in the niche under the window. The Spāre Manor date, "1790", is carved into the railing of the entrance staircase of the manor house. The photographic materials of the 1967 expedition of the Rundāle Palace Museum captured[16] the door leaves of the hall of the Spāre Manor House, the window sill, and the door leaf for the exit to the park; all of these carpentry products show a strong resemblance to the wooden panels of the walls of the Pope Manor library. The paneling of the Spāre Manor also features oval-shaped frame fillings with rounded edges, which in turn are similar to the door leaves of the rooms of the Ēķupe Manor House [17]. Other examples of Classicism from this period include the parish benches of the Tukums Church.

The interior of the Valtaiķi Church (the drapery carvings used in the decoration of the Valtaiķi Church pulpit are similar to those on the door of the old manor house of the Ķimale Manor (art object of regional significance No. 3695) is also designed in the Classicist style, where the church doors and pews are decorated with a T-shaped frame made in the filling, with mill-wing rosettes embedded in the ears. Here, unlike the examples in Pope, Spāre and Valdgale, the rosettes have six wings instead of eight, and their edges are

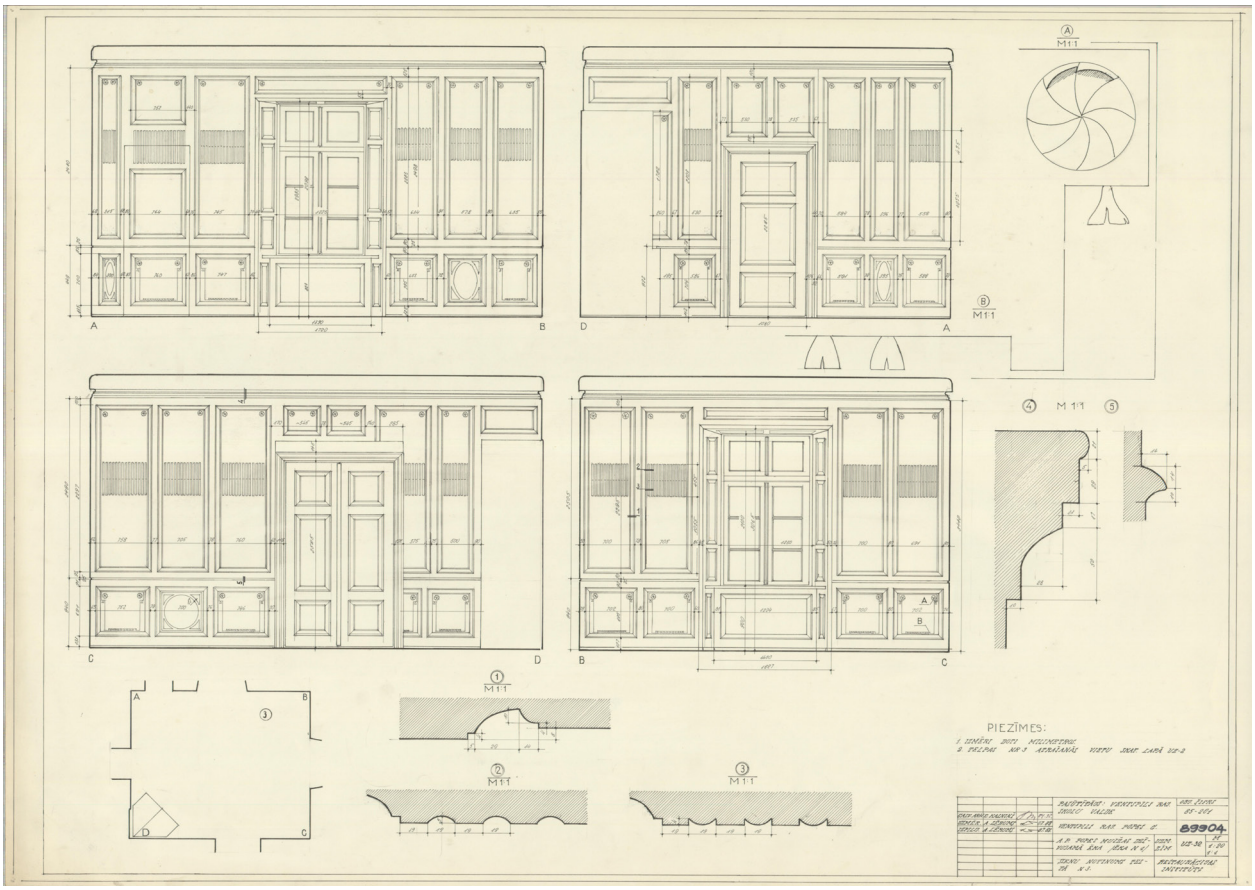


Fig. 16. Measurement survey of the library room paneling of the Pope Manor House. Restoration Institute, 1988

supplemented with notches. The furnishings of the Valtaiķi Church can be precisely dated because a paper plate with a text has been preserved on the back of the altar, which mentions the year of manufacture, 1792, and the author Johan Friedrih Conrdt – the Kuldīga master from Tilzīte: "Diese Kirchen Arbeit ist im Jahr 1792 verfertiget von Joh: Friedr: Conradt, Tischler Meister in Goldingen.". The Valtaiķi Church is currently the only known work whose author is is Johannes Friedrich Conrad (1747–1824), a master carpenter from Eastern Europe who immigrated to Kuldīga and became a citizen in 1774. His works also include the doors of Kuldīga city houses, some of which, as examples of typical classicism, have been preserved in the collection of the Kuldīga Museum from the building at Jelgavas Street 17. and those preserved in the urban environment - at Jelgavas Street 2 in Kuldīga, at Karlīnes Street 5 in Ventspils, and at Kārļa Street 5 in Ventspils, where the new Classicist style was expressed in a rich and diverse way [9].

Conclusion

1. Although the tastes of the Courland nobility and the architecture of manors in the 18th century were very strongly influenced by the ideas brought by the court of the Duchy of Courland, only a few were able to afford an equivalent interior in accordance with current European fashion trends, because wood paneling was relatively expensive and therefore an exclusive solution for decorating rooms.
2. Only a few examples of 18th-century interior decorative wood panels have survived in Latvia, but they show the development of general artistic styles very well. The factors contributing to the disappearance of wood panels were both the owners' desire to introduce modern changes in interiors, and also the fragility of wood as a material against fires and its use as a convenient fuel during the time when the buildings were abandoned. At the same time, the preservation of wood panels in the interior of a room was more durable than the fabric or leather wallpaper used in the decorative decoration of interiors in the 18th century, which, although fragmentary, has nevertheless survived.
3. As can be seen in the photographs of the interiors of the Pope Manor (20th century), the decorative significance of the panels had diminished over time, and their decorative part was covered with massive furniture or had works of art attached to them.
4. As the 19th century values in society developed, the previous styles - on the one hand - seemed anachronistic, but this does not allow us to conclude that there would have been a significantly large number of manor houses in Courland where the decorative wooden panels would have been dismantled and replaced with modern wall wallpapers.
5. The fragmentary wooden wall panels still existing in the manor houses, as well as archival materials and photofixations, provide the new owners of the manor houses with good research material, which serves for carrying out restoration work in historical buildings.
6. It is undeniable that the historical woodwork that has survived in the interiors of Latvian churches is a witness to the stylistic trends of the 18th century. The technical and artistic techniques of wood carvings allows us to identify the authorship of the compositional structure of the wall paneling of the manor houses in the region by analogy.

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Kopsavilkums

Raksta mērķis ir sniegt detalizētu pārskatu par 18. gadsimta interjera dekoratīvās apdares veidu ar koka paneļiem Kurzemē, kas ar konkrētu piemēru izcelšanu, kalpo kā uzskates līdzeklis dažādo vispārējo mākslas stilu attīstības raksturošanai Latvijas teritorijā. Kurzemes hercoga celtās rezidences Rundālē un Jelgavā, jau 18. gadsimta vidū Kurzemē ienesa Eiropas līmeņa arhitektūru un mākslu, kas tālāk izplatījās Kurzemes muižnieku celtajās rezidencēs. Rakstā īpaša nozīme ir baronu fon Bēru celtajai Popes muižai, kur saglabājusies vairāku periodu interjera dekoratīvo koka paneļu apdare, kas spilgti rāda vispārējo mākslas stilu uzslāņojumu.

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THE AMATEUR BOOK OF PARASKA PLYTKA-HORYTSVIT: THE HERITAGE OF UKRAINIAN VISUAL CULTURE

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Abstract. The article examines the phenomenon of the amateur book created by Paraska Plytka-Horytsvit as a significant component of Ukrainian visual culture of the 20th and early 21st centuries. The study analyzes the artist's biographical background as a key factor in shaping her authorship and visual language, highlighting the influence of Hutsul traditions, religious worldview, and oral culture on the structure and meaning of her creative work. Particular attention is paid to defining the amateur book as a specific form of Ukrainian naïve art that synthesizes handwritten text, visual thinking, and manual craft.
The research examines the material, compositional, and technical characteristics of Plytka-Horytsvit's handmade books, including handwriting, illustration, ornamentation, collage, papercut techniques, textile elements, binding practices, and the creation of personalized covers. The study outlines the distinctive stylistic characteristics of her visual narrative, symbolic systems, and iconographic models, focusing on Christian motifs, the representation of the female creator, and the articulation of a local Hutsul worldview. The role of the Hutsul dialect as a medium of imagery and a tool of preserving cultural memory is emphasized.
In conclusion, the article demonstrates that Paraska Plytka-Horytsvit's artistic output constructs an alternative model of Ukrainian visuality, deliberately independent of academic canons and ideological frameworks. Her books significantly contribute to the development of the author's book practices, women's art, and national naïve art, while also addressing issues of safeguarding local cultural heritage. The research reveals broad prospects for further interdisciplinary studies and museum representation of the artist's unique manuscript legacy.
Keywords: Paraska Plytka-Horytsvit, amateur book, naive art, Hutsul culture, women's art

Introduction

Naïve art remains one of the understudied phenomena of artistic culture in the twentieth and twenty-first centuries, underscoring the scholarly relevance of systematic research in this field. The specificity of this phenomenon lies in the creation of artworks by artists without formal academic art education, leading to the emergence of alternative visual strategies and compositional solutions compared with professional art. The absence of academic training shapes a distinctive type of artistic thinking characterized by autonomy, intuition, and the disregard of established canons. This allows naïve art to be considered as a particular form of representation of collective identity and visualizing cultural archetypes, expressed through symbolism, mythological motifs, and stable elements of folk tradition.

Within contemporary humanities discourse, the relevance of naïve art lies in examining its role in shaping cultural memory and identity. Despite the growing scholarly interest in Ukrainian naïve art of the second half of the twentieth century, the book-based creative practice of Paraska Plytka-Horytsvit remains insufficiently studied and largely marginalized within academic art-historical discourse. Her amateur handwritten books, which combine literary text, visual imagery, and material craft, are still not regarded as full-fledged art objects capable of shaping an autonomous model of Ukrainian visuality beyond official artistic canons.

A comprehensive examination of the artistic and stylistic characteristics of her manuscripts, their contribution to the preservation of local cultural memory, the development of a female creative narrative, and the formation of the author's book in Ukraine remains absent. In this context, a thorough art-historical analysis of Paraska Plytka-Horytsvit's work is required to actualize her role in national culture and facilitate her further inclusion in the history of Ukrainian art of the twentieth and early twenty-first centuries.

Materials and Methods

Over the past decades, the phenomenon of naïve art has gradually become an object of scholarly inquiry; however, its comprehensive interpretation as a component of cultural identity and cultural processes remains insufficiently developed. Within Ukrainian scholarship, art historians and cultural theorists have made a significant contribution to the study of this phenomenon. Oleksandr Naiden [8] examined the figurative and stylistic characteristics of naïve art and its relationship to folk tradition.

Petro Honchar emphasizes the role of naïve art as a distinctive code of cultural memory and collective identity [3]. In her studies, Alisa Lozhkina considers naïve and outsider art as integral components of contemporary artistic discourse, highlighting their relevance in the twenty-first century [7].

In contemporary research, the creative work of Paraska Plytka-Horytsvit is primarily examined within the framework of naïve art and as an important source for the study of local cultural memory. The artist's figure is gradually entering the sphere of professional scholarly attention through the efforts of contemporary researchers, museum institutions, and curatorial projects. A significant contribution to the popularization and scholarly interpretation of the creative legacy of Paraska Plytka-Horytsvit has been made by the publications of Z. Kosytska, in particular, an article devoted to the analysis of her paper cuttings as a distinct and self-sufficient layer of the author's artistic practice. The researcher examines the artist's paper cuttings within the context of Hutsul paper decoration traditions, while emphasizing their pronounced individual manner, manifested in the soft plasticity of lines, the dominance of symmetrical compositions, and the prevalence of vegetal and abstract motifs. Kosytska emphasizes the syncretic nature of Plytka-Horytsvit's creative practice, in which paper cuttings are closely interconnected with handwritten books, household objects, and the author's sacral worldview, thereby acquiring the status not only of decorative elements but also of distinctive cultural artifacts rooted in the lived experience and spiritual practices of the Hutsul community. The author focuses on the analysis of Paraska Plytka-Horytsvit's paper cuttings as a component of her artistic legacy, emphasizing their connection to the traditions of Hutsul folk art and their distinct individual manner. The researcher addresses the integrated nature of

Paraska's creative practice, in which visual, handwritten, and spiritual dimensions are interconnected, and in which paper cuttings function not only as decorative objects but also as cultural artifacts closely related to her lived experience and religious worldview [6].

Overall, existing studies indicate a gradual actualization of the artist's book heritage; however, a comprehensive analysis of its figurative and stylistic structure and cultural function still requires further development within scholarly discourse.

However, existing studies predominantly address isolated aspects of her activity—such as biographical events, her connection to Hutsul tradition, religious and ethical themes, or her photographic archive—while leaving Plytka-Horytsvit's book heritage outside systematic analytical consideration. Contemporary research lacks a comprehensive analysis of the iconographic structure of her manuscripts, the material and craft-based aspects of amateur book production, and a clear positioning of her creative work within the development of Ukrainian visual culture in the 20th and early 21st centuries. The role of the female authorial voice in constructing an alternative artistic tradition outside the official ideological models of the Soviet period also remains insufficiently conceptualized. Of particular importance in this context are the studies of A. Koliesnikova, who emphasizes that naïve art represents a form of "marginal yet deeply authentic expression," captures the lived perceptions of a specific ethnocultural community and functions as an artifact of visual memory [5]. The researcher also emphasizes that a key aesthetic category of naïve art is visual sincerity, understood as spontaneity, emotional openness, and immediacy of expression, which determines the specific nature of imagery beyond the framework of academic canons. These considerations are essential for interpreting the book-based creative practice of Paraska Plytka-Horytsvit, in which emotional sincerity and the directness of expression constitute the foundation of her artistic method.

The artist's book heritage has not yet become the subject of systematic art-historical analysis that would allow it to be revealed as a fully articulated visual phenomenon. Naïve art functions as a visual strategy of nation-building and as a means of constructing alternative realities. As is well known, the practice of creating amateur and authorial books by self-taught artists is not limited to the Ukrainian context, but is also present in various international artistic traditions. One of the most notable examples is the work of the American self-taught artist Henry Darger, whose extensive illustrated manuscript The Story of the Vivian Girls, in What Is Known as the Realms of the Unreal, represents a unique case of a large-scale, text-image narrative created outside institutional frameworks [2].

In a similar way, the handwritten books of Paraska Plytka-Horytsvit demonstrate a close integration of visual and textual elements, forming complex authorial systems that combine narrative, ornament, and personal expression. Both practices reflect an independent creative process and a tendency toward the construction of self-contained artistic worlds.

At the same time, Plytka-Horytsvit's works reveal a distinct connection to local cultural traditions, spiritual experience, and the visual language of Hutsul folk art. This allows her practice to be interpreted not only within the broader field of naïve and outsider art, but also as a culturally specific manifestation of vernacular artistic expression.

This provides a methodological framework for analyzing Plytka-Horytsvit's handwritten books as mechanisms for preserving and transmitting local cultural memory, for the formation of a female authorial voice, and for representing the Hutsul worldview.

The synthesis of previous research identifies the need for an in-depth analysis of the sources of visual authenticity that shape national identity in contemporary culture. In this context, the task arises not only to interpret naïve aesthetics within new media, but also to turn to its foundations – authorial practices in which visual language emerges within the framework of local tradition and individual creative experience. For this reason, this article focuses on the amateur book of Paraska Plytka-Horytsvit as an integral artistic phenomenon that combines visual, literary, and craft-based components and serves as a significant factor in the preservation of cultural memory.

The methodological framework of this study is based on an art-historical approach that combines formal-stylistic and visual-semiotic analysis. The research is grounded in the study of scholarly literature on naïve art in the world tradition and Ukrainian visual culture, as well as in the analysis of biographical sources related to the artist. Archival visual materials, including reproductions of Paraska Plytka-Horytsvit's works, were examined as the primary corpus for visual analysis.

An important component of the research was the direct observation of the artist's works presented at the exhibition "Paraska Plytka-Horytsvit. Overcoming Gravity" at Mystetskyi Arsenal. The visual analysis focuses on compositional structure, ornamental systems, stylistic features, and the interaction between text and image. The combination of archival research and in-situ observation allows for a more comprehensive interpretation of the artist's work, considering both its visual language and its cultural and symbolic meanings.

The aim of this study is to analyze the amateur book heritage of Paraska Plytka-Horytsvit within the context of Ukrainian visual culture of the twentieth and early twenty-first centuries, to identify its figurative, stylistic, as well as material and technical characteristics, and to determine the role of the author's book as a factor in the preservation of local cultural memory and the formation of national visual identity. Additionally, the study seeks to demonstrate the relevance of this artistic practice for contemporary visual culture, highlighting its potential significance for artists, designers, and illustrators interested in amateur techniques, handmade aesthetics, and the reinterpretation of vernacular traditions in modern creative processes.

General regulations

The life path of Paraska Plytka-Horytsvit (1927–1998) was marked by dramatic trials that profoundly shaped her worldview and creative practice. Born in the Hutsul village of Bystrets in the Carpathian region, Paraska received only primary education (four years of schooling); but under the influence of her erudite father, she acquired foreign language skills from an early age, including German. During the Second World War, the young Paraska became involved in the national liberation movement, serving as a liaison for the Ukrainian Insurgent Army (UPA) under the pseudonym "Lastivka," delivering food and clothing to underground shelters used by insurgents. In 1945, she was arrested by Soviet authorities; due to her young age, she avoided execution but was sentenced to ten years in corrective labor camps. Along with thousands of other young women from Western Ukraine, Paraska was deported to Siberia in freight trains.

After her release, Plytka-Horytsvit rarely spoke about her experience of imprisonment, believing that such memories

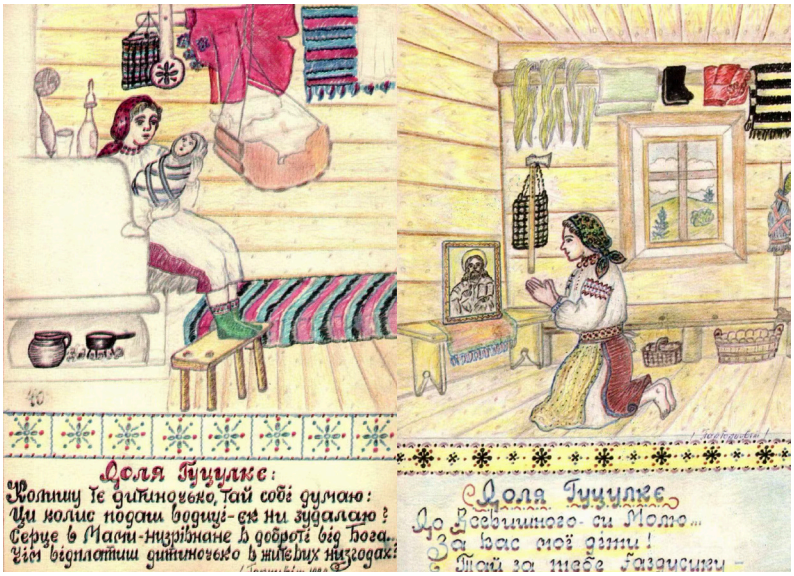


Fig. 1. Paraska Plytka-Horytsvit. The Fate of a Hutsul Woman, 1992. Paper, colored pencils, felt-tip pens, and a ballpoint pen [photo by Library of Ukrainian Art]

brought only pain and despair. Instead, she emphasized that her survival had been sustained by the humanity and compassion she encountered among doctors and fellow prisoners. During her incarceration, Paraska made a personal vow that, if she survived, she would devote her life to the glorification of God's peace on earth. This inner commitment determined the course of her subsequent life and became a spiritual imperative of her creative practice. She chose a life of seclusion, settling apart from her family and remaining solitary for the rest of her life. Distancing herself from the world in order to fulfill this vow, the artist adopted the double surname-pseudonym "Plytka-Horytsvit" and led what she herself described as a "hidden" life. Within this voluntary seclusion, she found her own path to spiritual self-expression, leaving behind a substantial creative legacy that continues to resonate today. Thus, the traumatic experience of war, repression, and exile, combined with profound religiosity and patriotism, laid the foundation for her subsequent mission—serving art as a form of spiritual practice and a means of preserving native culture. Paraska Plytka-Horytsvit consciously renounced personal comforts and devoted herself entirely to creative work, transforming her life into a form of monastic dedication to her artistic vocation.

The creative activity of Paraska Plytka-Horytsvit unfolded primarily in the second half of the twentieth century and developed under the specific conditions of the Soviet cultural field. By origin and vocation, a self-taught folk artist, she effectively remained outside the official Soviet cultural institutions. Plytka-Horytsvit had no formal artistic education



Fig. 2. Paraska Plytka-Horytsvit. Portrait of Lesia Ukrainka. Second half of the twentieth century. Cardboard, gouache [photo by Postimpreza]

and was not a member of any creative unions of the USSR. Moreover, her biography—the stigma of a "political" offender, her religious commitment, and the explicit national motifs present in her work—effectively precluded public recognition by Soviet authorities. It is therefore unsurprising that none of her numerous books were officially published during her lifetime; the first editions appeared only after Ukraine gained independence.

Despite the official authorities' lack of recognition, a distinctive intellectual circle gradually formed around Plytka-Horytsvit. During the 1960s, representatives of the Ukrainian creative intelligentsia – the so-called Sixtiers – visited her, perceiving her as a living embodiment of folk wisdom. Her home frequently hosted ethnographers, linguists, and artists interested in the treasures of folklore and local dialects she preserved. Some scholars have referred to Paraska as the "Hutsul Homer" [4] in recognition of the scale and epic character of her documentation of her people's life. Throughout her life, Plytka-Horytsvit collected, recorded, and reinterpreted the oral folk tradition of the Hutsuls. Her personal recollections and essays provide detailed accounts of Hutsul childhood, everyday life, and customary practices. A central place in the worldview and creative work of Plytka-Horytsvit was occupied by religiosity, closely intertwined with folk culture. According to researchers, 30 of Paraska's 46 large handwritten books are devoted to spiritual and theological themes (treatises, hagiographies, and prayerful reflections), while another 16 books consist of philosophical essays, with the remainder comprising poetry and folkloristic studies.

The visual art of Plytka-Horytsvit is likewise deeply rooted in the Hutsul religious tradition. She worked primarily in the style of folk primitivism (often referred to as "naïve painting"). The thematic scope of her numerous works includes series devoted to the life of the Hutsuls in the mountains – most notably the cycle The Fate of a Hutsul Woman [Fig. 1], which depicts the everyday life and festive moments of a highland woman in both joy and sorrow, as well as portraits of prominent figures of Ukrainian culture (Taras Shevchenko, Lesia Ukrainka [Fig. 2], Ivan Franko, Princess Olha, Olha Kobylianska, among others), and hundreds of icons on religious subjects. Significantly, even the decoration of her handwritten books was transformed by Paraska into a sacral folk practice: creating paper cuttings as a form of spiritual release, she consistently incorporated the cross as a constant symbol of faith and spiritual protection [Fig. 3]. These paper ornaments functioned as an organic extension of the book,



Fig. 3. Paraska Plytka-Horytsvit. Book decoration for Reflections in Praise of God. Second half of the twentieth century. Paper cutting, paper, cardboard, ballpoint pen [photo by Spravzhnia Varta journal]



Fig. 4. Paraska Plytka-Horytsvit. Icons in manuscripts. Second half of the twentieth century. Paper, colored pencils, and a ballpoint pen [photo by Ukrinform]

marking its completion as a significant event in the inner life of Paraska Plytka-Horytsvit.

The amateur book, in the context of naïve art, is a handcrafted publication by a non-professional author that combines literary text and visual imagery. Naïve art in general is characterized by the creative practices of self-taught artists, often rural creators without formal artistic education. Throughout her life, Paraska Plytka-Horytsvit produced handwritten authorial books in which she served as writer, artist, and publisher of her own works. Her literary output is remarkable for both its scale and genre diversity. Researchers have identified 46 large handwritten books (each comprising up to 500 pages) united in the series A Gift to the Native Land, as well as approximately 100 smaller booklets and stitched notebooks.

In the artist's manuscripts, textual pages are transformed into distinctive visual compositions: the author rendered the letters in a neat decorative script, framing each page with ornamental borders, headpieces, and tailpieces executed in colored pencils or felt-tip pens. In addition to abstract ornamentation, she incorporated her own drawings, icons, and decorative elements into the books, which either illustrated the written content or complemented it symbolically. For example, in spiritual collections, prayer texts are accompanied by small inserted reproductions of icons [Fig. 4] and festive greeting cards, outlined with the author's own decorative drawing; in ethnographic narratives, they are complemented by her photographs and drawings depicting figures from Hutsul



Fig. 5. Paraska Plytka-Horytsvit. Decorative embellishment of Paraska Plytka-Horytsvit's books. Second half of the twentieth century. Cardboard, paper [photo by Vogue UA]

legends or scenes of village life (celebrations, folk rituals, and related practices). In this way, the verbal and visual components in Plytka-Horytsvit's books form a unified narrative: the reader perceives her work not only through the semantic content of the words but also through their graphic embodiment, color palette, and page composition.

It is significant that each book created by Paraska Plytka-Horytsvit possessed a distinctive artistic image. The books differed from one another both thematically and stylistically, a variation determined by the content of the text as well as by the author's emotional state at the time of creation. For instance, the handwritten cycle of prayers The Wreath of Love for God is designed in a more restrained manner, with a predominance of vegetal ornamentation and canonical images of saints, whereas collections of fairy tales or an "adventure novel" are characterized by a more vivid color palette, naïve depictions of fantastical creatures, and insertions of magazine cut-outs featuring exotic landscapes, among other elements. In some of the smaller notebooks, she experimented with form: for example, there are "album-like" booklets in which the text is positioned alongside a large drawing across a double-page spread, as well as notebooks with cut-out pages that turn in a manner similar to children's toy books. All of this indicates that Plytka-Horytsvit intuitively grasped the principle of synthesizing word and image within the book, a characteristic feature of the artistic book.

Her handmade books may be compared to medieval illuminated manuscripts or to contemporary graphic novels; however, they belong to a different tradition—the tradition of naïve and sincere vision, in which the author lacked academic training yet possessed an inner necessity to express herself through the combination of text and image. As a result, unique works emerged in which "text transforms into image," and the book functions simultaneously as a literary and an artistic work.

The creation of each book constituted a genuine craft of manual labor for Paraska Plytka-Horytsvit, requiring time, concentration, and inventiveness. From the initial concept to the final finishing, she carried out all stages of book production independently, often employing readily available materials and folk techniques. The first step was the writing of the text. Possessing calligraphic skills, Paraska Stepanivna hand-copied her works onto separate sheets of paper, most commonly of standard notebook or album format. She wrote carefully, using a legible decorative script, frequently marking margins and lines in pencil to ensure textual alignment. In the early 1980s, after she was given a typewriter, the artist began retyping some of her previously handwritten texts and assembling larger volumes from smaller notebooks.

Particular attention was devoted by the artist to the visual decoration of the pages. As researchers note, "she adorned

each sheet with drawn ornaments." Simple materials were used for this purpose, including colored pencils, felt-tip pens, watercolor paints, and occasionally colored paper for appliqué. The ornamental motifs of Paraska Plytka-Horytsvit are rooted in Hutsul folk art and include stylized flowers, birds, and geometric patterns reminiscent of embroidered designs or motifs painted on traditional wooden chests. She also incorporated traditional techniques into the decoration of her books: in some instances, pages are adorned with actual embroidery applied to inserted linen pieces or with lace along the edges, resembling the framing of a ritual towel. Paraska likewise employed the paper-cutting technique; in several books, cut-out paper snowflakes and figures have been identified, affixed to the pages for decorative effect [Fig. 5]. The combination of heterogeneous materials paper, fabric, threads, printed cut-outs, and photographs endowed her books with the characteristics of a distinctive collage, rendering each copy a unique artistic object.

The final stage involved processing the binding and stitching the book. Initially, the artist either manually sewed the bundle of written sheets with strong threads or fastened it with wire. Subsequently, she pierced holes along the spine and inserted small furniture nails to reinforce the structure. The covers were made from thick cardboard or plywood, which she wrapped with fabric and paper, using homemade paste as an adhesive. The outer cover was designed with the same meticulous care as the inner pages. The artist hand-painted the title and authorship, added decorative elements, and, in some cases, inserted her own photograph or a thematic illustration. For instance, one of the large books from the Gift to the Native Land cycle features a dark-blue textile cover, decorated with a hand-embroidered sun and a beaded inscription.

Accordingly, the material dimension of Plytka-Horytsvit's books constitutes an integral part of their "narrative" as art objects. The process of creation – from the first written line to the final nail in the binding – becomes a component of the artist's creative expression. Every scratch left by the pen, every zigzag of ornamentation, and each fragment of fabric woven into the structure functions as a trace of the author's hand and inner world, endowing the books with particular artistic and c ultural value.

Conclusions

A distinctive feature of Paraska Plytka-Horytsvit's book practice is the close integration of word and image. Each of her handcrafted books functioned simultaneously as a literary work and as an artistic artefact. The artist not only authored the texts but also designed their visual form, carefully producing the pages through calligraphy or typewriting, subsequently sewing them into booklets and decorating them by hand. All dozens of Plytka-Horytsvit's volumes featured handmade bindings, produced from readily available materials (including leather) and adorned with original decorative elements. She extensively employed the traditional vytynanka technique; paper-cut ornaments served both as book illustrations and as decorative appliqués on the covers and pages of the manuscripts. Vytynanky were characterised by refined ornamental patterns and woven into the narrative of the book, adding a visual accent to the text. Contemporary scholars note that Paraska designed her books "in the manner of ancient manuscripts, adorned with unique ornaments," thereby effectively continuing the tradition of the handwritten book as a synthetic work of art. The legacy of Plytka-Horytsvit makes a significant contribution to the development of Ukrainian visual culture. Her handwritten books and illustrations expand the understanding of the boundaries of naïve art, demonstrating its capacity for complex artistic solutions and a high level of intellectual depth. At the same time, these works preserve and transmit Hutsul identity – language, rituals, folklore, and symbolism – making these elements accessible to contemporary viewers and readers. The spiritual dimension of her oeuvre deepens the religious worldview in Ukrainian visual culture, while the image of the woman creator in her work becomes an important component in the rethinking of women's roles within the national artistic canon. Her book-based mythmaking, documentation of the living Hutsul language, and creation of visual narratives constitute a distinct contribution to the history of Ukrainian art, demonstrating the close relationship between artistic innovation and cultural tradition.

The results of this study also demonstrate that the analysis of amateur and naïve artistic practices, particularly in the form of authorial books, requires a comprehensive methodological approach that combines formal-stylistic analysis, visual-semiotic interpretation, and contextual analysis. Such an approach makes it possible to examine these works not only as individual artistic expressions but also as complex cultural artefacts that integrate visual, textual, and material dimensions.

This analytical framework may be applied to the study of similar phenomena in other cultural contexts, including outsider art, vernacular artistic practices, and self-taught artistic production. It enables researchers to identify the relationships between artistic form, personal narrative, and cultural memory, thereby expanding the methodological tools for the study of non-academic art. At the same time, the findings of this research may be relevant not only for art historians but also for contemporary practitioners, including designers, graphic artists, and illustrators, particularly in the context of studying amateur techniques, handmade aesthetics, and the reinterpretation of vernacular traditions in modern visual practice. In this sense, the case of Plytka-Horytsvit can be considered as a representative example that contributes to the broader understanding of amateur artistic practices in global art history.

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Kopsavilkums

Rakstā aplūkots Paraskas Plitkas-Horicvitas *(Paraska Plytka-Horytsvit)* radītās amatiergrāmatas fenomens kā nozīmīga 20. gadsimta un 21. gadsimta sākuma Ukrainas vizuālās kultūras sastāvdaļa. Pētījumā analizēts mākslinieces biogrāfiskais konteksts kā būtisks faktors viņas autorības un vizuālās valodas veidošanā, īpaši izceļot hucuļu tradīciju, reliģiskā pasaules uzskata un mutvārdu kultūras ietekmi uz viņas radošās darbības struktūru un saturisko nozīmi. Īpaša uzmanība pievērsta amatiergrāmatas definēšanai kā specifiskai Ukrainas naivās mākslas formai, kurā sintezēts ar roku rakstīts teksts, vizuālā domāšana un amatnieciskas izgatavošanas prakses. Pētījumā analizētas Plitkas-Horicvitas ar rokām darināto grāmatu materiālās, kompozicionālās un tehniskās iezīmes, tostarp rokraksts, ilustrācijas, ornamentika, kolāža, papīra izgriezumu tehnika, tekstila elementi, iesiešanas paņēmieni un individualizētu grāmatu vāku veidošana. Rakstā raksturotas viņas vizuālā naratīva savdabīgās stilistiskās iezīmes, simbolu sistēmas un ikonogrāfiskie modeļi, īpašu uzmanību pievēršot kristīgajiem motīviem, sievietes-radītājas tēla reprezentācijai un lokālā hucuļu pasaules skatījuma artikulācijai. Uzsvērta arī hucuļu dialekta nozīme kā tēlainās izteiksmes līdzeklim un kultūras atmiņas saglabāšanas instrumentam. Noslēgumā pētījums atklāj, ka Paraskas Plitkas-Horicvitas mākslinieciskais mantojums veido alternatīvu Ukrainas vizualitātes modeli, kas apzināti pastāv neatkarīgi no akadēmiskajiem kanoniem un ideoloģiskajiem ietvariem. Viņas radītās grāmatas sniedz nozīmīgu ieguldījumu autorgrāmatas prakšu, sieviešu mākslas un Ukrainas nacionālās naivās mākslas attīstībā, vienlaikus aktualizējot lokālā kultūras mantojuma saglabāšanas jautājumus. Pētījums iezīmē plašas perspektīvas turpmākiem starpdisciplināriem pētījumiem, kā arī mākslinieces unikālā rokrakstu mantojuma interpretācijai un reprezentācijai muzeju vidē.

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MODELLING CONSTRUCTED WETLANDS: APPROACHES FOR ENVIRONMENTAL ENGINEERING

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Abstract. Constructed wetlands (CWs) are treatment systems whose performance depends on interacting hydraulic, biochemical and ecological processes. This structured review of a curated literature corpus evaluates process-based, empirical, data-driven and hybrid modelling approaches to support model selection in environmental engineering. Sixty-seven full-text files published principally in 2010-2025 were screened using predefined eligibility criteria. After three duplicate copies and one supplementary file were removed, 63 unique reports were assessed and 24 directly relevant sources were retained. Within this corpus, process-based models offered the most direct mechanistic interpretation but required extensive parameterization; empirical tools supported bounded design tasks; and machine-learning models predicted well within represented datasets but seldom included cross-site validation. A Cubist model trained on 618 records from 31 studies achieved test-set R^2 values of 0.92 for ammonium and 0.93 for chemical oxygen demand. A Bayesian heavy-metal model produced validation Nash-Sutcliffe efficiencies of 0.28-0.71, while a temporal long short-term memory model achieved R^2 = 0.93 for chemical oxygen demand over a 19-day test period. The proposed selection framework links model choice to engineering objective, scale, data availability, interpretability, validation evidence and uncertainty. Model complexity should match the decision, and predictive performance should be reported outside the calibration domain.
Keywords: constructed wetland modelling, environmental decision support, process simulation, predictive validation, uncertainty

Introduction

Constructed wetlands (CWs) use vegetation, porous media and microbial communities to treat wastewater, stormwater and diffuse agricultural pollution [1, 2]. Their low energy demand and capacity to provide habitat, water storage and landscape value make them relevant nature-based infrastructure. Their apparent simplicity, however, conceals strongly coupled flow, transport, sorption and transformation processes. Hydraulic short-circuiting, seasonal temperature variation, substrate ageing, oxygen transfer and changing pollutant loads can all alter treatment performance. Models are therefore used to test design alternatives, estimate effluent quality and examine behaviour that cannot be observed directly.

CW modelling has progressed from areal first-order expressions and compartment models to reactive-transport platforms and machine-learning algorithms. Process-based models such as CW2D, CWM1 and BIO_PORE represent selected biochemical and hydraulic mechanisms [3, 4]. Simplified tools such as RSF_Sim translate a narrower process description into a practical design calculation. Data-driven methods, including random forests, Cubist regression and long short-term memory (LSTM) networks, estimate relationships from monitoring or literature datasets [6-13]. Hybrid approaches combine mechanistic structure with statistical learning or connect site models to catchment hydrology.

The central engineering problem is not a lack of models but a lack of comparable evidence for selecting among them. A high coefficient of determination obtained from one dataset cannot be used to rank a model against an algorithm tested on another pollutant, concentration range or validation scheme. Process detail does not by itself guarantee reliable prediction, and high within-sample accuracy does not establish transferability to another wetland. Earlier comparisons already distinguished models intended for process understanding from models intended for design support [14], yet recent machine-learning studies have widened the gap between reported predictive accuracy and evidence needed for engineering adoption.

The available literature is also fragmented by wetland configuration, pollutant and scale. Nutrient and organic-matter models are relatively mature, whereas pathogen and emerging-contaminant modelling remains less developed. Catchment applications examine spatial arrangement and flow regulation, while most treatment models operate at cell or system scale. Sensitivity analysis, uncertainty bounds and external validation are reported inconsistently. These limitations reduce the usefulness of nominally accurate models for permitting, performance guarantees and long-term asset management.

This review addresses five questions: (1) which model families are used for CWs; (2) for which wetland configurations, pollutants, scales and decisions are they suitable; (3) what data, calibration and computational demands do they impose; (4) how convincingly are validation, sensitivity, uncertainty and transferability demonstrated; and (5) how should an environmental engineer select an approach under practical constraints? The original contribution is a decision framework linking model choice to the engineering task rather than treating reported accuracy as the sole criterion.

Materials and Methods

Review design and evidence corpus

The study was conducted as a structured review of a curated evidence corpus. Literature searches were performed iteratively over approximately six months while the manuscript was being prepared. Open scholarly search platforms and publisher-accessible scientific databases were searched using combinations of terms for the wetland system and the modelling approach. The core search expression was: ("constructed wetland*" OR "treatment wetland*" OR "artificial wetland*") AND (model* OR simulat* OR "process-based" OR empirical OR hydraulic* OR biochemical OR "reactive transport" OR "machine learning" OR "artificial intelligence" OR hybrid OR catchment). Additional records were identified by backward and forward citation checking. Because complete exports and stable result counts from all searches were not retained, the review does not claim exhaustive systematic retrieval.

The evidence base consisted of 67 locally archived full-text PDF files published principally in 2010-2025. An older source was retained only when it provided foundational

process information that was not adequately represented by a later publication. Eligible sources concerned engineered constructed, treatment or artificial wetlands and developed, applied, validated, compared or critically reviewed a model. Relevant approaches included hydraulic, biochemical, reactive-transport, empirical, statistical, machine-learning, hybrid and catchment models that represented CWs explicitly. Studies of natural wetlands, generic wetland remote sensing, global methane modelling, or treatment performance without a modelling contribution were excluded from the main synthesis. A natural-wetland study was retained only when it provided explicitly identified transferable methodological context. Reviews were used for classification and research-gap synthesis; direct performance claims were taken from primary modelling studies.

Three duplicate article copies and one supplementary-information file were removed from the 67-file archive. The remaining 63 unique reports were screened by title, abstract and, when required, full text. Both authors reviewed the eligibility decisions, and differences were resolved through discussion. Twenty-four sources were retained because they directly addressed at least one review question. Decisions and exclusion reasons were recorded in the accompanying screening log. This bounded-corpus approach makes the evidence pathway auditable while acknowledging that it cannot establish exhaustive coverage of all publications through 2025. Figure 1 summarizes the screening process and final evidence corpus.

Data extraction and critical appraisal

For each retained study, information was extracted on wetland configuration, wastewater type, pollutant, model family, software, spatial scale, dataset size, inputs, calibration, validation, performance metrics, sensitivity analysis, uncertainty treatment, interpretability and proposed engineering use. Both authors checked the extracted evidence against the full texts. Numerical values were linked to a page, table or figure in the evidence matrix.

Primary studies were appraised using ten reporting and validity criteria: transparent data origin; defined inputs and outputs; documented calibration; validation separated from calibration; an appropriate temporal or spatial validation design; performance metrics with units; sensitivity analysis; uncertainty quantification; examination of transferability; and sufficient model description for reproducibility. Criteria were recorded as yes, partial, no or not applicable. They were not summed into a single quality score because weaknesses in different domains are not interchangeable.

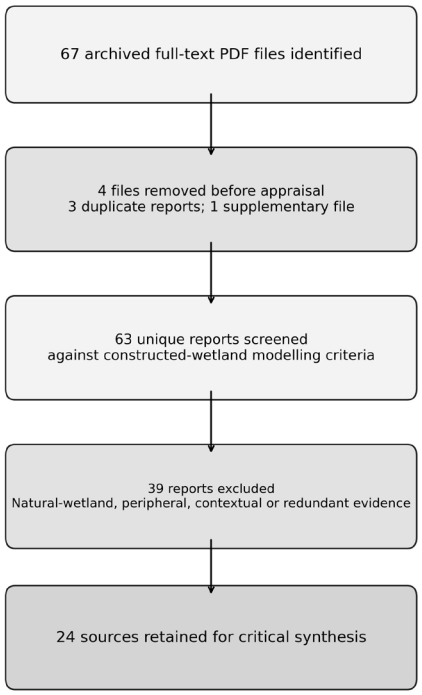


Fig. 1. Screening of the curated evidence corpus [construction by the authors]

Reported metrics were synthesized only within their study context. Calibration and validation results were separated, and R^2 was not treated as a universal measure of superiority. Direct comparisons were accepted only when algorithms were tested on the same data and outcome. Cross-study values are reported as examples of achieved performance, accompanied by dataset and validation information. No pooled effect or meta-analysis was attempted because the evidence is heterogeneous.

Results

Model families and intended uses

Process-based models describe selected physical, chemical and biological mechanisms. Yuan et al. grouped them into hydraulic, biochemical, reactive-transport, plant and clogging submodels [4]. Coupling these components can improve process representation, but each additional component introduces parameters, boundary conditions and identifiability problems. CW2D focuses on aerobic and anoxic transformations of organic matter and nitrogen, whereas CWM1 extends the reaction network to anaerobic processes and broader COD, nitrogen and sulphur fractionation. Implementations in HYDRUS connect these reaction sets to variably saturated flow and solute transport. BIO_PORE adds biofilm and structural development using a multiphysics environment, illustrating the detail possible when data and specialist capacity are available [3, 4].

Mechanistic detail is particularly valuable when the engineering question concerns why performance changes. Kadaverugu used OpenFOAM to link Richards-equation flow with reactive transport in a horizontal subsurface-flow wetland [15]. Bravo-Riquelme et al. represented As(III) sorption, ferrihydrite adsorption and coprecipitation in a horizontal-flow prototype [16]. The arsenic model reproduced the principal abiotic processes and estimated 14.7% arsenic removal by media sorption and 50.5% iron removal by ferrihydrite filtration, but its calibration to a single non-vegetated prototype limits immediate transfer to field CWs with biotic processes.

Transparent compartment models remain useful when their scope is bounded. Xuan et al. used STELLA to represent nitrogen transformations and plant and media effects in a subsurface upflow system [17]. Reported calibration and validation R^2 values were 0.9998 and 0.9644, respectively, but these results describe one configuration and should not be interpreted as general superiority over later models. RSF_Sim deliberately uses simple mass and volume balances with few inputs for retention soil filters treating combined sewer overflows [5]. Its limited scope is an engineering strength when the decision concerns COD and ammonium performance under the intended loading envelope, but it is unsuitable for detailed multi-contaminant analysis.

This distinction supports three practical model roles: research models used to understand interacting processes; focused models used to investigate one phenomenon; and design-support models built for a defined decision [14]. Complexity should follow the decision. A detailed reactive-transport model is justified when media selection, redox zonation or contaminant fate must be resolved; it is excessive when the

available data support only preliminary sizing.
The main characteristics, data requirements, strengths, limitations and appropriate uses of the reviewed model families are summarized in Table 1.

Data-driven models

Data-driven models estimate input–output relationships without explicitly representing every removal mechanism. Their strengths are flexibility and rapid prediction after training. Their principal risks are dependence on the sampled domain, data leakage, overfitting and weak mechanistic explanation.
Nguyen et al. compiled 618 records from 31 studies and compared random forest, classification and regression trees, support-vector machines, k-nearest neighbours and Cubist regression for subsurface CW design [8]. Cubist produced test-set R^2 values of 0.92 for ammonium and 0.93 for COD, with RMSE values of 7.77 and 21.77 mg L^{-1}. The common dataset permits a defensible comparison among the five algorithms. Nevertheless, literature-derived records combine sites, operating regimes and reporting practices, and a random record-level split is weaker evidence of geographic transferability than leaving entire studies or sites out of training.
Zhang and Jiang used genetic-algorithm-assisted feature selection and random forests to predict removal efficiency from four literature datasets containing 320 ammonium, 299 total-nitrogen, 306 total-phosphorus and 346 COD records [13]. Their reported R^2 values were 0.9405, 0.8277, 0.8136 and 0.8877, respectively. Feature-importance and partial-dependence analyses improved interpretability, but these values should not be compared directly with those of Nguyen et al. because the targets, records and preprocessing differ.
Time-dependent monitoring requires a different validation logic. Yang et al. divided a full-scale vertical-flow CW dataset chronologically into 166 training days and 19 test days [10]. The LSTM model achieved $R^2 = 0.93$ for COD on the raw test set and outperformed the other algorithms tested on the same data. The chronological split is preferable to random mixing for forecasting, although the short test period limits evidence about seasonal robustness.
Zhang et al. developed Bayesian linear and mixed models for Cd, Cu, Pb and Zn in stormwater CWs [12]. The mixed model accounted for differences among 12 source studies. Mean calibration Nash–Sutcliffe efficiency ranged from

Table 1. Comparison of constructed wetland model families
[construction by the authors based on 3, 4, 5, 8, 14, 20, 21]

Model family	Main representation	Typical data demand	Principal strength	Principal limitation	Appropriate use
Empirical design support	Removal coefficients, mass balances or compartments	Low–medium	Transparent and rapid	Valid only within a bounded design envelope	Screening and preliminary sizing
Mechanistic process based	Flow, transport and biochemical or geochemical reactions	High	Causal interpretation and scenario testing	Calibration burden and parameter non-identifiability	Detailed design and process investigation
Data driven/ML	Statistical relationships learned from observations	Medium–high	Flexible nonlinear prediction	Weak extrapolation and possible data leakage	Forecasting within a represented operating domain
Hybrid	Physical model coupled to statistical learning	High	Connects physical constraints with adaptive prediction	Compound calibration and uncertainty	Scale coupling, surrogate modelling and residual correction
Catchment integrated	Wetland modules within watershed or urban-water networks	Medium–high	Evaluates placement and cumulative effects	Simplified cell-scale treatment processes	Landscape planning and flow management

0.51 for Pb to 0.75 for Cu; validation values ranged from 0.28 for Pb to 0.71 for Zn. The decline from calibration to validation is informative: site effects improve fit, but metal-specific prediction remains uncertain. These values represent Nash-Sutcliffe efficiency rather than R^2 and indicate weaker validation performance than the calibration results.

Data augmentation can improve apparent accuracy without creating new independent environmental information. Dong et al. used 220 datasets and generated virtual samples for ammonium and COD prediction [18]. Average RMSE reductions of 21.5% and 23.8% were reported after augmentation. These results are promising for small datasets, but virtual observations inherit assumptions from the observed sample and cannot substitute for external field validation. Yin et al. compared four algorithms using 499 observations from an electromagnetic-field-enhanced wetland [11]. Random forest obtained test-set R^2 = 0.9446 and RMSE = 2.4328 mg L−1. This supports prediction within that enhanced configuration, not general application to conventional CWs.

Together, these studies show that data-driven performance must be interpreted through the validation unit. A model validated on randomly held-out records answers whether it interpolates within the compiled domain. A temporal split tests near-term forecasting. A study- or site-held-out design more directly tests transferability. Reporting only the final metric hides this distinction.

Hybrid, hydraulic and catchment approaches

Hybrid approaches combine a physical representation with a statistical component or connect models across scales. Rezaeianzadeh et al. used uncalibrated SWAT baseflow and stormflow estimates as ANN inputs for daily water-level prediction [19]. Training and test Nash–Sutcliffe efficiencies were 0.73 and 0.52, with RMSE values of 14.5 and 17.8 cm. The case concerned a natural headwater wetland and is therefore transferable methodological context rather than direct evidence of CW treatment performance. Its importance lies in demonstrating how approximate hydrological structure can supply useful predictors where field data are limited.

Hydraulic representation is fundamental because nominal retention time can conceal short-circuiting and dead zones. Wei et al. found pulse injection with NaCl or Rhodamine WT to be common in recent tracer studies and emphasized dimensionless residence-time-distribution indices for comparison [20]. Calibrated hydraulic models can identify inlet and outlet effects, dispersion and inactive volume, but their value depends on tracer data and on avoiding false precision in unmeasured flow paths.

At catchment scale, Peng et al. incorporated a CW module into WSIMOD and evaluated seven urban wetlands in Enfield, London [21]. Scenarios converting 1% of catchment area to wetlands reduced high flows by 18–23% and increased low flows by 35–50%; parallel placement attenuated peaks more effectively than series placement. These are scenario-specific results, but they show that spatial arrangement is an engineering variable that cell-scale treatment models cannot address.

Hybrid models are therefore most valuable when the components have distinct roles: a hydrological model supplies physically meaningful boundary conditions, a process model constrains transformations, and a statistical component learns residual or nonlinear behaviour. Simply placing two algorithms together does not make a model more transferable. Each component must be validated, and uncertainty must be propagated through the coupling.

Pollutants, validation and uncertainty

Nitrogen, COD and phosphorus dominate the quantitative modelling literature because monitoring data and established reaction structures are comparatively available [22]. Heavy-metal studies increasingly use statistical models, while mechanistic trace-metal models remain configuration-specific. Pathogen removal is still commonly represented by simple decay relationships. Emerging contaminants require sorption, biodegradation, photolysis and plant-uptake descriptions that vary strongly by compound [3, 23, 24]. The PFAS and pharmaceutical literature is expanding, but model parameterization remains constrained by limited long-term field evidence.

Validation is less consistent than model development. Mechanistic studies often calibrate many parameters against one experiment or site. Literature-trained ML studies provide larger record counts but may mix non-independent observations and heterogeneous reporting. Few studies evaluate performance at an entirely unseen site. Sensitivity analysis is discussed more often than formal uncertainty propagation, and prediction intervals are uncommon in the reviewed ML applications.

The practical consequence is that an engineering model should not be accepted solely because it reproduces observed concentrations. Credibility requires a stated application domain, separation of calibration and validation, sensitivity testing for influential parameters, and uncertainty bounds appropriate to the decision. A screening calculation may tolerate wide uncertainty; a regulatory performance guarantee cannot. Selected quantitative results from the reviewed studies, together with their main validation limitations, are summarized in Table 2.

Engineering model-selection framework

Model selection begins with the decision, not the software. For preliminary sizing with limited site data, an empirical or simplified design-support model is preferable if the project remains within its calibration envelope. For detailed investigation of redox pathways, media reactions or clogging, a mechanistic model is appropriate when hydraulic and kinetic parameters can be measured or calibrated. For operational forecasting with a sufficiently long monitoring record, a data-driven time-series model may be effective, provided validation is chronological and prediction intervals are reported. Catchment placement and flow regulation require a watershed or urban-water model with explicit CW representation. Hybrid models are justified when coupling resolves a defined scale or knowledge gap.

Five questions should be answered before model adoption. First, what output will change the engineering decision: effluent concentration, removal load, hydraulic residence time, flood attenuation or operational control? Second, does the available dataset represent the expected loading, climate and wetland configuration? Third, is mechanistic explanation required by designers or regulators? Fourth, has the model been validated at the relevant temporal and spatial scale? Fifth, is uncertainty small enough for the consequence of an incorrect decision?

The decision matrix in Table 3 translates these questions into model choices. It treats interpretability, calibration burden and transferability as co-equal with accuracy. This avoids two common errors: applying an elaborate process model without sufficient parameter data, and applying a high-performing ML model outside its training domain.

The overall engineering model-selection framework, linking the decision context to the appropriate modelling approach, is illustrated in Figure 2.

Table 2. Selected quantitative evidence and validation limitations [construction by the authors from the cited full texts]

Study	Model/data	Reported validation result	Critical interpretation
Xuan *et al.* [17]	STELLA; one subsurface upflow system	Calibration R^2 0.9998; validation R^2 0.9644	Strong case fit; narrow system-specific evidence
Rezaeianzadeh *et al.* [19]	SWAT–ANN; 279 days; natural headwater wetland	Test NSE 0.52; RMSE 17.8 cm	Transferable hybrid method, not direct CW-treatment evidence
Zhang *et al.* [12]	Bayesian mixed model; 12 source studies	Validation NSE 0.28–0.71 by metal	Site effects matter; performance declines outside calibration
Nguyen *et al.* [8]	Five ML algorithms; 618 records from 31 studies	Cubist test R^2 0.92 NH_4-N and 0.93 COD	Strong common-dataset comparison; site-held-out validation not demonstrated
Yang *et al.* [10]	LSTM; 166 training and 19 test days	COD test R^2 0.93	Chronological validation; short test interval
Dong *et al.* [18]	ML with virtual samples; 220 records	Average RMSE reductions 21.5% and 23.8%	Improved internal prediction; synthetic data do not replace external validation
Zhang and Jiang [13]	GA–RF; 299–346 records by pollutant	R^2 0.8136–0.9405	Interpretable feature analysis; metrics cannot be ranked against other datasets
Yin *et al.* [11]	Four ML models; 499 observations	RF test R^2 0.9446; RMSE 2.4328 mg L−1	Strong within-system result for an enhanced CW configuration
Peng *et al.* [21]	WSIMOD catchment scenarios	High flows −18–23%; low flows +35–50% at 1% area	Useful spatial decision evidence; scenario and catchment specific

Table 3. Engineering model-selection matrix [construction by the authors]

Decision context	Preferred model family	Minimum evidence	Required caution
Early feasibility or preliminary sizing	Empirical design support	Representative influent, loading and configuration	Do not extrapolate beyond calibration envelope
Final process design or media investigation	Mechanistic process based	Hydraulic parameters, kinetics, calibration and independent validation	Test parameter sensitivity and identifiability
Short-term operational forecasting	Time-series ML	Continuous monitoring covering operating variability	Use chronological validation and prediction intervals
Prediction from multi-site historical data	Interpretable ML or statistical model	Harmonized records and site identifiers	Hold out complete sites or studies during validation
Catchment placement and flood/flow assessment	Integrated watershed or urban-water model	Spatial network, climate and flow data	Cell-scale treatment may be simplified
Data-scarce system with physical knowledge	Hybrid or simplified mechanistic model	Defensible boundary conditions and limited calibration data	Propagate uncertainty from every component
Regulatory performance assessment	Transparent validated model	Traceable inputs, independent validation and uncertainty bounds	Accuracy alone is insufficient for compliance decisions

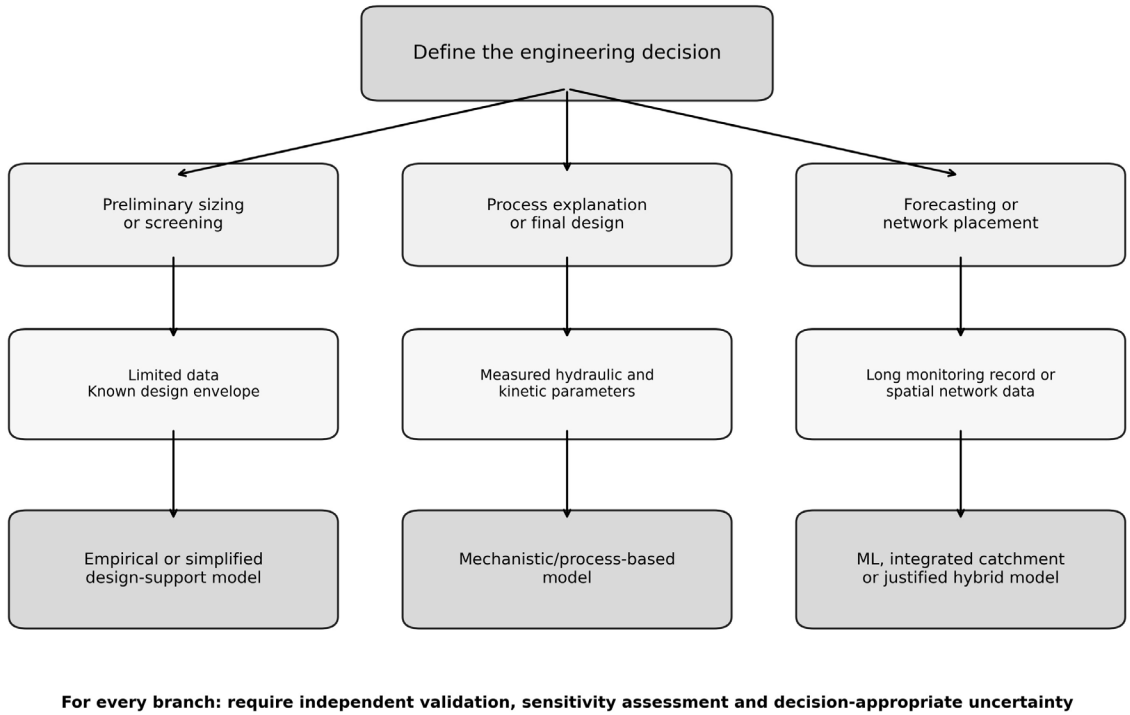


Fig. 2. Engineering framework for constructed-wetland model selection [construction by the authors]

Discussion

The reviewed evidence does not support a universally superior CW model. Within the retained corpus, process-based models offered causal structure and scenario analysis but could be over-parameterized. Simplified models traded detail for usability and could be more credible when their application domain was explicit. Machine-learning methods provided strong interpolation in several compiled and monitored datasets, yet external-site validation was uncommon. Hybrid models were promising because they connected scales and forms of knowledge, but they also combined sources of uncertainty.

For environmental engineering practice, reporting standards are as important as algorithm development. Studies should identify the validation unit, publish data splits or code where possible, report errors in physical units, and distinguish measured from imputed or synthetic observations. Sensitivity analysis should precede calibration in highly parameterized models. Uncertainty should be carried into design outputs rather than mentioned only as a limitation.

The landscape context also matters. CWs are not isolated reactors: their area, connection, vegetation and position affect treatment, flow regulation and co-benefits. Catchment applications such as WSIMOD demonstrate that placement may influence high- and low-flow outcomes [21]. However, natural-wetland remote-sensing and methane models should not be presented as CW evidence unless a transfer pathway and engineering purpose are explicit. A focused connection to landscape planning is stronger than a broad catalogue of adjacent wetland research.

Several gaps remain. Pathogens and emerging contaminants lack transferable parameter sets and long-term validation. Hybrid and multi-stage CWs need modular models that exchange mass and uncertainty consistently. Data-driven studies need site-held-out testing and methods for detecting operation outside the training domain. Regulators and practitioners need open examples, calibration guidance and outputs tied to compliance criteria. Progress in these areas would make model sophistication actionable rather than merely computational.

This review is limited by its curated local corpus. Transparent screening and source-level verification improve auditability, but exhaustive coverage cannot be claimed without rerunning and documenting database searches. A future systematic stage would require rerunning and fully documenting the database searches. The principal conclusions are therefore a critical synthesis of the retained evidence, not estimates of publication frequency across the complete literature.

Conclusions

Constructed-wetland model choice should be determined by the engineering decision, available evidence and acceptable uncertainty.

Within the reviewed corpus, process-based models offered the most direct mechanistic interpretation when pollutant pathways, hydraulic behaviour or design mechanisms needed to be explained, but their credibility depended on identifiable parameters and independent validation. Simplified design-support models were preferable for bounded planning tasks when detailed data were unavailable. Machine-learning models achieved strong predictions within represented datasets - for example, test R^2 values of 0.92 and 0.93 for ammonium and COD in the Cubist study - but these results did not establish cross-site transferability. Temporal and site-held-out validation provided stronger evidence than random record splits.

Hybrid and catchment models extend CW analysis beyond the treatment cell, particularly for boundary conditions, spatial placement and flow regulation. Their components and propagated uncertainty must nevertheless be evaluated separately. Across all model classes, sensitivity analysis, prediction uncertainty and external validation remain less developed than calibration and accuracy reporting.

The proposed selection framework therefore gives equal weight to purpose, scale, data, interpretability, validation and uncertainty. Applying this framework can help environmental engineers choose models whose complexity is supported by the available information and whose outputs are defensible for design, operation and landscape-integrated water management.

Author statements

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Author contributions. Both authors conceptualized the study and defined the review scope. DL collected and analysed the literature and contributed to the synthesis of modelling approaches and pollutant-specific findings. LG contributed to writing and revision and reviewed the results. Both authors approved the final manuscript and accept responsibility for its content.

Conflict of interest. The authors declare no conflict of interest.

Data availability. No new experimental data were generated. The evidence matrix, screening log and search protocol are supplied as supplementary files with this manuscript. During manuscript preparation, the authors used ChatGPT and Perplexity to assist with organizing and checking textual material. The authors verified the cited sources, revised the content and accept responsibility for the final publication.

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Kopsavilkums

Mākslīgie mitrāji (constructed wetlands, CW) ir notekūdeņu attīrīšanas sistēmas, kuru efektivitāti nosaka hidraulisko, bioķīmisko un ekoloģisko procesu mijiedarbība. Šajā strukturētajā literatūras pārskatā izvērtētas procesos balstītas, empīriskas, datos balstītas un hibrīdas modelēšanas pieejas, lai palīdzētu izvēlēties piemērotākos modeļus vides inženierijas uzdevumiem. Pārskatā izmantota mērķtiecīgi atlasīta zinātniskā literatūra. Atbilstoši iepriekš noteiktiem atlases kritērijiem sākotnēji izskatīti 67 pilnteksta faili, kas galvenokārt ietvēra publikācijas no 2010. līdz 2025. gadam. Pēc trīs publikāciju atkārtotu kopiju un viena papildmateriālu faila izslēgšanas izvērtēti 63 unikāli avoti. No tiem padziļinātai analīzei atlasīti 24 avoti, kas tieši atbilda pārskata mērķim.

Analizētajā avotu kopā procesos balstītie modeļi vislabāk palīdzēja izskaidrot mitrājos noritošos mehānismus, taču to izmantošanai bija jānosaka daudzi parametri. Empīriskie modeļi bija piemēroti skaidri definētiem projektēšanas uzdevumiem. Savukārt mašīnmācīšanās modeļi sniedza precīzas prognozes apstākļos, ko aptvēra izmantotās datu kopas, bet to piemērotība citiem objektiem tika pārbaudīta reti. Cubist modelis, kura apmācībā izmantoti 618 datu ieraksti no 31 pētījuma, testa datu kopā sasniedza determinācijas koeficientu R^2 = 0,92 amonija un R^2 = 0,93 ķīmiskā skābekļa patēriņa prognozēm. Smago metālu modelim, kas balstīts Bajesa pieejā, Neša–Satklifa efektivitātes koeficients validācijā bija 0,28–0,71. Savukārt ilgās īstermiņa atmiņas (long short-term memory, LSTM) modelis ķīmiskā skābekļa patēriņa prognozēšanai 19 dienu testa periodā sasniedza R^2 = 0,93.

Piedāvātais modeļu izvēles ietvars saista inženiertehnisko uzdevumu un modelēšanas mērogu ar datu pieejamību, modeļa interpretējamību, validācijas rezultātiem un nenoteiktību. Modeļa sarežģītībai jāatbilst risināmajam uzdevumam, bet tā prognožu precizitāte jānovērtē un rezultāti jāatspoguļo arī apstākļos, kurus neaptver kalibrēšanai izmantotie dati.

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ARCHITECTURE OF SCHOOL BUILDINGS AND EDUCA-TIONAL SPACE IN LATVIA

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Abstract. The study provides a historical and chronological overview of the development of school architecture in Latvia under the influence of various political and economic factors, considering both histor-ical and contemporary contexts. The scientific contribution of the research lies in its evaluation of the transformation processes affecting school building architecture. The study traces the develop-ment of the educational system and the spatial-functional dynamics of school environments in the territory of Latvia from the eighteenth and nineteenth centuries onward, within a region historically shaped by a fluctuating and dynamic boundary between Western and Eastern cultures. The recognition and interpretation of this historical experience represent a significant value and a vital contribution to contemporary society at a time when the global world is undergoing rapid technological advancement.
Keywords: harmony, sustainability, school architecture, landscape, interior

Introduction

Nowadays, as the great powers' struggle intensi-fies over the redistribution of the Baltic states' spir-itual, economic, and political space, an idea first ex-pressed in 1920 at the historical Latvian intelligent-sia conference in Bulduri becomes relevant: the ne-cessity of consoli-dating Baltic intellectual, econom-ic, and political power and fostering diverse international scientific cooperation. The authors of these far-sighted ideas at the time were the conference intelli-gentsia – Z. A. Meierovics, K. Kasparsons, J. Pliekšāns (Rainis) [16]. The ideas of that era could not be realized due to war and occupation, but today they are still rec-ognized as far-sighted and relevant. The study of interconnections between architecture, so-ciety, and politico-economic factors remains a consistently relevant research topic [1].

The purpose of architecture is to create a harmo-nious, psycho-emotionally and functionally balanced environment that promotes the well-being of its us-ers, forming an integrated whole between architec-ture, landscape space, and interior design. However, in practice, this specif-ic interaction in new school buildings, reconstructions, and renovations is not always suffi-ciently balanced. The situation reveals deficiencies and points to the need for interdisciplinary solutions in contemporary school architecture. The relevance of the topic is substantiat-ed by the UN Resolution on environmental sustainability in con-struction and urban devel-opment, since 2022, and the EC initiative "New European Bauhaus," since 2021. Educational buildings, as a publicly significant and sensitive segment of buildings, particularly em-pha-size the need for high-quality spatial environ-ments.

A number of studies have been conducted on Lat-vian school architecture. Starting from the origins of schools in Latvia, which began near monasteries and simple single-story wooden buildings with traditional gable roofs in rural Latvia – the so-called folk schools – to the or-nate brick schools built in Latvian major cities in the 19th and 20th centuries, many of which continue to operate today [2; 4; 8; 9; 10; 17; 18; 22; etc.]. The range of studies is supplemented by rural schools built in manor houses [7].

After World War II, standardized brick schools were predominantly built in the Baltics. However, in architectural research concerning this specific period, schools constitute a small part of the overall research framework [12; 21; etc.). Since 1991, a new concep-tual approach to school design and landscap-ing has been identified in Latvian school architecture, associ-ated with a shift in paradigms and values, new quests for harmony, sustainability, and technological ad-vancements in mate-rial production. Latvian school architecture, within the context of global trends, strives to restore harmony for environmental users in all aspects, including increasing the presence of land-scape space indoors through extensively glazed fa-cades [5]. However, it should be emphasized that among the studies, there is little focus specifi-cally on school architecture and the spatial environment of schools in Latvia; it is more often a supporting factor for style, era, personality, or the processes being studied.

In parallel with architectural research, a number of studies have been conducted on the de-velopment of education in Latvia, the physical and psycho-emotional health of environmen-tal users, and other school-related fields in historical and contemporary contexts. Small-scale studies with an interdiscipli-nary focus exist for individual buildings [20; 17; 15].

Comprehensive studies specifically on Latvian school architecture in a historical and interdiscipli-nary context have not yet been conducted.

The aim of the research is to provide a broader historical overview of the dynamics of school archi-tecture in Latvia within the context of politico-economic processes.

The tasks of the research is to compile the histo-ry of school architecture in the territory of Latvia in chronological order from the 18th century to the pre-sent day, divided into four his-torical periods. The development of school building architecture in Latvia is closely linked to the country's political, economic, and social history, which can be distinguished into four significant periods: the Duchy period (18th–20th centuries), the period of the independent Latvian state (1918–1940), the Soviet occupation period (1945–1991), and the period follow-ing the restoration of Latvia's independence (since 1991). Each of these periods reflects dif-ferent stages of national devel-opment in both urban and rural contexts, while simul-taneously illustrating the role of the education system in the broader framework of economic and cul-tural growth. To identify the most significant factors influ-encing school architecture in Lat-via.

The object of the research is the compositional, functional, and qualitative evaluation of school archi-tecture within the context of politico-economic pro-cesses during the secondary education stage.

The methodology includes the collection and analysis of archival materials, on-site surveys and photographic documentation, comparative analysis, and the inductive method for gener-alizing the ob-tained data.

The contribution and scientific novelty of this specific research lie in the compilation of the history of school architecture from the late 18th century to the present day in Latvia, and an interdisciplinary evaluation of architectural and spatial dynamics with-in the context of politico-economic processes.



Fig. 1. The formation of schools in the context of urban development in the 18th/19th centuries (from left - German Gymnasium in Riga, German Realschule in Jelgava, Academia Petrina, Girls' Gymnasium in Jelgava [image created by the author, 2026 from internet resources]

History of school architecture in Latvia
Duch/governorate of Courland
18th century – early 20th century

The architectural stylistics of educational in-stitutions, or school buildings, in Latvia and their historical heritage are closely linked to the 18th-19th century wave of European cultural history develop-ment in architecture, art, and science. Cultural growth fostered the economic and political development of nations in the mid-19th century, when England, France, and Germany experienced a rapid boom in industrial development, based on educational ad-vancement and technological innovation. American scientist D. Lowenthal [19] has linked this to three factors:

- The development of historical conscious-ness among European peoples and national cultural identity;
- The connection of cultural heritage with the spread of nationalist ideology;
- The realization of the irreversibility of rap-id social change.

Latvia's historical territory, with its origins in the former Duchy of Courland, already at the end of the 18th century marked strong pursuits of edu-cational and cultural identity in the Baltics. The residence of the Duchy of Courland in Mitau/Jelgava took the first step in educational institution construc-tion. In 1775, Duke P. Biron founded the University - Academia Petrina, which was the second in the Bal-tics after the University of Tartu in Estonia. The building's author is Danish architect S. Jensen. The university building is characterized by a striking ba-roque facade design with a symmetrical interior lay-out, complemented by enfilades along both longitu-dinal facades (Figure 1). The baroque facade expres-sion is enhanced by a vertical dominant, a tower, which served the university for acquiring astronomi-cal knowledge. The architectural visual image of the building introduced strong architectural form sym-bolism into the rapid social change process in the country within the historical urban fabric of 18th-century Mitau/Jelgava. The citadel of the German-Baltic culture and science of the former Duchy of Courland initiated a convincing wave of educational development in Latvia.

In urban development, the architecture of educational institution buildings forms a distinctly strong spatial design. This applies to building height, density, and stylistic trends. It is undeniable that the scale and proportions of urban school building vol-umes differ from rural school construction.

Rural manors in Latvia developed as strong socio-economic centers in the 1870s-1890s, supply-ing agricultural products to cities. Rural school con-struction for the eradication of illiteracy is an im-portant prerequisite for economic growth. In the sec-ond half of the 19th century, as the wave of the West-ern European industrial revolution swept across the Baltics, economic prosperity was also observed in rural manors in Latvia.

In the 1870s-1880s, manor owners under-stood that alongside economic prosperity, there must be educated manor servants and their children, which is an undeniable continuation of the manor's economic growth. The pace of economic activity in the country spurred a wave of rural school construc-tion. Schools generally provided space for about 40-50 children, who could begin learning to read and calculate in winter after autumn farm work. People were needed for manor work who could calculate milk quantities, potato weights, and count piglets in the sty. In the baron's forests, it was also necessary to calculate timber quantities during logging.

The rural school building was typically a single-story structure with an attic conversion for overnight stays. Fieldstones were used for the build-ing foundations. A small vaulted cellar was usually built in, where potatoes, sauerkraut and cucumbers were stored for school needs. In harsh winter condi-tions, children stayed at school for several weeks, ensuring sustenance for a longer period. A woodshed was located in the schoolyard, providing fuel for the school stoves in the mornings and evenings. The ar-chitecturally laconic design language of rural schools was based on several **compositional elements of the facades:**

- Red clay brickwork with lime mortar joints; unplastered building plinth with large fieldstone masonry;
- Red clay tile gable roof, not flatter than 40 degrees, to withstand snow load;
- Oak small-pane window frames with shut-ters to protect the glass from wind pressure; double-leaf panel doors;
- Several building decorations – wood carv-ings along the eaves, a band dividing floors with corner bricks.

Rural schools were traditionally built of clay bricks, which retained heat from wood stoves and thermal walls better in winter. Lower quality clay bricks had lime mortar plaster and lime paint applied to the facades. Many manor owners also owned for-ests, brick, and lime kilns, and had to oversee school construction, material procurement, and their deliv-ery by horse-drawn carts. Schools were located closer to the sub-manor, where the servants' houses, cattle sheds, hay barns, fruit orchards, and fields were pri-marily situated, so that the children's chatter and frol-icking would not disturb the manor's German-Baltic lifestyle.

Tree alleys or rows of trees along the school road were not planted during the so-called manor period. They emerged during the free state or post-war period in the 1960s. Historically, alleys were only planted along the road leading to the manor house, church, or cemetery.

The First Free State of Latvia 1918-1940

After the establishment of the Latvian Free State in 1918, rural schools continued to exist. In 1922, following the **Agrarian Land Reform**, schools acquired new premises – former manor houses and castles, which were adapted for school needs. New functional elements were introduced into the layout – a corridor and classroom system, a dining room with a kitchen, several restrooms, handwashing facilities, and reconstruction of engineering communications. In manor houses, enfilades were adapted into corri-dors, the dining room was transformed into a hall after reconstruction, and the manor's reception room with parquet flooring was repurposed as a gymnasi-um, etc. In turn, these functional changes had a recip-rocal effect – "thanks to" the establishment of schools in manor houses in the 1920s, many historical build-ing volumes



Fig. 2. The architectural language of school buildings in the rural landscape in the 1880s-1890s (from left – Skursteņmuiža school, Franksesava manor school, Anna manor school) [image created by the autor, 2026 from persona archive resources]

have been preserved to this day. Serving school needs, old manor buildings were heated in winter, and the condition of roofs, windows, and wooden ceilings was maintained. By providing heat-ing for the buildings, the structural condition of the buildings was not compromised. Nowadays, within the framework of the optimization of the school net-work, this particular aspect is becoming dramatic, because as the rural population shrinks, the number of children decreases, and several rural schools that were located in manor buildings are being closed. (Remte Castle, Svitenes Castle, Laidzes Castle, Be-brene Manor, etc.). **This posed a danger to the preservation of cultural-historical heritage.**

While in rural Latvia, spacious and elegant rural manor houses and castles with luxurious parks, pond systems, and walking paths were acquired for school needs in the 1920s, in pre-war Latvia, new, spacious, and bright schools with high ceilings and large windows were built in cities. Modern central heating with radiators, a comfortable kitchen with a dining hall, a separate hall for sports and festive events were created, incorporating the most modern solutions into the building's functional layout. **National identity** was emphasized with symbols like a Latvian sun, rye ears, or the "jumis" symbol in a niche on the school's entrance facade. Conversely, on manor castles or houses, niches with German herald-ry were sawn off and replaced with Latvian symbol-ism. Schools were established in both expropriated private manors and state-owned properties (Figure 3).

In urban spaces, the architectural stylistics of educational buildings formed a distinctly strong design. This applies to building height, density, and stylistic trends. It is undeniable that the scale and proportions of urban school building volumes differ from the architectural appearance of rural schools, which is a legacy of manor construction.

For educational institution buildings in cit-ies, clear and precise classical forms were typically chosen, most often arranged in a Renaissance compo-sitional structure. The Renaissance was a time of the revival of humanistic ideals, science, and education, and the architectural symbolism of these buildings in the 1870s/1880s is associated with this – the former Alexander Gymnasium in Riga, now the Music Acad-emy, the Realschule in Jelgava, the Gymnasium in Liepaja, etc.

The eclecticism style in the architecture of educational institutions is evident in the building of the State University and Riga's 1st Gymnasium on Raina Boulevard. A review in the Riga Almanac of the 1870s stated that the building's style fully corre-sponds to its intended purpose; it is calm, simple, and dignified, while the building's facades are conse-quently stately and expressive. Eclecticism is charac-terized by a uniform compositional rhythm, a rich-ness of plastic decoration, and clarity of elements [13, pp. 106, 293] (Figure 4).

Occupation of Latvia 1940-1990

A new phase in the development of Latvian architecture began with the country's occupation in the summer of 1940. Losing state independence, are orientation occurred in culture and art. In architec-ture, this meant abandoning the use of Western Euro-pean and US architectural experience, which was so characteristic of Latvia. It was determined that the task of Latvian architects was to become participants in socialist construction. Under political pressure, they were urged to discard everything old, obsolete, and to integrate more quickly into the "friendly fami-ly of Soviet architects." The most talented architects of the Free State era had fled, perished in the war, or suffered repression. Five years of war brought new changes. The historical centers of cities were de-stroyed, and new residential and public buildings were urgently needed. The half-century of occupation can be divided into three phases in building architec-ture [13, p. 6], which directly affected the architec-ture of educational buildings:

- Industrialization and mass construction (1955-1965);
- The search for the distinctiveness of modern architecture (1966-1975);
- The search for regional architecture (1975-1985).

The only and fastest option was industriali-zation and the expansion of mass construction (1955-1965), based on the implementation of stand-ardized projects. This is clearly evident in the con-struction of educational institutions in

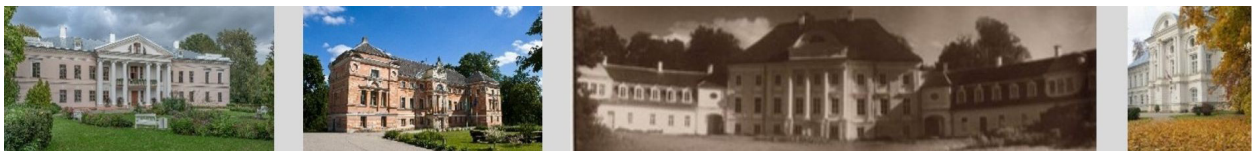


Fig. 3. Adaptation of manor houses and castles for rural school needs in the 1920s (from left – Svitenes Castle, Remtes Castle, Kaucmindes Manor, Zaļā Manor) [image created by the author, 2026 from internet resources]

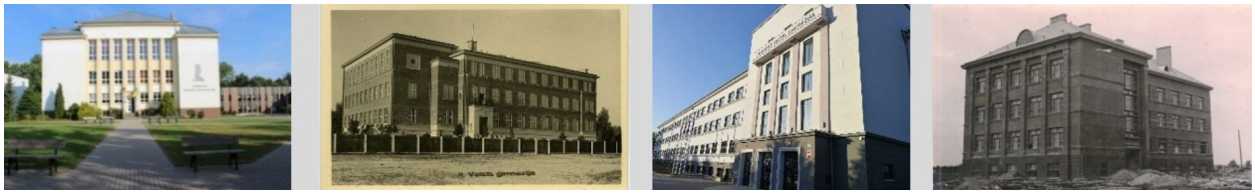


Fig. 4. School architecture in urban environments in the 1920s-1930s (from left – Dobele Gymnasium, German Gymnasium II in Riga, Gymnasium in Jelgava, Primary School in Valmiera) [image created by the author, 2026 from internet resources]



Fig. 5. The design language of school buildings in the 1960s/1970s (from left – Pārlielupe Secondary School, Jelgava 4th Secondary School, P. Bendrups Boarding School, Dzirnieki Primary School)
[image created by the author, 2026 from personal archive and internet resources]



Fig. 6. The search for regional architecture (from left – Secondary School in Slampe, Druva, Riga Music School)
[image created by the author, 2026 from internet resources]



Fig. 7. Additions to manor houses in the 1970s-1980s (from left – Lielvircava manor house, Staļģene manor house and its additions)
[image created by the author, 2026 from internet resources]

Latvian cities, which had lost a significant portion of their built en-vironment during the war [13, pp. 185-191]. The period of 10-20 years after the war marked the rapid use of prefabricated building structures in school con-struction. The architectural language was formed by standardized elements – white silicate brick facades, hollow reinforced concrete slab ceilings, and com-bined roofs. School buildings were equipped with autonomous boiler rooms without connection to the city's central heating or gas supply systems. Today, the external appearance of these buildings is not noticeable, as the exterior walls of school buildings are insulated and plastered, thus eliminating the so-called white brick architecture (Figure 5).

The search for the distinctiveness of **modern architecture (1966-1975)** in school building archi-tecture was directed towards the use of standardized industrial building materials, exploring the balance in the interplay of proportions, scale, and linear ele-ments in architectural compositional solutions. Line-arity, conciseness, and the rhythmic composition of window rows made the architecture of school build-ings oppressive. Many project authors included areas for tree plantings to mitigate visually industrial asso-ciations. Today, with trees reaching heights of 6-10 meters, the disproportion of school building architec-tural forms is evident. Even today, the insulation and facade painting of school buildings provide a positive visual contribution [13].

The search for **regional architecture (1975-1985)** was a new and bold step in school architecture in the rural landscape. These were typically kolkhoz or rural village territories. By introducing a new ar-chitectural design for the school building, its scale was exaggerated (Figure 6).

In rural areas that developed around manor centers, as mentioned earlier, schools were housed in manor houses. In the 1970s-1980s, as kolkhoz centers expanded, additions were made to schools. Some of these were designed as prefabricated reinforced con-crete volumes with combined roof structures, creat-ing a contrast with the historical building. In contrast, some of the realized additions were small in volume with gable roofs, harmonizing with the historical volume. For example, the small sports hall of Staļģene School in the post-war years was housed in the for-mer manor smithy, with only a slight extension of its volume (Figure 7).

School architecture in the second stage of the existence of the independent state of Latvia, from 1991 to the present day

Political-economic context

Upon Latvia's liberation from occupation in 1991, the educational system standards of the occupa-tion period were also abolished. **The new Law on Education (1998)** stems from EU directives, estab-lishing the right to a high-quality and inclusive edu-cational environment. [29, p. 55]. The Construction Law, adopted in 2013, mandates public consultation on construction proposals [27], regulating parameters for school design and construction based on the psy-cho-emotional well-being of users in a healthy envi-ronment. The Ministry of Welfare issues guidelines **"Environmental accessibility guidelines for public buildings and premises and public outdoor spaces"** [30]. During the **2014-2020 EU funds** planning peri-od, ambitious fund projects are being implemented in Latvian schools, as co-financing.

The School Modernization Program (2015) was developed to improve school infrastruc-ture by implementing projects related to inclusive education-based environmental accessibility and en-ergy efficiency enhancement. This

specific program provides an opportunity to renovate and rebuild many schools across Latvia [26]. The Energy Efficiency Law (2016) [31] and the Action Plan for the Devel-opment of Digital Education (2019) are significant factors to mention. With the support of EU funds during the 2014-2020 planning period, large-scale fund projects are being implemented in Latvian schools as co-financing to rebuild schools according to modern requirements.

The School Network Optimization (2020) foresees the liquidation and reorganization of small, unprofitable state schools due to economic and social factors [33]. The **"School 2030"** education reform, implemented from 2016 to 2023, supports a change in teaching approaches in schools [34]. The project "Competence Approach to Learning Content," im-plemented by the State Education Content Center [26], aims to develop, approve, and sequentially implement a general education content and teaching approach in Latvia for ages from preschool to sec-ondary school, resulting in students acquiring the knowledge, skills, and attitudes necessary for modern life.

The new Cohesion Policy has led to the de-velopment of the **Latvian National Development Plan 2021-2027** [32]. "A quality living environment and territorial development ensure the economy's transition to a climate-neutral economy, including care for nature, the environment, and infrastructure." The Law on General Education foresees a transition to teaching exclusively in Latvian within three years – the implementation of **"Unified School"** in the 2023/2024 academic year [35]. The opportunity to learn minority languages and cultural history is pre-served. Latvian becomes the sole language in state schools.

An indirect correlation between guidelines in the education segment, general global trends in the sector, and contemporary school architecture, its spa-tial environment, is clearly discernible. School archi-tecture in Latvia is directly influenced by the **Construction Law and Construction Regulations** [25] and regulations "Public Buildings and Structures" [24], individual municipal decisions, as well as direct cooperation between the client and the architect.

According to data from the Central Statistical Bureau [28] and the State Education Information System, in the 2025/2026 academic year, 477 munic-ipal general education institutions and 76 private ed-ucational institutions operate in Latvia. From 2014-2026, 8 newly constructed schools have been put into operation at the secondary education level [23].

Since 1998, the number of schools in Latvia has continued to decrease from over 1100 schools at the secondary level in 1998 at the beginning of the academic year to 600 schools in 2024, influenced by economic and demographic factors [28]. The only municipalities with consistently positive birth rates are in certain suburban districts of Riga, where more intensive construction is observed. Demographics, the listed decisions, programs, and laws have directly and indirectly influenced school building architecture in Latvia, promoting modernization, integration of new technologies, and compliance with contemporary school requirements.

Architecture

With the restoration of independence, exten-sive work began in Latvia on reforming the education process and organizing schools. To promote good architectural practices, the Latvian Association of Architects (LAS) organizes an annual professional competition. In **1995**, **Sv. Gregora School in Saldus** was the first to receive the Grand Annual Award in Architecture (architects: A. Andersons, I. Andersone). Utilizing World Bank (WB) loans and EU funds, a large-scale process of school reconstruction and ren-ovation was initiated in Latvia. By **2000**, the renova-tion of **Lielplatone Primary School** was completed, including a new canteen and heating system, while **Augstkalne School** received insulation in 2004, cost-ing over 140 thousand lats. In 2002, the Grand Annual Award in Architecture was presented for the reconstruction of **Āgenskalns Gymnasium** in Riga (*architects - Brīnišķīgo projektu birojs*). In 2008, the Grand Annual Award in Architecture was given for the con-struction of the sports hall at **Talsi City 2nd Secondary and Primary Schoo**l (*architects – UPB: U. Pīlēns, G. Pīlēna, Dz. Heinsbergs, I. Ķauķe*). In **2009**, **Jelgava 4th Secondary School**, a typical Soviet-era building, was radically reconstructed and supple-mented with a new extension (*architects - Komunālprojekts Jelgava: A. Ziemeļniece*). Funding: from the municipal budget – 3,152,244 lats, from the State Investment Program – 2 million lats. The school ex-tension, with glazed planes, connects to the typical building structure constructed during the occupation period. The new extension includes a concert hall with excellent acoustics and a school canteen. The architecture employs a new design language, vibrant colors, extensively glazed and curved facades that merge the interior with the landscape space, featuring the canopies of large trees (Figure 8).

The semi-circular glazed facade allows na-ture to enter space. This play of forms allows younger schoolchildren, during breaks, to feel the calming touch of nature and maintain inner balance amidst academic stress and competition. Glass, form, color, and landscape space are the main elements of this architectural play.

In **2010**, the **Latvian International School in Piņķi** was put into operation. The architecture fea-tures concise geometric forms with extensively glazed facade planes, particularly highlighting the glazed entrance motif, and merging interior space with landscape space (architects: D. Zalāne, A. Roķis). In **2012**, the **Saldus Music and Art School** was completed (architects - MADE arhitekti: M. Pu-trāms, L. Krūmiņa, E. Ozola, U. Sedlovs, L. Amoliņa), receiving the Grand Annual Award in Ar-chitecture. Classrooms are arranged around the pe-rimeter of the two-story building volume, with halls and libraries at the center of the layout. Atria serves as a source of natural daylight in the communication area. The building incorporates thoughtful climate control factors, as the building structures with an integrated heating system ensure a stable microcli-mate, while the solid wood and profile glass exterior wall construction is part of an energy-efficient natural ventilation system, thanks to the double-layer facades. The lower layer consists of vertical wooden planks, and the upper layer consists of glass panels, through which the wooden cladding visually interacts with the landscape space. In 2015, the reconstruction of Maltas Sec-ondary School was completed, adding a multifunc-tional hall extension (architects - SAALS: M. Krūmiņš, R. Kleina; client: Rēzekne Municipality). Two school buildings and a new connecting structure were reconstructed. The school and sports functions are unified by a spatial compositional axis. The col-orfulness of the sports hall facades is enhanced by an openwork wooden cladding, creating dynamism from different viewing angles. The ground floor level is visually open – glazed. The main entrance to the building is emphasized with a stylized symbol of the Maltas coat of arms – a clover leaf, which is also used as a plant in the extensive lawns near the school. The new, monumental building volume of the sports hall features natural material cladding – wooden sid-ing, which blends the building into the surrounding landscape.

In **2016**, the **Ādažu Free Waldorf School** was completed



Fig. 8. Studies of the interaction between landscape space and interior space through architecture - Jelgava 4th Secondary School, 2014. [image created by the author, photos from author's personal archive, 2026]

(architecture in several phases 1998-2016: AMS, S. Ņikiforovs et al.; client - Ādažu Brīvās Valdorfa skolas valde). Funding: loan from "BluOr Bank" and private funds. The school building represents original architecture and an alternative learning environment, constructed from separate, distinct, freely formed, and interconnected building volumes. They are characterized by irregular shapes, playful rounded roofs, varied finishes, and irregular windows with free-form mullions, collectively re-sembling fairy-tale motifs. The building complex, forming an arc shape, harmoniously integrates into the landscape, though it is currently considered energy inefficient.

Within the framework of the 2014-2020 EU funding program, all school buildings of **Jēkabpils 2nd Secondary School** were reconstruct-ed, its facade received vibrant colors, and the territo-ry and parking lot were improved. The total cost of the reconstruction is 8.3 million euros, with an EU fund contribution of 2.3 million euros. The total cost of reconstruction and improvement of the learning environment at **Bauska State Gymnasium** is over 1.6 million euros, with an EU fund contribution of 641 thousand euros. Infrastructure improvements and modernization of educational equipment were carried out at **Jelgava Vocational Secondary Schoo**l. As part of the project, two secondary school buildings were fully renovated and modernized, and the court-yard was landscaped. The project also included the reconstruction of the **sports field at Jelgava 4th Primary School**, transforming it into a multifunc-tional sports stadium. The total cost of the secondary school renovation is 5,026,235 euros, with an EU fund contribution of 3,110,950 euros. Renovation work at **Dobele State Gymnasium** is fully complet-ed. Dobele Primary School has been reconstructed, increasing the number of classrooms to ensure an ergonomic learning environment, and a new sports hall has been built. The total project costs are 11,780,177 euros, with an EU fund contribution of 3,501,820 euros. The sports hall at Ventspils 2nd Primary School has been renovated, and an ergo-nomic learning environment has been created in the home economics classrooms at **Ventspils 2nd Secondary School**. At Ventspils State 1st Gymnasium, classrooms have been built and renovated, and the conference room and training hall have been modern-ized. The project aims to improve the learning envi-ronment in 8 Ventspils schools, with total costs of 5,321,157 euros and an EU fund contribution of 3,866,378 euros. Ciecere Primary School has mod-ernized its learning environment, ensuring accessible and high-quality general education that meets the needs of students. The school's existing sports hall has been converted into a multifunctional space. The costs are 1,572,089 euros, of which the EU fund con-tribution is 54,979 euros. Saldus Vocational School has been modernized, with several buildings renovat-ed to ensure the learning environment aligns with the development of the national economy and to improve access to vocational education. The project included the reconstruction of dormitories and the renovation of the sports hall. Total costs are 3,095,044 euros, with an EU fund contribution of 2,630,787 euros. The reconstruction of the old building of Sigulda State Gymnasium creates an ergonomic and modern learn-ing environment in the building constructed in 1962. Both school buildings are connected with an open semi-circular courtyard inside. Reconstruction work at Sigulda 1st Primary School has been completed. The total project costs are 18.6 million euros, with EU co-financing of almost 3 million euros. The total cost of the 3-story new building at Smiltene Second-ary School is over 1.6 million euros, with an EU fund contribution of 570,472 euros. Renovation of the his-toric building and reconstruction of the sports hall at Valmiera Viestura Secondary School cost over 4 million euros, with 1.28 million euros in EU co-financing. The reconstruction of Gulbene Munici-pality Secondary School and dormitory cost over 5 million euros, with 3.03 million euros in EU co-financing. At Rēzekne State 1st Gymnasium and Rēzekne 2nd Secondary School, modern and ergo-nomic learning environments have been created through EU fund projects, and the Gymnasium's sports field and both schools' sports halls have been renovated. Infrastructure development has been car-ried out in six Daugavpils educational institutions: Daugavpils State Gymnasium, 3rd Secondary School, 13th Secondary School, 16th Secondary School, Saskaņa Primary School, and the Technol-ogy Lyceum. The total cost of renovating and im-proving these educational institutions is 10,166,316 euros, with 4,525,000 euros from EU funds. Moderni-zation of building volumes at **Preiļi 1st Primary School, Jānis Eglītis Preiļi State Gymnasium, Balvi State**

Gymnasium, and **Balvi Primary School** cost a total of 2,375,178 euros, with 1,767,133 euros from EU funds. At Balvi Primary School and Balvi State Gymnasium, to facilitate the gradual implemen-tation of competence-based general education con-tent, renovation work was carried out in classrooms, corridors, and sanitary facilities, modern IT solutions were acquired, and the renovated spaces were equipped with ergonomic furniture. A sports field and hall were also built at Balvi State Gymnasium. The total project costs are over 3.2 million euros, with 2.2 million euros from EU funds.

In **2017**, the new building of **Exupery Inter-national Primary School** was put into operation – Finalist, The Latvian Architecture Award 2017 (*architecture: 8 AM, Lejnieku projektēšanas birojs, La-bie koki; Client: Elena Buyanova*). The school's 2-story cylindrical building volume fits well into the sparse, low-rise mixed-type development. A glazed tunnel connects the glazed building volume at the second-floor level to another building volume formed by a block of two rhombuses. The interior of the glazed building volume actively communicates with the public street space through a thoughtfully de-signed strip of greenery. A strong spatial synthesis is formed around the circular courtyard with interiors on both sides, thanks to curved glazed facade planes and landscaping. The successful collaboration of ar-chitects, interior designers, and landscape architects has materialized into a harmonious learning envi-ronment that flows from the landscape space into the interiors and vice versa. The interior layout and ar-chitecture are based on the openness and collabora-tion of the educational process. This example con-firms the harmonious interaction between the new learning process and environment.

The first floor features a widely glazed cy-lindrical building volume, with reduced glazing on the second floor. The air passage between the build-ings is fully glazed. Large, glazed areas extend from ground level to the roofs in one corner and the central part of the building. The remaining glazing features a rhythmic division of windows at the third-floor level. Light and shadow play not only on the facade glazing but also indoors, created by eye-shaped cutouts and rhythmic mullions in the glazing on the overhang of the spacious second-floor balcony. Sunlight, thanks to the extensive glazed exterior planes and open inte-rior layouts, flows smoothly from one zone to another throughout the day, creating a psychologically warm environment. The internal glazed atrium receives sunlight throughout sunny days. The concept of im-provement is based on the international education system chosen by the school and kindergarten, which helps children develop their self-expression skills, learn to think independently, and develop as person-alities. Environmental design is developmental and educational, encouraging children to be creative and imaginative. The project does not include ready-made play equipment; children are offered various natural materials – wood, stone, sand, moss, etc., which al-low them to express themselves creatively, conjuring up their own story for each (Figure 9).

In **2017**, **the primary school of Riga Centre Humanitarian Secondary School** was put into oper-ation (*architect: K. Pēkšēns, A. Vasiļjeva, J. Barinova*). The brick facade and decorative elements of the historic building were restored, a new elevator was added to the building volume, interiors were renovat-ed, and the surface of the adjacent territory was re-placed.

Reconstruction of Liepāja State Gymnasium No. 1 – Grand Prize of the Year (The Latvian Architecture Award **2018**, (*architect - Wonderfull: I. Mekša; client - Liepāja City Municipality Admin-istration*). A functionally and visually unified learn-ing environment has been created, respecting the val-ues of the building built in 1912 (architect Louis Ludwig Wilhelm Melville) and striving for the ease of use and spatial comfort characteristic of Art Nou-veau. As a result of the renovation, the school has become a well-thought-out learning space in the mood of warm gray sand, blue sea and sky. The re-construction shows exquisite respect for the historical heritage. The richly decorated building volume oppo-site Ausekļa Street stands out from Kūrmājas Street. The surrounding 4-5 story historic buildings densely enclose the gymnasium. Individual trees in the lawn opposite the facade across Ausekļa Street and around the building create spatial balance. The building's courtyard is defined by building volumes on three sides, opening onto the sports field. The terraced courtyard allows for outdoor learning, adding creativ-ity to the educational process. Thanks to the histori-cal window divisions and mullions, the interaction between the landscape and interior space maintains a harmonious balance, complemented by the canopies of large trees. In winter, the tree branches soften the spatial fusion, respecting the privacy of all users. The composition and proportion of glazed areas relative to the unglazed parts preserve the historical division, creating rhythmic plays of light and shadow in spac-es. The deep window reveals and ornate window mul-lions leave a visually strong impression, softening the light and shadow effects. The principle of symmetry (windows of the large hall), the principle of the cen-tral axis (windows, glazed doors at the ends of corri-dors), and the principle of rhythm (windows of class-rooms) in the window arrangement organize the inte-riors with light and shadow accents (Figures 10).

The reconstruction of **Jelgava State Gym-nasium** was completed in 2019 (*architects - ARH Studija; client - Jelgava City Council*). Funding: 12.3 million euros, realized by Jelgava City Municipality as a co-financed project by the European Regional Development Fund. The gymnasium building was constructed in 1939 (architect V. Zebauers). The school's architecture and interiors after reconstruc-tion exude respect for historical heritage, with archi-tectural elements from the 1930s restored. The school's outdoor space has been enhanced with a sports field, landscaping, and new plantings that sea-sonally stand out against the gray facade color. The renovated spaces are bright; historical stained-glass windows at the ends of corridors have been restored and moved to recreation areas. The historical tiled floor has been preserved, the hall's ceiling with gyp-sum ornamental decorations and voluminous chande-liers have been restored. The narrow spruce plank flooring of the historical sports hall and the main staircase with metal railings have been restored. The monumental wall paintings by artist A. Zvejnieks, created in the 1980s, have been restored. The gymna-sium's classrooms after renovation are decorated in pastel shades, creating a spacious and bright emo-tional atmosphere.

In **2019**, **Ādažu Primary School** was also put into operation, consisting of five concise building volumes that compositionally form a unified, modern school structure with extensively glazed facade planes. The landscaping is in stylistically unified, geometrically concise square forms, complementing the patterns of plantings and paving. Work continued in three phases, fully completed in 2022 with the fur-nishing of specialized classrooms. In the same year, Berģi Music and Art Primary School was complet-ed (architects - Ozola & Bula). It stands out against the surrounding Upesciems dune landscape due to its bright yellow-green facade coloring and voluminous stepped building composition.

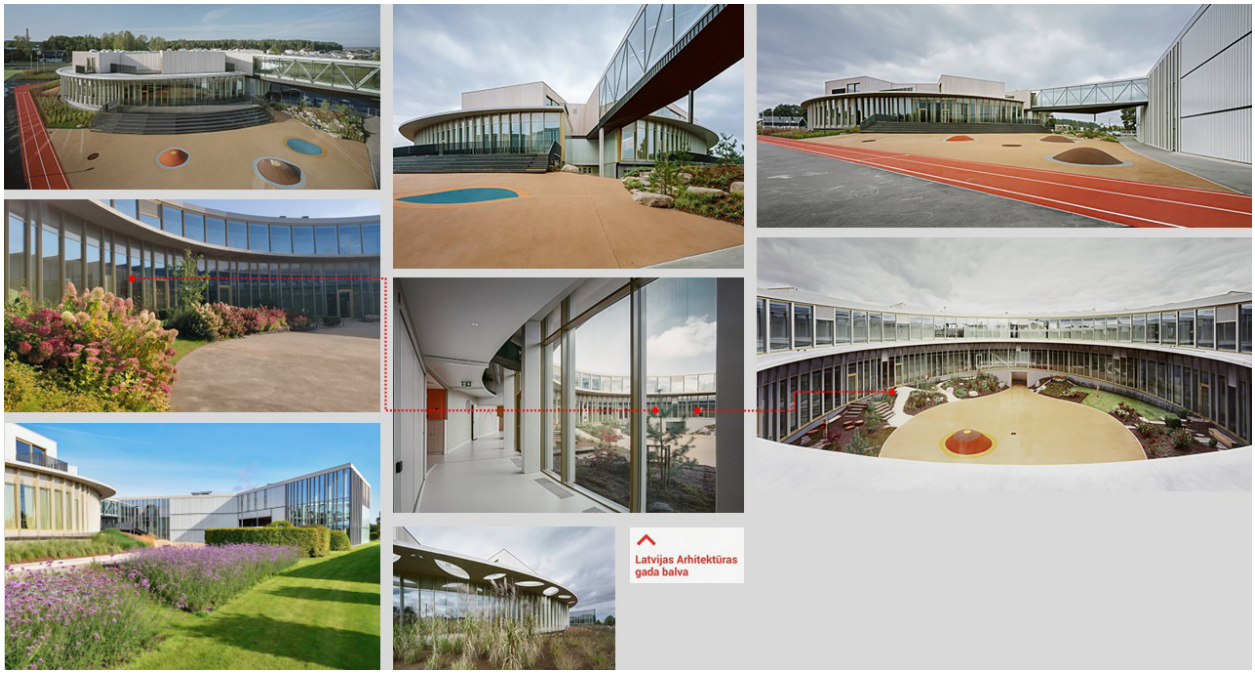


Fig. 9. Studies of the interaction between landscape space and interior space through architecture - new buidings of the Exupery international school in Piņķi [image created by the autor`s, 2026, authors of photos I. Stūrmanis, K. Loris]

The presence of the forest, the surrounding pines, and the reflections in the pond, together with the architecture, create a harmonious environment. The school's layout allows for a creative approach to the learning process, utiliz-ing the spacious, bright interiors and landscape space. The adjacent territory has been landscaped with new roads and recreation areas, and greening work has been carried out in recreation zones with tree and perennial plantings. The total cost of the school's creation is 10,115,554 euros, with an EU fund contri-bution of 1,053,329 euros. In **2019**, **Dobele Music School** was also completed (*architects - MARK arhitekti: M. Ošāns, J. Graholskis, I. Markuse, A. Eniņa, A. Parafiņuka; client: P. Avena Charity Foun-dation "Paaudze"*). The reconstruction of the build-ing volume combines the renovation of the historic building with contemporary architecture, highlighting the values of the landscape space. Thorough restora-tion work was carried out in the historic building, based on research of 19th-century interiors. Facades, the hall's historical ceilings, and wall paintings were restored. Adjacent to the historic building, on the principle of contrast, a new monumental concrete extension with a concert hall was built on the expres-sive landscape relief. The extension's extensively glazed facade planes and functional roof – a venue and viewing area – visually merge the school envi-ronment with the adjacent Bērze River floodplain. In 2019, the reconstruction and new extension of the **Latvian International School** were also completed (*architects: S. Vaivade*). The building complex forms a new, concise composition of building forms, whose volume with extensively glazed planes and window reveals contrasts with the coniferous panel cladding. The landscaped territory with plantings visually merges the landscape space with the interior.

In **2020**, the construction complex of **Daugavpils Design and Art Secondary School *"Saules skola"*** was completed (*architects: MARK arhitekti: M. Ošāns, A. Kļava, J. Gertmanis, L. Rutka; client: Daugavpils City Council*). The school complex fea-tures two connected buildings with unique facades. The secondary school block is decorated with the "Saules skola" emblem – a curved facade with ce-ramic panels and stained-glass accents. The primary school building's facade is designed with a three-dimensional brick pattern, depicting a fragment of a sun symbol. The core of the new building is a multi-functional atrium-type space with a full-height glazed facade, organizing group spaces and surrounding the courtyard on three sides, creating an environment for creative learning. The reconstruction and expansion of Liepāja Music, Art, and Design Secondary School with a new extension were completed in 2020 (architects - Baltex Group: A. Kokins; client –Valsts nekustamie īpašumi). The total project costs are 3,908,839 euros, with an EU fund contribution of 3,322,513 euros. The school buildings are located near the sea, Jūrmala Park, and in the historic center of the city. Several building facades were carefully restored and insulated from the inside, preserving their authenticity. The architecture of the new exten-sion features functionally concise forms with exten-sively glazed planes. Simultaneously, accessibility to the environment around the new building was ad-dressed. The extension provides opportunities for competency development through workshops. Bright learning spaces were created, respecting the specifics of cultural education programs and ensuring appro-priate finishing materials, acoustic requirements, and natural and artificial lighting solutions. The year **2020** also marked the completion of the reconstruc-tion and extension of **Talsi Christian Secondary School**, uniting the building volumes into one com-position (*architects - AEG projektu birojs: Ē. Gein-bergs, K. Eitcens, A. Grundule; client: Talsu Kristīgā skola*). The existing buildings were reorganized, modernized, and renovated, implementing a unified design and functionality concept for the entire school building.

New building of **Exupery International Secondary School with Boarding School** – Finalist, The Latvian Architecture Award **2024** (*architect - 8 A.M.: J. Lasis, L. Lase, A. Pimenova; client: LTD "LMH"*). Exupéry International School (EIS), located in Piņķi, a village on the outskirts of Riga, offers ed-ucational opportunities up to university level. The building was constructed as the second phase of the Eis complex. The school's load-bearing structures are made of wood, supplemented with metal elements, forming a hybrid. One of the main ideas in the project was to create a building

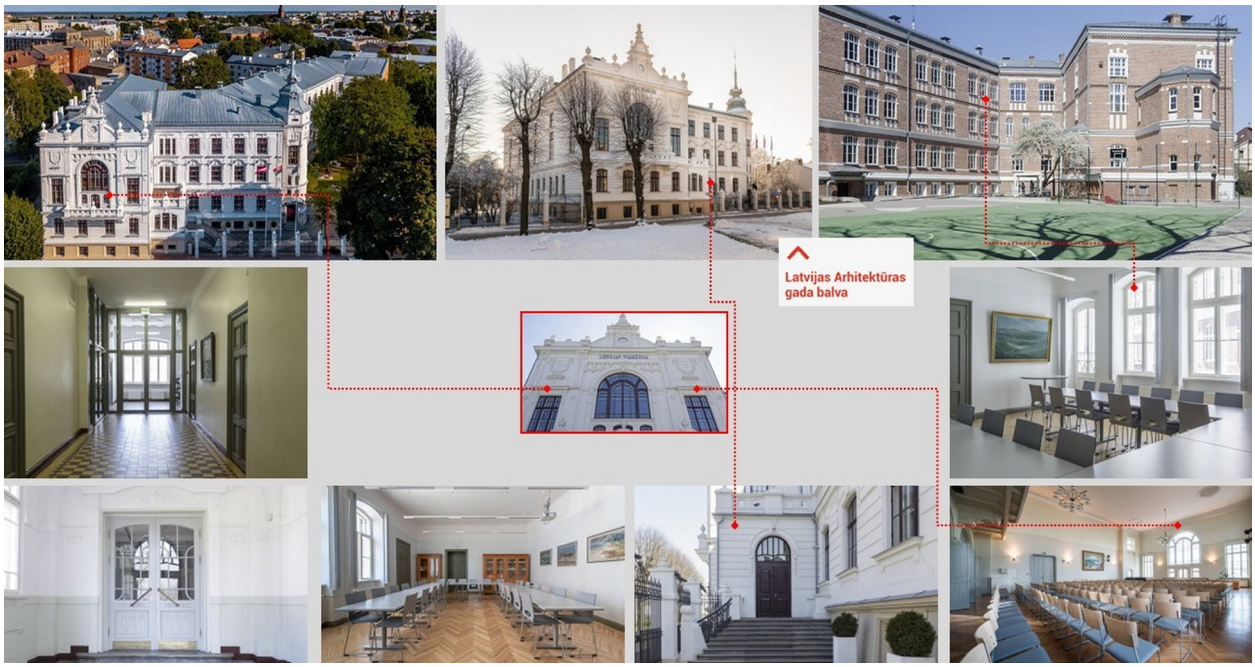


Fig. 10. Studies of the interaction between landscape space and interior space through architecture - reconstruction of the Liepaja State Gymnasium [image created by the author`s, 2025, author of photos E. Pohevičs]

that would reveal its essence as a teaching tool for 'building physics'. The new EIS building has a linear volume with more restrained glazing than the adjacent glazed cylinder volume from the first construction phase. The facades feature square window volumes playing at different depths relative to the street facade, like paintings. The courtyard facades are adorned mainly with empha-sized functional, rhythmic window areas. The facades opening onto the courtyard are extensively glazed. The garden is designed in a minimalist style. The interiors create a balanced interaction with the land-scape space, thanks to the extensive territory and thoughtful plantings. A broader fusion of landscape space and interior space through glazed exterior sur-faces is observed in active public transit zones, creat-ing a harmonious interaction. Individual windows serve as picture frames for artworks, where thought-fully designed plantings act as art objects. The pro-portion of glazing to the unglazed part in the building volume is smaller. The proportion varies balanced on different facades. Through the picture-frame win-dows, the play of light and shadow created by the sun forms illuminated zones in the open space layout, emphasizing specific functions. Sun accents highlight functional furniture groups in the rooms.

Mārupe Music and Art School – Semi-Finalist, The Latvian Architecture Award **2023** (*architects - AR4: A. Vītols, I. Spriņģe, D. Dauvarts, R. Četverņa, I. Rīta; client - Mārupes Municipality Council*). The 2-story volume built during the Soviet era was originally a cultural center, including a col-lective farm dispatch point; later, the building housed an art and music school. With the growth of the mu-nicipality's population, the need to expand the school arose. Today, the two-story building has been radical-ly reconstructed – the exterior wall of the old volume has become part of the interior. Soviet-era terrazzo floors in the lobby, the large hall's wooden parquet, the metal structure of the lobby stairs with parquet planks embedded in the steps, and the metal stair supports have been preserved. The school building has gained expressive plasticity and two additional floors. Connecting the two building volumes, the lev-el difference is addressed with ramp systems for ac-cessibility. The new volume, facing the street, con-ceals the old structure and connects to the former main entrance with a new, spacious corridor and glazed shop windows. The landscaping of the territo-ry with low plantings in the lawn is designed along the street line between the facade and the street. The adjacent forest area serves as a balancing background for the expressive building volume. The building's new four-story volume stands out in a low-rise resi-dential and industrial development zone. The build-ing's main facade adjoins Mazcenu Avenue. The first floor of the building features a widely glazed, re-cessed strip, through which the landscape space and interior space flow into each other. At a specific an-gle of sunlight incidence, the adjacent forest is re-flected in the glazed facade planes, while the golden-hued curved facade changes its tone. A valuable fac-tor of harmonious interaction is the pine forest adja-cent to the building, surrounding it on two sides. Na-ture merges with the interior through extensively glazed planes, creating an emotionally calming at-mosphere vital for sensitive art and music learning. Two facades, opening onto utility areas, buildings, and some tree plantings through glazed planes, create a less valuable interaction. The building's four-story volume is divided into a widely glazed first-floor strip and a dynamically rhythmic window division on the upper floors. The proportion of the glazed part to the unglazed part emphasizes interior functions. The elongated building volume's long facades are pre-dominantly oriented north and south. Light and shad-ow play is most evident in the windows adjacent to the south facade, for example, in the hall, where win-dows are arranged on two levels. The rhythmic mul-lions of the first-floor extensively glazed north fa-cade create rhythmic light and shadow effects. In the orchestra, choir, and chamber halls, veneered panels at various angles, as well as wall panels and acoustic curtains, are used for sound absorption to ensure acoustic solutions for the ceilings. Facade materials and tones are used in the interior to create a cohesive environment.

New building of Ogre State Gymnasium – Semi-Finalist, The Latvian Architecture Award **2023**: (architect - NAMS). The expressive architecture of the school building volume strongly contrasts with the surrounding forest landscape and

low-rise mixed-type development that encloses the building. The main facade, adjoining G. Asara Street, is visually separated from the development across the street by a row of trees. The extensively glazed motifs of the two entrances on the building's south facade dynamically emphasize spatial interaction. The building has three floors. The surrounding forest landscape creates an emotionally harmonious environment with the interi-ors through extensively glazed planes. On the second floor, open recreation areas with views of the central courtyard are arranged in free zones along the court-yard facade. The enclosed courtyard is not intended for landscaping. The building's entrance motif is de-signed with an original, dynamic glazing composi-tion. However, other facades mainly feature ribbon windows, except for vertical windows facing the courtyard. The atrium, with a skylight and courtyard, forms the central compositional and functional block of the building plan, creating plays of light and shad-ow. The inner courtyard is visually partially connect-ed to the interior through glazed vertical strips. The glazing of classrooms onto the corridor ensures in-creased natural lighting. On the second floor, visually open recreation areas are arranged in free zones along the courtyard facade, visually connecting with the courtyard through the extensively glazed facade plane. From the third floor, access is provided to a roof terrace intended as an observatory. The build-ing's atrium with glazed skylights and classroom glazing onto the corridor ensures increased natural light in the spaces.

In **2024, Jēkabpils State Gymnasium, Kuldīga Centre Secondary School, Valmiera State Gymnasium,** and **Jelgava Technology Secondary School** were fully reconstructed, acquiring a learning environment that meets modern requirements with EU fund support.

Kuldīga Technology and Tourism Tech-nical School, which received a Special Award (recognition) from the International Jury, The Latvian Architecture Award 2024, and the "Latvijas Būvniecības Gada balva 2024" (*architect - Arhitektes Lienes Griezītes studija, Gints un kolēģi: L. Griezīte – Verpakovska, A. Vaivare, G. Vaivars, G. Lūsis – Grīnbergs; client: Professional education competence center "Kuldiga Technology and tourism technical school"*). The building was built in the 1860s-1870s. The building is located in the old town of Kuldīga, which is included in the UNESCO World Heritage list. The reconstruction task required integrating the vocational education function into a building located within Kuldīga's historic urban fabric. Two new building volumes serve as a dialogue between history and modernity. The new building volume echoes the window rhythms of the historic building, introducing contemporary features in window divisions and pro-portions. The historic block fits well into the low-rise development of Kuldīga's old town, creating a har-monious interaction. The new block has vertically elongated window proportions. Extensive glazing is used only for the building's courtyard entrance motif, which harmoniously merges the school's courtyard with the entrance hall. The historic building block retains its original rhythmic window proportions. The extensively glazed entrance motif on the building's east facade, illuminated by morning sun rays, accen-tuates the building's entrance, making the school hall bright and psychologically warm. The interiors create a harmonious interaction towards the east with the landscape space of the Baltic Teachers' Seminary park. The silhouettes of large trees in winter, planted rhythmically in a row parallel to the street, and the foliage in summer create a psychologically balancing effect. Towards the west, the interiors create a visual interaction with the east facade of the Kuldīga Needle Factory building on the opposite side of the street, which adjoins the Kalpaka Street line. Thanks to the technical school building's setback from the street line, the row of large trees in front of the facade, and the parking lots, the density of the historic develop-ment creates a harmonious environment.

In **2025**, after extensive reconstruction, **Lielupe Primary School** reopened with its new sports hall, The Latvian Architecture Award **2025** – competition not closed. (architecture - *K IDEA: A. Kokins, I. Dišereits, A. Kokina, M. Daukšte; client: Jūrmala City Municipality*). Surrounded by pine for-est and low-rise residential buildings, the primary school's ambitious building volume, with its cheer-fully orange and yellow details in the architecture, harmoniously integrates into the surrounding land-scape, clearly indicating the presence of a child's world. Low decorative plantings near the school, framed by geometrically shaped triangular flower-beds, play with concrete curbs and lawns, comple-mented by natural boulders, visually softening the contrast between the pine forest and the white build-ing volume. Roof glazing in the school's transition areas, floor-to-ceiling glazed exterior walls in both assembly halls, and the extensively glazed end fa-cades of the new sports hall merge the interior with the landscape space, visually incorporating nature into the learning and sports processes, improving the quality of the psycho-emotional environment. The cheerful color palette with orange, yellow, green, and turquoise blue wall, ceiling, and floor finishes in the interiors continues the architectural style in a playful color scheme, creating a harmonious learning envi-ronment in all spatial aspects. The play of light and shadow created by the pine forest softens the direct sunlight in the classrooms, creating light games. The historic school building blocks were built in 1962 and 1986. This example once again confirms that it is possible to successfully reconstruct an educational institution built during the Soviet era, creating a school that meets modern quality standards in a cheerful language of forms and colors. In addition to the school building's reconstruction, territory land-scaping was also addressed, and a spacious sports hall was created.

Conclusions

The pursuit of educational and cultural iden-tity in the historical territory of Latvia at the end of the 18th century clearly marks the process of social change in the country, which is well discernible in urban environments and manor territories. School construction becomes increasingly convincing, with their number growing at the beginning of the 20th century, dictated by the rapid pace of the country's economic development. The period of the first inde-pendent republic is identified as a strong impetus for the search for expressions of national identity in ar-chitecture. Elegance, form, synthesis, harmony, and proportion – the introduction of the language of spa-tial compositional elements into urban development, particularly highlighting the 1920s-1930s. During the period from 1940-1990, under occupation, Latvian school architecture was characterized by mass-produced standardized school construction, which in later years evolved into the search for modern re-gionalism.

Since 1991, school architecture in Latvia has been indirectly influenced by a new political and economic context and a large number of government decisions: the Law on Education (1998), individual municipal decisions, European Union (EU) fund fi-nancing, especially the 2014-2020 planning period, the School Modernization Program (2015), the Ener-gy Efficiency Law (2016), the Action Plan for the Development of Digital Education (2019), School Network Optimization (2020), the "School 2030" Education Reform, the National Development Plan 2021-2027, the implementation of "Unified School" in

the 2023/2024 academic year, which envisages a transition to education in the Latvian language in state schools, the demographic situation in the coun-try as a whole, and the associated significant reduc-tion in the number of schools. The listed decisions and programs have indirectly influenced the architec-ture of school buildings in Latvia, promoting mod-ernization, integration of new technologies, and com-pliance with modern educational requirements. Alongside the large-scale renovation and reconstruc-tion works in state and municipal schools with the support of EU funding, several new private educa-tional institutions have also been built in the country with private funding, which stand out with their ex-pressive architecture.

Since 1991, the learning environment has been shaped by the interaction of school architecture, interiors, and landscape spaces, through widely glazed surfaces in architecture, which manifests in three leading types of attitudes and demonstrates a radical change in values in Latvia in the historical context:

- The symbolic, respectful, and precise resto-ration of historical school buildings built be-fore 1941 and their landscape spaces, serv-ing as a bridge to re-establish connections with Western European culture. Two signifi-cant periods can be distinguished in this par-ticular time phase: the period of the Duchy of Courland until 1795 and the first stage of the Latvian Republic until the occupation of Latvia in 1940.
- School buildings constructed from the end of World War II until 1991 are radically re-built, transforming the layout of school buildings and their visual synthesis with the landscape space through widely glazed sur-faces on the facades. Buildings constructed during the occupation period from 1945-1991 emphasize a diametrically opposite paradigm of values and a shift in the coun-try's course from West to East.
- School buildings constructed after 1991 re-flect a search for radically new forms and spatial harmony between architecture, land-scape space, and interiors, based on the lat-est developments in the educational process. A new conceptual approach to school design and landscaping is indirectly linked to a par-adigm shift in the education sector (School 2030) and new technological achievements in material production and construction, such as widely glazed surfaces on facades.

Latvian school architecture today, within the context of global trends, strives to restore the harmo-ny of environmental users in all aspects, aimed at higher well-being, respect, and creativity for each individual. The technological possibilities of the 21st century provide a high visual aesthetic level for edu-cational buildings. Environmental accessibility, acoustics, energy efficiency, climate, engineering communication solutions, landscaping, terraces, sports fields, transportation solutions, etc., around schools are designed to provide opportunities for a creative learning process not only indoors but also in landscape spaces.

The drastic reduction in the number of rural schools today, influenced by demographic and eco-nomic factors, unfortunately, has an adverse effect on the possibilities of preserving cultural and historical heritage, as the buildings remain unmanaged. The Ministry of Culture must urgently find consolidation opportunities in the real estate tax system and attract funding for the maintenance of cultural spaces (build-ings, parks, alleys, infrastructure, etc.).

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Kopsavilkums

Pētījums sniedz Latvijas skolu arhitektūras attīstības vēsturisku un hronoloģisku pārskatu, analizējot tās veidošanos dažādu politisko un ekonomisko faktoru ietekmē, kā arī aplūkojot gan vēsturisko, gan mūsdienu kontekstu. Pētījuma zinātniskais devums ir skolu ēku arhitektūru ietekmējošo transformācijas procesu izvērtējums. Pētījumā izsekota izglītības sistēmas attīstība un skolu vides telpiski funkcionālā dinamika Latvijas teritorijā, sākot no 18. un 19. gadsimta, reģionā, kura vēsturisko attīstību būtiski ietekmējusi mainīga un dinamiska Rietumu un Austrumu kultūru robežzona. Šīs vēsturiskās pieredzes apzināšana un interpretācija ir nozīmīga mūsdienu sabiedrības vērtība un būtisks zinātniskais ieguldījums laikā, kad pasaulē norisinās strauja tehnoloģiju attīstība.

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SURFACE WATER FILTRATION PROTOTYPES AS PUBLIC SPACE ELEMENTS FOR NUTRIENT REMOVAL AND BIODIVERSITY IN URBAN WATER LANDSCAPES

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Abstract. Urban water bodies are important components of urban landscapes, providing ecological, spatial and social functions. However, many urban surface waters are affected by nutrient pollution, particularly phosphorus, which contributes to water quality degradation and ecological imbalance. Nature-based solutions (NBS) are increasingly promoted as sustainable approaches for improving urban water management while simultaneously enhancing biodiversity and ecosystem services. This article examines the integration of NBS into urban water landscapes in Latvia and Estonia, focusing on surface water filtration prototypes implemented as landscape-based interventions in public spaces to improve water quality through nutrient removal. The study applies a qualitative and indicator-based assessment of ecosystem services, analysing nutrient removal potential, biodiversity development and the role of these interventions within the surrounding urban landscape. The results demonstrate that the analysed prototypes function as multifunctional solutions, effectively supporting phosphorus removal as a primary and measurable function, while simultaneously providing habitat for waterbirds and generating complementary ecological and cultural ecosystem services. Overall, the findings highlight the potential of small-scale, spatially integrated nature-based solutions to contribute to water quality improvement while simultaneously delivering multifunctional ecosystem services in urban water landscapes.
Keywords: nature-based solutions, nutrient removal, ecosystem services, biodiversity, urban water bodies

Introduction

Urban water bodies, including rivers, lakes, ponds, wetlands and constructed water features, are fundamental components of urban landscapes, shaping spatial structure, supporting ecological processes and enabling social functions. Increased awareness of the multifunctional value of urban water bodies, as reflected in the diversity of ecosystem services they deliver, has driven a progressive reconceptualisation of their role from discrete infrastructural components to integral landscape assets of broad societal relevance [31].

Urban water bodies offer a broad spectrum of ecosystem service (ES) benefits, with regulating services such as flood attenuation, microclimate stabilisation and water quality regulation, and cultural services including recreation and aesthetic appreciation, constituting their most significant contributions [19]. Provisioning services, by contrast, are of secondary relevance in the urban context, owing primarily to the limited demand for direct material outputs that characterises densely settled environments [24;37].

The spatial value of urban water bodies extends well beyond their ecological functions. Waterfronts, riparian corridors and lakeshores rank among the most frequented and socially significant public spaces in cities, functioning as structuring axes for movement, social interaction and community life. Their capacity to create visual openings in the cityscape, define place identity and anchor neighbourhood character makes them disproportionately influential relative to their physical extent [7]. This spatial prominence directly underpins the cultural and social ecosystem services they provide. Empirical research consistently links proximity to blue-green environments with improved mental health outcomes, reduced stress and enhanced wellbeing [40], while recreational use, aesthetic experience and environmental education constitute further dimensions of their cultural value.

Despite their multifunctional value, urban water bodies face significant ecological pressures, with nutrient pollution driven by nitrogen and phosphorus inputs from urban runoff, wastewater and diffuse sources representing one of the most pervasive threats to water quality. Excessive nutrient loading leads to eutrophication, promoting algal blooms, oxygen depletion and biodiversity loss, and altering biogeochemical cycles in freshwater systems [2;6;20;41]. These processes are further influenced by hydrological connectivity, land use patterns and sediment dynamics, which together determine the transport, transformation and retention of nutrients across the aquatic continuum [20;42].

In response to these challenges, nature-based solutions (NBS) have emerged as adaptive and cost-effective approaches to urban water management, gaining increasing attention in planning and design discourse under conditions of urbanisation, climate change and ecological degradation [28]. The European Commission defines nature-based solutions as "Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions" [13]. NBS offers a multidisciplinary, integrated approach that simultaneously enhances ecosystem functions and resilience, biodiversity and human well-being [27]. In urban water environments, this integration often takes a physical form, combining ecological processes with spatial and landscape design to address multiple challenges within a single intervention.

Such approaches include constructed wetlands, vegetated buffer systems, restored riparian zones and other forms of green infrastructure that facilitate nutrient removal through plant uptake, microbial transformation, sedimentation and adsorption processes [3;5;42]. However, while NBS can significantly contribute to nutrient reduction, their effectiveness is highly context-dependent and often requires integration with broader watershed-scale management and long-term monitoring [2;29].

While many studies have focused on the technical performance of water treatment systems, considerably less attention has been given to their spatial integration within urban landscapes and their contribution to biodiversity and ecosystem services, particularly in the context of Baltic cities. This study examines the integration of nature-based solutions into urban public spaces, focusing on surface water filtration prototypes and their role in nutrient removal, biodiversity support and ecosystem service provision in Latvia and Estonia.

Materials and Methods

Study Area

The study was conducted in two eutrophic lakes in Latvia and Estonia, Lake Dūņezers and the Võnnu lake (Fig.1), based on their high nutrient loads and suitability for testing NBS for phosphorus removal. Lake Dūņezers (57.518514°N, 24.698206°E, Limbaži municipality, Latvia) is a public subglacial lake in the Gauja River basin, Latvia, and part of the Dūņezers Nature Reserve and Natura 2000 network. It is approximately 4.75 km long, with a maximum depth of 2 m, although sedimentation has reduced average depths in many areas to below 0.5 m. The lake is severely eutrophic, with total nitrogen and phosphorus concentrations exceeding good ecological status thresholds. Major nutrient inputs originate from wastewater discharge and industrial effluents, while deep sapropel deposits contribute substantial internal loading. These conditions have led to recurrent cyanobacterial blooms dominated by Oscillatoria sp. and Microcystis sp., with water transparency declining to 0.15 m. Despite this, the site remains important for biodiversity, supporting protected species of European conservation importance, such as Vertigo angustior, Myotis dasycneme, diverse fish communities, and rare invertebrates [35].

The Võnnu lake (58.284602°N, 27.046010°E, Kastre Municipality, Tartu County, Estonia) consists of two interconnected shallow artificial lakes in Estonia, formed by damming a stream flowing into the Luutsna River. The lakes are extremely nutrient-enriched, with total phosphorus reaching 1.1 mg/l and total nitrogen about 6.4 mg/l, while transparency has declined to 15 cm. Nutrient inputs are associated with wastewater discharge and agricultural runoff, and thick organic sediments further worsen ecological conditions. The system is characterized by toxic blooms of Planktothrix agardhii, absence of submerged vegetation, and pollution-tolerant biological communities [31].

Selected Nature-Based Solutions

The study focuses on surface water filtration prototypes implemented as NBS within the framework of the NutriLoopWorks project, which focuses on improving nutrient management and water quality in Latvia and Estonia. These prototypes represent small-scale interventions designed to reduce phosphorus concentrations in eutrophic urban water bodies through the application of sorbent materials of natural origin.

The filtration approach is based on the use of calcium-based sorbent media capable of binding phosphate ions through adsorption processes, drawing on previous experimental research on calcium/iron-based composites for phosphorus removal from wastewater [21;22].

The selection of the analysed cases was based on four criteria: (1) the use of nature-based materials for phosphorus removal; (2) implementation in open urban or peri-urban water environments; (3) integration into publicly accessible spaces with consideration of visual quality and landscape design; and (4) the potential to support circular nutrient management through phosphorus recovery and reuse in urban green spaces, while also supporting biodiversity and ecosystem functions.

Ecosystem Service Assessment Framework

The identification and assessment of ES and its corresponding indicators provided by surface water filtration prototypes in this study are grounded in the Common International Classification of Ecosystem Services (CICES) V5.2, the standard framework adopted across the European Union for systematic ES classification, mapping, and evaluation [15]. ES relevant to surface water filtration prototypes were identified through a structured review process, combining the CICES V5.2 classification with an analysis of ecological functions of the aquatic ecosystem and those associated with the surface water filtration prototype. The identification process followed the ES cascade model, which traces the causal chain from ecosystem structure and processes through ecological functions to the services delivered to society [15].

As the first part of the ES assessment, performance indicators were established to evaluate the ecosystem's delivered services and demonstrate NBS performance over time.

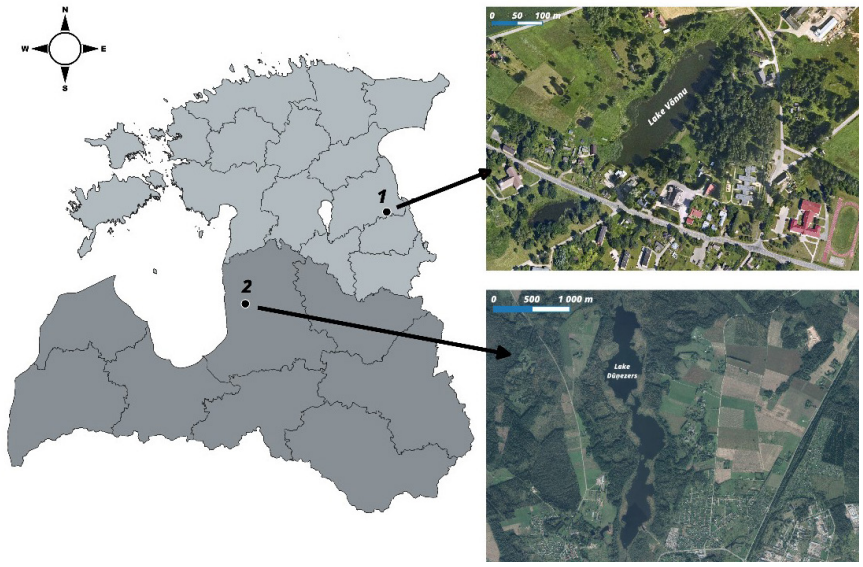


Fig.1. Location of the study sites:
(1) Lake Dūņezers (Latvia) and
(2) Võnnu lake (Estonia)
[created by the authors using 26; 32, 2026]

For each indicator, a distinction was maintained between ecosystem potential supply, reflecting the structural and functional capacity of the prototype to generate services under current conditions and actual supply (flow), representing services actively realised at the time of assessment, such as measured phosphorus reduction, confirmed nest occupancy, documented species presence, or observed improvements in water quality parameters associated with fish habitat. This distinction is particularly important in short-term NBS evaluation, as regulating services such as nutrient removal can be detected within a single season, whereas habitat-related indicators, including species richness and fish habitat quality, reflect longer-term ecological responses [1; 8].
In the second part of the assessment, these indicators will be applied to assess the diversity, quality, and interactions of ES, and to evaluate the effectiveness of the NBS in delivering ES and enhancing water quality.

Results

Design of a Floating Surface Water Filtration Prototype
The NBS prototype, implemented in the selected study sites, is a floating structure with a birdhouse and submerged phosphorus-absorbing filter cartridges (Fig.2.). The structure is based on a pontoon system composed of cylindrical floating elements that ensure buoyancy and stability, supported by a corrosion-resistant frame and a moisture-resistant deck with a textured, non-slip surface. The platform, approximately 2.5 × 3.0 m in size, is designed to accommodate structural loads as well as bird activity, while a gently inclined access ramp facilitates movement of birds from the water onto the platform. A wooden bird shelter filled with natural nesting material is installed on the platform and adapted to local waterbird species, providing resting and nesting opportunities through an open and accessible design.
Water purification is achieved through submerged phosphorus-absorbing filter cartridges positioned beneath the platform and attached to its structure. These modules are filled with granular calcium-based sorbent material of natural origin, which binds phosphate ions while maintaining water permeability. The modular arrangement allows continuous interaction between the water body and the filtration system.
The platform is anchored to the lakebed to ensure stability under varying hydrological conditions. The prototype combines functional water treatment with a spatially integrated floating structure within the urban water landscape.

Ecosystem Services of the Floating Surface Water Filtration Prototype
The prototype assessed in this study represents an integrated NBS deployed in publicly accessible urban waterbodies, enabling the simultaneous provision of water quality regulation, habitat and cultural services and resulting in a multi-service ES profile (Fig. 3). The types of ecosystem services identified are consistent across both study sites, although their magnitude and expression may vary depending on local environmental conditions.
Within the regulation and maintenance category, the primary function of the prototype is water quality regulation, achieved through the filtration unit positioned beneath the platform. This component facilitates the removal of total phosphorus, thereby contributing to the regulation of the chemical condition of freshwater systems. In parallel, the nesting platform provides habitat maintenance by offering structurally suitable breeding and resting sites for waterbird species in a degraded urban aquatic environment, assessed using indicators such as nest site availability and platform occupancy. Waterbirds as mobile species supported by the platform contribute to broader landscape-level ecological connectivity, linking the urban waterbody to surrounding green and blue infrastructure networks beyond the immediate site.
The presence of waterbirds further contributes to the biological regulation of the aquatic environment through foraging activity, which indirectly supports nutrient cycling and suppression of algal development within the water body. Beyond direct regulation, the improvement of water clarity and dissolved oxygen conditions resulting from phosphorus reduction creates the potential for enhanced fish habitat quality. This is identified as an indirect provisioning service, dependent on sustained improvements in water quality rather than a directly measurable short-term effect.
The integration of the prototype into a publicly accessible urban park setting provides a range of cultural ecosystem services, including landscape aesthetic value and opportunities for recreation and environmental education. These benefits are associated with the visual presence of the structure and waterbirds, supporting activities such as birdwatching, increasing public engagement with urban water environments and raising environmental awareness.
Together, these ES and their corresponding indicators capture the multi-service profile of this urban NBS, which

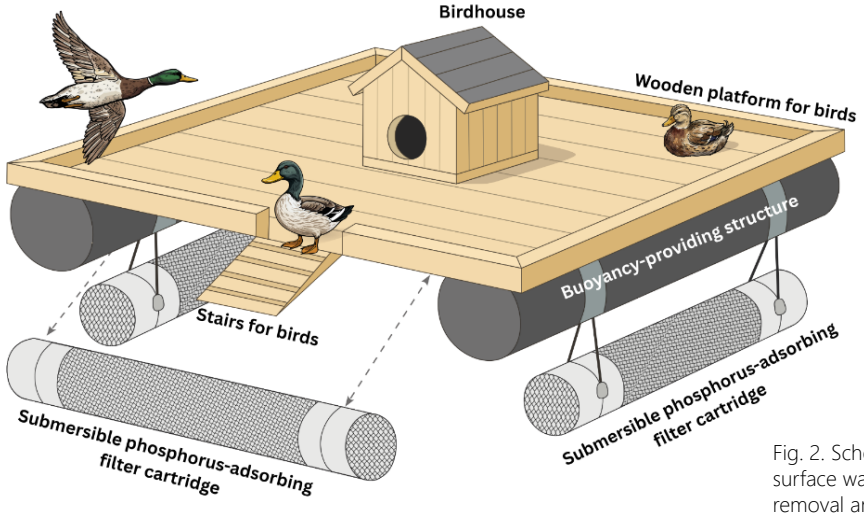


Fig. 2. Schematic representation of the floating surface water filtration prototype for phosphorus removal and habitat provision in urban lake environments [created by the authors, 2026].

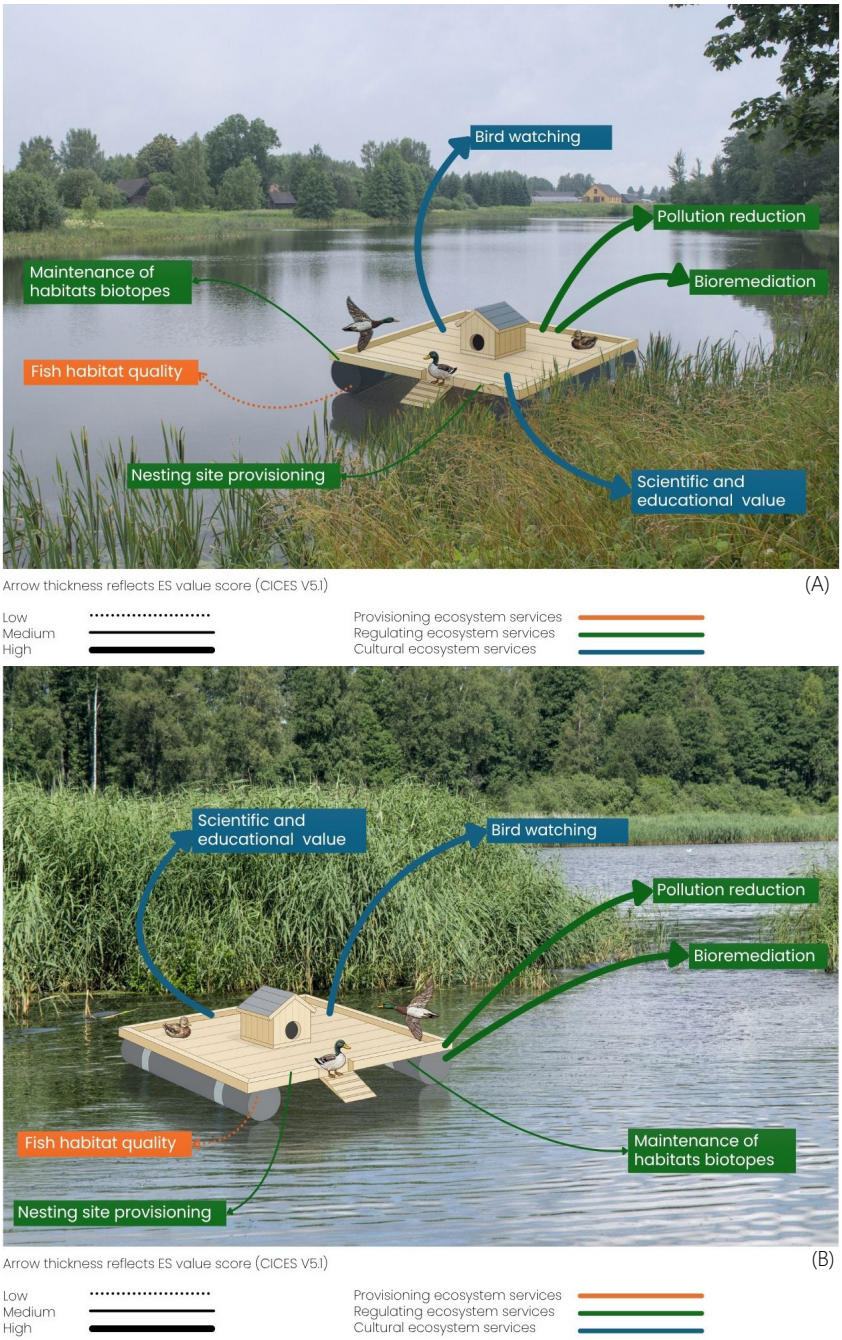


Fig. 3. Ecosystem service profile of the floating surface water filtration prototype (A) Lake Dūņezers (Latvia), (B) Võnnu lake (Estonia). Labelled arrows indicate ES; arrow thickness reflects their relative importance, and colours represent ES groups according to CICES classification [created by the authors, 2026].

functions not only as a technical approach to environmental management but also as a communicative tool that fosters public understanding, trust and engagement, thereby supporting meaningful and inclusive dialogue [10].

Discussion

Cities represent contexts where the demand for multifunctional solutions is particularly high due to limited space and increasing pressure on ecosystem services [17]. In this context, the results of this study demonstrate how small-scale nature-based solutions can contribute to water quality improvement, biodiversity support and ES provision within urban water landscapes. EU policies such as the European Green Deal, the EU Biodiversity Strategy for 2030, and the EU Climate Adaptation Strategy actively promote NBS, emphasizing their contribution to the development of healthy urban ecosystems, which in turn support the health of other key European ecosystems, for example, by connecting natural areas in the surrounding countryside and beyond the urban boundary [14].

Urban landscapes are increasingly recognised as complex socio-ecological systems that are fundamental to long-term sustainability and human well-being [12]. Within this context, NBS represent a critical component, offering integrated approaches that address environmental challenges while supporting urban liveability [13]. The dependence of urban landscapes on functional green and blue infrastructure highlights the need to embed NBS within urban planning and development strategies, as these systems provide ES that cannot be replicated by grey infrastructure alone.

The results of this study show that the floating surface water filtration prototype reflects a broader shift towards multifunctional NBS that simultaneously address water quality, biodiversity and social functions within a single spatially integrated intervention. This aligns with increasing research emphasising that NBS can deliver multiple ecosystem services, contributing not only to ecological restoration but also to human well-being and urban liveability [4;5]. The provision of multiple benefits is a core principle of the NBS

concept, requiring a balance between primary objectives and co-benefits [37]. In this context, the co-location of phosphorus filtration, waterbird habitat and public space integration within a compact floating structure demonstrates how even small-scale interventions can function as multi-service systems. Similar findings have been reported in studies of constructed wetlands and riparian systems, where water purification, habitat provision and cultural services are delivered simultaneously [17;23].

In addition to ecological benefits, NBS are increasingly associated with improvements in human health and well-being, including enhanced mental health, reduced stress and increased opportunities for recreation [9]. The integration of the prototype into a publicly accessible urban landscape therefore extends its function beyond environmental remediation, supporting social engagement with water ecosystems and raising environmental awareness.

At the same time, the ES profile identified in this study highlights both synergies and limitations inherent in NBS implementation. While the prototype effectively combines water quality regulation with habitat provision, the magnitude and directness of different services vary. This reflects a broader finding in the literature that ecosystem service delivery from NBS is uneven and context-dependent [25;38]. In particular, the distinction between direct and indirect services is critical. Nutrient removal represents a measurable and immediate regulatory service, whereas biodiversity-related and provisioning services often emerge over longer temporal scales and depend on broader ecosystem dynamics. Similar temporal mismatches between ecological improvements and ecosystem service benefits have been observed in river basin and wetland restoration studies, where improvements in ecological status do not always translate directly into increased ES gains [25].

These dynamics underline the importance of integrated ES assessment frameworks, which combine biophysical indicators with social and economic evaluation methods [38]. However, such approaches also introduce challenges related to data requirements, valuation uncertainties and the risk of oversimplifying complex socio-ecological interactions [16].

The results further confirm that the performance and ES outcomes of NBS are highly context-dependent, influenced by site-specific conditions such as nutrient loads, hydrology and ecological status. This is consistent with broader literature emphasising that the effectiveness and transferability of NBS cannot be assumed across different environmental and socio-economic contexts [5]. At the same time, the prototype demonstrates the potential of small-scale, modular interventions to contribute to urban water management. Unlike large-scale wetland restoration or basin-level interventions, such solutions can be implemented incrementally and adapted to local conditions, offering flexibility in densely built urban environments. This aligns with recent calls for scalable and modular NBS approaches that can complement conventional infrastructure while delivering ecosystem service co-benefits [11].

In urban contexts, upfront costs of NBS may be comparable to those of grey infrastructure; however, they are often more cost-effective in the long term due to lower maintenance requirements and their capacity to deliver multiple ES [34]. Nevertheless, their long-term effectiveness depends on continued maintenance, monitoring and integration within broader water management strategies, with success strongly linked to governance frameworks, stakeholder engagement and alignment with policy instruments such as the EU Water Framework Directive [11].

Conclusions

This study demonstrates that small-scale, spatially integrated nature-based solutions can effectively contribute to urban water management while delivering multiple ecosystem services. The analysed floating surface water filtration prototype shows how phosphorus removal, habitat provision and public space integration can be combined within a single intervention, supporting both water quality improvement and biodiversity enhancement in eutrophic urban lakes.

The results confirm that such prototypes can function as multifunctional elements within urban water landscapes, contributing simultaneously to nutrient removal, biodiversity support and ecosystem service provision. Nutrient removal remains the most direct and measurable function, while additional ecological and social benefits emerge as complementary outcomes. The findings highlight that multifunctionality can be achieved even under spatial constraints, with compact and modular interventions providing meaningful ecological functions within urban environments.

At the same time, the effectiveness of such solutions remains context-dependent, with ecosystem service delivery varying in scale and over time. While regulating services can be observed in the short term, biodiversity-related benefits depend on longer-term ecological processes.

Overall, the study emphasises the role of surface water filtration prototypes as nature-based solutions that integrate ecological processes, spatial design and social value, supporting the development of resilient and multifunctional urban water landscapes.

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Kopsavilkums

Pilsētvides ūdensobjekti ir nozīmīgas pilsētu ainavas sastāvdaļas, kas nodrošina ekoloģiskās, telpiskās un sociālās funkcijas. Tomēr daudzus pilsētvides virszemes ūdeņus ietekmē biogēno elementu piesārņojums, jo īpaši paaugstināta fosfora koncentrācija, kas veicina ūdens kvalitātes pasliktināšanos un ekoloģiskā līdzsvara traucējumus. Dabā balstīti risinājumi (DBR) arvien plašāk tiek izmantoti kā ilgtspējīga pieeja pilsētvides ūdens apsaimniekošanas uzlabošanai, vienlaikus sekmējot bioloģisko daudzveidību un ekosistēmu pakalpojumu nodrošinājumu. Rakstā analizēta dabā balstītu risinājumu integrācija pilsētvides ūdens ainavās Latvijā un Igaunijā, īpašu uzmanību pievēršot virszemes ūdeņu filtrācijas prototipiem, kas publiskajā ārtelpā īstenoti kā ainavā integrēti risinājumi ūdens kvalitātes uzlabošanai, samazinot biogēno elementu koncentrāciju. Pētījumā izmantots kvalitatīvs un indikatoros balstīts ekosistēmu pakalpojumu novērtējums, analizējot biogēno elementu, īpaši fosfora, samazināšanas potenciālu, bioloģiskās daudzveidības attīstību un šo risinājumu lomu apkārtējā pilsētvides ainavā. Rezultāti liecina, ka analizētie prototipi darbojas kā multifunkcionāli risinājumi, kuru primārā un kvantitatīvi novērtējamā funkcija ir fosfora samazināšana ūdenī, vienlaikus nodrošinot dzīvotnes ūdensputniem un veicinot papildu ekoloģisko un kultūras ekosistēmu pakalpojumu veidošanos. Kopumā pētījuma rezultāti apliecina neliela mēroga, telpiski integrētu dabā balstītu risinājumu potenciālu uzlabot ūdens kvalitāti un vienlaikus nodrošināt daudzveidīgus ekosistēmu pakalpojumus pilsētvides ūdens ainavās.