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

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

Introduction

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Materials and Methods

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

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

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

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

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

- City area, forest, and green space areas, considering that forest land includes land covered by forests, land under forest infrastructure, as well as floodplains, marshes, glades, and adjacent swamps (Meža Likums. Latvija Republikas Saeima, 2000).
- Property rights (municipal, state, private forests) – since cities are the focus, greater attention is paid to the volume of forests owned by municipalities. The information available in planning documents, municipal and company websites is prepared in different time periods and varies in content. This article uses data compiled by the Latvian Association of Local and Regional Governments on city forest areas and property rights in 2021 (Latvijas Pašvaldību savieniba & Upenieks, 2021) and city areas as per the Latvian Official Statistics Portal (Oficiālās Statistikas Portāls, n.d.).
- Specially protected areas in urban forests (Meža ĪADT) as essential for ensuring environmental and natural functions of urban forests. Data were verified through the Nature Conservation Agency's Nature Data Management System Ozols (Dabas Datu Pārvaldības Sistēma Ozols, n.d.).
- Forest parks as special structures within the urban forest network – defined as forest territories of public or cultural-historical significance, equipped with facilities and used by the public for recreation (Meža Likums. Latvija Republikas Saeima, 2000). These are established following Cabinet of Ministers Regulations on the creation and management of parks and forest parks (Noteikumi Par Parku Un Mežaparku Izveidošanu Mežā Un to Apsaimniekošanu, 2013).
- Significant forest masses – the primary structural components of urban forests. Information was obtained from planning documents and expert interviews.
- Main tree species characteristic of Latvian urban forests. Data were gathered through expert interviews, planning documents, or company websites.
- Forest landscape characteristics, influenced by biotic and abiotic growth conditions and the nature of urban development. Data were obtained from expert interviews and field surveys.

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

Results and Discussion

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

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

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

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

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

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

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

In the cities examined in the study, pine trees dominate, except in Jelgava, where birch trees are the most common.

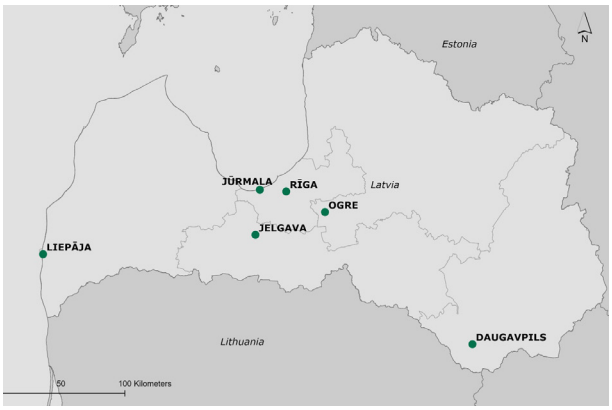

Fig.1. Case study areas (cities) selected for the research (created by authors)

TABLE 1

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

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

*(Oficiālās Statistikas Portāls, n.d.)

**(Latvijas Pašvaldību savieniba & Upenieks, 2021)

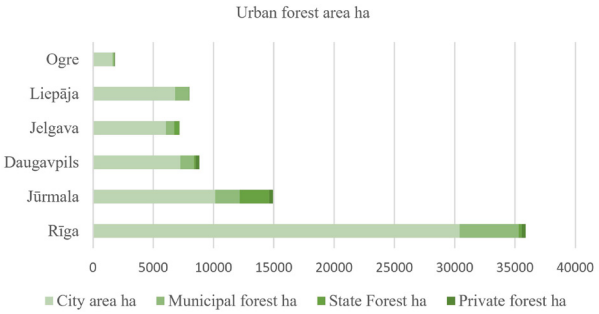

Fig. 2. Urban Forest Areas and Ownership Distribution
(2021 data, created by authors)

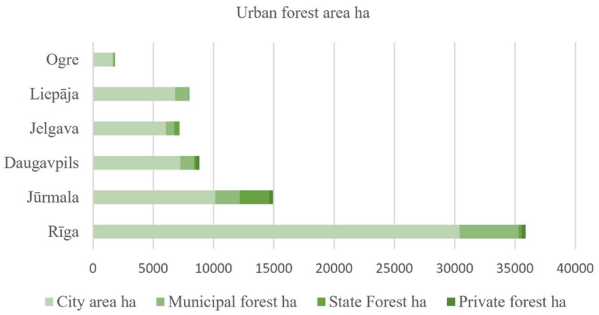

Fig. 3. Urban Forest Areas and Ownership Distribution in Percentages
(2021 data, created by authors)

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

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

TABLE 2

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

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

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

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

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

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

Management Authority: In all cities, the leading management authority is linked to the local municipality (Table 5). State-owned urban forest areas are managed by the joint-stock company "Latvian State Forests" (Latvijas valsts meži), while in some areas of Jurmala, the management is handled by the Nature Conservation Agency. In Jelgava, part of the state-owned urban forests is managed by the Latvian State Forest Science Institute Silava and the Forest Management Agency Forest Research Station of the Latvian University of Agriculture at the Jelgava Information Center (Visit Jelgava, n.d.). Jurmala (Stratēģiskā Ietekmes Uz Vidi Novērtējuma Vides Pārskats Jūrmalas Valstspilsētas Attīstības Stratēģijai 2010.-2030.Gadam – Aktualizācijai, 2023; Jūrmalas pilsētas pašvaldība, 2010). Liepaja (Liepaja.Lv, n.d.). A special mention should be made of SIA Rīgas meži. which is the leading urban forest manager in Latvia with extensive experience, significant financial resources, and a large workforce. As of 2024, SIA Rīgas meži operates four forest districts—Riga, Jugla, Tīreļi, and Katrīna—that manage the forests, gardens, and parks owned by the Riga municipality. Their jurisdiction includes approximately 63,000 hectares of forest, including 4,893 hectares within Riga itself, as well as areas within a 50 km radius of the capital and the Katrīna forest district in the Limbaži region (Rigas Meži, n.d.).

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

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

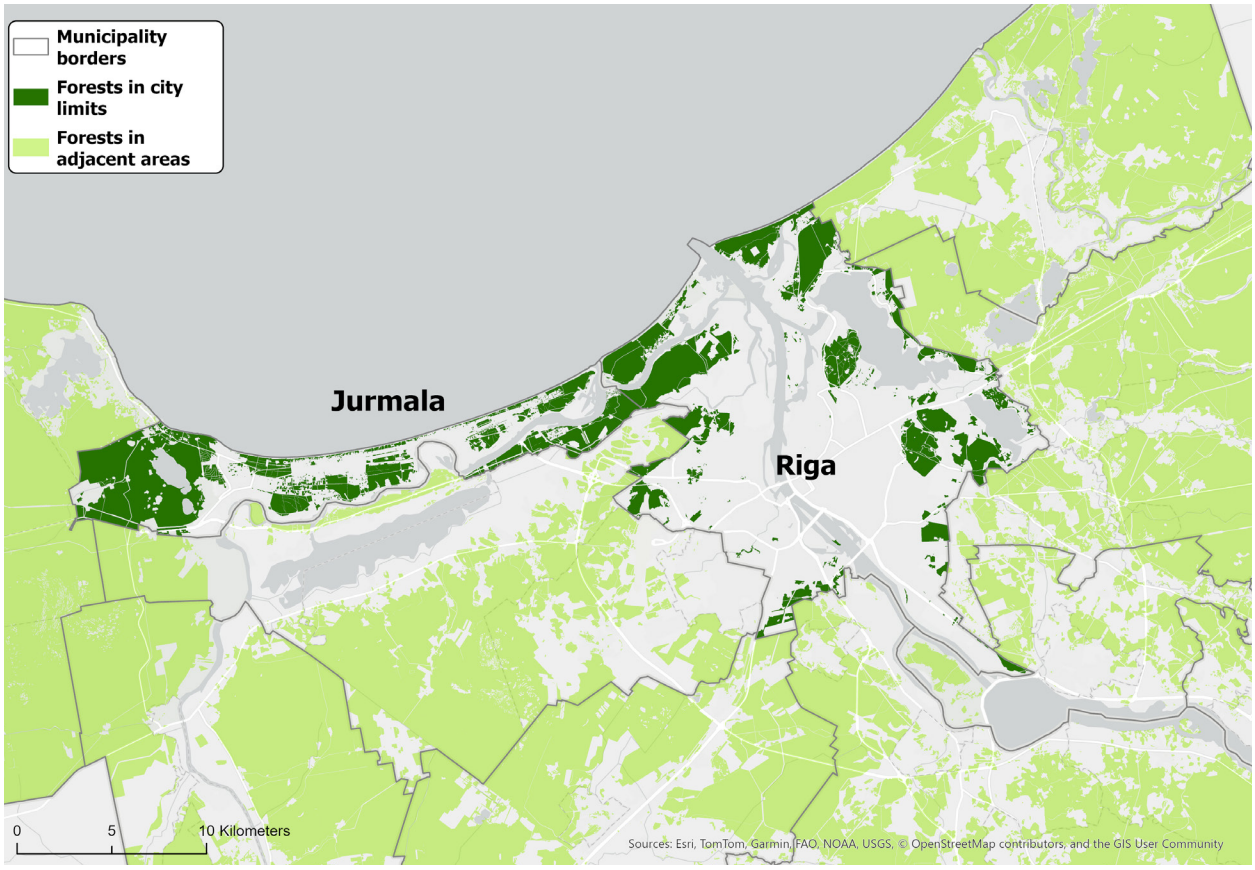

Fig. 4. Illustration of Urban forest coverage in Riga and Jurmala (created by authors)

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

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

Multifunctional management

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

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

Participation: In most cities, explanatory publications, surveys, and community events are organized, often by other municipal structures. The involvement of stakeholders is most extensive in SIA Rīgas meži. In the nature and recreation zones designated by the Landscape Ecological Planning, within urban areas, local landscape design plans are developed based on the zoning of the Forest Management Plan and Landscape ecological plan, considering natural and other values. These plans are made available for public consultation or information through the company's website. Suggestions from the public are evaluated, and if necessary, the planned forestry activities are adjusted based on feedback.

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

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

The expert survey was carried out in May-November 2024 with 10 experienced professionals from institutions involved in urban forest management. The experts agreed with the authors' definition of urban forests, the identified functions of urban forests, the stakeholders, the need for legislative changes. 7 experts supported the urban forest classification groups, 3 recommended simplifying the classification. The

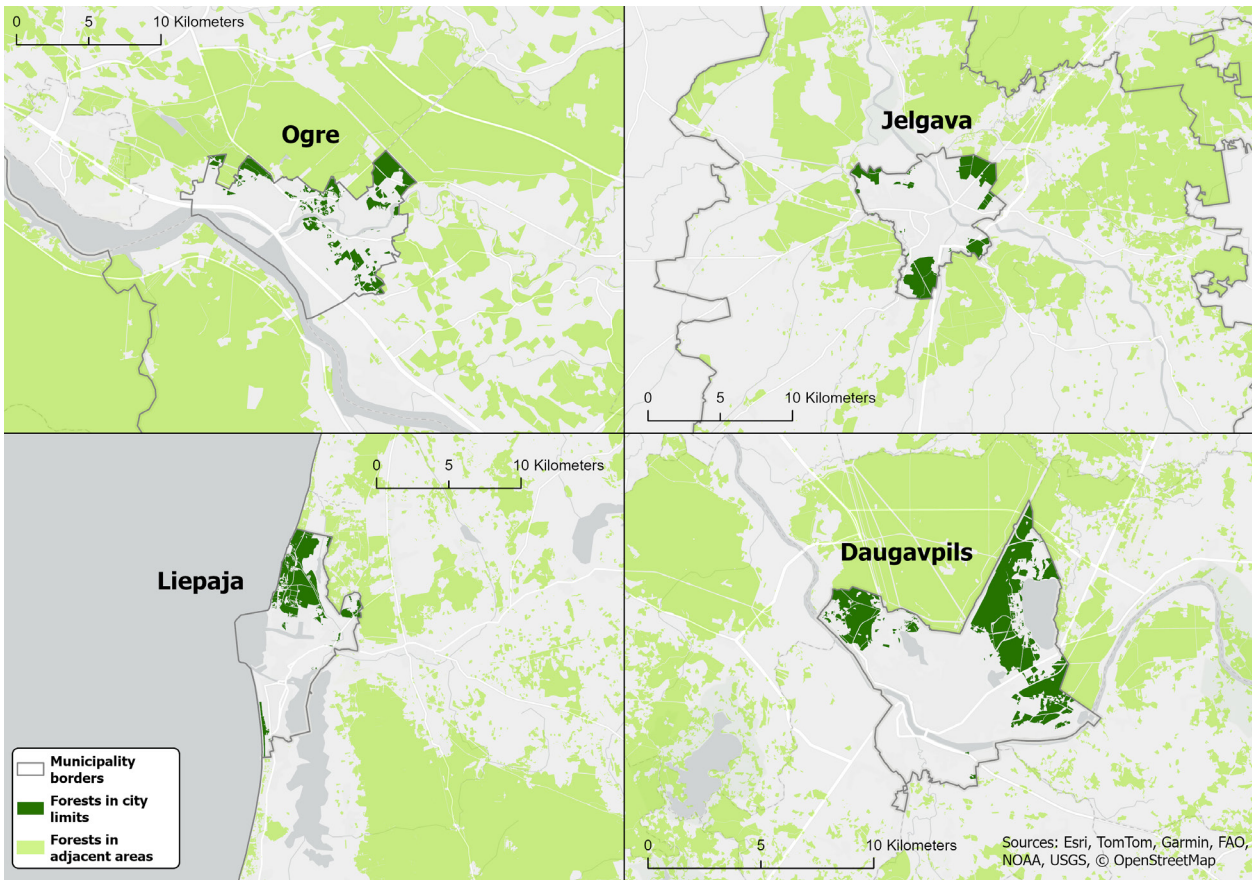

Fig. 5. Illustration of Urban forest coverage of Ogre, Jelgava, Liepaja and Daugavpils (created by authors)

TABLE 3

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

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

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

TABLE 4

Characteristics of forest landscapes (created by the authors)

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

TABLE 5

Urban forest management and governance (created by the authors)

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

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

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

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

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

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

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

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

Conclusions

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

Urban Forest Definition and Functions:

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

Planning and Governance:

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

Mitigating Human Impact and Enhancing Resilience:

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

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

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

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

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Kopsavilkums

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