Latvijas Biozinātņu un tehnoloģiju universitāte
Latvia University of Life Sciences and Technologies
Meža un vides zinātņu fakultāte
Faculty of Forest and Environmental Sciences

Mg. telpiskās attīstības plānošanā **Ieva Kraukle**

promocijas darbs – tematiski vienotu zinātnisko publikāciju apkopojums

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Zinātnes doktora grāda

zinātnes doktore (Ph.D.) humanitārās un mākslas zinātnēs

iegūšanai

Promocijas darba vadītāja
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Madara Markova, Dr.arch., Latvijas Biozinātņu un tehnoloģiju universitātes Meža un vides zinātņu fakultātes, Ainavu arhitektūras un vides inženierijas institūta docente, vadošā pētniece, promocijas padomes sekretāre.

Promocijas darba aizstāvēšana notiks LBTU Mūzika, vizuālās mākslas un arhitektūra nozares promocijas padomes atklātā sēdē 2026. gada 18.06. plkst. 10:00 Meža un vides zinātņu fakultātes, Ainavu arhitektūras un vides inženierijas institūta sēžu zālē, Rīgas ielā 22, Jelgavā.
Ar promocijas darba kopsavilkumu var iepazīties LBTU Fundamentālajā bibliotēkā, Lielā ielā 2, Jelgava.
Atsauksmes sūtīt promocijas padomes sekretārei, Dr.arch. Madarai Markovai (Jelgavā, Akadēmijas ielā 11, LV-3001, Jelgava, Latvija, e-pasts: madara.markova@lbtu.lv).

INFORMATION

The research was carried out at the Latvia University of Life Sciences and Technologies, Faculty of Forest and Environmental Sciences from year 2020 to 2025.
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Outi Tahvonen PhD., Häme University of Applied Sciences
Promotion Board:

Professor, Dr.arch. Aija Ziemeļniece, chairman;
Professor, Dr.arch. Daiga Skujāne, vice-chairman;
Professor, Dr.arch. Una Īle;
Professor, Dr.arch. Natalija Ņitavska;
Professor, Dr.arch. Sandra Treija;
Associate professor, Dr.arch. Madara Markova, the secretary of the Promotion Board.

The thesis will be defended at a public session of the Promotion Board of the Sector of Music, visual arts and architecture on June 18, 2026. at 10:00 AM in the meeting hall of the, Jelgava.The thesis and summary are available at the Fundamental Library of Latvia University of Life Sciences and Technologies, 2 Lielā Street, Jelgava.

References should be addressed to the secretary of the Promotion Board, associate professor of the Faculty of Forest and Environmental Sciences, Dr.arch. Madara Markova (11 Akadēmijas Street, Jelgava, Latvia, LV-3001, e-mail: madara.markova@lbtu.lv).

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KOPSAVILKUMS

Promocijas darbā veikts visaptverošs Latvijas pilsētmežu pārvaldības pieredzes izvērtējums, analizēts normatīvais ietvars, apzinātas ekosistēmu, īpaši kultūras pakalpojumu vērtības, kā arī izstrādāti ieteikumi pilsētmežu ilgtspējīgai plānošanai un apsaimniekošanai. Pētījuma mērķis ir izstrādāt pieeju pilsētmežu, ekosistēmu kultūras pakalpojumu, dabas, ainavisko vērtību un funkciju identificēšanai, klasifikācijai un pārvaldībai, veicinot šo teritoriju iekļaušanu pilsētvides attīstības procesos. Darbā piedāvāta pilsētmežu klasifikācijas sistēma, kas balstīta ekosistēmu pakalpojumu un funkcionālās nozīmes izvērtējumā, kā arī izstrādāti ieteikumi integrētai, dabā balstītai pārvaldībai.

Pētījuma zinātnisko novitāti veido Latvijas apstākļiem pielāgota pilsētmežu definīcija, kas veicina vienotu izpratni un salīdzināmību starptautiskā kontekstā, kā arī integrētas pārvaldības pieejas piedāvājums, kas apvieno ekoloģiskos, sociālos un telpiskos aspektus. Būtisks ieguldījums ir arī inovatīvās kvalitatīvās metodes Go-along izmantošana, kas ļāvusi padziļināti izprast pilsētmežu lietotāju pieredzi, emocionālo saikni un uztveri, atklājot ainavas nozīmi cilvēku ikdienā un identitātē. Šie rezultāti sniedz zinātniski pamatotu pamatu pilsētmežu ilgtspējīgai attīstībai un piedāvā praktiski izmantojamus risinājumus pašvaldībām, plānotājiem un nozares profesionāļiem.

SUMMARY

This doctoral thesis provides a comprehensive assessment of Latvia's urban forest management experience, analyzes the regulatory framework, identifies the values of ecosystems and specific cultural services, and develops recommendations for the sustainable planning and management of urban forests. The aim of the study is to develop an approach for identifying, classifying, and managing urban forests, ecosystem services, and the natural and landscape values and functions of these areas, thereby promoting their integration into urban development processes. The study proposes a classification system for urban forests based on an assessment of ecosystem services and functional significance, and develops recommendations for integrated, nature-based management.

The scientific novelty of the study lies in a definition of urban forests adapted to Latvian conditions, which promotes a common understanding and comparability in an international context, as well as the proposal of an integrated management approach that combines ecological, social, and spatial aspects. Another significant contribution is the use of the innovative qualitative Go-along method, which has allowed for an in-depth understanding of urban forest users' experiences, emotional connections, and perceptions, revealing the significance of the landscape in people's daily lives and identities. These results provide a scientifically grounded foundation for the sustainable development of urban forests and offer practical solutions for local governments, planners, and industry professionals.

ZUSAMMENFASSUNG

In der Dissertation wurde eine umfassende Analyse der Bewirtschaftungspraktiken von Stadtwäldern in Lettland durchgeführt. Dabei wurden der einschlägige rechtliche Rahmen, die ökologischen und insbesondere die kulturellen Ökosystemleistungen sowie die landschaftlichen Werte dieser Gebiete systematisch untersucht. Auf dieser Grundlage wurden Empfehlungen für eine nachhaltige Planung und Bewirtschaftung von Stadtwäldern entwickelt. Ziel der Studie ist es, einen wissenschaftlich fundierten Ansatz zur Identifizierung, Klassifizierung und Steuerung von Stadtwäldern sowie ihrer ökologischen, kulturellen und landschaftlichen Funktionen zu erarbeiten und damit ihre stärkere Integration in stadtentwicklungspolitische Prozesse zu

fördern. Die Arbeit schlägt ein Klassifizierungssystem vor, das auf der Bewertung von Ökosystemleistungen und funktionaler Bedeutung basiert, und formuliert Leitlinien für ein integriertes, naturbasiertes Management.

Die wissenschaftliche Neuheit der Untersuchung liegt in der Entwicklung einer an die spezifischen Rahmenbedingungen Lettlands angepassten Definition des Begriffs Stadtwald, die ein einheitlicheres Verständnis und eine bessere Vergleichbarkeit im internationalen Kontext ermöglicht. Darüber hinaus wird ein integrierter Bewirtschaftungsansatz vorgeschlagen, der ökologische, soziale und räumliche Dimensionen systematisch miteinander verbindet. Ein weiterer wesentlicher Beitrag besteht im Einsatz der innovativen qualitativen Go-along-Methode, die ein vertieftes Verständnis der Nutzungserfahrungen, der emotionalen Bindungen und der Wahrnehmungsmuster von Stadtwaldbesuchern ermöglicht hat. Dadurch konnten die Bedeutung von Landschaft für den Alltag, die Identitätsbildung und das Wohlbefinden der Bevölkerung sowie die Potenziale und Herausforderungen der Stadtwaldentwicklung präziser herausgearbeitet werden. Die Ergebnisse liefern eine wissenschaftlich belastbare Grundlage für die nachhaltige Entwicklung von Stadtwäldern und bieten praxisorientierte Handlungsempfehlungen für Kommunen, Planungsinstitutionen und Fachakteure.

PUBLIKĀCIJU SARAKSTS / *LIST OF PUBLICATIONS*

Promocijas darbs ir balstīts uz septiņām publikācijām, atsauces uz kurām tekstā ir veidotas, izmantojot romiešu ciparus:

The thesis is based on seven publications, referred in the text with Roman numerals:

I Kraukle, I., Stokmane, I., Vugule, K. (2021). Planning of urban forests in Riga and major European cities. Research for Rural Development 2021, Volume 36 https://doi.org/10.22616/rrd.27.2021.040 *(indeksēta SCOPUS un WoS datubāzēs).*

II Kraukle, I., Stokmane, I., Vugule, K. (2021). Legal framework of urban forestry management in Latvia. Research for Rural Development 2021, Volume 36 https://doi.org/10.22616/rrd.28.2022.040 *(indeksēta SCOPUS un WoS datubāzēs).*

III Kraukle, I., Stokmane, I., Vugule, K. (2022). The Ogres Zilie kalni park urban forest management. Landscape Architecture and Art, 21(21), 7–17. https://doi.org/10.22616/j.landarchart.2022.21.01 *(indeksēta SCOPUS un WoS datubāzēs).*

IV Čaupale, R., Kraukle, I., Hofmane, A. (2023). Thoughtful paths of Nature Park „Ogres Zilie kalni". Landscape Architecture andArt, 22(22), 44–51. https://doi.org/10.22616/j.landarchart.2023.22.04 *(indeksēta SCOPUS un WoS datubāzēs).*

V Kraukle, I., Jūrmalis, E., Stokmane, I., Vugule, K. (2024). Urban and peri-urban forest area stakeholder identification, case study of 'Bernāti' and 'Ogres Zilie kalni' nature parks. Research for Rural Development 2024, Volume 39. https://doi.org/10.22616/RRD.30.2024.040 *(indeksēta SCOPUS un WoS datubāzēs).*

VI Kraukle, I., Jūrmalis, E., Stokmane, I., Vugule, K. (2025). Experience of urban forest management in Latvia from the perspective of experts and sites' managers. Landscape Architecture and Art 2025, 25(25), 46–55. https://doi.org/ 10.22616/j.landarchart.2024.25.05 *(indeksēta SCOPUS un WoS datubāzēs).*

VII Kraukle, I., Stokmane, I., Vugule, K. (2025). The 'go-along' interviews for assessment of users' attitudes toward urban forest management. Research For Rural Development 2025, Volume 40 https://doi.org/10.22616/RRD.31.2025.047 (indeksēta SCOPUS un WoS datubāzēs).

AUTORA IEGULDĪJUMS / *THE CONTRIBUTION OF THE AUTHOR*

Nr.	**Ideja /** *Original idea*	**Pētījuma plāns /** *Study design*	**Datu ievākšana** */ Data collection*	**Datu analīze /** *Data analysis*	**Manuskripta sagatavošana /** *Manuscript preparation*	**Promocijas darba autora ieguldījums %** */ Contribution of the author, %*
I	IK	IK	IK	IK	IK, IS, KV	90%
II	IK	IK	IK	IK	IK, IS, KV	90%
III	IK	IK	IK	IK	IK, IS, KV	90%
IV	RC, IK	RC, IK	RC, IK, AH	RC, IK, AH	RC, IK, AH	70%
V	IK	IK	IK, EJ	IK, EJ	IK, EJ	85%
VI	IK	IK	IK	IK	IK, EJ	90%
VII	IK	IK	IK	IK	IK, IS, KV	90%

IK-Ieva Kraukle; IS-Ilze Stokmane; KV-Kristīne Vugule; RC-Renāte Čaupale; AH-Anete Hofmane; EJ -Edgars Jūrmalis.

PROMOCIJAS DARBA APROBĀCIJA / *APPROBATION OF RESEARCH RESULTS*

Promocijas darbs ir ticis aprobēts vairākos līmeņos. Promocijas darba izstrādes laikā uzkrātās zināšanas un kompetences tika izmantotas zinātnisko projektu realizācijā. Ir sniegti 13 ziņojumi starptautiskajās zinātniskajās konferencēs. Promocijas darba rezultāti ir publicēti zinātnisko rakstu krājumos un žurnālos, kas indeksēti SCOPUS un/vai Web of Science datubāzēs. Uzkrātās kompetences tika pielietotas tematisku lekciju sagatavošanai un iekļaušanai LBTU studiju procesā. Darba pieredze no 2003. - 2012. gadam SIA "Rīgas meži", no 2014. gada un pašreiz – Ogres novada pašvaldības aģentūrā "Tūrisma, sporta un atpūtas kompleksa "Zilie kalni" attīstības aģentūra" saistībā ar pilsētmežu apsaimniekošanu (pārvaldību).

The doctoral thesis has been approved at several levels. The knowledge and competencies accumulated during the development of the doctoral thesis have been utilized in the implementation of scientific projects. Thirteen reports have been presented at international scientific conferences. The results of the doctoral thesis have been published in collections of scientific articles and journals indexed in the SCOPUS database. The accumulated competencies were used to prepare thematic lectures and include them in the LBTU study process. Work experience in 2003 - 2012 at the Limited liability company "Rīgas meži, SIA", from 2014 until now – at the Ogre Municipality Agency "Tourism, Sports, and Recreation Complex "Zilie kalni" Development Agency" in urban forest management (administration).

Projekti / *Projects*

Promocijas darba izstrādes laikā notikusi dalība 2 zinātniski pētnieciskos projektos, kas ir tieši saistīti ar pilsētmežu apsaimniekošanu:

1. 2024.-2026. g. Tēma R129-"Ietekme uz vidi un apsaimniekošanas izaicinājumi rekreācijai nozīmīgās meža teritorijās Latvijā, Nr. lzp-2023/1-0137", Valsts pārvaldes iestādes finansēts projekts, zinātniskais asistents.
2. 2025.-2026. g. Akadēmiskās karjeras doktorantūras grants "Urbāno mežu ainavas

funkcionalitāte un attīstības perspektīvas ilgtspējas un klimata pārmaiņu kontekstā" (AF25), kas iekļauj izmaksu segšanu Atveseļošanas projekta Nr. 5.2.1.1.i.0/2/24/I/CFLA/002 "LBTU institucionālās kapacitātes stiprināšana izcilībai studijās un pētniecībā" ietvaros.

During the development of the doctoral thesis, the author took part in 2 projects that are directly related to urban forest management:

1. 2024-2026. Subject R129- "Environmental impact and management challenges in forest areas of significance for recreation in Latvia, No. lzp-2023/1-0137", project financed by the State Administration institution, scientific assistant.

2. 2025-2026 Academic career PhD grant "Urban forest landscape functionality and development prospects in the context of sustainability and climate change" (AF25), which includes cost coverage under Recovery Project No. 5.2.1.1.i.0/2/24/I/CFLA/002 "Strengthening the institutional capacity of LBTS for excellence in studies and research".

Publikācijas, kas indeksētas SCOPUS un/vai WoS datubāzēs / *Publications indexed in SCOPUS and/or WoS databases*

1. Kraukle, I., Stokmane, I., Vugule, K. (2021). Planning of urban forests in Riga and major European cities. Research for Rural Development 2021, Volume 36. https://doi.org/10.22616/rrd.27.2021.040
2. Kraukle, I., Stokmane, I., Vugule, K. (2022). Legal framework of urban forestry management in Latvia. Research for Rural Development 2021, Volume 37. https://doi.org/ 10.22616/rrd.28.2022.040
3. Kraukle, I., Stokmane, I., Vugule, K. (2022). The Ogres Zilie kalni park urban forest management. Landscape Architecture and Art, 21(21), 7-17. https://doi.org/10.22616/j.landarchart.2022.21.01
4. Čaupale, R., Kraukle, I., Hofmane, A. (2023). Thoughtful paths of Nature Park „Ogres Zilie kalni". Landscape Architecture and Art, 22(22), 44–51. https://doi.org/10.22616/j.landarchart.2023.22.04
5. Kraukle, I., Jūrmalis, E., Stokmane, I., Vugule, K. (2024). Urban and peri-urban forest area stakeholder identification, case study of 'Bernāti' and 'Ogres Zilie kalni' nature parks. Research for Rural Development 2024, Volume 39. https://doi.org/10.22616/RRD.30.2024.040
6. Kraukle, I., Jūrmalis, E., Stokmane, I., Vugule, K. (2024). Experience of urban forest management in Latvia from the perspective of experts and sites' managers. Landscape Architecture and Art 2025, 25(25), 46-55. https://doi.org/10.22616/j.landarchart.2024.25.05
7. Kraukle, I., Stokmane, I., Vugule, K. (2025). The 'go-along' interviews for assessment of users' attitudes toward urban forest management. Research for Rural Development 2025, Volume 40. https://doi.org/10.22616/RRD.31.2025.047

Ziņojumi konferencēs / *Presentations at international scientific conferences*

Promocijas darba izstrādes laikā ir sniegti XIII ziņojumi starptautiskajās zinātniskajās konferencēs, kas ir tieši saistīti ar promocijas darba pētījuma tēmu:

During the development of the research, XIII reports have been presented at international scientific conferences that are directly related to the topic of the research:

1. Planning of urban forests in Riga and major European cities. Ieva Kraukle, Ilze Stokmane, Kristine Vugule. Research for Rural Development 2021. Jelgava, Latvia, May 12-14, 2021.
2. Urbāno mežu ainavas funkcionalitāte un attīstības perspektīvas, Ieva Kraukle. LLU

Ainavu arhitektūras un plānošanas katedras zinātniski praktiskā konference Ainava/ procesi/ tendences. Jelgava, Latvija, 2021. gada 23. aprīlis.Legal framework of urban forestry management in Latvia. Ieva Kraukle, Ilze Stokmane, Kristine Vugule. Research for Rural Development 2022. Jelgava, Latvia, May 18-20, 2022.

3. Covid 19 ietekme uz Dabas parka "Ogres Zilie kalni" tūrisma infrastruktūras attīstību. Ieva Kraukle, Ilze Stokmane, Kristine Vugule. 81. Latvijas Universitātes starptautiskā zinātniskā konference 2023. Rīga, Latvija, 2023. gada 17. marts.
4. Thoughtful trails of Ogre Nature park Zilie kalni. Renāte Čaupale, Ieva Kraukle. Scientific Conference Application of nature therapy principles for creation of green environment, Kaunas forestry and environmental engineering university of applied sciences. Kaunas, Lithuania, April 20, 2023.
5. Urban forest development. Ieva Kraukle. ECLAS Conference 2023, Labyrinths of the world "Landscape Crossroads", Doctoral Colloquium "Orbus Pictus". Brno-Lednice, Czech Republic, September10-13, 2023.
6. Urban and peri-urban forest area stakeholder identification, case study of 'Bernāti' and 'Ogres Zilie kalni' nature parks. Ieva Kraukle, Edgars Jūrmalis, Ilze Stokmane, Kristine Vugule. Research for Rural Development 2024. Jelgava, Latvia, May 15-16, 2024.
7. Pilsētmežu funkcijas un to atspoguļošana teritorijas plānošanas dokumentos. Ieva Kraukle, Ilze Stokmane, Kristine Vugule. 82. Latvijas Universitātes starptautiskā zinātniskā konference. Rīga, Latvija, 2024. gada 15. marts.
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12. Urban forests for human health activities. Nature park Ogres Zilie kalni. Ieva Kraukle, Ilze Stokmane, Kristine Vugule. 4th World Conference on Forests and Parks For Public Health. World society for Forests&Parks for Public Health. Luxembourg, May 21-24,2025.

Akadēmiskais darbs / *Academic work*

Promocijas darba izstrādes laikā iegūtās zināšanas un iestrādnes tika izmantotas Latvijas Biozinātņu un tehnoloģiju universitātes maģistra studiju programmas "Ainavu arhitektūra un plānošana" studiju kursā "Ilgtspējīga ainavu attīstība". Attiecīgi no 2021. gada līdz 2024. gadam studiju kursa "Ilgtspējīga ainavu attīstība" maģistrantiem tika lasītas lekcijas par tēmu "Pilsētmeži – Rīgas, Pierīgas un dabas parka "Ogres Zilie kalni" kontekstā", kā arī laika posmā no 2021. līdz 2024. gadam lasītas lekcijas Baltijas universitāšu tīklojuma "Bova" kursā "***Outdoor Recreation Planning and Design".*** 2025. gada 4. martā novadīta mācību ekskursija dabas parkā "Ogres Zilie kalni", iepazīstinot klātesošos ar pilsētmežu

apsaimniekošanas praksi un izaicinājumiem.

The knowledge and insights acquired during the development of the doctoral thesis were used in the study course ***"Sustainable Landscape Development"*** *of the professional Master's study programme "Landscape Architecture and Planning" of the Latvian University of Life Sciences and Technologies. Accordingly, from 2021 to 2024 lectures were given to master's students of the study course* ***"Sustainable Landscape Development"*** *on the theme "Urban Forests – in the Context of Riga, Pierīga and Nature Park "Ogres Zilie kalni", as well as lectures were given in the course* ***"Outdoor Recreation Planning and Design"*** *of the Baltic University Network "Bova" from 2021 to 2024. On 4 March 2025, a study excursion was conducted to the Nature Park "Ogres Zilie kalni", introducing the participants to the practices and challenges of urban forest management.*

Promocijas darba struktūru veido ievads, materiāli un metodes, rezultāti un diskusijas, un noslēgumā secinājumu un ieteikumu sadaļa, 135 izmantotie avoti un 7 publikācijas. Promocijas darba apjoms: 47 lapaspuses, 8 attēli un 9 tabulas. Visi bez atsaucēm ievietotie attēli un tabulas ir pētījuma gaitā iegūti autora materiāli.

The structure of the doctoral thesis consists of an introduction, materials and methods, results and discussions, conclusions and recommendations, the list of bibliography that contains 135 sources and 7 publications in the appendix. The volume of the doctoral thesis is 44 pages, 7 figures and 9 tables. All images and tables included without sources are materials obtained by the author in the course of the research.

1. IEVADS

21. gs. sākumā 0,8 % no visiem Latvijas mežiem (Donis, 2001) tika uzskatīti par pilsētmežiem (kas pieder valstij un pašvaldībām). Otrs rādītājs, kas statistiski raksturo tēmas aktualitāti ir teritoriju platība, ko klāj meži, un tas gadsimta sākumā bija 20 % no pilsētu teritorijas (Donis, 2001).

Covid-19 ietekme skaudri parādīja, cik būtiskas cilvēku labsajūtai ir pilsētai tuvās pilsētmežu teritorijas, kuras ārkārtas situācijā, ko radīja pandēmija, bija pieprasītas daudz vairāk nekā jebkad agrāk. Novērotā prakse parādīja, ka rekreācijas zonas pilsētmežos ir ļoti aktuālas. Ņemot vērā jauno pieredzi ar vīrusa ierobežošanu, īpaši būtiski ir izkliedētas rekreācijas zonas, kas ierobežo pārlieku apmeklētāju koncentrēšanos.

Pēdējo gadu laikā arvien lielāka uzmanība ir pievērsta jautājumam par pilsētu zaļajām struktūrām kopumā. Šajā ziņā liela nozīme bija koncepcijām un politikai, kas saistīta ar ilgtspējīgu attīstību. Apvienoto Nāciju Organizācijas Konferencē par vidi un attīstību 1992. gadā tika uzsvērts, ka pilsētu attīstību var panākt tikai integrējot sociālos, ekonomiskos un ekoloģiskos aspektus, tādēļ dažādu nozaru un ieinteresēto personu centieni būtu jāintegrē vietējā līmenī (Apvienoto Nāciju Organizācija, 1995).

Klimata pārmaiņas (United Nations Organisation, 2015b) ir cieši saistītas ar biodaudzveidības krīzi (European Parliament, 2020) un pati daba ir spēcīgs sabiedrotais cīņā pret klimata pārmaiņām (IPBES, 2019). Pilsētu zaļā infrastruktūra (*urban green infrastructure*) ir stratēģiski pārvaldīts pilsētas zaļo zonu un dabisko un daļēji dabisko ekosistēmu tīkls, kas atrodas pilsētas telpas robežās (*EnRoute*) (Maes et al., 2019), tāpēc vairāk uzmanības jāpievērš pilsētu zaļajām struktūrām, to paplašināšanai, nevis atsevišķiem dabas elementiem. Arvien lielākā mērā praktiķi, pētnieki un politiķi popularizē un veicina visas pilsētas zaļās struktūras ieguldījumu pilsētas dzīves un vides kvalitātes uzlabošanā. Turklāt vietējās pašvaldības arvien skaidrāk apzinās, ka, strādājot augsta spiediena apstākļos, ir nepieciešama vairāk integrēta, videi draudzīga plānošana un pārvaldība, lai apmierinātu pašreizējās sabiedrības prasības.

Mežu teritorijās parasti runā par apgādes jeb nodrošinājuma, regulējošiem un atbalsta, kultūras jeb nemateriālajiem ekosistēmu pakalpojumiem (Jūrmalis et al., 2023; Li et al., 2022; Millennium Ecosystem Assessment, 2005). Pilsētmežiem ir būtiska loma ekosistēmu pakalpojumu nodrošināšanā un uzturēšanā (Baskent et al. 2020), kā arī izmantošanai dažādām cilvēku vajadzībām (Burgess, Harrison, & Limb, 1988; Carrus et al., 2015; Endreny, 2018) – atpūtai, sportošanai, izziņai, dabas baudīšanai, ogošanai un sēņošanai. Pilsētmeži ir neatsverami fiziskās un mentālās veselības nodrošināšanai (Berman et al., 2008; Endreny et al., 2017). Covid-19 pandēmija radīja lielāku izpratni par zaļo teritoriju nozīmīgumu sabiedrības dzīvē (Geary et al., 2021) un mainīja veidu kā mijiedarbojamies ar apkārtējo vidi (Honey-Rosés et al., 2021).

Bioloģiski daudzveidīgās teritorijas palīdz mazināt daudzas vides problēmas, piemēram, gaisa piesārņojumu, troksni, klimata pārmaiņu ietekmi, karstuma viļņus, plūdus un sabiedrības veselības problēmas, padarot pilsētas ilgtspējīgas (Maes et al., 2019). Dažādu meža funkciju līdzsvarošanā un visu ekosistēmu pakalpojumu sniegšanai jāpalielina sinerģija un jāsamazina kompromisi, balstoties uz pētījumos pieradītu informāciju (European Parliament, 2022).

Viens no Eiropas Savienības mērķiem ir vēlākais līdz 2050. gadam panākt klimatneitralitāti (European Union, 2022), kur meža ekosistēmas ir īpaši nozīmīgas, lai mazinātu klimata pārmaiņas un to radīto ietekmi. Tāpēc pilsētmežiem nepieciešama ilgtspējīga un aktīva apsaimniekošana, stiprinot mežu ekosistēmu pielāgošanās spēju un noturību.

Pilsētmežu pārvaldībā mežsaimniecība un mežsaimnieki ir tikai viena no ieinteresētajām pusēm (Randrup et al., 2005), šajā procesā iesaistīti arī pilsētplānotāji, ainavu arhitekti, dārzkopji, arboristi (Krajter Ostoić et al., 2020), un pilsētu mežsaimniecība ir kļuvusi par sociālo mežsaimniecību (Konijnendijk et al., 2006), vides izglītības nodrošinātāju (Akmar et al., 2011). Būtiska ir jēdziena pilsētmeži padziļināta ieviešana Latvijas teritoriālās plānošanas jomā, analizējot ārvalstu praksi šādu teritoriju attīstībā. Parkus un citas zaļās zonas tradicionāli

projektējuši ainavu arhitekti, tāpēc nozares pienesums pilsētmežu attīstības aktualizēšanā ir ļoti būtisks.

Promocijas darbā pētīta situācija Latvijas pilsētmežos – pilsētu un izpētes teritoriju (stratēģiskā un vietas) mērogā, balstoties uz ārvalstu pieredzi. Izstrādājot Latvijas ainavu politikas ieviešanas plānu 2024.-2027. gadam (Par Ainavu politikas ieviešanas plānu 2024.–2027. gadam, 2024), 2. rīcības virzienā "Ainavu pārvaldības uzlabošana" plānots ietvert aktivitāti – "mērķtiecīga zaļās infrastruktūras plānošana un veidošana laukos un urbānā vidē, ņemot vērā pielāgošanās aspektus klimata pārmaiņām", kas tieši sasaucas ar darba aktualitāti, izstrādājot ieteikumus un vadlīnijas ilgtspējīgai pilsētmežu ainavu plānošanai, izveidei un pārvaldībai.

Urbanizācijas procesi rada būtiskas problēmas pilsētu zaļo teritoriju saglabāšanai – to platības un kvalitātes samazinās, notiek fragmentēšanās, saplūstot urbānajām teritorijām, kā rezultātā notiek būtiska pilsētas un tās tuvākās apkārtnes mijiedarbība (Carreiro, Song, & Wu (Eds.), 2008). Lai mazinātu negatīvos aspektus, jārunā par telpisko plānošanu, kur pilsētas un piepilsētas ir savstarpēji neatraujamas un vienotas (Akmar et al., 2011; Hawkins & Selman, 2002). Kā ilgtspējīgi iepriekš minētās problēmas risinājumi tiek atzīti dabā balstīti risinājumi (*nature-based solutions*) (Bayulken, Huisingh, & Fisher, 2021), kas promocijas darba izstrādes gaitā konstatēti un parādīti arī Latvijas pilsētu struktūrā, kur daudzviet pilsētas zaļās teritorijas savienojas un saplūst ar plašākiem piepilsētas mežu masīviem (skatīt I, II un VI publikāciju) un, pamatojoties uz starptautisko pieredzi, veidots Rīgas modelis, kas piemērojams arī citām Latvijas pilsētām. Mūsdienīga telpiskās plānošanas pieeja pieprasa integrētu vides, ekonomisko un sociālo aspektu līdzsvarošanu un apmierināšanu (Konijnendijk et al., 2006), papildinot to ar modernu pārvaldību, kas piešķir vietai papildus vērtību (Clark & Stankey, 1979). Latvijā arvien vairāk tiek pievērsta uzmanība tieši pilsētmežu plānošanai, lai gan Eiropā šis jautājums skatīts jau izsenis (Akmar et al., 2011; Carreiro et al., 2008; Konijnendijk, 2003; Konijnendijk et al., 2006). Autore piedāvā turpināt attīstīt Latvijai aktuālu dabā balstītu risinājumu pilsētmežu pārvaldības modeli, atbilstoši mūsdienu prasībām definējot pilsētmeža terminu, ieviešot to telpiskās attīstības plānošanā un normatīvajos aktos.

Pilsētmežs 1) ir mežs — ekosistēma visās tās attīstības stadijās, kur galvenais organiskās masas ražotājs ir koki, kuru augstums konkrētajā vietā var sasniegt vismaz piecus metrus un kuru pašreizējā vai potenciālā vainaga projekcija ir vismaz 20 procentu no mežaudzes aizņemtās platības, minimālā platība 0,5 ha (Latvija Republikas Saeima, 2000), un 2) tas kalpo kā publiskā ārtelpa pilsētu administratīvajās robežās un ārpus tām esošā urbānā vidē, kur primārās ir sociālās un vides funkcijas, kam nepieciešama regulāra kopšana un atjaunošana, saglabājot vai uzlabojot teritorijas sociālo, estētisko, kultūrvēsturisko un ekonomisko vērtību (Kraukle, 2013; Kraukle, Stokmane, & Vugule, 2022a). Pilsētmežā primārās ir sociālās un vides funkcijas. Pilsētmežs kalpo kā publiskā ārtelpa pilsētas administratīvajās robežās un ārpus tām esošajā urbānajā vidē.

1.1. Promocijas darba tēmas robežas

Pilsētmežiem ir dažādas funkcijas un izmantošana, kas mūsdienās galvenokārt balstās uz ekosistēmu kultūras pakalpojumu – fiziskās un psihoemocionālās rekreācijas nodrošināšanu. Līdz šim teritoriju plānojumos pilsētmeži dažkārt tiek paradīti kā "zaļā teritorija", bieži pat neparādot meža juridisko statusu vai sabiedrībai saprotamo un Latvijai raksturīgo meža ainavu. Pētot citu valstu zinātnisko un praktisko pieredzi, nākas saskarties ar termina pilsētmeži (*urban forest*) pārāk plašu, izplūdušu pielietojumu – valstīs ar mazu mežu īpatsvaru pilsētmežiem tiek pieskaitītas koku rindas un pat atsevišķi koki. Lai precizētu izpratni, tiek piedāvāta konkrēta pilsētmežu definīcija, kas atbilst Latvijas situācijai. Pilsētmeži veic gan sanitāri higiēniskās funkcijas – aiztur piesārņojumu un troksni, gan rekreācijas un kultūrvēsturiskās funkcijas, kur pilsētmeži kalpo kā vide iedzīvotāju atpūtai un izglītošanai. Pilsētmežos sastopami gan bioloģiski un vizuāli ļoti vērtīgi nogabali, gan nozīmīgas kultūrvēsturiskas un ainaviskas

vērtības, gan degradētas teritorijas, tāpēc, plānojot un pārvaldot pilsētmežus, aktuāli ir balstīties uz pieminētajām dažādajām funkcijām, kas pieprasa dažādu pieeju.

Promocijas darbā ir veikts pilsētmežu pārvaldības pieredzes Latvijā izvērtējums un izstrādāti pilsētmežu plānošanas un pārvaldības ieteikumi. Pilsētmežu ainavu funkcionalitāte ilgtspējīgā plānošanā ir tieši atkarīga no pārvaldības kvalitātes, kas nosaka šo ainavu ekoloģisko, sociālo un telpisko vērtību saglabāšanu un attīstību ilgtermiņā.

1.2. Promocijas darba mērķis

Izstrādāt pieeju un ieteikumus pilsētmežu ainavisko vērtību, ekosistēmu kultūras pakalpojumu un funkciju apzināšanai, klasifikācijai un pārvaldībai Latvijas kontekstā, veicinot pilsētmežu kā nozīmīgas ainavas sastāvdaļas ilgtspējīgu attīstību un iekļaušanu pilsētvides plānošanā.

1.3. Promocijas darba pētnieciskie uzdevumi

1. Izvērtēt pilsētmežiem saistošo normatīvo aktu ietvaru, lai identificētu pastāvošos tiesiskos un institucionālos nosacījumus, kas ietekmē šo teritoriju plānošanu, apsaimniekošanu un ilgtspējīgu attīstību.
2. Apzināt un analizēt pilsētmežu ainaviskās vērtības un ekosistēmu funkcijas, noskaidrojot to nozīmi apkārtējās vides kvalitātes, sabiedrības labbūtības un kultūras identitātes veidošanā un izstrādāt pieeju iekļaušanai pilsētvides plānošanā.
3. Izstrādāt pilsētmežu klasifikācijas pieeju, balstoties uz teritorijai raksturīgajiem ekosistēmu pakalpojumiem un to funkcionālo nozīmi.
4. Izstrādāt ieteikumus pilsētmežu ilgtspējīgai ainavu plānošanai un pārvaldībai Latvijā, lai veicinātu integrētu pieeju nozares attīstībā, uzlabotu starpsektoru sadarbību un nodrošinātu pilsētmežu, kā nozīmīgas dabas un sociālās vides sastāvdaļas, ilgtspējīgu funkcionēšanu.

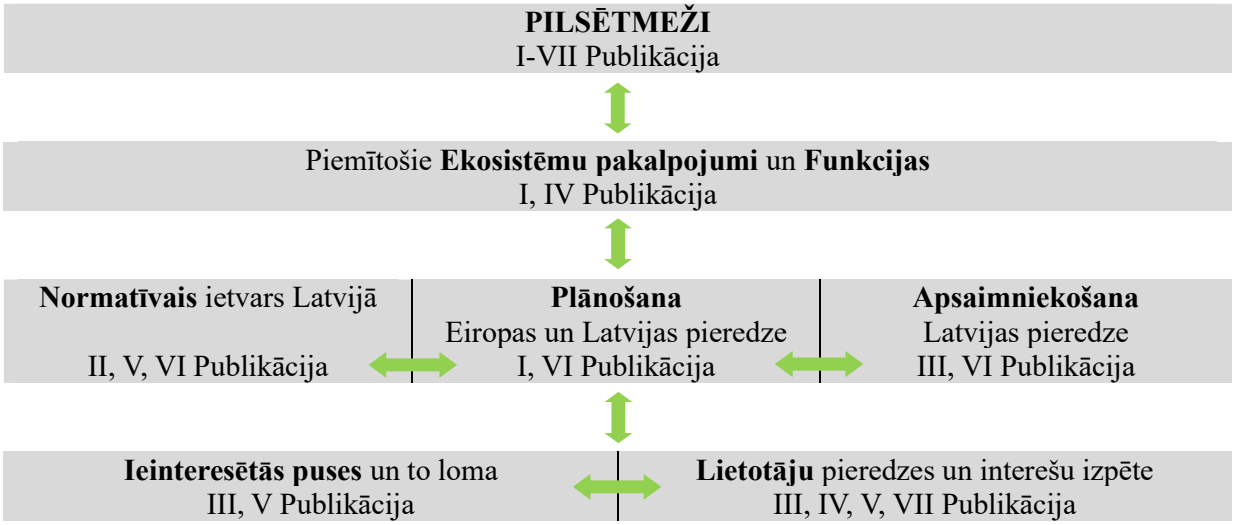
1.4. Promocijas darba novitāte

1. Bieži, runājot par pilsētmežiem, īpaši starptautiskā mērogā, var redzēt atšķirīgu izpratni par jēdziena "pilsētmeži" (*urban forests*) lietošanu. Piedāvāta Latvijas mūsdienu situācijai atbilstoša konkrēta definīcija, veicinot skaidrāku un salīdzināmu izpratni par pilsētmežu jēdzienu, tādējādi atvieglojot pārvaldes un apsaimniekošanas prakses veidošanu.
2. Ņemot vērā, ka pilsētmežu apsaimniekošanā galvenā ir sociālā funkcija, to pārvaldība (ietver plānošanu, plaša spektra izmantošanu un kopšanu) arī prasa īpašu pieeju un praktiskās darbības, lai nodrošinātu ilgtspējīgu, dabai un cilvēkiem draudzīgu izmantošanu un kopšanu, lai saglabātu dabas vērtības, bioloģisko daudzveidību, noturību pret antropogēnām slodzēm, klimata pārmaiņām un uzlabotu rekreācijas iespējas – autore piedāvā plašāk un pielietot integrētu, dabā balstītu pieeju.
3. Pētījumā lietota inovatīva padziļināta kvalitatīvās pētniecības metode *Go-along*, noskaidrojot ekspertu un sabiedrības (lietotāju) pieredzi un viedokli par pilsētmežu izmantošanu un attīstības potenciālu, ainavas, biotopu, kultūrvēstures vērtību apzināšanu, uzsverot personiskās biogrāfijas, notikumu, emociju nozīmību.

1.5. Promocijas darba pētījuma uzbūve

Pētījuma ietvaros apskatīti dažādi ar pilsētmežiem un to apsaimniekošanu saistīti aspekti,

kuru savstarpēja izpēte vērsta uz promocijas darbā izvirzītā mērķa sasniegšanu (skat.1.1. att.).



1.1. att. **Promocijas darba pētījuma galvenie soļi**

Promocijas darba pētījums veidots sekojot darba stratēģijai, lai sasniegtu promocijas darbam izvirzīto mērķi (skat. 1.1. tab.).

1.1.tabula. **Promocijas darba stratēģija**

Pētniecības posmi/pieejas	Pētījumā veiktās darbības	Publikācijas
Literatūras studijas	Pētījuma jautājuma precizēšana	I, II, III
	Tēmas definīciju noteikšana	IV, V, VI, VII
	Normatīvo aktu izpēte	II, V, VI
	Labās prakses gadījumu apskate	I, VI
Izpētes teritoriju atlase	Atlases kritēriju un pazīmju definēšana (lielums, lietojums, reljefs, dabas apstākļi, atrašanās vieta, teritorijas plānojums, apsaimniekošana, problēmas u. c.)	I, II, V, VI, VII
Pētniecības datu ieguve	GIS datu, karšu, fotogrāfiju izpēte	I, V, VI, VII
	Lauka novērojumi	I, III, VI
	Ekspertu intervijas	III, VI
	Go-along intervijas	VII
	Šultes (*Schulte*) tabulas	IV
	Speciālistu diskusijas	VI
Pētniecības datu apstrāde un analīze	Datu, grupēšana, salīdzināšana, analizēšana	I-VII
	GIS lietošana datu analīzei un grafiskai attēlošanai	VII
	Kopsakarību noteikšana	I-VII
	Diskusijas	VI
Secinājumi un ieteikumi	Priekšlikumu veidošana izpētes teritoriju plānošanai un apsaimniekošanai	I-VII

2. MATERIĀLI UN METODES

Pētījums veikts piecu gadu (2021.-2025.) periodā, un tā ietvaros analizēta pilsētmežu plānošanas un apsaimniekošanas prakse **izpētes teritorijās** (skat. 2.1. att. un 2.1. tab.) Latvijā un Eiropā, kombinējot teorētiskās un empīriskās pētniecības metodes. Pētījumā izmantotās metodes tika izvēlētas atbilstoši pētījuma stratēģijai un ir apkopotas 1.1. tabulā.

Teorētiskajā daļā tika veikta zinātniskās literatūras, kā arī normatīvā regulējuma analīze, pētot pilsētmežu attīstības tendences un klasifikācijas pieejas (I un III publikācija), ieinteresētās puses (V publikācija). Īpaša uzmanība tika pievērsta pilsētmežu normatīvajam ietvaram Latvijā (II, V, VI publikācija).

Empīriskajā daļā tika analizēti pilsētmežu sniegtie ekosistēmu kultūras pakalpojumi un ar tiem saistītās funkcijas (III, IV publikācija). Veikta izpētes teritoriju atlase, lai izprastu pilsētmežu attīstības tendences un klasifikācijas pieejas un salīdzinošai analīzei starp dažādām izpētes teritorijām (I, III, VI publikācija) Tika apzinātas arī ieinteresētās puses un to loma plānošanas un pārvaldības procesos (V publikācija). Pētījumā tika veikti kvalitatīvi un kvantitatīvi lauka pētījumi: izpētes teritoriju apsekošana dabā, inventarizācija un fotofiksācija, strukturētas intervijas ar pilsētmežu apsaimniekošanas ekspertiem (VI publikācija), kā arī *Go-along* intervijas ar izpētes teritoriju ikdienas lietotājiem (VII publikācija). Daļā gadījumu tika pielietota arī psiholoģijas izpētes metode – Šultes tabulas tests (IV publikācija), lai analizētu lietotāju uztveres aspektus.

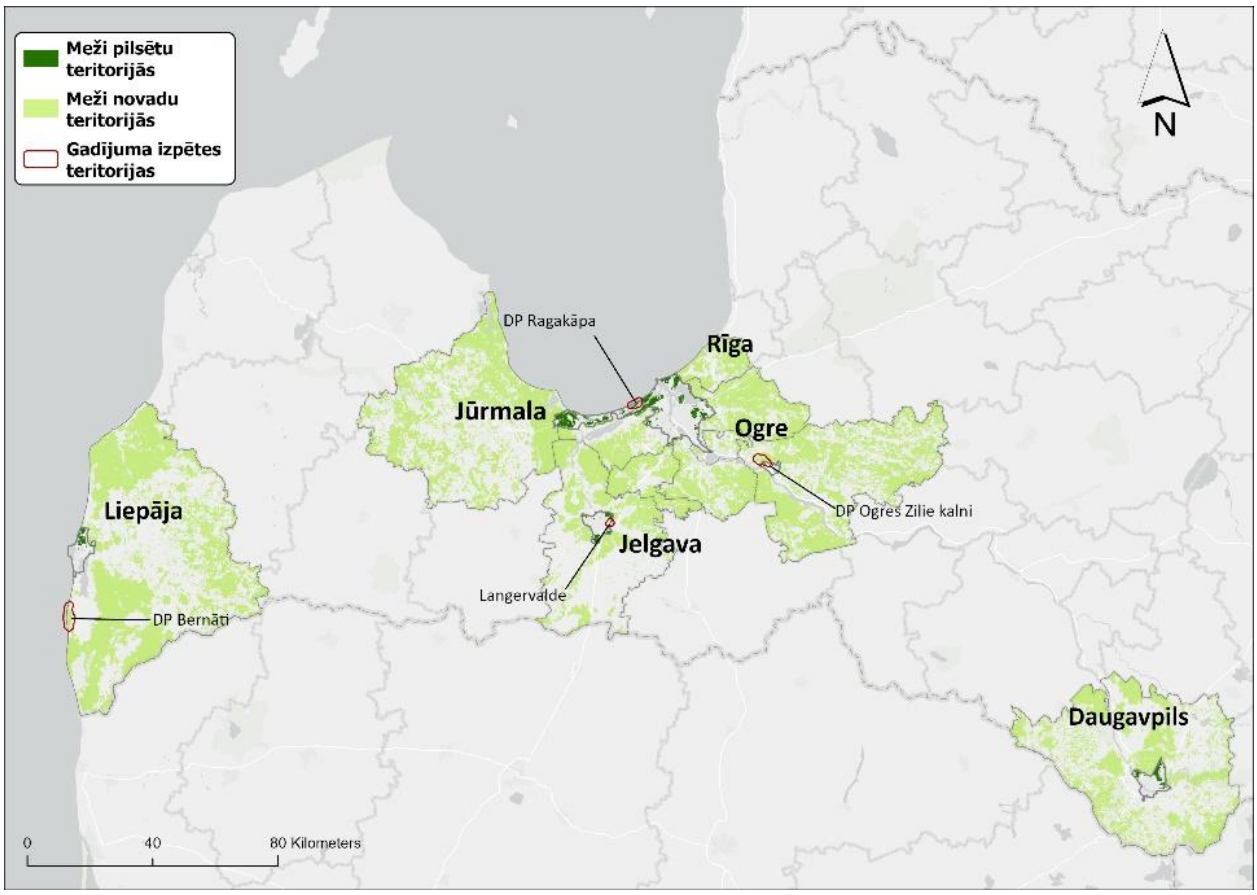
Pētījumā pielietotās metodes

- **Teorētiskās metodes:** zinātniskās literatūras analīze, normatīvo aktu un plānošanas dokumentu satura analīze.
- **Empīriskās metodes:** izpētes teritoriju atlase, apsekošana dabā, inventarizācija un fotofiksācija, strukturētās un daļēji strukturētās intervijas, *Go-along* intervijas, anketēšana, dokumentu analīze, Šultes tabulas tests, kā arī iegūto datu kvantitatīvā un kvalitatīvā analīze.

2.1. Pētāmā objekta raksturojums

Ņemot vērā praktiskā darba pieredzi Rīgas pilsētai piederošajos mežos (2003. gads– pašreiz), pētījumā detalizētāk analizēta pilsētmežu attīstība Latvijā, balstoties uz Eiropas pilsētmežu attīstības pieredzi. Pētāmā objekta raksturošanai, izmantojot gadījumu izpētes metodi, izvēlētas dažādas pilsētmežu teritorijas Latvijā.

Pētījuma daļa par pilsētmežu pārvaldības pieredzi stratēģiskā mērogā Latvijā (VI publikācija) koncentrējas uz esošās situācijas analīzi **sešās pilsētās ar izteiktu pilsētmežu īpatsvaru** (pilsētā 13–47 %, vidēji 20 % pilsētmežu)**, salīdzinot situāciju visos Latvijas statistiskajos reģionos** (NUTS 3. līmenī) (Par Latvijas Republikas statistiskajiem reģioniem, 2024): Rīga (līdz 2024 gada 1. janvārim tika izdalīta atsevišķi) un Jūrmala atrodas Rīgas statistikas reģionā, Jelgava un Ogre – Zemgales un Vidzemes statistikas reģionos, Daugavpils un Liepāja – Latgales un Kurzemes statistikas reģionos (skat. 2.1. tab. un 2.1. att.). 2.1. att. attēloti meži, pilsētu iekļaujošo novadu teritorijā, lai parādītu pilsētmežu fragmentēšanos vai savienojumus ar citiem meža masīviem.



2.1. att. **Pilsētmežu izpētes teritorijas** (tehniskais izpildījums E. Jūrmalis)

No **sešām pilsētām ar izteiktu pilsētmežu īpatsvaru**, atlasītas **četras gadījuma izpētes teritorijas** (vietas mērogā), ar atšķirīgu ģeogrāfisko novietojumu, gadījuma izpētei pieņemamu izmēru. Lai iedziļinātos dažādos pilsētmežiem būtiskos aspektos, konkrēto teritoriju izvēle lielā mērā bija atkarīga no teritorijas raksturojuma: visas četras izvēlētās teritorijas ir pilsētmežu teritorijas pilsētas robežās vai piepilsētā, ir dažāda lieluma (vismaz 50 ha un vairāk), tiek intensīvi izmantotas rekreācijai (Jūrmalis, Līviete, & Bārdule, 2022), ir veidota infrastruktūra rekreācijai, pilsētmežus apsaimnieko pašvaldība, valsts vai to struktūras, ir dažādas provizoriski identificētas problēmsituācijas, – dabas parki "Ogres Zilie kalni", "Ragakāpa", "Bernāti" un Langervaldes mežs (skat. 1.2. un 2.1. tab.). Langervaldes mežs tika izvēlēts, lai pārbaudītu vai pilsētmežu funkcijas, tipoloģija, pārvaldības principi ir attiecināmi arī pilsētmežos ar atšķirīgiem apstākļiem (nav aizsargājama teritorija, līdzens reljefs ar pārmitru auglīgu augsni, bez rekreācijai piemērotām ūdenstilpēm, mazāka platība). Rīgas pilsētmeži pētīti Ilzes Jankovskas promocijas darbā (Jankovska, 2013), un Daugavpils pilsētmežu situācija ir tuva Rīgas situācijai. Lielā izpētes apjoma dēļ tie nav iekļauti gadījuma izpētes teritoriju apskatā.

2.1.tabula. **Promocijas darba pilsētmežu izpētes teritorijas**

Latvijas pilsētmeži						
Pilsētas ar izteiktu pilsētmežu īpatsvaru (stratēģiskais mērogs)	Rīga	Ogre	Jūrmala	Jelgava	Liepāja	Daugavpils
NUTS 3	Rīga LV00A	Vidzeme LV00C	Rīga LV00A	Zemgale LV009	Kurzeme LV00B	Latgale LV005
Gadījuma izpētes teritorija (vietas mērogs)	-					-
	-	Dabas parks Ogres Zilie kalni	Dabas parks Raga kāpa	Langer valdes mežs	Dabas parks Bernāti	-
Publikācijas	I, VI,	I, II, III, IV, V, VII, VII	I, II, VI, VII	I, VI, VII	V, VI, VII	VI

Lai gan izvēlētām pilsētmežu teritorijām ir unikālas dabas vērtības un pieejamās rekreācijas iespējas, tās ir reprezentatīvas arī citām teritorijām ar līdzīgām īpašībām un rekreācijas izmantošanas modeļiem. Pētījuma rezultātus ir iespējams izmanot citos Latvijas pilsētmežos, analizējot konkrēto esošo situāciju, izvērtējot kopīgās un atšķirīgās problēmas un piedāvājot attiecīgus risinājumus.

2.2. Gadījuma izpētes metode

Gadījuma izpētes metode (izpētes teritoriju atlase, apsekošana dabā, inventarizācija un fotofiksācija) izmantota, lai noskaidrotu pilsētmežu lietotāju ainavas uztveri izvēlētajās teritorijās, vietas mērogā. Pētījuma ietvaros tika izvēlētas 3 līdzīgas pilsētmežu teritorijas un 1 salīdzinoši atšķirīga teritorija, kurās tika veikti meža teritoriju lauku apsekojumi, inventarizējot esošo situāciju (skat. 2.2. tab.).

2.2. tabula **Promocijas darba gadījuma izpētes pilsētmežu teritorijas**

Gadījuma izpētes teritorija	Dabas parks "Ogres Zilie kalni"	Dabas parks "Ragakāpa"	Dabas parks "Bernāti"	Langervaldes mežs
Atrašanās vieta	Ogres novads, starp Ogri un Ikšķili	Jūrmalas pilsēta, gar Rīgas līča krastu Buļļuciemā	Gar Baltijas jūru, starp Bernātiem un Jūrmalciemu	Jelgavas pilsēta
Īpaši aizsargājamais meža biotops	Gaišie priežu meži uz osu pauguriem	Mežainas piejūras kāpas	Boreālie meži, mežainas jūrmalas kāpas	-
Aizsardzības kategorija	dabas parks *Natura 2000* teritorija	dabas parks *Natura 2000* teritorija	dabas parks *Natura 2000* teritorija	-
Kods	LV0305200	LV0303300	LV0303600	-
Platība, ha	312	150	794	50
Apsaimnieko	Pašvaldība	Valsts Pašvaldība	Valsts Pašvaldība Fiziskas personas	Valsts
ĪADT* izveidošanas gads	2004	1962	2004	-
Zaļi zilā struktūra	Mežs un Dubkalnu ūdenstilpe	Mežs un jūras līča krasts	Mežs un jūras krasts	Mežs un grāvju sistēmas

Gadījuma izpētes teritorija	Dabas parks "Ogres Zilie kalni"	Dabas parks "Ragakāpa"	Dabas parks "Bernāti"	Langervaldes mežs
Problēmas	• Liela antropoloģiskā slodze • Atšķirīgas lietotāju intereses • Haotisks taku tīkls • Zemsedzes nomīdīšana			Pārmitra augsne un biezs pamežs

ĪADT* īpaši aizsargājamās dabas teritorijas (Latvijas Republikas Saeima, 1993; Par-Ipasi-Aizsargajamam-Dabas-Teritorijam, 2020)

Ņemot vērā informācijas pieejamību, galvenā izpētes teritorija bija Dabas parks "Ogres Zilie kalni". Dabas parks "Ragakāpa" izvēlēts kā teritorija, kas pēc daudziem parametriem (dabas parks, Natura 2000, līdzīga priežu mežu ainava uz izteikta kāpu vai osu pauguru reljefa, atrašanās urbānā vidē, salīdzinoši neliela teritorija, zaļi zilā struktūra, apsaimniekošanas problēmas/izaicinājumi) līdzīga "Ogres Zilajiem kalniem", savukārt dabas parks "Bernāti" izvēlēts kā iepriekšējiem diviem līdzīga teritorija , kas atrodas tālu no Rīgas, bet ir valstspilsētas Liepājas tuvumā. Langervaldes pilsētmežs Jelgavā izvēlēts, jo nav dabas parks, taču atrodas tuvu Rīgai.

2.3. Salīdzinošā metode – literatūras apskats

Zinātniskās literatūras, normatīvo aktu un dažāda līmeņa plānošanas dokumentu analīze veikta ar mērķi identificēt iepriekšējo pieredzi un uzkrātās zināšanas par pilsētmežu attīstību un pārvaldību. Pētāmais temats tika aplūkots no dažādām perspektīvām, lai atklātu kopīgās tendences un atšķirības valstu un institucionālajā praksē, kā arī dažādu autoru konceptuālajos skatījumos. Šāda pieeja ļāva veidot zinātniski pamatotu un kritiski izvērtētu pētnieka pozīciju.

Salīdzinošā analīze tika izmantota šādos aspektos -

- Starptautiskās un Latvijas pieredzes analīzei, īpaši pilsētmežu ainavu, funkciju un pārvaldības (t. sk. ilgtspējīgas plānošanas, saglabāšanas un apsaimniekošanas) prakses kontekstā, balstoties uz pašvaldību, apsaimniekošanas uzņēmumu stratēģijām, meža apsaimniekošanas plāniem un citiem nozīmīgiem plānošanas dokumentiem (I, II, VI publikācija);
- Normatīvā regulējuma analīzei, salīdzinot tiesību aktu un politikas dokumentu ietvaru, kas ietekmē pilsētmežu attīstību Latvijā un starptautiskā mērogā (II, V, VI publikācija);
- Empīrisko datu interpretācijai, salīdzinot aptauju un interviju rezultātus dažādās izpētes teritorijās (III, V, VI, VII publikācija).

Vizuāli salīdzinošā analīze tika piemērota -

- Pilsētmežu ainavisko īpašību un funkciju noteikšanai, analizējot kartogrāfiskos materiālus, fotodokumentāciju un citu vizuālo informāciju, kā arī veicot apsekojumus dabā un fotofiksāciju (I, III, IV, V, VI, VII publikācija);
- Starptautiskās pārvaldības pieredzes izpētei, izmantojot vizuālos avotus kā papildinājumu politikas un plānošanas dokumentu analīzei (I publikācija).

2.4. Socioloģisko pētījumu metodes – aptauja un intervijas

Pētījumā izmantotas gan kvalitatīvās, gan kvantitatīvās izpētes metodes, kas raksturīgas socioloģiskajiem pētījumiem (Carpiano, 2009; Douglas, 1985; Holstein & Gubrium, 1995; Homiča, 2009; Melnikov & Kotarba, 2017). Metodoloģiskā pieeja ietvēra interviju un anketas izstrādi, datu vākšanu, kā arī iegūto datu strukturētu analīzi. Dati tika iegūti, izmantojot vairākas pieejas, tai skaitā *Go-along* intervijas ar pilsētmežu ikdienas lietotājiem (VII publikācija), strukturētas un daļēji strukturētas intervijas ar ekspertiem (VI publikācija), kā arī iedzīvotāju vēlmju un uzskatu izpēti, veicot aptauju (III, V, VI publikācija).

Apkopotie dati ietver teksta, audio un vizuālos ierakstus, tostarp interviju atšifrējumus,

fotogrāfijas, kartes un respondentu veikto maršrutu vizualizācijas. Šie materiāli tika kvalitatīvi analizēti, izmantojot tematiskās kodēšanas un saturanalīzes pieejas.

2.4.1. Ekspertu fokusgrupas strukturēta socioloģiskā aptauja

Lai iegūtu padziļinātu priekšstatu par pilsētmežu apsaimniekošanas praksi Latvijā, pētījuma ietvaros tika veikta **strukturēta fokusgrupas aptauja**, kuras mērķis bija noskaidrot profesionāļu–ekspertu (t. i., pilsētmežu apsaimniekotāju) viedokli par aktuālajām problēmām, izaicinājumiem un iespējām pilsētmežu pārvaldībā Latvijā (VI publikācija).

Aptaujā tika iekļauti **10 mērķtiecīgi izstrādāti jautājumi**, kas aptvēra šādas tēmas:

- pilsētmeža definējums un galvenās funkcijas (sociālā, vides, vides izglītības, dabas aizsardzības, estētiskā un ekonomiskā),
- pilsētmežu iekļaušana pašvaldību teritorijas plānošanas dokumentos,
- ieinteresēto pušu loma,
- normatīvais regulējums,
- identificētie izaicinājumi un nepieciešamie uzlabojumi pārvaldības praksē.

Būtiska pētījuma sastāvdaļa bija **normatīvā regulējuma pilnveides nepieciešamības izvērtējums**, kā arī **problēmjautājumu apzināšana**, kas kavē ilgtspējīgu un sistemātisku pieeju pilsētmežu pārvaldībā Latvijā.

Ekspertu aptauja tika veikta no 2024. gada maija līdz novembrim. Tās laikā pētniece klātienē apmeklēja visas izvēlētās izpētes pilsētas un to pilsētmežu teritorijas, kur norisinājās tiešas tikšanās ar pašvaldību pārstāvjiem un pilsētmežu apsaimniekotājiem. Tikšanās ietvēra **strukturētu sarunu**, kas tika balstīta uz iepriekš sagatavotu jautājumu kopu. Jautājumi tika nosūtīti respondentiem iepriekš, lai nodrošinātu iespēju pārdomāt atbildes, tādējādi veicinot **dziļāku un pārdomātāku viedokļu paušanu**.

Šī metode ļāva apkopot daudzslāņainu, profesionālu skatījumu uz pilsētmežu pārvaldības situāciju Latvijā, kā arī iezīmēt tendences, izaicinājumus un normatīvās nepilnības, kas būtu risināmas plānošanas un pārvaldības pilnveidošanas kontekstā.

2.4.2. Padziļinātās kvalitatīvās *Go-along* intervijas

Pētījuma ietvaros tika izmantota **padziļinātā kvalitatīvā *Go-along* intervijas metode**, ar mērķi izprast pilsētmežu lietojumu no ikdienas lietotāju perspektīvas, īpaši fokusējoties uz mežu sociālo funkciju un to ietekmi uz cilvēku atpūtas paradumiem pilsētvidē (VII publikācija).

Go-along intervija ir uz vietu balstīta datu vākšanas metode, kurā pētnieks pārvietojas kopā ar respondentu viņam pazīstamā vidē, sniedzot iespēju tiešā veidā izprast apkārtējās vides uztveri, sajūtas un lietošanas veidus. Metode balstīta uz *S. Kusenbach* (2003) koncepciju, kurā pētnieks "izstaigā" (vai izbrauc) respondenta ikdienas telpu, ļaujot dalībniekam pašam noteikt maršrutu un uzsvarus sarunā, atklājot nozīmīgas vietas un saiknes ar vidi.

***Go-along* intervijas** pētījumā tika veiktas kā:

- **pastaigas** (ejot kājām kopā ar dalībnieku),
- **braucieni** (pārvietojoties ar transportu),
- vai **kombinēta forma**, atkarībā no teritorijas lieluma un respondenta izvēles.

Izpētes teritorijas aptvēra četras dažādas pilsētmeža zonas Latvijā:

- dabas parks **"Ogres Zilie kalni"** (Ogres un Ikšķiles teritorijā),
- dabas parks **"Bernāti"** (Liepājas novadā),
- dabas parks **"Ragakāpa"** (Jūrmalā),
- **Langervaldes mežs** (Jelgavā).

Laika posmā no 2022. gada 3. marta līdz 2025. gada 25. janvārim tika veiktas **kopumā 26 intervijas**. Interviju laikā:

- maršruti tika dokumentēti, izmantojot ***ArcGIS QuickCapture*** lietotni;
- tika veikta **fotofiksācija** galvenajās intervijās izceltajās vietās;
- sarunas ierakstītas audio formātā, vēlāk **transkribētas** un tematiski kodētas, lai veiktu saturisko analīzi.

Intervijās respondenti tika aicināti veikt sev ierasto maršrutu attiecīgajā pilsētmeža teritorijā, daloties pieredzē par vidi, tās uztveri, lietojumu (arī dažādās sezonās), emocionālo nozīmi un priekšlikumiem tās pilnveidei.

Respondentu atlasei tika izmantota mērķtiecīgā un daļēji arī **"sniega bumbas"** stratēģija, īpaši teritorijās, kur pētniekam nebija iepriekšējas personiskas vai institucionālas saiknes. Vairāki respondenti tika piesaistīti, sadarbojoties ar vietējām nevalstiskajām organizācijām, kopienu aktīvistiem vai izmantojot ieteikumus no iepriekšējiem dalībniekiem.

Jānorāda, ka viens no šīs metodes izaicinājumiem bija **respondentu motivācija un pieejamība**, jo dalība prasa gan laiku (vidēji no 40 minūtēm līdz 2,5 stundām), gan vēlmi dalīties ar personīgi nozīmīgu pieredzi saistībā ar pilsētmežu izmantojumu un nozīmi ikdienā.

2.5. Psiholoģiskā metode uzmanības noturības novērtēšanai

Pētījuma ietvaros tika izmantota uzmanības un koncentrēšanās noturības psiholoģiskā novērtēšanas metode – Šultes tabulas, lai izvērtētu Zilo kalnu taku vides psihoemocionālo ietekmi uz cilvēku uztveri. Šī pieeja ļauj analizēt, kā atšķirīgi vides stimuli (piemēram, takas konfigurācija, telpiskā struktūra, estētiskie elementi) ietekmē cilvēka uzmanības spējas un to dinamiku pārvietošanās laikā (IV publikācija).

Šultes tabulu tests ir izstrādāts 20. gadsimta vidū, to radījis vācu psihologs Valters Šulte ar mērķi diagnosticēt uzmanības koncentrāciju un mentālo noturību. Testa pamatā ir 5x5 matrica, kurā skaitļi no 1 līdz 25 ir izvietoti nejaušā secībā. Dalībniekam jāatrod skaitļi augošā secībā, vienlaikus reģistrējot izpildes laiku. Testa rezultāti ļauj novērtēt uzmanības intensitāti, reakcijas ātrumu un izmaiņas kognitīvajos procesos pirms un pēc dažādu vides tipu pieredzes.

Pētījumā Šultes tabulas tika pielietotas elektroniskā formātā, izmantojot mobilo ierīci, kur testa lietotne tika iepriekš instalēta. Dati tika iegūti trīs mērījumu punktos:

1. pirms pastaigas,
2. pēc A takas (vienkāršots, lineārs maršruts – mazāk stimulējošs),
3. pēc B takas (līkumota, dabiskāka, potenciāli psihoemocionāli bagātāka).

Katrā mērījumu punktā tika veikta piecu Šultes tabulu sērija, precīzi reģistrējot katras tabulas aizpildīšanas laiku. Dalībnieku skaits – 18 respondenti, kas piedalījās vairākās eksperimenta dienās. Maršrutu secība tika mainīta, lai neitralizētu pieraduma efektu. Kopējais pastaigas garums – apmēram 2 km, vidējais ilgums – 40 minūtes; katras takas vidējais posms – 1 km, ap 20 minūtēm.

Šī metode ļāva pētījumā sasaistīt videi raksturīgās telpiskās īpašības ar kognitīvās aktivitātes pārmaiņām, uzsverot ainavas strukturālo elementu un vides kvalitātes nozīmi cilvēka psiholoģiskajā labsajūtā.

2.6. Kvantitatīvās metodes

Izmantojot kvantitatīvo pētījuma metodi – iegūstot kvantitatīvu (empīrisku), skaitlisku informāciju – veidojot grafikus, tabulas, tika analizēti pieejamie statistikas dati par meža platībām izpētes pilsētu teritorijās Latvijā (VI publikācija), analizēti psiholoģiskās noturības testu, ekspertu aptauju un *Go-along* interviju dati (IV, VI, VII publikācijas). Liela daļa no kvantitatīvajiem datiem, kalpoja informācijas apkopošanai, analizēšanai, secinājumiem, bet tiešā veidā nav atspoguļoti publikācijās.

3. REZULTĀTI UN DISKUSIJA

Šajā nodaļā ir apkopoti galvenie promocijas darba pētījuma rezultāti, kas iedalīti sešās apakšnodaļās. Pirmajā apakšnodaļā iekļauts skaidrojums par pilsētmežu jēdzienu un plānošanas pieredzi Eiropā un Latvijā. Otrajā apakšnodaļā aprakstīts Latvijas pilsētmežu apsaimniekošanas normatīvais ietvars. Trešajā apakšnodaļā analizētas ieinteresētās puses un to loma pilsētmežu teritorijās. Ceturtajā apakšnodaļā identificēti pilsētmežiem piemītošie ekosistēmu pakalpojumi un funkcijas. Piektajā apakšnodaļā pētīta pilsētmežu apsaimniekošanas pieredze Latvijā. Sestajā apakšnodaļā veikta pilsētmežu lietotāju pieredzes un interešu izpēte.

3.1. Pilsētmežu plānošanas pieredze Eiropā un Latvijā

Šajā apakšnodaļā ir apskatīta pilsētmežu plānošanas pieredze Eiropā un Latvijā. Apkopota pilsētmežu plānošanas pieredze Vīnē, Stokholmā, Kopenhāgenā un Rīgā. Konkrētās pilsētas izvēlētas, jo tajās ir izteikti daudz pilsētmežu (atbilstoši ievadā dotajai definīcijai), uzkrāta ilggadīga pieredze pilsētmežu dažādu līmeņu plānošanā un pārvaldībā.

Salīdzinošā izpēte un analīze ļauj efektīvi iepazīties ar iepriekš uzkrāto pieredzi un situāciju pētījuma jomā, kas saistīta ar pilsētmežiem. Izvēloties pilsētas ar līdzīgu pilsētmežu situāciju, ir iespējams ātrāk atrast konkrētai situācijai piemērotus risinājumus. Vīne, Stokholma un Kopenhāgena līdzīgi Rīgai ir valstu galvaspilsētas ar salīdzinoši lielu pilsētmežu īpatsvaru, kas saplūst ar urbānās teritorijas ieskaujošiem lielākiem mežu masīviem. Par šo pilsētu mežiem pieejama plaša informācija un tās ir labās prakses piemēri, ko iespējams izmantot dažādu mērogu pilsētu mežu situācijās.

Latvijā pakāpeniski pieaug uzmanība pilsētmežu plānošanas jautājumiem, kas Eiropas kontekstā jau ilgstoši ir nozīmīgs pilsētvides attīstības aspekts (Akmar et al., 2011; Carreiro et al., 2008; Konijnendijk, 2003; Konijnendijk et al., 2006). Pilsētmežu plānošanā tiek iekļautas esošās vai mērķtiecīgi veidotas zaļās teritorijas, kuru funkcija ir mazināt urbāno teritoriju saplūšanas risku un nodrošināt telpisku līdzsvaru pilsētu struktūrā.

Plānošana Eiropas pilsētās notiek vienlaikus ar plānošanu pilsētu un piepilsētu teritoriju vai reģionu līmenī. Vīnē, Kopenhāgenā un Stokholmā ir lielas zaļās teritorijas, kas tiek saglabātas, neraugoties uz pilsētu teritoriju paplašināšanos.

Vīnē intensīva un praktiska pilsētmežu plānošana un attīstīšana aizsākta jau 1960.-os gados, kad pilsētai tika pievienotas plašas esošo mežu teritorijas un tika iestādīti vairāk nekā 500 ha jaunu rekreācijai paredzētu mežu. Politiķu mērķis bija saglabāt zaļo teritoriju joslu starp Vīnes apbūvētajām teritorijām (Erhart, 2002; Weidinger, 2011). Vīnē plānošanas dokumenti ir juridiski saistoši vai neformāli. Neformālie plānošanas dokumenti ir "Vīnes Zaļās joslas plāns 1995" (*Plan Greenbelt Vienna 1995*) un pilsētas attīstības plāni desmit gadiem (*Stadtentwicklungsplan 94*, *STEP 94*, *STEP 2005* un *STEP 2025* (Wieshofer et al., 2015), kas katrā posmā paredz dažādus pasākumus zaļo zonu saglabāšanai un attīstībai. Vīnes mežs 9900 ha platībā ir "Zaļās plaušas", kas ir daļa no Zaļās joslas. 2005. gadā UNESCO Vīnes mežu pasludināja arī par biosfēras rezervātu teritoriju ar īpašu kultūras un dabas ainavu (Vienna Tourist Boardwww.wien.info, 2025).

Zviedrijas pilsētmeži pārsvarā izmantoti kā saimnieciskie meži. Tikai pagājušā gadsimta 90. gados sāka akcentēt mežu sociālās vērtības. Falks (Rydberg & Falck, 2000) pilsētmežu definīcijā iekļauj visus pilsētas un piepilsētas teritorijā esošos mežus, kuros ir nekultivēta zemes veģetācija. **Stokholmā** kopš 1998. gada pilsētas plānos tiek akcentēts "Celt pilsētu uz iekšu" (*"Build the City Inwards"*) – attīstīt pilsētu, nepaplašinot teritoriju, īpaši saglabājot zaļās un pilsētmežu teritorijas, aktīvi izmantojot degradētās teritorijas (Stockholm, 1999; *Stockholm City Plan 2018*, 2018). 2001.gadā Stokholmā apstiprināja reģionālo pilsētas attīstības plānu, kas paredz attīstības mezglu un saglabājamās zaļās teritorijas, kurās jāsavieno 2 galvenās funkcijas – rekreācija un bioloģiskās daudzveidības saglabāšana (Nelson, 2009). Stokholma kopš 2004.

gada kā plānošanas rīku izmanto Zaļo karti (*Green map*), kurā iekļauta informācija par biotopiem, resursu atjaunošanu un sociotopiem. Sociotopu kartes ietver cilvēkiem nozīmīgas pilsētmežu un citas zaļās teritorijas, to kvalitātes un attīstīšanu (Ståhle, 2006; Xiu et al., 2017). Pilsētvidē mežam – vismaz 50 ha platībā, ar dažādām aktīvās atpūtas iespējām pie ūdens, kultūrvēsturiskām vērtībām – jābūt pieejamam 1 km attālumā (Nelson, 2009; Ståhle, 2010), kas nozīmē atraktīvu zaļo teritoriju pieejamību ejot kājām vai braucot ar automašīnu 10-15 minūšu laikā. Galvenais, pilsētmežu teritorijām jābūt pietiekami lielām, lai nodrošinātu iedzīvotāju vajadzību un labsajūtu un vides aizsardzību (Stahle, 2002).

Kopenhāgenas Zaļā tīkla plāns (*Green Network plan*) ietver rekreācijai paredzētu ainaviski augstvērtīgu dabas parku sistēmu, savstarpēji saistītu ar zaļajām joslām (*greenways*) un ekoloģiskajiem koridoriem, kas nodrošina pilsētmežu teritoriju saglabāšanu (Vejre, Primdahl, & Brandt, 2007). Zaļo teritoriju plānošanu pašvaldību līmenī ietekmē reģionālie un nacionālie plāni (Nordh & Olafsson, 2020). Kopenhāgenas 5 pirkstu plāns (*5 Finger Plan*) paredz pilsētvides attīstību šaurās zonās, starp kurām tiek saglabāti neapbūvēti zaļie ķīļi, nodrošinot cilvēkiem iespēju dzīvot ļoti tuvu zaļajām zonām (Cahasan & Clark, 2005; Vejre et al., 2007).

Rīgas un Pierīgas dzīves telpas areāls veido vienotu struktūru, kurā savijas strauji augošas urbānās teritorijas un plašas mežu teritorijas. Jau 1924. un 1936. gada Rīgas ģenplānos pēc arhitekta Arnolda Lamzes ieteikuma parādās ideja, ka plānojums jāizstrādā plašākam ekonomiskajam reģionam (Lamze, 1932), līdzīgi kā tas tiek darīts Kopenhāgenā un Stokholmā. Kaut arī pēdējos gados, īpaši pēc Covid-19 krīzes, Rīgas un Pierīgas pilsētmežu labiekārtojuma uzlabošanai pievērsta lielāka uzmanība, tā vēl joprojām ir nepietiekama. Intensīvi izmantotās teritorijās vienīgais veids, kā pasargāt mežu no būtiskas antropogēnās slodzes (Bell, 1997; Emsis, 1980) un augsnes erozijas (Emsis & Tuktens, 1988), ir mērķtiecīga labiekārtojuma veidošana.

Kopumā par izvēlētajām pilsētām un pilsētmežu apsaimniekošanu pieejama plaša informācija un dati, kā arī saskatāmas daudzas līdzības ar Rīgas situāciju. Pamatojoties uz Eiropas pilsētu pieredzi veidots Rīgas-Pierīgas modelis pilsētmežu stratēģiskā mēroga apjomu saglabāšanai, kas ir neatņemama pilsētvides plānošanas, ilgtspējīgas attīstības un pārvaldības sastāvdaļa (I publikācija), ko savukārt tālāk var izmantot un pielāgot citu pilsētu pilsētmežu teritorijās.

3.2. Latvijas pilsētmežu pārvaldības normatīvais ietvars

Šajā apakšnodaļā apskatīti starptautiskie un nacionālie politikas plānošanas dokumenti un normatīvie akti, kas saistīti ar pilsētmežiem un attiecināmi uz Latviju. Plašāk pētīts jautājums, cik lielā mērā pilsētmeži ir atspoguļoti Eiropas un Latvijas normatīvajos aktos un plānošanas dokumentos (skat. II publikāciju).

Mežu teritoriju normatīvā bāze ir juridisko normu kopums, kas regulē meža un cilvēku attiecības – valsts saimniecības politikas daļa, vadības un rīcības kopums (Strods et al., 1999). Tradicionālās mežsaimniecības saknes ir senas, pirmie vietējo autoru raksti par meža apsaimniekošanu parādās 1814., 1840. gadā (Indriksons, 2025), pilsētmežu plānošana un pārvaldība ir jaunāka nozare ne tikai Latvijā, bet arī pasaulē. Tā ir kļuvusi par profesionālu un zinātnisku jomu, kas savu nozīmi Eiropā ieguva XX gadsimta 90. gados (Konijnendijk, 2003; Krajter & Konijnendijk, 2015).

Turpinot padziļināti analizēt pilsētmežu apsaimniekošanas aspektus, II publikācijā paustās atziņas ir papildināmas ar vēsturisku skatījumu, uzsverot, ka arī Latvijā jau agrāk ir pastāvējusi izpratne par pilsētmežu nozīmi. Jau 20. gadsimta vidū A. Zviedris (1949) un Ž. Sūna (1979) akcentēja īpašas apsaimniekošanas prasības un noteikumus zaļo joslu mežiem, kas atradās ap pilsētām. Urbanizācijas procesu rezultātā daļa šo teritoriju mūsdienās jau funkcionē kā pilnvērtīgi pilsētmeži, tādējādi apliecinot nepieciešamību pēc mērķtiecīgas un vietā balstītas plānošanas pieejas.

Normatīvo aktu kopums ir ļoti plašs un daudzslāņains, tas nepārtraukti attīstās un mainās, pētniecības un praktiskā darba procesā izkristalizējās to nozīmība konkrētu pilsētmežu problēmu atspoguļošanai un risināšanai, līdz ar to iespējams paplašināt II publikācijā apskatītos normatīvus un atziņas (skat. 3.1. un 3.2. tab.).

3.1. tabula. **Starptautiskie normatīvie akti mežu politikai un plānošanai**

Normatīvā dokumenta nosaukums	Pilsētmeži dokumentā
ANO Vispārējā konvencija par klimata pārmaiņām (Apvienoto Nāciju Organizācija, 1997)	Meži un pilsētmeži netiek īpaši izcelti, bet ir nozīmīgi dokumentos minēto mērķu sasniegšanai
ANO Vispārējā konvencija par klimata pārmaiņām Kioto protokola Dohas grozījumi (United Nations Organisation, 2015a)	
Eiropas Padome, Eiropas ainavu konvencija (Eiropas Padome, 2000)	
Eiropas Parlamenta Direktīva 2009/147/EK Par savvaļas putnu aizsardzību, "Baltā grāmata" (European Parliament, 2009)	
Eiropas Parlamenta Direktīva Nr. 1143/2014 par invazīvo svešzemju sugu introdukcijas un izplatīšanās profilaksi un pārvaldību (Eiropas Parlaments, 2014)	
ANO Riodežaneiro konvencija "Par bioloģisko daudzveidību" (Apvienoto Nāciju Organizācija, 1995)	Pilsētmeži tiešā formā nav izcelti, bet ir ilgtspējīgas mežu apsaimniekošanas prakses daļa
ANO Vispārējā konvencija par klimata pārmaiņām Kioto protokols (Apvienoto Nāciju Organizācija, 1997)	Pilsētmeži tiešā formā nav izcelti, bet ir ilgtspējīgas mežu apsaimniekošanas prakses daļa
ANO Vispārējā konvencija par klimata pārmaiņām Parīzes nolīgums (United Nations Organisation, 2015b)	
Eiropas Padome, Bernes konvencija "Par Eiropas dzīvās dabas un dabisko dzīvotņu aizsardzību" (Eiropas Padome, 1996)	
Eiropas komisija, "Zaļā grāmata" (European Commission, 2010)	
Eiropas komisija, Eiropas zaļais kurss (European Commission, 2020)	
Forest Europe, ES Meža stratēģija 2030. gadam (European Parliament, 2022)	Daudzfunkcionālu mežu ieguldījums
ES Bioloģiskās daudzveidības stratēģija (European Parliament, 2020)	Pilsētās, kurās ir vairāk nekā 20 000 iedzīvotāju, jārada biodaudzveidīgi un pieejami pilsētmeži

Balstoties uz Rio konvenciju (Apvienoto Nāciju Organizācija, 1995), bioloģiskās daudzveidības aizsardzības jautājumi tiek iestrādāti nozaru stratēģijās un rīcības plānos, cita starpā arī mežsaimniecības nozarē. Eiropas Savienībā ir izstrādāta bioloģiskās daudzveidības politika un pieņemti normatīvie akti, kuru mērķis ir nodrošināt bioloģiskās daudzveidības saglabāšanu (Putnu un Biotopu direktīvas, Invazīvo sugu pārvaldības regula).

Saskaņā ar Apvienoto Nāciju Organizācijas (ANO) 1992. gada 9. maijā pieņemto Vispārējo konvenciju par klimata pārmaiņām (UNFCCC) tika izveidota galvenā uzraudzības institūcija — Līgumslēdzēju pušu konference (Conference of the Parties, COP), kura tiek sasaukta vismaz reizi gadā, lai izvērtētu konvencijas īstenošanu un lemtu par turpmākiem pasākumiem. Balstoties uz šīs konvencijas ietvaru, ir pieņemti vairāki nozīmīgi starptautiskie tiesību akti un politikas dokumenti, tostarp Kioto protokols (Apvienoto Nāciju Organizācija, 1997), Kioto protokola Dohas grozījumi (Apvienoto Nāciju Organizācija, 2015), Parīzes

nolīgums (Apvienoto Nāciju Organizācija, 2015), kuri nosaka starptautiskās saistības siltumnīcefekta gāzu emisiju ierobežošanā un klimata pārmaiņu mazināšanā. Šie dokumenti veido pamatu valstu nacionālajiem klimata politikas ietvariem, tostarp arī attiecībā uz zemes izmantošanu, mežsaimniecību un bioloģiskās daudzveidības saglabāšanu.

Saskaņā ar *Forest Europe* ziņojumu (Forest Europe, 2020), Mežsaimniecības jautājumu darba grupa (*Forest and Forestry Issues Working Group*) nodarbojas ar mežsaimniecības politikas koordināciju un ar mežiem saistītu jautājumu risināšanu Eiropas Savienības un starptautiskā līmenī, pārstāvot valstu intereses dažādos starptautiskos forumos un procesos, tostarp klimata pārmaiņu, bioloģiskās daudzveidības un ilgtspējīgas mežsaimniecības jomā:

- ANO Mežu forums (UNFF; ANO ECOSOC),
- Meža aizsardzības brīvprātīga sadarbība Eiropas reģionā notiek Ministru konferenču līmenī (*Forest Europe*),
- ANO Pārtikas un lauksaimniecības organizācijas (FAO) Mežsaimniecības komiteja (COFO).
- Mežsaimniecības jautājumu darba grupa galvenokārt strādā ar šādiem jautājumiem (Forest Europe, 2020):
- UNFF un COFO sesiju prezentācija,
- juridiski saistošs nolīgums par Eiropas mežiem, ES Kokmateriālu regula un FLEGT regula (licencēšanas sistēma importam un vispārējs regulējums) (https://international-partnerships.ec.europa.eu/policies/climate-environment-and-energy/forests_en),
- *EU Forest Governance and Value Chains Programme* (FGVC) (https://www.fao.org/in-action/legal-sustainable-wood-assurance-programme/forest-governance-value-chains/en/), kas ir galvenais mehānisms Eiropas Savienības un partnervalstu izveidoto meža partnerību īstenošanai. FGVC sniedz tehnisku un finansiālu palīdzību valstīm, kas iesaistījušās meža partnerībās, lai uzlabotu meža nozares pārvaldību, ilgtspējīgu meža apsaimniekošanu, lai tie pildītu savu ekonomisko, sociālo un vides lomu.

Vēl viens nozīmīgs institucionāls dalībnieks meža politikas veidošanā Eiropā ir Eiropas Meža institūts (*European Forest Institute*, EFI) (European Forest Institute, 2003). Tā galvenais mērķis ir veikt starpdisciplinārus pētījumus par mežu politiku Eiropas mērogā, aptverot plašu tematisko loku – mežu izmantošanu, saglabāšanu un to ilgtspējīgas apsaimniekošanas attīstību, veicinot uz zinātnes pierādījumiem balstītu lēmumu pieņemšanu mežsaimniecības jomā. Eiropas Meža institūts ir starptautiska organizācija, galvenā mītne atrodas Joensū, Somijā. Latvija tai pievienojās 2007. gadā, lai aktīvāk iesaistītos starptautiskajā sadarbībā mežsaimniecības un meža, tai skaitā pilsētmežu, pētījumu veikšanā.

Būtiski papildināt sākotnējo normatīvu uzskaitījumu ar Eiropas Bioloģiskās daudzveidības stratēģiju 2030 – *Atgriezīsim savā dzīvē dabu*, kuras mērķis ir panākt, lai līdz 2030. gadam biodaudzveidība dabas, cilvēku un klimata interesēs nostātos uz atlabšanas ceļa (European Parliament, 2020). Stratēģija ir Eiropas zaļā kursa, kura mērķis ir aizsargāt, saglabāt un stiprināt ES dabas kapitālu (European Commission, 2020), būtiskākā sastāvdaļa. Stratēģija atbalsta klimata pārmaiņu seku mazināšanu un pielāgošanos, izmantojot dabā balstītus risinājumus.

Nozīmīgs uzdevums pilsētmežu aspektā ir pilsētu, kurās ir vairāk nekā 20 000 iedzīvotāju, zaļināšanas plānošana ilgtermiņā. Tiem būtu jāietver pasākumi, kuru mērķis ir radīt biodaudzveidīgus un pieejamus pilsētmežus un citas pilsētas zaļās struktūras, kas uzlabo zaļo zonu savienotību, ierobežot pārmērīgu pļaušanu un citu biodaudzveidībai kaitīgu praksi (European Parliament, 2020). Šis ir viens no retajiem stratēģiskajiem dokumentiem, kur skaidri minēti tieši pilsētmeži.

Aktuāls dokuments ir Eiropas meža stratēģija 2030 (European Union, 2022), tās mērķis ir palielināt daudzfunkcionālu mežu līdzsvarotu ieguldījumu zaļā kursa mērķu un ES Biodaudzveidības stratēģijas 2030. gadam mērķu sasniegšanā, kur īpaši svarīga ir ilgtspējīga zaļā izaugsme, darbavietu radīšana, vides ilgtspējība, aprites ekonomika un klimatneitralitātes panākšana vēlākais līdz 2050. gadam. Stratēģija uzsver, ka meži ne tikai veicina klimata un

biodaudzveidības mērķu sasniegšanu, tostarp aizsargājot augsni un ūdeni, bet arī sniedz ekonomiskas un sociālas priekšrocības un plašu pakalpojumu klāstu, sākot no iztikas līdzekļiem līdz atpūtai (European Union, 2022).

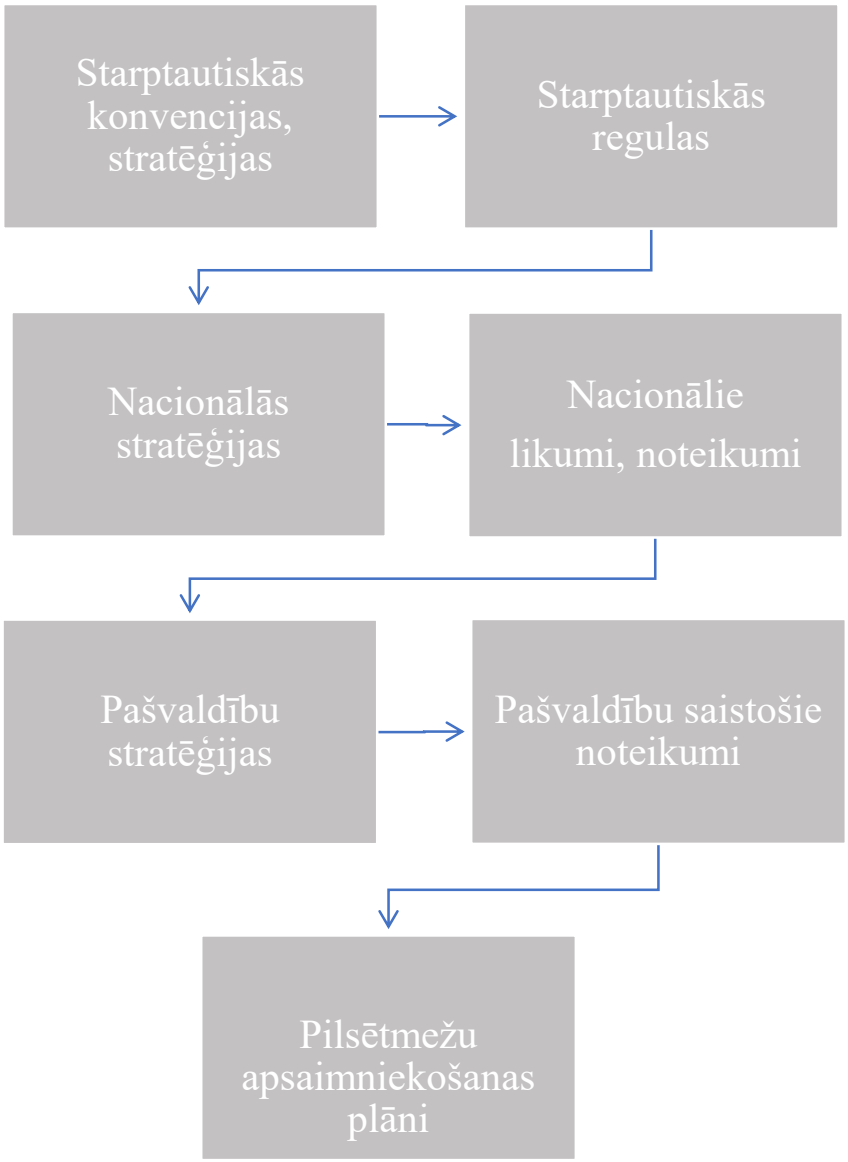
Eiropas meža stratēģija uzsver mežu būtisko nozīmi cilvēku veselībai un labjūtībai, pilsētu un piepilsētu mežu teritoriju īpašo nozīmi urbanizētās vietās, kur zaļās, bioloģiski un rekreatīvi nozīmīgās teritorijas ir īpaši svarīgas. Nepieciešams stiprināt mežu ekosistēmu pielāgošanās spēju un noturību pret klimata izmaiņām un urbanizāciju un antropogēno spiedienu, izmantojot ilgtspējīgu un aktīvu apsaimniekošanu.

3.2. tabula. **Latvijas nacionālā līmeņa politikas, stratēģijas, normatīvie akti**

Normatīvā dokumenta nosaukums	Pilsētmežu regulējums dokumentā
Augu aizsardzības likums (Latvijas Republikas Saeima, 1998)	Meži un pilsētmeži netiek īpaši izcelti, bet ir nozīmīgi dokumentos minēto mērķu sasniegšanai
Sugu un biotopu aizsardzības likums (Latvijas Republikas Saeima, 2000)	
Vides aizsardzības likums (Latvijas Republikas Saeima, 2006)	
Teritorijas attīstības plānošanas likums (Latvijas Republikas Saeima, 2011)	
Pašvaldību likums (Latvijas Republikas Saeima, 2023)	
MK not. Nr.257 ANO Vispārējās konvencijas par klimata pārmaiņām Kioto protokolā paredzēto kopīgi īstenojamo projektu komisijas nolikums (Latvijas Republikas Ministru kabinets, 2003)	
MK not. Nr.115 Par kārtību, kādā apstiprina, ievieš un uzrauga ANO Vispārējās konvencijas par klimata pārmaiņām Kioto protokola projektu mehānismus. (Latvijas Republikas Ministru kabinets, 2006)	
Latvijas ilgtspējīgas attīstības stratēģija 2030. gadam (Latvija Republikas Saeima, 2010)	Vispārīgi nosaka mežu jomas attīstības nepieciešamību, pilsētmeži netiek īpaši izcelti
Ainavu politikas pamatnostādnes 2013.-2019. gadam (Latvijas Republikas Ministru kabinets, 2013b)	
Latvijas Nacionālais attīstības plāns 2021.–2027. gadam (Latvijas Republikas Saeima, 2020)	
Vides politikas pamatnostādnes 2021.–2027. gadam (Latvijas republikas Ministru kabinets, 2021)	
Likums par īpaši aizsargājamām dabas teritorijām (Latvijas Republikas Saeima, 1993)	Cita starpā nosaka darbības meža zemēs
MK not. Nr.264 Īpaši aizsargājamo dabas teritoriju vispārējie aizsardzības un izmantošanas noteikumi (Latvijas Republikas Ministru kabinets, 2010)	
Aizsargjoslu likums (Latvijas Republikas Saeima, 1997)	
MK not. Nr.248 Meža ilgtspējīgas apsaimniekošanas novērtēšanas kārtība (Latvijas Republikas Ministru kabinets, 2013a)	Nosaka meža ilgtspējīgas apsaimniekošanas novērtēšanas kārtību, pilsētmeži netiek īpaši izcelti
Latvijas mežu politika (Latvijas Republikas Ministru kabinets, 1998)	Nosaka meža nozares attīstības ilgtermiņa stratēģiskos un taktiskos mērķus, pamatprincipus, pilsētmeži netiek īpaši izcelti.
MK not. Nr.63 Meža aizsargjoslu ap pilsētām noteikšanas metodika (Latvijas Republikas Ministru kabinets, 2003)	Nosaka meža aizsargjoslu ap pilsētām noteikšanas metodiku
MK not. Nr. 628 Par pašvaldību teritorijas attīstības plānošanas dokumentiem (Latvijas Republikas Ministru kabinets, 2014)	Cita starpā attiecas uz mežiem un pilsētmežiem plānošanas dokumentos

Normatīvā dokumenta nosaukums	Pilsētmežu regulējums dokumentā
Meža likums (Latvija Republikas Saeima, 2000)	Regulē Latvijas mežu un pilsētmežu ilgtspējīgu apsaimniekošanu, saistību ar teritorijas plānojumu izstrādāšanu

Normatīvajos aktos sastopamas gan tiešas, gan netiešas norādes uz mežu un pilsētmežu nozīmīgumu. Gan starptautiskie, gan nacionālie normatīvie dokumenti ir būtiski un attiecināmi uz konkrētiem pilsētmežiem (skat. 3.1. att.). Tomēr konvencijās un stratēģijās meži un īpaši pilsētmeži minēti tikai atsevišķos gadījumos. Likumos un Ministru kabineta noteikumos iekļauta konkrētāka informācija par mežiem, taču jēdziens *pilsētmeži* tajos joprojām netiek lietots. Tajā pašā laikā normatīvajos dokumentos tiek skaidri noteikti aspekti, kas attiecas uz mežiem pilsētu teritorijās vai to tiešā tuvumā (piemēram, meža aizsargjoslas ap pilsētām). Pilsētmežu kā atsevišķas kategorijas izdalīšana normatīvajos aktos varētu veicināt to specifisko funkciju precīzāku definēšanu un nodrošināt atbilstošāku apsaimniekošanu, saskaņojot to ar dažāda līmeņa teritorijas plānošanas dokumentiem.



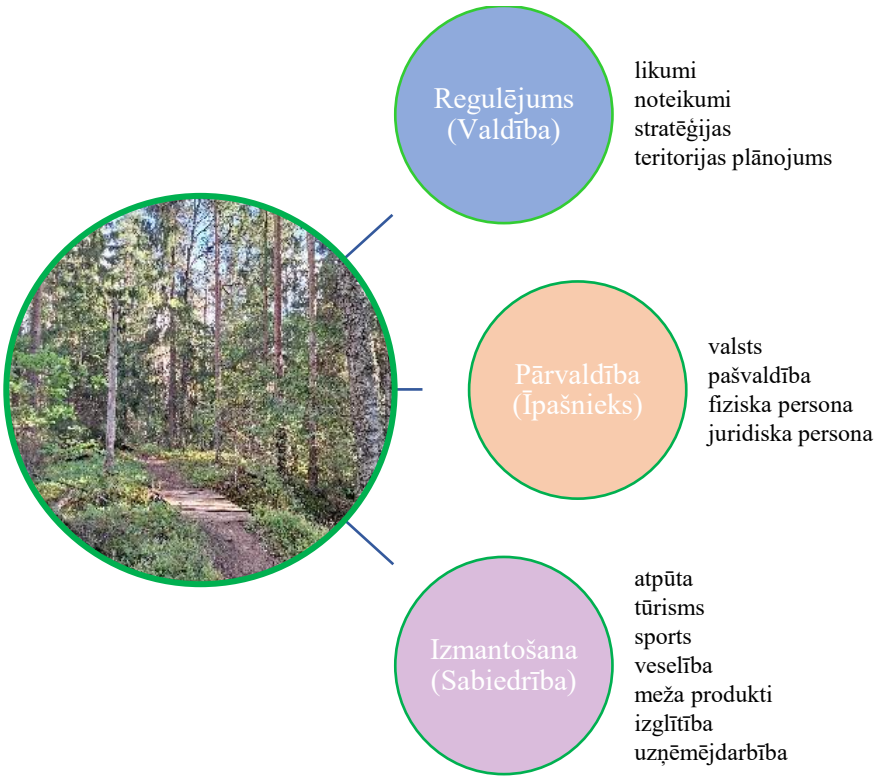
3.1. att. **Ar pilsētmežiem saistīto normatīvo aktu un plānošanas dokumentu hierarhija**

Normatīvo aktu bāze apskatīta arī VI publikācijā, izskatot pilsētmežu apsaimniekotāju pieredzi, kur izskanēja atziņa, ka apsaimniekotāji ir pielāgojušies normatīvajai bāzei, bet tomēr nepieciešamas izmaiņas, īpaši aizsargājamo mežu un piejūras teritoriju apsaimniekošanas

noteikumos, ņemot vērā kaitēkļu un slimību invāzijas – paredzot iespējas individuāliem risinājumiem.

3.3. Ieinteresētās puses un to loma pilsētmežu teritorijās

Šajā apakšnodaļā ir apkopota pētījuma daļa par iesaistītajām pusēm pilsētmežu teritorijās, ietverot gan publiskās, gan privātās struktūras (III, V publikācija). Pilsētmežu pārvaldībā jāievēro ne tikai moderni mežsaimniecības principi, bet arī laba pārvaldība kā administratīvo tiesību princips (Kovaļevska, 2009), kas attiecas uz valsts, nozares vai uzņēmuma procesiem. Galvenie labas pārvaldības principi nozīmē ievērot procesu, noteikumu un lēmumu pieņemšanas caurskatāmību un pamatotību, atbildīgu, taupīgu, konstruktīvu un efektīvu pieeju jebkurā darbībā, lēmumu pieņemšanā iesaistīt cilvēkus, uz kuriem tas attieksies, sniegt vienlīdzīgu informāciju visiem par iespējām, ņemt vērā ieinteresēto pušu vajadzības, personisku neieinteresētību (Jones, 2007; Kovaļevska, 2009).



3.2. att. **Ieinteresēto pušu iesaistes un lomu sadalījuma shēma pilsētmeža teritorijai**

Pilsētmežu plānošanā un pārvaldībā būtiska nozīme ir ieinteresēto pušu, īpaši vietējo iedzīvotāju, līdzdalībai. Iedzīvotāju viedokļa izteikšanai iespējams piemērot dažādas publiskās līdzdalības formas (Jones, 2007), tostarp tiesības iesniegt lūgumus, publiskās izmeklēšanas, vietējos referendumus (piemēram, parakstu vākšanu), iedzīvotāju biedrību un padomju darbību, pārstāvniecības mehānismus, atklātos seminārus, publiskās apspriešanas, kā arī citas aktivitātes, kas sniedz iespēju proaktīvi paust sabiedrības idejas, priekšlikumus un vajadzības pilsētvides attīstībā (skat. 3.2. att. un 3.3. tab.). Izvērtējot normatīvos aktus, plānošanas dokumentus un ieinteresēto pušu aktivitātes, sabiedrības emocijas un atšķirīgās prasības, pilsētmežu īpašnieks, pārvaldītājs ir pakļauts lielam spiedienam - jāņem vērā ļoti daudzi aspekti, kas ierobežo pilsētmežu apsaimniekošanu un prasa lielu skaidrojošu darbu.

3.3. tabula. **Ieinteresēto pušu lomu un interešu sadalījums**

Struktūra	Loma	Ieinteresētās puses	Intereses	Interešu apraksts
Valsts	REGULĒ	Saeima	Likumdošana	Izdod jomu regulējošus likumus
		Ministru kabinets	Noteikumi	Izdod jomai saistošus Ministru kabineta noteikumus
		Valsts meža dienests	Uzraudzība	Uzrauga visus ar mežu saistītos jautājumus
		Valsts vides dienests	Uzraudzība	Uzrauga ar mežu vides saglabāšanu saistītos jautājumus kompetences ietvaros
		Dabas aizsardzības pārvalde	Uzraudzība	Uzrauga ar mežu vides saglabāšanu saistītos jautājumus ĪADT, kompetences ietvaros
		Valsts policija	Uzraudzība Palīdzība	Veic noziegumu izmeklēšanu
		Valsts ugunsdzēsības un glābšanas dienests	Palīdzība Uzraudzība	Ugunsdrošības nodrošināšana Darbinieku apmācība
Pašvaldība		Dome	Noteikumi	Izdod konkrētā pašvaldībā saistošus noteikumus
		Būvvalde	Uzraudzība	Būvniecības procesa uzraudzība
		Teritorijas attīstības plānošanas u.c. struktūrvienības	Uzraudzība Realizēšana	Attīstības plānošanas u.c. dokumenti, kas attiecas arī uz mežu teritorijām
		Pašvaldības policija	Uzraudzība Palīdzība	Veic sabiedriskās kārtības uzturēšanu
Īpašnieks	APSAIMNIEKO	Valsts	Pārvaldība	Meža apsaimniekošana, rekreācija, vides saglabāšana, vides izglītība
		Pašvaldība	Pārvaldība	Meža apsaimniekošana, rekreācija, vides saglabāšana, vides izglītība
		Juridiskās personas	Pārvaldība	Meža apsaimniekošana, vides saglabāšana,
		Fiziskās personas	Pārvaldība	Meža apsaimniekošana, vides saglabāšana,
Sabiedrība	LIETO	Vietējie iedzīvotāji	Lietošana	Atpūta, sports, meža velšu vākšana, fotografēšana, neoficiāla dzīvnieku apbedīšana
		Latvijas iedzīvotāji	Lietošana	Tūrisms, atpūta, sports, svētceļojums, fotografēšana
		Ārzemnieki	Lietošana	Tūrisms, atpūta, sports, svētceļojums, fotografēšana
Izglītības iestādes		Pirmsskolas, pamata, vidējās, profesionālas, speciālās, interešu, augstākās	Lietošana	Sporta nodarbības Vides izglītība Mežsaimnieciska prakse Citas mācību nodarbības meža vidē

Struktūra	Loma	Ieinteresētās puses	Intereses	Interešu apraksts
Bruņotie spēki	LIETO	Zemessardze Jaunsardze	Lietošana Dalība	Apmācības Sacensības Dalība pasākumos
Uzņēmēji		Tūrisma organizatori	Lietošana	Tūrisms, objektu apskate, pārgājieni
		Pasākumu organizētāji	Lietošana	Sporta sacensības Koncerti Teātra un cirka izrādes
		Pakalpojumu sniedzēji	Lietošana	Zirgu izjādes Suņu pajūgu izbraucieni Virvju takas Sporta inventāra noma Ēdināšanas pakalpojumi
		Pakalpojumu sniedzēji	Pakalpojumi meža īpašniekam	Meža kopšana Infrastruktūras izbūve
NVO		Dažādu jomu NVO	Uzraudzība	Vides jautājumi
			Lietošana	Izdzīvošanas skola
			Lietošana	Sports

Meža nozares ietvaros sadarbība ir būtiska dažādos pārvaldības līmeņos — vietējā, pašvaldību, reģionālā un valsts mērogā (Kenney, Wassenaer, & Satel, 2011). Šī sadarbība var aptvert gan regulatīvās, gan praktiskās pārvaldības intereses. Vienlaikus nozīmīga ir arī sabiedrības iesaiste un interešu ievērošana pilsētmežu izmantojumā.

3.4. Pilsētmežiem piemītošie ekosistēmu pakalpojumi un funkcijas

3.4.1. Ekosistēmu pakalpojumi

Ekosistēmu pakalpojumi ir visi resursi un procesi, ko cilvēcei nodrošina daba. Parasti izdala 1) apgādes jeb nodrošinājuma, 2) regulējošos jeb atbalsta un 3) kultūras jeb nemateriālos ekoloģiskos pakalpojumus (Millennium Ecosystem Assessment, 2005). Pētījumā izmantota starptautiskā kopējā ekosistēmu pakalpojumu klasifikācija (CICES) (Haines-Young & Potschin, 2012), balstoties arī uz *De Groot, Wilson, & Boumans* (2002) izstrādāto tipoloģiju. Gadījuma izpētes teritoriju analīzē īpaši izceltas četras kultūras ekosistēmu pakalpojumu kategorijas: fiziskās (atpūta), pieredzes (estētika), intelektuālās (zinātniskās un izglītojošās vērtības, kultūras mantojums un identitāte) un iedvesmas (garīgās un reliģiskās vērtības, iedvesma) (Clemente et al., 2019).

Pētījumā redzams, ka pilsētmežu teritorijā ir būtiski visi ekosistēmu pakalpojumi, bet cilvēkam kā sociālai būtnei īpaši svarīgi ir kultūras jeb nemateriālie ekoloģiskie pakalpojumi – visdažādākā veida atpūta dabā, fiziskās un garīgās veselības uzlabošana, sports, tūrisms, ainavu vizuālā uztvere, iedvesma. Līdzsvarojot visus ekosistēmu pakalpojumus un dažādās meža funkcijas, ir svarīga atsevišķu daļu saplūšana un rezultāta uzlabošanās, nevis kopējo ieguvumu mazināšanās (European Parliament, 2022).

Dabas parki "Ogres Zilie kalni", "Ragakāpa" un "Bernāti" ir Latvijā labi atpazīstamas dabas teritorijas ar dažādām rekreācijas iespējām, kas savu nozīmīgumu īpaši paradīja Covid-19 pandēmijas laikā. Balstoties uz dabas parka "Ogres Zilie kalni" gadījumu (III publikācija), sākotnēji pētīti pilsētmežiem piemītošie ekosistēmu pakalpojumi un no tiem izrietošās pilsētmežu funkcijas, kas tālākā pētījuma gaitā skatītas arī citu izpētes teritoriju griezumā (IV, VI publikācija). Katrā izpētes teritorijā saskatāmi visi iepriekš minētie ekosistēmu pakalpojumi.

Pilsētmežu ietvarā var runāt par 1) bioloģiskajiem jeb dabiskajiem mežu resursiem, kas var attīstīties bez cilvēka iejaukšanās un 2) rekreatīvajiem meža resursiem, kuru attīstībai ir vajadzīga apzināta cilvēka darbība (Randrup et al., 2005). Pilsētmežos, un vēl izteiktāk īpaši aizsargājamās dabas teritorijās, ir sastopami biotopi ar relatīvi augstu bioloģisko daudzveidību (Alvey, 2006; Laiviņš, 2011).

3.4.2. Pilsētmežu funkcijas un klasifikācija

Analizējot pilsētmežus caur ekosistēmu pakalpojumu prizmu, var izvirzīt galvenās pilsētmežiem raksturīgās funkcijas un mezglu vietas (pēc K. H. Grossera – vietas ainavas telpā, kur cilvēku intereses saduras ar mežu) (Bāra et al., 2003; Melluma, 2023), kuru realizēšanās telpā ir atkarīga no meža un cilvēka mijiedarbības veida un intensitātes, kas nosaka konkrētās teritorijas pārvaldības un praktiskās apsaimniekošanas paņēmienus un prizmu.

Praksē visbiežāk balstās uz ekonomiskajām, sociālajām un ekoloģiskajām funkcijām, no kurām agrāk kā būtiskāko uzsvēra ekonomisko faktoru (Projektā FUTURE Forest gūto atziņu piemērošana..., 2011). Mūsdienās lielāko īpatsvaru ieguvusi sociālā funkcija – pilsētmeži ir vieta aktīvai un pasīvai atpūtai, sportam, meža augu vākšanai, dabas skaistuma baudīšanai, vides izglītībai un pētniecībai (Akmar et al., 2011; Konijnendijk et al., 2006). Otra svarīgākā funkcija ir dabiskās vides nodrošināšana un klimata regulēšanas funkcija (Konijnendijk et al., 2006) un kā pēdējā mūsdienās paliek ekonomiskā – tā tiek realizēta, ja nav pretrunā ar pārējām funkcijām. Plānojot pilsētmežus kā daudzfunkcionālu sistēmu, būtiski izvērtēt funkciju saderību vai konfliktus, izvēloties dominējošo – tā noteiks arī apsaimniekošanas veidu (Projektā FUTURE Forest gūto atziņu piemērošana..., 2011).

Balstoties uz teoriju, iepriekšējo pieredzi un lauka pētījumiem, tiek izdalītas **sešas pilsētmežu būtiskākās funkcijas: sociālā, vides, vides izglītības, dabas aizsardzības, estētiskā un ekonomiskā.** Kā gadījuma izpētes teritorija, kurā konstatētas visas galvenās pilsētmežu funkcijas, sākotnēji izmantots dabas parks "Ogres zilie kalni" (skat. III publikācijas 1. att.), bet, turpinot izpēti, arī dabas parks "Ragākapa", dabas parks "Bernāti" un Langervaldes mežs (3.4. tab.), ko apliecina arī pilsētmežu teritoriju ekspertu aptauja (VI publikācija) un lietotāju *Go-along* aptauja par pilsētmežu lietošanas paradumiem (VII publikācija).

3.4. tabula. **Pētījumā iekļauto gadījuma izpētes teritoriju pilsētmežu funkciju pārskats**

Pilsētmežu funkcija	Ogres Zilie kalni	Ragakāpa	Bernāti	Langervalde
Sociālā	Piemīt	Piemīt	Piemīt	Piemīt
Vietas ar labiekārtojumu	Daudzas vietas ar publiski pieejamu labiekārtojumu	Minimāls labiekārtojums	Atsevišķas vietas ar labiekārtojumu	Minimāls labiekārtojums
Takas un trases	Pārsvarā dabīgas takas, ar kāpnēm, atsevišķi izbūvēti grantētu taku posmi, laipas pāri grāvjiem	Pārsvarā dabīgas takas, ar kāpnēm, atsevišķi izbūvēti grantētu un dēļu klājuma taku posmi	Pārsvarā dabīgas takas, ar kāpnēm, tiltiņu	Visas galvenās takas izbūvētas ar šķeldas segumu, tiltiem pāri grāvjiem
Vēstures liecības	Pilskalns I pasaules kara ierakumi Senā slēpošanas tramplīna vieta	Jūrmalas brīvdabas muzejs	Pūsēna kalns Kūrorta objekti Senās estrādes vieta Senā slēpošanas tramplīna vieta	Senās estrādes vieta

Pilsētmežu funkcija	Ogres Zilie kalni	Ragakāpa	Bernāti	Langervalde
Vides	Piemīt	Piemīt	Piemīt	Piemīt
Vides izglītība	Zinātniski pētījumi Nodarbības skolēniem Ekskursijas ar gidu	Zinātniski pētījumi Nav ziņu	Zinātniski pētījumi Nodarbības skolēniem Ekskursijas ar gidu	Zinātniski pētījumi Nav ziņu
Dabas aizsardzība	Ir ĪADT	Ir ĪADT	Ir ĪADT	Nav ĪADT
Estētiskā	Ir izteikti pievilcīgu ainavu dažādība	Ir pievilcīgu ainavu dažādība	Ir izteikti pievilcīgu ainavu dažādība	Nav izteikti pievilcīgu ainavu
Zaļi zilā struktūra	Mežs un Dubkalnu ūdenskrātuve	Mežs un jūras līča krasts	Mežs un jūras krasts	Mežs un grāvju sistēmas
Ekonomiskā	Ierobežota Pilsēta Piepilsēta ĪADT	Ļoti ierobežota Pilsēta ĪADT Piejūra	Ļoti ierobežota Piepilsēta ĪADT Piejūra	Ierobežota Pilsēta

1.Sociālās funkcijas. Mūsdienās pilsētmežos faktiski tiek realizēta sociālā mežsaimniecība (Konijnendijk et al., 2006), ar visplašāko fokusu uz rekreācijas funkcijām un pakalpojumiem. Mežs ir vispiemērotākā vieta veselīga dzīvesveida uzturēšanai – regulārām pastaigām, nūjošanai, skriešanai, slēpošanai, riteņbraukšanai.

Lai nodrošinātu visu funkciju veiksmīgu realizāciju un minimizētu sociālās funkcijas spiedienu uz vides un dabas aizsardzības funkcijām, Zilajos kalnos ir izveidota un tiek pilnveidota sporta un rekreācijas infrastruktūra, ko var iedalīt 3 grupās:

1) punktveida vietas ar labiekārtojumu, kas lokalizējas visintensīvāk izmantotajās teritorijās pie Dubkalnu ūdenskrātuves, slēpošanas trases Starta laukumā, bērnu aktīvās atpūtas laukumā u. c. – kur tiek veidota nepieciešamā infrastruktūra – stāvvietas, tualetes, soli, galdi un grili, atkritumu urnas, pārģērbšanās kabīnes. Kā piesaistes, vietas atpazīstamības punkti teritorijā izvietots skatu tornis un koka skulptūras. Aktivitāšu vietas, ko veido uzņēmēji – virvju takas, velo un slēpju noma.

2) līnijveida objekti – meža ceļi, pastaigu, velobraukšanas, suņu pajūgu un zirgu izjādes takas, apgaismota distanču slēpošanas trase 10 km garumā.

3) apzinātas dažādu vēstures periodu kultūrvēsturiskā mantojuma vietas, kas var ietvert arī ainavas ar simbolisku nozīmi (Nitavska, 2023).

Visās izpētes teritorijās konstatēta tāda pati vai līdzīga infrastruktūra (skat. 3.5. tab.). Daudzviet ir izveidots labiekārtojums, kas regulāri jāuztur, jāatjauno un jāpapildina, novēršot stihisku neatļautu teritorijas izmantošanu, vandālismu un reaģējot uz intensīvās antropogēnās slodzes radītajām problēmām (augsnes erozija, zemsedzes nobradāšana, augsnes sablīvēšana, atkritumu izmešana).

3.5. tabula. **Pētījumā iekļauto izpētes teritoriju labiekārtojuma pārskats**

Sociālās funkcijas Labiekārtojums	Ogres Zilie kalni	Ragakāpa	Bernāti	Langervalde
Punktveida vietas ar labiekārtojumu				
Stāvlaukumi	x	x	x	x
Peldvietas	x	x	x	-

Sociālās funkcijas Labiekārtojums	Ogres Zilie kalni	Ragakāpa	Bernāti	Langervalde
Ģērbtuves	x	x	x	-
Tualetes	x	-	x	-
Labiekārtotas tualetes	x	x	x	-
Soli	x	x	x	x
Atkritumu urnas	x	x	x	x
Norādes	x	x	x	x
Informatīvie stendi	x	x	x	x
Skatu tornis	x	-	x	-
Bāka	-	x	x	-
Akmens skulptūras	-	-	x	-
Koka skulptūras	x	-	x	x
Ēdināšanas pakalpojumi	-	x	x	-
Velo un slēpju noma	x	-	-	-
Virvju gaisa takas	x	-	-	-
Ūdenssporta (kaitbords, vindsērfings) Motorizēto ūdens peldlīdzekļu noma	-	x	-	-
Takas un trases				
Dabiskas takas	x	x	x	x
Takas ar grants segumu	x	x	-	-
Takas ar dēļu segumu	-	x	-	-
Takas ar šķeldas segumu	x	-	-	x
Tiltiņi	x	x	x	x
Koka kāpnes	x	x	x	-
Apgaismota slēpošanas trase	x	-	-	-

2. Vides funkcija. To pilda visa meža teritorija un tā ir pati svarīgākā, tā eksistē neatkarīgi no cilvēka. Pilsētmeža teritorijas regulē ūdens plūsmu un ūdens kvalitāti, uzlabo un stabilizē augsni, novērš vēja un ūdens eroziju, saista ogļskābo gāzi, bagātina gaisu ar skābekli, fitoncīdiem (Emsis, 1980; Melluma, 2023; Sūna, 1979), mazina gaisa piesārņojuma izplatīšanos (Pilecka Uļčugačeva, 2024), izlīdzina krasas temperatūras svārstības, vēja un caurvēja spēku, mazina trokšņu piesārņojumu. Visās gadījuma izpētes teritorijās uzskatāmi redzama meža vides funkcijas izpausme saskaņā vai neskatoties uz cilvēka darbību.

3. Vides izglītības funkcijas. Pilsētmežs kalpo kā specifiska dabas laboratorija zinātniekiem, mācību klase visai sabiedrībai, veidojot izpratni par procesiem, likumsakarībām dabā, mežā, specifiski pilsētmežā, rādot ceļu nelabvēlīgo ietekmju mazināšanai. Jaunā paaudze ir tendēta pilnība atslēgties no dabas, pat valstīs ar plašām zaļajām teritorijām (Abdel, 2023), tāpēc meža iepazīšana, dalība izglītojošos pasākumos, nodarbībās, talkās veido videi draudzīgu uzvedības modeli arī cilvēku ikdienā, mazinot atsvešinātību no dabas izpratnes.

Visās gadījumu izpētes teritorijās lielākā vai mazākā mērā notiek dažādi vides izglītības pasākumi, talkas, ekskursijas, zinātniskie pētījumi, kas nodrošina vides izglītības funkcijas.

4. Dabas aizsardzības funkcija. Pilsētmežu plānošanā un pārvaldībā ir aktuāla dabas aizsardzības funkcija. Daudzas sugas ir pielāgojušās dzīvei urbanizētā vidē. Pilsētmežos ir sastopamas plašas teritorijas ar augstvērtīgu bioloģisko daudzveidību, ko apliecina arī izpētes teritoriju piemēri – "Ogres Zilie kalni", "Ragakāpa" un "Bernāti" ir īpaši aizsargājamās teritorijas, dabas parki (Latvijas Republikas Ministru kabinets, 2010; Latvijas Republikas Saeima, 1993). Visās teritorijās sastopami dažādi aizsargājamie biotopi un sugas (vairāk informācijas skatīt katras teritorijas dabas aizsardzības plānā) ("Par-Ipasi-Aizsargajamam-Dabas-Teritorijam," 2020).

Pilsētmežos ar augstvērtīgām vai retām sugām vai biotopiem ir zonas, kur primāra ir dabas vērtību aizsardzība un saglabāšana, šādām vietām nav vēlams cilvēku pieplūdums. Bieži realitātē šīs vietas ir arī īpaši vizuāli pievilcīgas un interesantas rekreācijai – aizliegumi to apmeklēšanai nedarbojas, visefektīvākais līdzeklis ir pārdomāta un pēc iespējas augstvērtīga infrastruktūra, kas mazina antropogēno slodzi uz biotopiem vai sugām un zinātniski pamatota biotopu apsaimniekošana.

5. Estētiskās funkcijas. Pilsētmežiem kā lielām dabiskām vai pusdabiskām struktūrām piemīt būtiska ainaviskā vērtība, kas īpaši svarīga pilsētvidē ar cilvēku radīto būvju un infrastruktūras ainavu. Pat ja mežu ainava nav izteikti vizuāli pievilcīga, to kopjot var veidot cilvēkiem pievilcīgākas, patīkamākas ainavas (Heyman, 2012). Ilze Jankovska pētījusi Rīgas pilsētmežu ainavas, kam apmeklētāji dod priekšroku – pārsvarā dominē intensīvi labiekārtots mežs – ar izcirstu pamežu, novāktiem sausajiem zariem un kritalām, ir veikta labiekārtojuma infrastruktūras izbūve, izvēles ainava atgādina parku – "savannas tipa" mežaudzi ar zemu zemsedzi, caurskatāmību un pieejamību (Heyman, 2012; Jankovska, 2013). Ņemot vērā atziņas par kritalu un sausās koksnes nozīmi meža ekosistēmā, Latvijā jau normatīvajos aktos noteikts saglabājamās koksnes apjoms (Latvijas republikas Ministru kabinets, 2012; Latvijas Republikas Saeima, 1993). Tikai zināšanas un dabisko procesu izpratne var uzlabot apmeklētāju novērtējumu par labu mazāk izkoptām, bet bioloģiski vērtīgākām ainavām (Gobster, 1999; Jankovska, 2013; Straupe et al., 2012).

Dabas parki "Ogres Zilie kalni", "Ragakāpa" un "Bernāti" ir pievilcīgi apmeklētājiem ar atšķirīgajām un mainīgajām mežu ainavām uz artikulēta reljefa (osu pauguri vai piejūras kāpas) – skrajas vecu priežu audzes, lapu koku audzes, nelieli purviņi, kas mijas ar ūdeņu ainavām (Dubkalnu ūdenstilpe vai Baltijas jūras plašā ainava), kas kopīgo ainavu padara interesantu un pārsteigumiem bagātu.

6. Ekonomiskās funkcijas. Meža teritorijas producē un uzkrāj izmantojamus izejmateriālus, piemēram, koksni, skujas, augļus un ogas, sēnes. Mūsdienās pilsētmežos koksnes iegūšanai atvēlēta vismazākā loma, kas vairāk saistīta ar mežaudžu kopšanu, slimību vai kaitēkļu bojājumu gadījumā, un cirtēm ainavas uzlabošanai un veidošanai. Dabas parkos šīs iespējas ir vēl ierobežotākas.

Meža nekoksnes materiālu – sēņu, ogu, augļu, čiekuru, riekstu, ziedu, lapu, zaru, sakņu, sulu vākšana cilvēku patēriņam pilsētmežos uzskatāma vairāk par sociālu rekreācijas funkciju, jo dabas aizsardzības noteikumi, īpašuma tiesības vai pilsētvides piesārņojums neļauj izmantot pārtikā iegūto produkciju.

Visās izpētes teritorijās ir iespējama ļoti ierobežota mežistrāde, īpaši dabas parkos un vēl jo vairāk piejūras teritorijās – sanitārās cirtes, lai likvidētu nokaltušos un bīstamos kokus, kas atsevišķos gadījumos atstājami meža teritorijā (Latvijas Republikas Ministru kabinets, 2010). Izpētes teritorijās ir plašas un iecienītas sēņošanas un ogošanas vietas (to kvalitāti var mazināt aizaugšana ar krūmiem), kas vasaras beigās un rudenī izkliedē apmeklētājus pa visu teritoriju.

Klasificēšana ļauj veiksmīgāk plānot, apsaimniekot pilsētmežu teritorijas, izvirzīt un ievērot nepieciešamos saimnieciskās darbības ierobežojumus un uzdevumus. Pilsētmežiem ir raksturīga daudzfunkcionalitāte, bet, vadoties no vietas esošajiem apstākļiem, kāda ir dominējoša. Vietas, kur konstatējamas būtiskās, sabiedrībai ilgtermiņā nozīmīgas funkcijas, jāparāda dažāda līmeņa meža apsaimniekošanas plānos un arī pašvaldību teritorijas plānojumos vai tematisko plānojumu sadaļā.

Pilsētmežu klasifikācijas grupas, ietverot galvenos nosakošos parametrus/kritērijus un attiecīgos īpašos noteikumus plānošanai un apsaimniekošanai:

1. Rekreācijas pilsētmeži – ietver meža teritorijas ar ierobežotu izmantošanu mežsaimniecībā, kur kā dominējošais izmantošanas veids izvirzīta iedzīvotāju aktīva atpūta pilsētmežos. Izvietojami ar sportu un rekreāciju saistīti objekti (labiekārtotas atpūtas vietas, dabas takas, skatu torņi, slēpošanas trases u. c.). Vietas izvēles kritēriji – ērta sasniedzamība 15-30 minūšu laikā, piebraucamie ceļi, auto novietošanas iespējas, pievilcīga, izteiksmīga ainava (pārredzama vai īpatnēja meža ainava, īpaši izteikts reljefs, ūdens tuvums, ainavas

dominantes, tāli skati u. c.), sabiedrības/lietotāju pieprasījums, iespēja ērtai, efektīvai labiekārtojuma izveidei un uzturēšanai, kā arī tālākai paplašināšanai.

2. Aizsargājamie pilsētmeži – dominējošā izmantošana, vietas izvēles kritēriji ir saistīti ar aizsargjoslu, vides, sugu un biotopu vērtībām, to aizsardzību, uzlabošanu un atbilstīgu saudzējošu meža plānošanu un apsaimniekošanu. Īpaši vērtīgos dabas objektos, biotopos, parasti neierīko rekreācijas vietas, bet ja ir liela sabiedrības interese un noslodze, antropogēnās ietekmes mazināšanai jāplāno, jāveido ierobežojoša augstvērtīga infrastruktūra.

3. Vizuāli nozīmīgi pilsētmeži – izvēles kritērijs, var būt visi meži, kuru iekšējā struktūra (pievilcīgas ainavas pastaigām) vai skats uz tiem no ārpuses (ceļmalu, dažādu pilsētas struktūru atdalīšana) ir vizuāli nozīmīgs. Ieteicamas ainavas cirtes, atļauta arī kailcirte, īpaši izvērtējot ciršu vizuālo ietekmi uz meža ainavu, veicot rūpīgu cirsmu un meža atjaunošanas plānošanu un projektēšanu.

4. Kultūrvēsturiski pilsētmeži – izvēles kritērijs un dominējoša lietošana ir saistīta ar kultūrvēsturisku vērtību esamību teritorijā, to saglabāšanu, saudzējošu eksponēšanu un atbilstīgu plānošanu, labiekārtošanu un meža apsaimniekošanu.

5. Saimnieciskie pilsētmeži – un dominējošais izmantošanas veids ir mežsaimniecība un mežsaimnieciskās produkcijas ieguve. Šo teritorijas izvēles kritērijs var būt grūta sasniedzamība, nepiemērotība rekreācijai, īpašu dabas vai kultūrvēstures vērtību iztrūkums. Ņemot vērā, ka šie meži var būt vizuāli nozīmīgi ar savu vizuālo apjomu, ieteicamas ainavas cirtes, atļauta arī kailcirte, īpaši izvērtējot ciršu vizuālo ietekmi uz meža ainavu, veicot rūpīgu cirsmu un meža atjaunošanas plānošanu un projektēšanu.

Ņemot vērā, ka rekreācijas, ainaviskas nozīmes un kultūrvēsturiskas nozīmes mežu kopšana no mežsaimnieciskā viedokļa ir līdzīga, darba izstrādes gaitā veidojās diskusija par šo mežu apvienošanu vienā grupā. Promocijas darbā grupas izdalītas atsevišķi, lai uzsvērtu to nozīmību pilsētmežu teritorijās, veicinātu diskusiju par to potenciālu un īpašu izmantošanu.

Pilsētmežu plānošana un pārvaldība notiek gan stratēģiskā, pilsētu – pašvaldību līmenī, gan lokālā – vietu - mežaudžu - ainavu līmenī (skat. 3.3. att.), atbilstoši pilsētmeža apsaimniekošanas plānam, vai labiekārtojuma gadījumā – atbilstoši tehniskajam projektam.

3.3. att. **Pilsētmežu plānošanas pieeja stratēģiskā un vietas mērogā**.

Pilsētmežu izvērtēšanas soļi:

1. solis. **Pamatfunkciju identifikācija.** Jāapzina galvenās funkcijas, ko teritorija pilda. Pilsētmežu stratēģiskajā plānojumā visos meža masīvos lielākā vai mazākā mērā būs saskatāmas visas pilsētmežu funkcijas, tās bieži pārklāsies. Vietu līmenī dominējošās pilsētmežu funkcijas palīdz izprast, kādas ir konkrēto pilsētmežu teritoriju vērtības un iespējas – līdz ar to attiecīgais plānošanas, apsaimniekošanas un labiekārtojuma veids un līmenis.

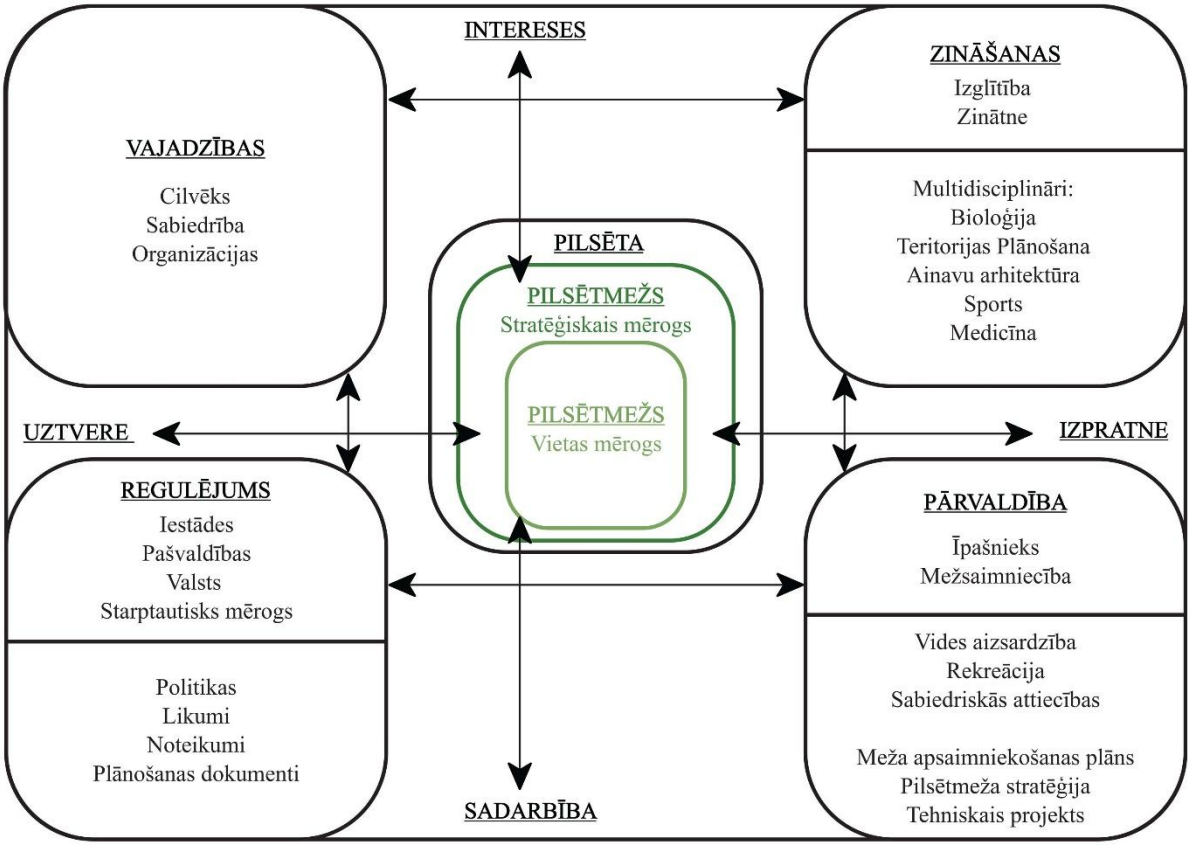
Atšķirīgās funkcijas jāparāda vietas līmeņa meža/ainavu apsaimniekošanas plānos, tehniskajos projektos. Pašvaldību tematisko plānojumu sadaļā var parādīt ilgtspējīgus un nozīmīgus pilsētmežu objektus.

2. solis. **Pilsētmežu tipoloģijas kritēriju izvērtēšana un dominējošās funkcijas noteikšana.** Kā primārās tiek izvirzītas funkcijas, kam ir noteikts valsts vai pašvaldības aizsardzības statuss (dabas, kultūrvēstures). Ja ir vairāki aizsardzības statusi, prioritārs ir objekts ar unikalitāti konkrētā vietā, būtiski saglabāt un neapdraudēt aizsargājamo vērtību. Sociālās funkcijas tiek pakārtotas aizsargājamām vērtībām veidojot atbilstošu infrastruktūru vai novirzot apmeklētāju plūsmas. Teritorijās, kur nav būtiski izteiktas citas funkcijas kā primārais saglabājas ekonomiskais aspekts.

Pilsētmežu īpašnieks vai pārvaldītājs, plāno savu darbību, izvērtē, virza tālākās attīstības, apsaimniekošanas prioritātes un nosaka dominējošo meža tipu un nepieciešamo apsaimniekošanu. Plānojot jāizvēlas kāda, kura ir stratēģiski nozīmīga un atbilstoša dominējošajam lietošanas veidam.

3. solis. **Pilsētmežu apsaimniekošanas plānu atspoguļojums telpiskās plānošanas dokumentos**. Dažāda līmeņa plānu izstrādāšanas laikā veicama meža pārvaldnieku sadarbība ar pašvaldībām, telpiskās attīstības plānotājiem, sabiedrību par kopēju redzējumu teritoriju attīstībā, īpaši paredzot sabiedrībai nozīmīgu teritoriju nākotni un to atspoguļojumu pašvaldību teritoriju plānojumos, tematiskajos plānos. Pilsētmežu dominējošo klasifikācijas grupu var ietvert pašvaldību teritoriju plānojumos, vai tematisko plānojumu sadaļā.

Ar pilsētmežu un to pārvaldību saistītie procesi, mērogi, regulējums, zināšanas, vajadzības saistās ar dažādām interesēm, ir ciešā visaptverošā mijiedarbībā, ko uzlabo sadarbība (skat. 3.4. att.). Valstij, pašvaldībām, organizācijām, indivīdiem atšķirīgās situācijās pilsētmežā var būt dažādas lomas, uztvere, izpratne, ietekme, vajadzības un atbildība, kas izpaužas kā regulējošas, īpašumtiesību, pārvaldītāja vai lietotāja skatupunkts.



3.4. att. **Pilsētmeža procesu, interešu un mērogu mijiedarbība**.

Pilsētmeži ir daudzfunkcionālas teritorijas ar sešām galvenajām funkcijām; sociālo, vides, vides izglītības, dabas aizsardzības, estētisko un ekonomisko, kuru hierarhija un dominējošā funkcija nosaka teritorijas klasifikāciju, plānošanas un apsaimniekošanas pieeju.

3.4.3. Psihoemocionālais aspekts kā pilsētmeža funkcija

Pētījumā Zilajos kalnos tika novērots kā dažādi stimuli un taku maršruti un konfigurācija ietekmē cilvēku uzmanību. Atšķirīgu stimulu apjoms un daudzveidība ir ļoti svarīga informācijas plūsmas noteikšanā, kas ir svarīgi plānojot pastaigu taku trases, lai novērtētu psiholoģisko labsajūtu (IV publikācija).

Pilsētu sociālajā psiholoģijā laime ir maksimāli pievilcīgas emocijas informācijas plūsmā (Lidin, 2021). Covid-19 pandēmija parādīja, ka dabiskā vide spēj minimizēt sociālās mijiedarbības negatīvās izpausmes (Weinstein, Przybylski & Ryan, 2009).

Jebkuras dabas teritorijas pieejamību nodrošina taku tīkls. Zilajos kalnos un pārējās izpētes teritorijās tas ir izveidojies ilgstošas apmeklētāju lietošanas rezultātā. Vairākas no takām tikušas izveidotas kā meža kvartālus atdalošās stigas, kas izveidotas taisnās līnijās, kvadrātos. Vēl atsevišķas takas veidojušās izteikti taisnās līnijās - bijušās augstsprieguma līnijas, esošo kabeļvadu vai augstspiediena gāzes vada aizsargjoslās izveidoto meža stigu vietās. Taku mērķis ir ne tikai izvest apmeklētājus caur konkrēto teritoriju, bet arī sniegt fizisku un emocionālu labsajūtu un prieku. Viens no taku raksturlielumiem ir to virsmas segums un tā kvalitāte – iešanai ērts (līdzens, bedrains, ar atsegtām koku saknēm, pārmitrs, dubļains vai smilšains), dabisks vai īpaši izbūvēts (koksnes šķelda, stabila grunts, grants, oļi, dažāda veida akmens šķembas, dēļu laipas, akmens vai betona bruģis, betons, asfalts un citi segumi). Plānojot taku tīklu ir svarīga ne tikai tā funkcionalitāte, bet arī emocionālā uztvere, ko nosaka dažādu stimulu skaits un informācijas plūsma – ainavu "atvērumi" un "slēgumi", lai panāktu horizontālā līdzsvara sajūtu, ievērotu harmonisku mērogu un proporcijas (Olszewska-Guizzo, 2023; Raven-Ellison, 2019). Ainavu uztverē liela nozīme ir ainavas slāņiem jeb distances zonām (priekšplānam, vidusplānam un fonam) (Olszewska-Guizzo, 2023; Raven-Ellison, 2019). Gan Zilajos kalnos, gan abās piejūras izpētes teritorijās ir iecienītas takas ar skatu uz ūdens plašumiem, Zilajos kalnos aiz ūdens spoguļa vidusplāna atkal redzama tālākā fona meža ainava, un turpinot ceļu taka ievijas meža slēgtajā ainavā, nodrošinot skatu mainību. Dizaina princips ar vismaz diviem ainavas slāņiem, ir nozīmīgs arī meža taku organizēšanā.

Plānojot pastaigu maršrutus, jāņem vērā arī tiešā sensorā daudzveidība (Salonen et al., 2012), piedāvājot dažādu informāciju un atšķirīgus stimulus, piemēram, lineārus, taisnus tālus skatus, līkumotas takas ar ainavas skatu virzienu izmaiņā, virsmas augstuma un atvēruma platuma izmaiņas, dažādu ceļa virsmas materiālu izmantošana un daudz kas cits. Vides, ainavas daudzveidība kalpo kā stimuls kognitīvajai attīstībai -"bagātināti vides stimuli var ietekmēt neiromorfoloģisko struktūru un uzvedības funkcijas" (Y. Zhang, Chen, & Zhou, 2018).

Bagātīgas informācijas iedarbība ir labvēlīga cilvēkam, tā dod psiholoģisku komfortu un līdz ar to pozitīvu ietekmi uz cilvēka veselību (Ulrich, 1977).

Septiņi nozīmīgi vides aspekti, kas uzlabo veselību un stimulē kognitīvo veselību: ietver nepieciešamību pēc dabiskas, estētiski patīkamas vides, kas ir informatīva un ērta. Videi piemīt daudzveidība, dinamika, iesaistīšanās, izziņas uzlabošana, piecu maņu iesaistīšanās un emociju gammas izraisīšana (Y. Zhang et al., 2018). Videi un ainavai jābūt skaidrai, precīzi definētai un viegli lietojamai, bez potenciālām briesmām, piemēram, skaidra takas virzība, pameža pietiekama caurskatāmība (Ulrich, 1977). Dažādos pētījumos ir uzsvērta vides apstākļu dabas teritoriju infrastruktūras lielā lomā veselības uzlabošanā (Hipp, 2011; Ulrich, 2000).

Pilsētmežu ainavas galvenā pievilcība slēpjas Latvijas mērogam izteiktā reljefā – piejūras kāpās vai osu pauguros ar gaišajiem priežu mežiem, kas mijas ar egļu vai lapukoku audzēm mitrākās vietās. Langervaldes mežā ir izteikti līdzens reljefs, bet dažāda veida meža biotopi nodrošina pietiekamu ainavas daudzveidību. Izteikta ainavas iezīme ir ūdens spogulis, kas īpaši labvēlīgi iedarbojas uz cilvēka psihoemocionālo labsajūtu (Zhang et al. 2021) – Dubkalnu

ūdenstilpe vai Baltijas jūra. Langervaldes vienkāršākajā ainavā savu papildinājumu dod izteiktais meliorācijas grāvju tīklojums, kas ienes taisnlīnīju rūtojumu meža iekšējo augu struktūru un taku struktūras neregulārajam raksturam, radot savdabīgu līdzenuma meža ainavu. Mūsu steidzīgajā ikdienā telpiskā kārtība, kur atsevišķi stimuli netraucē, bet rada iekšēju klusumu, novērš apmeklētāja domas no ārējā uz pārdomām un apcerēšanu (Olszewska-Guizzo, 2023; Salonen et al., 2012). Ainavām ir būtiska loma attīstības psiholoģijā visos vecumos. Veidojot pastaigu taku tīklu pilsētmežu teritorijā, ir liela nozīme iztēli rosinošai dabiskai, skaidrai un dzīvespriecīgai infrastruktūrai (Raven-Ellison, 2019). Pētījumi liecina, ka darbības mežā var uzlabot uzmanības koncentrēšanu un pašregulācijas prasmes pirmsskolas vecuma bērniem (Ulset et al., 2017)

Jaunākie pētījumi apstiprina, ka laika posmā no 2019. gada līdz 2022. gadam ir izveidojušies jauni dabas teritoriju lietošanas paradumi (World Health Organization, 2025) – cilvēki labprāt distancējas un lieto nomaļākas nelielas atpūtas vietas (Kraukle, Stokmane, & Vugule, 2022b).

Uzmanība ir veids, kā cilvēks aktīvi apstrādā ierobežotu skaitu informācijas (ienākošo stimulu) (Sternberg, 1999). Pārāk intensīvi strādājot, koncentrējoties vienlaikus uz vairākiem uzdevumiem, būtiski tiek nogurdināta uzmanība (Schumann et al., 2022), koncentrējoties uz vienu objektu, uzlabo uzmanības dinamiku (Kaplan & Kaplan, 1989). Lai pārslēgtos ātrāk no viena uzdevuma uz citu, ir vajadzīga kāda ārēja metode – pastaiga dabā, īpaši, ja tā ir ikdienas rutīna, uzlabo vispārējo garīgo un fizisko veselību (Zhang et al., 2022).

IV publikācijā apkopotie rezultāti liecina, ka uzmanības dinamika uzlabojās pēc 2. vai 3. mērījuma, kas parasti bija 20-30 minūtes, tas saskan ar teoriju, ka pietiek ar 20 minūšu pastaigu dabā, lai restartētu uzmanību. Pastaigas beigās (40-60 minūtes) samazinājās uzmanības dinamika no fiziska noguruma. Pētījumā izmatotos taku maršrutus skatīt IV publikācijas 2. attēlā. Izpratnei par mehānismiem, kas nosaka lēmumu pieņemšanu, izvēloties pastaigu taku, jāietver ne tikai psiholoģiskie, bet arī sociālie aspekti, kas nodrošinātu visaptverošāku izpratni par taku plānošanu, lai radītu psiholoģisko labsajūtu un emocionāli pozitīvu uzvedības modeli. Ņemt vērā 20-30 minūšu pastaigas pozitīvo ietekmi uz cilvēka uzmanības dinamiku ieteicams plānot svarīgo objektu sasniedzamību 20 minūšu gājienā. Konkrētās takas veidam (taisna vai līkumota) nebija nosakāmas ietekmes uz uzmanības dinamiku, ko var skaidrot ar meža apaugu un reljefa ietekmi, kas vizuāli dzēš atšķirību starp līkumotu un taisnu taku. Ņemot vērā ainaviskās līdzības ar izpētes un citām līdzīgām pilsētmežu teritorijām rezultātus iespējams vispārināt.

3.5. Pilsētmežu apsaimniekošanas pieredze Latvijā

Šajā apakšnodaļā sniegti rezultāti par pilsētmežu apsaimniekošanas pieredzi Latvijā, jo izpētei izvēlētas izteikti mežainas Latvijas valstpilsētas visos Latvijas statistiskajos reģionos: Rīga, Jūrmala, Jelgava, Ogre, kas atrodas attiecīgi galvaspilsētas Rīgas tiešā tuvumā, kā arī Daugavpils un Liepāja, skatīt 2.1. attēlu un 2.2. tabulu, vairāk informācijas VI publikācijā.

Atskatoties vēsturē, izpētei izvēlēto pilsētu meži ir bijuši nozīmīgi jau senāk (Zviedris, 1949), no 1978. gada, kad Rīgas, Jūrmalas, Ogres, Daugavpils, Liepājas un Jelgavas meži bija iekļauti Republikas pakļautības pilsētu zaļo zonu mežu platībās, Rīgas pilsētā bija mežaparku iecirknis, Jūrmala un Ogre ar saviem mežiem ietilpa Rīgas zaļajā zonā (Sūna, 1979).

Mūsdienās pilsētas mežu apsaimniekotājiem ir īpaši nepieciešama visaptveroša zinātniska izpratne par dabiskajiem procesiem mežaudžu attīstībā, plānošanā, integrējot ekoloģiskos un ekonomiskos mērķus (Franklin et al., 2002; Donis, 2003;). Pilsētmežam, tāpat kā jebkurai dabiskai sistēmai, ir raksturīga noteikta tolerance pret antropogēnām slodzēm (Emsis & Tuktens, 1988; Seidler & Bawa, 2013). Rekreācijas process ir jāplāno, jākontrolē un mērķtiecīgi jāvada, lai pasargātu intensīvi apmeklētas vietas no negatīvām izmaiņām dabiskajā meža vidē – antropogēnās slodzes jeb cilvēka radītās ietekmes uz vidi un dabu (Bisht et al., 2024).

Pilsētmežu ainavu apdraud pilsētu apbūves izplešanās. Lielākas mežu platības tiek fragmentētas, notiek process, kur nepārtrauktas biotopu platības tiek sadalītas mazākos, daudzskaitlīgākos fragmentos (Franklin et al., 2002). Fragmentēšanas negatīvo ietekmi atspoguļo atziņa – 10 fragmentos, kur katrs ir ar vidējo platību 1 km^2, saglabājas mazāka bioloģiskā daudzveidība nekā vienā fragmentā ar platību 10 km^2 (Ehrlich & Kremen, 2001; Seidler, 2017; Seidler & Bawa, 2001).

Kā būtiskākā problēma pilsētmežos uzskatāma augsnes erozija un noblietēšanās intensīvi izmantotās platībās, bioloģiski vērtīgo ainavu vietā izveidojas ruderālas ainavas ar nabadzīgu sugu sastāvu. Pilsētas zaļās publiskās teritorijas regulāri jālabiekārto un jākopj (Straupe et al., 2014; Straupe et al., 2012).

Pēc Jāņa Doņa datiem (Donis, 2001) vidēji Latvijā 20% no pilsētas teritorijas ir pilsētmežu. Kā redzams VI publikācijas 2. attēlā (Latvijas pašvaldību savienības 2021. gada dati (Latvijas Pašvaldību savienība & Upenieks, 2021)), Latvijas galvaspilsētas Rīgas platība ir vairāk nekā divas reizes lielāka kā citām apskatītajām pilsētām un tajā ir visvairāk pilsētmežu teritoriju (5494 ha, 18 % no pilsētas teritorijas). Jūrmala (4802 ha, 47 %) izceļama kā otrā lielākā pilsēta ar lielu pilsētmežu platību. Daugavpils (1592 ha, 22 %), Liepāja (1192 ha, 18 %) un Jelgava (1121 ha, 19 %), ir līdzīgas pilsētas platības un pilsētmežu apjoma ziņā. Ogre (209 ha, 13 %) ir mazākā no apskatītajām pilsētām, bet ar līdzvērtīgu pilsētmežu īpatsvaru. VI publikācijā apskatītas pilsētmežu pārvaldības pazīmes, kas šeit apkopotas 3.6. tabulā (lietotie apzīmējumi: X ir, - nav, nd – nav datu).

3.6. tabula. **Pilsētmežu pārvaldības pazīmes**

Pārvaldības pazīme	Rīga	Jūrmala	Daugavpils	Jelgava	Liepāja	Ogre
1. Apsaimnieko						
1.1. Apsaimnieko pašvaldība	x	x	x	x	x	x
1.2. Apsaimnieko valsts	-	x	-	x	-	-
2. Integritāte ir	x	x	x	x	x	x
3. Stratēģija						
3.1. Pašvaldības	x	x	x	x	x	x
3.2. Uzņēmuma	x	-	-	-	-	x
3.3. Meža apsaimniekošanas plāns	x	-	-	x	x	x
3.4. Ainavu ekoloģiskais plānojums	x	-	-	-	-	-
3.5. Meža inventarizācijas	x	x	x	x	x	x
4. Daudzfunkcionalitāte						
4.1. Vides izglītojošie pasākumi	x	nd	x	nd	nd	x
4.2. Talkas	x	x	x	x	x	x
4.3. Rekreācijas teritoriju labiekārtošana	x	x	x	x	x	x
4.4. Pameža kopšana	x	x	x	x	x	x
4.5. Atkritumu savākšana	x	x	x	x	x	x
4.6. Bīstamu koku nozāģēšana	x	x	x	x	x	x
4.7. Augošas koksnes pārdošana	x	nd	x	x	x	x
4.8. Meža stādāmā materiāla audzēšana	x	-	-	-	-	-
4.9. Mežistrādes darbi	x	-	-	-	-	-
4.10. Kūrorts kā daudzdisciplīnu apsaimniekošanas veids	-	x	-	-	x	-

Pārvaldības pazīme	Rīga	Jūrmala	Daugavpils	Jelgava	Liepāja	Ogre
5. Līdzdalība – dažādu interešu grupu iesaistīšanās apsaimniekošanā						
5.1. Skaidrojošas publikācijas, aptaujas, talkas	x	x	x	x	x	x
5.2. Plānoto darbu sabiedriskā apspriešana	x	-	-	-	-	-
6. Papildus ierobežojumi pilsētmežu apsaimniekošanai*						
6.1. Īpaši aizsargājamās teritorijas	x	x	-	-	x	x
6.2. Piejūras teritorijas	x	x	-	-	x	-

Ņemot vērā, ka visas 5 pārvaldības pazīmes ir redzamas pētītajās pilsētmežu teritorijās, varam runāt ne tikai par apsaimniekošanu, bet pilnvērtīgu pilsētmežu pārvaldību šajās valstspilsētās. 6. punktā redzami būtiski papildus noteikumi pilsētmežu apsaimniekošanā.

3.5.att. **Pilsētmežu pārvaldība stratēģiskā un vietas mērogā**

Visās pilsētmežu pārvaldības pazīmēs ir vērojamas gan stratēģiskā mēroga, kas ietver visas īpašumā esošās teritorijas, gan vietas mēroga aktivitātes, kas redzamas 3.5. attēlā. **Pārvaldību var definēt** kā konsekventu, caurskatāmu un ilgtspējīgu sistēmu, kurā savstarpēji saskaņoti stratēģiskie mērķi, pieņemtie lēmumi un praktiskā apsaimniekošana, balstoties vienotos ekoloģiskos, sociālos un ētiskos principos gan stratēģiskajā, gan vietas mērogā.

2024. gada maijā-novembrī tika veikta pilsētmežu pārvaldībā iesaistīto 10 ekspertu aptauja no 6 izpētes teritorijām – pilsētām ar izteiktu pilsētmežu īpatsvaru (intervijas jautājumi 2. pielikumā). Ekspertu aptaujas ietvaros tika noskaidrots viedoklis par pilsētmežu definīciju, iesaistīto pušu loku, funkcionālo nozīmi, klasifikāciju, plānošanas dokumentos nostiprināmo informāciju un normatīvā regulējuma nepieciešamību (skat. 3.6. attēlu).

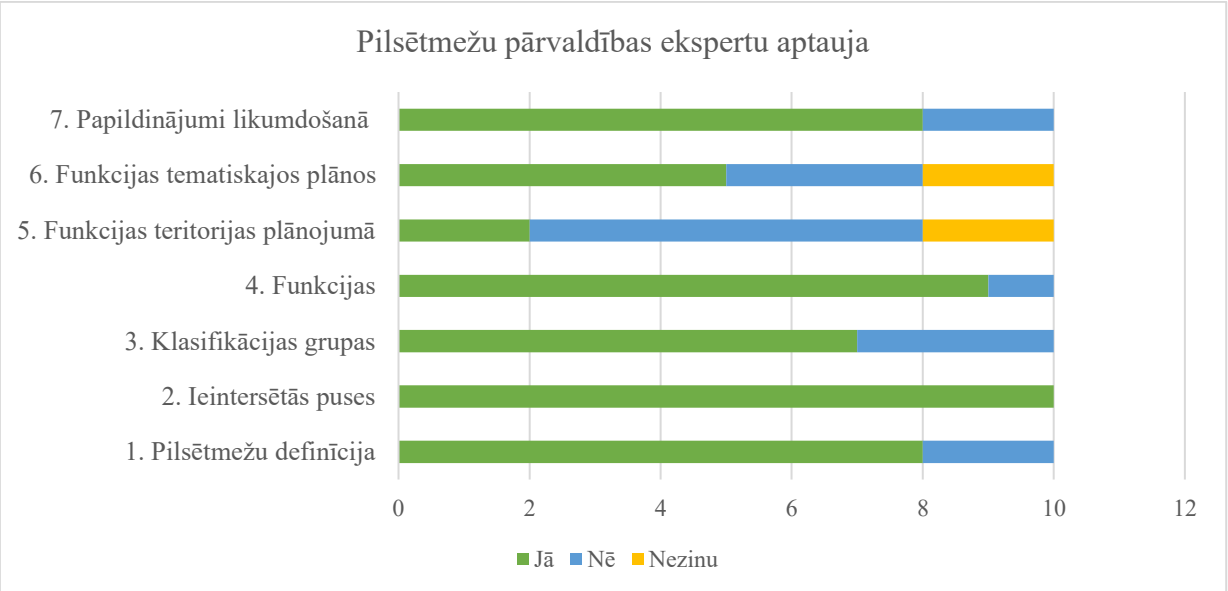
Lielākā daļa ekspertu atzina izstrādāto pilsētmežu definīciju par atbilstošu, tomēr vairāki respondenti uzsvēra, ka vides funkcijas šādā kontekstā būtu jāizvirza kā prioritāras. Tāpat tika pausts vienprātīgs atbalsts izvirzītajam ieinteresēto pušu lokam — regulējošās institūcijas, īpašnieki vai apsaimniekotāji un lietotāji —, papildinot, ka noteiktos gadījumos dabas aizsardzības nevalstiskās organizācijas var pildīt arī regulējošu lomu.

Eksperti lielākoties piekrita piedāvātajai pilsētmežu klasifikācijai — rekreācijas, aizsargājamie, vizuāli nozīmīgie, kultūrvēsturiskie un saimnieciskie meži. Taču daži uzskatīja, ka šāds iedalījums varētu būt pārāk detalizēts un apgrūtināt praktisko pielietojumu. Pārsvarā tika atbalstīts arī izvirzītais pilsētmežu funkciju loks, ietverot sociālo, vides, vides aizsardzības, vides izglītības, estētisko un ekonomisko dimensiju.

Viedokļi par šo funkciju integrēšanu teritorijas plānojumā bija dalīti. Tikai neliela daļa ekspertu uzskatīja, ka funkciju iekļaušana būtu būtisks solis uzlabotai apsaimniekošanai un sadarbībai ar sabiedrību. Daudz biežāk tika izteikts viedoklis, ka pārāk detalizēts regulējums varētu ierobežot īpašumtiesības un padarīt apsaimniekošanas procesus vēl sarežģītākus, īpaši ņemot vērā mainīgos apstākļus. Tika piedāvāts risinājums — izmantot zonējumu un noteikt funkcijas mežsaimnieciskajos plānos, nevis stingri nostiprināt tās teritorijas plānojumā.

Daļa ekspertu uzskatīja, ka tematiskie plāni varētu kalpot kā noderīgs rīks, veicinot komunikāciju ar sabiedrību un palīdzot izprast pilsētmežu attīstības virzienus, tomēr šiem plāniem nevajadzētu būt juridiski saistošiem. Tie būtu interpretējami kā informatīvi, skaidrojoši dokumenti, kas palīdz veidot dialogu starp ieinteresētajām pusēm.

Attiecībā uz normatīvo regulējumu vairums ekspertu izteica viedokli, ka esošā likumdošana nav pietiekami elastīga un kavē efektīvu rīcību. Lai gan daži norādīja, ka pašvaldībām jau šobrīd ir nepieciešamie rīki pilsētmežu pārvaldībai, kopumā tika uzsvērta nepieciešamība atvieglot un vienkāršot dažādas procedūras, piemēram, kailciršu nosacījumus un pilsētmežu kopšanas darbu atļaušanas kārtību. Tāpat tika norādīts, ka šādas izmaiņas veicinātu arī dabisko sugu, piemēram, saulmīļu priedes (*Pinus sylvestris*), atjaunošanos, kas ir raksturīga Latvijas pilsētmežu ainavai.



3.6.att. **Pilsētmežu ekspertu aptauja** (2024. gada dati).

Vēl aptaujā bija vairāki atvērtie jautājumi, kur tika lūgts plašāks skaidrojums, tai skaitā par piejūras mežu apsaimniekošanas īpatnībām. Trim respondentiem nebija šādas pieredzes. Galvenā atziņa, ka piejūras mežu ekosistēmas ir jūtīgas un tām nepieciešama aizsardzība, kas Latvijas gadījumā ir stingri noteikta normatīvos, piemēram, Jūrmalā un Liepājā pārklājas noteikumi, kas attiecas uz pilsētas teritorijām, piejūras krasta kāpu aizsargjoslu, īpaši aizsargājamām dabas teritorijām, kā arī sabiedrības daļas krasā noliedzošā nostāja, faktiski noved pie situācijas, ka pat pieļaujamie mežsaimnieciskie darbi netiek veikti. Savukārt cita sabiedrības daļa pārmet, ka mežs netiek kopts. Būtiska problēma ir liels apmeklētāju skaits, kas rada būtisku antropogēno slodzi meža biotopiem un rada lielu atkritumu daudzumu.

Kā galvenie izaicinājumi pilsētmežu apsaimniekošanā minēti sabiedrības dažādās intereses un viedokļi, kas bieži ir pretrunīgi, un komunikācijas un uzticības veidošana ar sabiedrību. Svarīga ir izglītošana un informēšana, lai veicinātu sabiedrības izpratni par meža vērtībām un kopšanas nozīmi.

Tāpat pie izaicinājumiem tika minētas -

- Postošas klimata pārmaiņas, kas redzamas kā biežākas un postošas vētras, kaitēkļu un invazīvo sugu izplešanās.
- Politiskā ietekme uz lēmumu pieņemšanu, kas var manīties atkarībā no pašvaldību vēlēšanu rezultātiem.
- Resursu trūkums – finansējums un cilvēkresursi, kas ierobežo kvalitāti.

Eksperti nosauca arī nepieciešamos uzlabojumus pilsētmežu apsaimniekošanā -

- Ļoti svarīgas ir sabiedrības izglītošana un regulāra komunikācija, organizējot regulārus izglītojošus pasākumus, dažādas talkas, skaidrojot plānotos meža kopšanas darbus.
- Atkritumu apkarošana, atkritumu urnu izvietošana tiek būtiski izvērtēta, vairums apsaimniekotāju tās vairs neizvieto.
- Kvalitatīva un profesionāla pilsētmežu mežaudžu kopšana un nepārtraukta infrastruktūras uzlabošana. Teritoriju zonēšana un atšķirīgas darbu intensitātes noteikšana.
- Plānošanas procesā iesaistīt sabiedrību, pašvaldības un ekspertus.
- Atvieglot, padarīt elastīgākus normatīvos aktus, piemēram, kailciršu noteikumus, lai veicinātu saulmīļu sugu atjaunošanos, cīņu ar kaitēkļiem, slimībām.
- Veidot savstarpēju pieredzes apmaiņu pilsētmežu īpašniekiem, apsaimniekotajiem.

3.6. Pilsētmežu lietotāju pieredzes un interešu izpēte

Apakšnodaļā aprakstīta pilsētmežu lietotāju pieredzes un interešu izpēte 4 pilsētmežu teritorijās – dabas parkos "Ogres Zilie kalni", "Bernāti", "Ragakāpa" un Langervaldes mežā. Plašāk jautājums skatīts VII publikācijā. Lai noskaidrotu pilsētmežu lietotāju paradumus un viedokļus par pilsētmežu izmantošanu, tika analizētas vairākas iepriekš veiktas aptaujas un pielietota *Go-along* metode (skat. 2.4.2. punktā), lai, pamatojoties uz izpētes rezultātiem, uzturētu kultūras ekosistēmu pakalpojumus, nodrošinātu sociālo funkciju realizāciju, attīstītu un uzlabotu pilsētmežu plānošanas apsaimniekošanas praksi. Tika veiktas 26 intervijas, kuru rezultāti papildināja un saskanēja ar iepriekš veiktajām aptaujām.

Pētot konkrēto pilsētmežu lietotāju [kvadrātiekavās norādīts respondentu skaits] paradumus, skaidri redzams, ka pastaigas [22] mežā ir galvenā, dominējošā nodarbe, daudzi izved pastaigā savus suņus [10] un iet kopā ar bērniem/mazbērniem [6]. Nākamā populārākā nodarbe ir peldēšanās [11] un pat peldēšana visu gadu [2] teritorijās, kur ir tāda iespēja. Trešā populārākā nodarbe ir slēpot [9] un šļūkt no kalniņiem [9] sniegotajā periodā. Tikpat aktīvi apmeklētāji skrien [8], nūjo [8] un brauc ar velosipēdu [8]. Daļa respondentu sēņo [6], fotografē [6], iet pārgājienos [4] vai vada ekskursijas [3]. Atsevišķi respondenti atzīmē, ka ogo [2], rieksto [2], vāc materiālus floristikai [2]. Bernātiem papildus ir raksturīgi vākt "jūras mēslus" [2] un

čiekurus zivju kūpināšanai [1].

Kā būtisks aspekts pilnīgi visās 26 intervijas, respondenti pauž pozitīvas emocijas, ko gūst no uzturēšanās mežā, sajūsmu par liela mēroga ainavām, konkrētiem augiem, celmiem, kritušiem kokiem, zirnekļiem un rasas lāsēm, jūsmo par meža smaržām (maijpuķītes, mežs pēc lietus, rudenī u. c.), putnu dziesmām vai klusumu. Daudzi atzīmē, ka atpūšas no stresa un ikdienas uztraukumiem. Visbiežāk apmeklējuma maršruts un ilgums ir atkarīgs no noskaņojuma un laika apstākļiem. Konkrētāki maršruti iezīmējas apmeklētājiem, kuri sporto un grib veikt konkrētu distanci. Respondenti, kas sporto, atzīmē, ka izvēlas konkrētās teritorijas, jo tās viņiem ir vizuāli pievilcīgas.

Ir vairāki respondenti, kas teritorijas apmeklē jau no agras bērnības, jaunības un ar to saistās dažādas sentimentālas atmiņas. Daudzi labprāt stāsta par sev zināmajiem vēsturiskajiem notikumiem teritorijā, maršrutā iekļaujot sev interesantās vietas.

Interviju laikā tika veiktas fotofiksācijas, vietās, kam respondenti īpaši pievērsās, pārsvarā norādot to nozīmību vai pievilcību.

4. SECINĀJUMI UN PRIEKŠLIKUMI

Balstoties uz promocijas darba pētnieciskajiem uzdevumiem, izpētes procesā veiktajiem pētījumiem ir iegūti rezultāti, izdarīti secinājumi un sagatavoti priekšlikumi, kas var uzlabot pilsētmežu pārvaldību, plānošanu un apsaimniekošanu.

1. Ir veikta pilsētmežiem saistošu normatīvo aktu izpēte. Pilsētmežu pārvaldība ir mežsaimniecības nozare, kas ir būtiski atšķirīga no klasiskās mežsaimniecības. Trūkst skaidru tiesību normu, kas noteiktu un reglamentētu pilsētmežus atbilstoši aktuālai situācijai un ilgtspējai.

Ir nepieciešams ieviest un popularizēt vienotu pilsētmežu definīciju Latvijā. Kā arī veidot vienotu definējumu Eiropas Savienībā, ņemot vērā būtiskās valstu atšķirības.

Starptautiskajos un vietējos tiesību aktos, politikās un plānošanas dokumentos svarīgi skaidrāk iezīmēt mežu un pilsētmežu lomu, uzsverot to būtisko nozīmi CO_2 emisiju samazināšanā, bioloģiskās daudzveidības un dabisko biotopu uzturēšanā un saglabāšanā, sociālo un ekonomisko funkciju nodrošināšanā.

Pamatojoties uz pētījumā iegūtajiem rezultātiem pilsētmežu apsaimniekošanas jautājumiem nepieciešams visaptverošāks regulējums, nepieļaujot mežu fragmentēšanu, saglabājot iespējamu rekreācijas infrastruktūras izveidi, pārvaldību atbilstoši aktuālai situācijai un ilgtspējai. Paredzēt iespēju kopt teritorijas īpaši aizsargājamās dabas teritorijās, kāpu aizsargjoslā, kas atrodas pilsētas teritorijā. Kā viens no risinājumiem varētu būt īpaši noteikumi, kad tiek pieļautas atkāpes no vispārējiem noteikumiem, konkrētu problēmu risināšanai.

2. Apzinātas pilsētmežu ainavas vērtības un funkcijas pilsētu un gadījuma izpētes teritorijās.

Ņemot vērā pētījumā iegūtos rezultātus un secinājumus, vadošo pilsētmežu apsaimniekotāju pozitīvo pieredzi, nepieciešams turpināt vērtīgo dabas, rekreācijas, ainaviski, kultūrvēsturiski nozīmīgo teritoriju definēšana un identificēšana dabā, papildus uzmanību pievēršot pilsētmežu sociālajiem jautājumiem, pozitīvajai psihoemocionālajai iedarbībai, to pārvaldības plānošanai un iekļaušanai telpiskās plānošanas tematiskajos plānos, lai izvērtētu vai ir nepieciešama to nostiprināšana pašvaldību saistošajos noteikumos.

3. Izstrādāta pilsētmežu klasifikācijas pieeja iekļaušanai pilsētvides plānošanā.

Balstoties uz promocijas darbā pētītajiem ekosistēmu kultūras pakalpojumiem un attiecīgajām pilsētmežu funkcijām, pilsētmežus var klasificējusi piecās grupās: **rekreācijas, aizsargājamie, ainaviskas nozīmes, kultūrvēsturiskas nozīmes un saimnieciskie meži**.

Pamatojoties uz pētījumā iegūtajiem rezultātiem un izrietošajiem secinājumiem, būtiskāka loma jāatvēl pilsētmežu plānošanai gan stratēģiskā – pilsētas, gan vietas – konkrētās mežaudzes mērogā. Pilsētas/pašvaldības mērogā nosakāma dominējošā pilsētmeža funkcija, kurai pakārtotas pārējās, kas vienlaicīgi konstatējamas teritorijā, kā arī to var parādīt pašvaldības līmeņa telpiskās plānošanas dokumentos. Lai nodrošinātu dominējošās funkcijas vislabāko realizāciju, virzāma plānošana un sekojošā apsaimniekošana. Mežaudzes mērogā plānojamas konkrētās lokālās zonas un objekti, izstrādājot meža/ainavu apsaimniekošanas plānus, labiekārtojuma, infrastruktūras tehniskos projektus.

4. Izstrādāti ieteikumi ilgtspējīgai / integrētai pilsētmežu ainavu pārvaldībai (plānošana, apsaimniekošana) Latvijā.

Modernā pilsētmežu pārvaldība ietver ļoti daudzus aspektus – pilsētas vide un mērogs, konkrētais meža masīvs un lokālais mērogs, dabas procesi, kas norisinās bez cilvēka līdzdalības, procesi ko ietekmē cilvēks – no globālā līdz indivīda līmenim savijas vienotā ilgtspējīgā un integrētā procesā. Mežs ir stabila, pašpietiekama, dabiska ekosistēma, un tā pastāvēšanai un uzturēšanai nepieciešams daudz mazāk resursu nekā cilvēka veidotu parku uzturēšanai. Faktiski lielākie līdzekļi nepieciešami sociālo – rekreācijas funkciju nodrošināšanai.

Apsverot pētījumā iegūtos rezultātus un secinājumus, vadošo pilsētmežu pārvaldītāju pieredzi, pilsētmežu plānošanas un pārvaldības procesā jābūt zināšanām ne tikai

mežsaimniecībā, vides zinātnēs, bet arī administrēšanā, ainavu un telpiskās attīstības plānošanā, sportā, medicīnā (fiziskā un psihoemocionālā veselība), sabiedriskajās attiecībā, ir jāiesaista dažādu jomu speciālisti, eksperti, studenti arī dažādu jomu ieinteresētās personas un lietotāji, jo katram ir savas zināšanas, pieredze, vajadzības, kas bieži vien var būt kardināli pretējas – pēc iespējas ir jāsalāgo dažādās intereses. Plānošanas un pārvaldības procesā jāizvērtē lietotāju vēlmes, valsts un pašvaldību noteikumi, īpašnieku/apsaimniekotāju saistības, iespējas un ekspertu atziņas.

Ņemot vērā pētījuma rezultātus un secinājumus, nepieciešama lielāka sabiedrības izglītošana un līdzdalība. Lai mazinātu ieinteresēto personu konfliktsituācijas un domstarpības, ļoti būtiski ir skaidrot lietotājiem vides aizsardzības prasības vai apsaimniekošanas specifiku, kas sākotnēji izsauc krasu lietotāju pretreakciju. Izstrādājot dažāda līmeņa plānus pilsētmežu teritorijām, ir svarīgi apzināt dažādu ieinteresēto pušu vajadzības un intereses. Ciešā mijiedarbībā ar ieinteresētajām pusēm jāizstrādā un jāievieš modernu daudzmērķu zaļās infrastruktūras plānošanas un kopšanas pieeju, kas ir vērsta uz pilsētmežu, teritoriju ilgtspējas palielināšanu un noturību pret klimata izmaiņām.

Balstoties uz promocijas darba izstrādē izkristalizētiem secinājumiem ir būtiski nepieļaut mežu turpmāku urbanizācijas izplešanos un fragmentēšanu. Urbanizācijas izplešanās un fragmentēšanas mazināšanai teritorijas plānošanas dokumentos striktāk noteikt jaunas apbūves veidošanas ierobežojumus pilsētmežu teritorijās, pieļaujot rekreācijai nepieciešamās būves. Pilsētmežu "zaļie ķīļi" ir plānošanas veids, kura mērķis ir ierobežot pilsētu teritoriju nepārtrauktu paplašināšanos, neatstājot vietu dabiskām teritorijām, kas nepieciešamas vides daudzveidības saglabāšanai un meža ekosistēmu pakalpojumu sniegšanai. Jāuztur dzīvotspējīgas mežu teritorijas, kas aptver pietiekami lielas platības un daudzveidīgas struktūras un vecuma koku audzes, kā arī bioloģisko daudzveidību, neaizmirstot par labiekārtojumu un aprīkojumu iedzīvotāju rekreācijas vajadzībām. Jāveido un jāuztur daudzveidīgas mazākas struktūras (zaļie koridori), kas savieno pilsētmežus un lielākos parkus. Zaļie koridori ir ļoti svarīgi bioloģiskās daudzveidības saglabāšanai gadījumos, kad zaļās teritorijas ir pārāk sadrumstalotas.

Ņemot vērā pētījumā iegūtos rezultātus, svarīgi nodrošināt zaļo teritoriju, vēlams, pilsētmežu, pieejamību urbānās teritorijās, ejot kājām vai braucot ar automašīnu 10-15, augstākais 30 minūšu laikā. Plānojot, projektējot konkrētās pastaigu takas un rekreācijas infrastruktūru, jāietver fiziskie, psiholoģiskie un sociālie aspekti, uz kuriem balstās apmeklētāju lēmums taku izvēlē. Ņemot vērā cilvēku uzmanības dinamiku, svarīgie objekti plānojami 20 minūšu gājienā.

Pamatojoties promocijas darbā iegūtajiem rezultātiem un secinājumiem, būtiska nozīme ir rekreācijas infrastruktūrai. Jāveicina noturība pret antropogēnām slodzēm, augsnes noblietēšanu un eroziju. Lai antropogēnā slodze negatīvi neietekmētu teritorijā esošos biotopus intensīvi apmeklētu vietu izmantošana var notikt tikai visaptveroši attīstot labiekārtojumu – veidojot konkrētas takas ar vietai piemērotu ilgtspējīgu segumu (dabiskā grunts, grants, šķembas, dažāda veida cietais segums, metāls, betons, citi modernie materiāli,). Dēļu seguma taku un kāpņu izveide un jāizvēlas gadījumos, kad nav alternatīvas – vieta ir pārmitra, ļoti izteikts reljefs, nav alternatīvas takas izvietošanai, finansiāli ierobežojumi. Koka segums nav ieteicams jo Latvijas klimatiskajos apstākļos tas bieži ir slidens, tas nav ilgmūžīgs – konstrukcijas jāmaina 5-8 gadu periodā, ļoti rūpīgi jāseko izbūves kvalitātei un uzturēšanai, lai tās būtu lietotājiem drošas. Kāpnes un koka seguma takas (ja tās jāšķērso perpendikulāri) ierobežo apmeklētājus ar bērnu ratiņiem vai cilvēkus ar kustību traucējumiem, velosipēdistus. Plānojot pilsētu attīstību, kā vienu no nozīmīgākajiem uzdevumiem jāizvirza tūrisma un rekreācijas infrastruktūras pilnveidošanu un uzlabošanu, nodrošinot ilgtspējīgu un līdzsvarotu dabas vērtību, īpaši pilsētmežu apsaimniekošanu un izmantošanu pēc iespējas plašam apmeklētāju lokam. Labiekārtojumā svarīga loma atvēlama vides izglītības, kultūrvēsturiskās un citas informācijas iekļaušana labiekārtojumā, komunikācijā (informācijas stendi, norādes, saites uz papildus informāciju digitālajā vidē).

Jāpievērš lielāka uzmanība meža vizuālās ainavas un rekreācijas vietu plānošanai, veidošanai uzturēšanai. Jāveic pilsētmežu ainavu kopšanu, īpaši bieza pameža vietās veicot tā regulāru izkopšanu gar takām 4-10 platumā, vēlams variēt izkoptās joslas platumu, kā arī saglabāt atsevišķus krūmu pudurus, izvērtēt nepieciešamību nozāģēt nokaltušos kokus drošības nolūkos, veikt kopšanas cirtes, atpalikušo koku izņemšanu, ainavisku skatu, atvērumu saglabāšanai/veidošanai.

Lielais apmeklētāju skaits dabas teritorijās pieprasa uzlabot minimālos pakalpojumus, to infrastruktūrai jāveido, lai tās ir pieejamas un izmantojamas visām iedzīvotāju grupām (sasniedzamība un universālā dizaina pamatprincipi) – autostāvvietas, atpūtas zonas, soliņus, atkritumu urnas, tualetes, pieejamību cilvēkiem ar īpašām vajadzībām. Plaša klāsta kopšanas darbu intensitātes zonēšana, ņemot vērā vides, kultūrvēstures vērtības/potenciālu un antropogēno slodzi. Svarīgs ir pietiekams finansējums infrastruktūras izveidei, lai organizētu un optimizētu apmeklētāju plūsmas, un visa veida kopšanas darbiem (atkritumu savākšana, pameža kopšana, zāles pļaušana u.c.).

Ņemot vērā promocijas darbā iegūtos rezultātus, lietotāju atšķirīgos viedokļus un Covid-19 pieredzi, viens no risinājumiem ir veidot dažādas zonas ar intensīvāku un mazāk intensīvu labiekārtojuma infrastruktūru un kopšanu, lai apmeklētāji varētu izvēlēties sev atbilstošu labiekārtojuma un apmeklētāju intensitāti. Nepieciešamas plašas teritorijas, kurās pietiekamā attālumā var uzturēties liels skaits apmeklētāju. Nevar attīstīt tikai lielas teritorijas, kas pulcē lielu cilvēku skaitu, ir jāattīsta arī nelielas takas un individuālas atpūtas iespējas.

1. INTRODUCTION

At the beginning of the 21st century, 0.8% (Donis, 2001) of all forests in Latvia were considered urban forests (owned by the state and local governments). Another indicator that statistically characterizes the relevance of this topic is the area covered by forests, which at the beginning of the century was 20% of urban areas.

The impact of Covid-19 has starkly demonstrated how important urban forests close to the city are for people's well-being. In an emergency situation caused by the pandemic, they were in greater demand than ever before, and practice observed had shown that recreational areas in urban forests are very relevant. Given the new experience with virus containment, dispersed recreational areas that limit excessive visitor concentration are particularly important.

In recent years, increasing attention has been paid to the issue of urban green structures in general. Concepts and policies related to sustainable development have played an important role in this regard. The United Nations Conference on Environment and Development in 1992 emphasised that urban development can only be achieved by integrating social, economic, and ecological aspects; therefore, the efforts of various sectors and stakeholders should be integrated at the local level (United Nations, 1995).

Climate change (United Nations Organisation, 2015b) is closely linked to the biodiversity crisis (European Parliament, 2020), and nature itself is a powerful ally in the fight against climate change (IPBES, 2019). Urban green infrastructure (UGI) is a strategically managed network of urban green areas and natural and semi-natural ecosystems located within the boundaries of an urban ecosystem (EnRoute) (Maes et al., 2019), therefore, more attention should be paid to urban green structures and their expansion rather than individual green elements. Practitioners, researchers, and policymakers are increasingly concerned with the contribution of the entire urban green structure to improving the quality of urban life and the environment. In addition, local governments are increasingly aware that, working under high pressure, more integrated, environmentally friendly planning and management is needed to meet the current demands of society.

In forest areas, we usually talk about provisioning, regulating and supporting, cultural or intangible ecosystem services (Jūrmalis et al., 2023; Li et al., 2022; Millennium Ecosystem Assessment, 2005). Urban forests play a significant role in providing and maintaining ecosystem services (Baskentet al., 2020), as well as in serving various human needs (Burgess, Harrison, & Limb, 1988; Carrus et al., 2015; Endreny, 2018) – recreation, sports, learning, enjoying nature, berry and mushroom picking. Urban forests are invaluable for physical and mental health (Berman et al., 2008; Endreny et al., 2017). The Covid-19 pandemic has raised awareness of the importance of green spaces in public life (Geary et al., 2021) and changed the way we interact with our environment (Honey-Rosés et al., 2021).

Biologically diverse areas help to mitigate many environmental problems, such as air pollution, noise, the effects of climate change, heat waves, floods, and public health issues, making cities more sustainable (Maes et al., 2019) . In balancing the various functions of forests and providing all ecosystem services, synergies should be increased and trade-offs reduced, based on research-proven information (European Parliament, 2022).

One of the European Union's goals is to achieve climate neutrality by 2050 at the latest (European Union, 2022), where forest ecosystems are particularly important in mitigating climate change and its impacts. Therefore, urban forests require sustainable and active management, strengthening the adaptive capacity and resilience of forest ecosystems.

In urban forest management, forestry and foresters are only one of the interested parties (Randrup et al., 2005), this process also involves urban planners, landscape architects, gardeners, and arborists (Krajter Ostoić et al., 2020), and urban forestry has become social forestry (Konijnendijk et al., 2006) and a provider of environmental education (Akmar et al., 2011). It is essential to further implement the concept of urban forests in Latvia's spatial planning by analysing foreign practices in the development of such areas. Parks and other green

areas have traditionally been designed by landscape architects, so the contribution of this sector to the development of urban forests is very significant.

The doctoral thesis studies the situation in Latvian urban forests – at the scale of cities and research areas, based on foreign experience. When developing the Latvian Landscape Policy Implementation Plan for 2024-2027 (Par Ainavu politikas ieviešanas plānu 2024.–2027. gadam, 2024), it is planned to include the activity "Targeted Planning and Creation of Green Infrastructure in Rural and Urban Environments, Taking Into Account Aspects of Adaptation to Climate Change" into the 2nd action line "Improving Landscape Management", which directly resonates with the relevance of the work, developing recommendations and guidelines for sustainable planning, creation, and management of urban forest landscapes.

Urbanisation processes pose significant challenges to the preservation of urban green spaces – their area and quality are declining, they are becoming fragmented and merging with urban areas, resulting in significant interaction between the city and its immediate surroundings (Carreiro, Song, & Wu (Eds.), 2008). To mitigate the negative aspects, spatial planning must be discussed, where cities and suburbs are inseparable and unified (Akmar et al., 2011; Hawkins & Selman, 2002). Nature-based solutions are recognised as sustainable solutions to the above-mentioned problems (Bayulken, Huisingh, & Fisher, 2021), which were also identified and demonstrated in the structure of Latvian cities during the development of the doctoral thesis, where in many places urban green areas connect and merge with wider suburban forest massifs (see Publications I, II, and VI) and based on international experience, the Riga model has been developed, which is also applicable to other Latvian cities. A modern approach to spatial planning requires the integration and balancing of environmental, economic, and social aspects (Konijnendijk et al., 2006), complemented by modern management that adds value to the location (Clark & Stankey, 1979). In Latvia, increasing attention is being paid to urban forest planning, an issue that has long been considered in Europe (Akmar et al., 2011; Carreiro et al., 2008; Konijnendijk, 2003; Konijnendijk et al., 2006).

The author proposes to continue developing a nature-based solution urban forest management model relevant to Latvia, defining the term urban forest in accordance with modern requirements, and introducing it into spatial development planning and regulatory enactments.

An **urban forest** is: 1) A forest — an ecosystem in all stages of development, where the main producer of organic matter is trees, which can reach a height of at least five meters in a given location and whose current or potential crown projection is at least 20 percent of the area occupied by the forest stand, the minimum area is 0.5 ha (Latvijas Republikas Saeima, 2000), and 2) It serves as a public outdoor space within the administrative boundaries of cities and in the urban environment outside them, where the primary functions are social and environmental, requiring regular maintenance and renewal, preserving or improving the social, aesthetic, cultural and historical, and economic value of the area (Kraukle, 2013; Kraukle, Stokmane, & Vugule, 2022a). The primary functions of urban forests are social and environmental. Urban forests serve as public outdoor spaces within the administrative boundaries of cities and in the urban environment outside them.

1.1. Scope of the doctoral thesis

Urban forests have various functions and uses, which today are mainly based on ecosystem cultural services – providing physical and psycho-emotional recreation. Until now, urban forests have often been presented in spatial plans as a "green area", often without indicating the legal status of the forest or the forest landscape that is familiar to the public and characteristic of Latvia. When studying the scientific and practical experiences of other countries, one encounters an overly broad and vague use of the term "urban forest" – in countries with a small proportion of forests, rows of trees and even individual trees are counted as urban forests. To clarify the understanding, a specific definition of urban forests is proposed

that corresponds to the situation in Latvia. Urban forests perform both sanitary and hygienic functions – they trap pollution and noise – as well as recreational and cultural and historical functions, where urban forests serve as an environment for residents to relax and learn. Urban forests contain biologically and visually valuable stands, significant cultural and historical values, and degraded areas. When planning and managing urban forests, it is important to base decisions on the various functions mentioned above, which require different approaches.

This doctoral thesis evaluates the experience of urban forest management in Latvia and develops recommendations for urban forest planning and management. **The functionality of urban forest landscapes in sustainable planning depends directly on the quality of management, which determines the preservation and development of the ecological, social, and spatial value of these landscapes in the long term**.

1.2. Objective of the doctoral thesis

To develop an approach and recommendations for the identification, classification, and management of the landscape values, ecosystem cultural services and functions of urban forests in the Latvian context, promoting the sustainable development of urban forests as an important component of the landscape and their inclusion in urban planning.

1.3. Research tasks of the doctoral thesis

1. Assess the regulatory framework governing urban forests in order to identify existing legal and institutional conditions that affect the planning, management, and sustainable development of these areas.

2.Identify and analyze the landscape values and ecosystem functions of urban forests, clarifying their importance in shaping the quality of the surrounding environment, public well-being, and cultural identity.

3. Develop a classification model for urban forests based on the ecosystem services characteristic of the area and their functional significance.

4. Develop recommendations for sustainable landscape planning and management of urban forests in Latvia in order to promote an integrated approach to the development of the sector, improve cross-sectoral cooperation, and ensure the sustainable functioning of urban forests as an important component of the natural and social environment.

1.4. Novelty of the doctoral thesis

1. When discussing urban forests, especially on an international scale, there are often differences in understanding the concept of "urban forests". A specific definition appropriate to the current situation in Latvia is proposed, promoting a clearer and comparable understanding of the concept of urban forests, thus facilitating the development of administration and management practices.

2. Given that the main function of urban forest management is social, its management (including planning, wide-ranging use, and maintenance) also requires a specific approach and practical measures to ensure sustainable, nature- and people-friendly use and maintenance in order to preserve natural values, biological diversity, resilience to anthropogenic pressures and climate change, and improve recreational opportunities – the author proposes a broader and more integrated, nature-based approach.

3. An innovative in-depth qualitative research method called *Go-along* was used in the study to clarify the experience and opinions of experts and the public (users) regarding the use and development potential of urban forests, the identification of landscape, habitat, and cultural

and historical values, emphasising the importance of personal biographies, events, and emotions.

1.5. Structure of the doctoral thesis research

The research examines various aspects related to urban forests and their management, the interdisciplinary study of which is aimed at achieving the goal set out in the doctoral thesis (see Fig. 1.1).

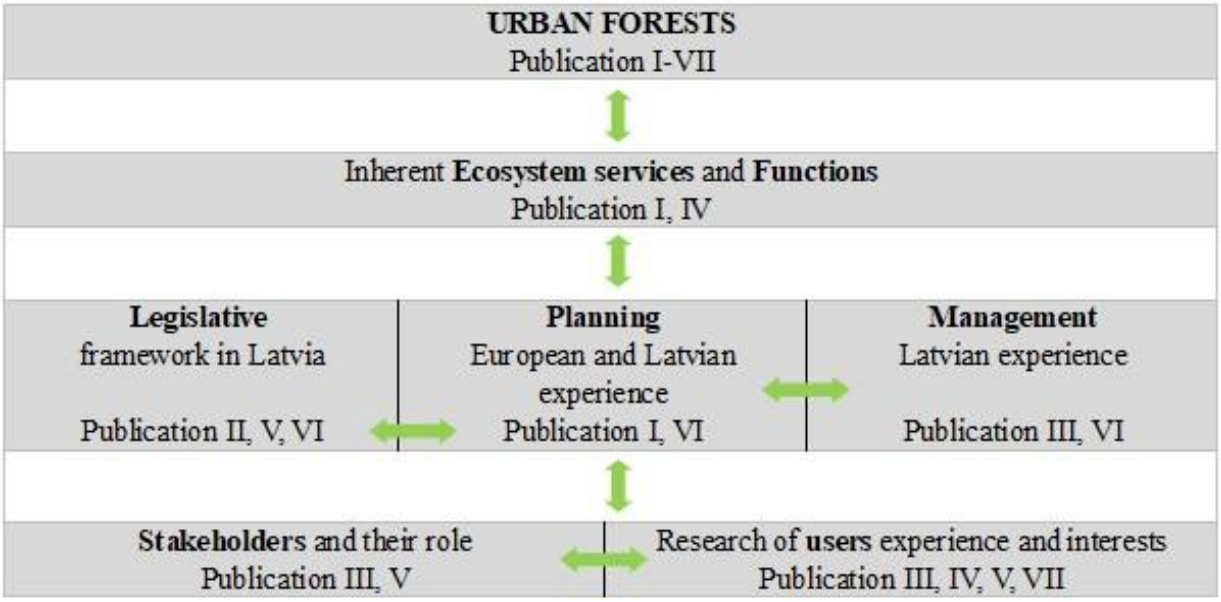


Fig.1.1. **Main steps of the doctoral thesis research**

The doctoral thesis research was conducted in accordance with the work strategy in order to achieve the objectives set for the doctoral thesis (see Table 1.1).

Table 1.1. **Doctoral thesis strategy**

Research stages/approaches	Research activities	Publications
Literature research	Clarification of the study issue	I, II, III
	Outlining the topic definitions	IV, V, VI, VII
	Researching regulatory acts	II, V, VI
	Reviewing good practice cases	I, VI
Selection of study areas	Defining selection criteria and characteristics (size, use, terrain, natural conditions, location, spatial plan, management, problems, etc.)	I, II, V, VI, VII
Research data collection	Research of GIS data, maps, photographs	I, V, VI, VII
	Field observation	I, III, VI
	Expert interviews	III, VI
	Go-along interviews	VII
	Schulte tables	IV
	Specialist discussions	VI
Research data processing and analysis	Data, grouping, comparing, analysing	I-VII
	Using GIS capabilities for data analysis and graphical representation	VII
	Identification of correlations	I-VII

Research stages/approaches	Research activities	Publications
	Discussions	VI
Conclusions and recommendations	Preparation of proposals for planning and management of research areas	I-VII

2. MATERIALS AND METHODS

The research was conducted over a period of five years (2021–2025) and analyzed urban forest planning and management practices in the study areas (see Fig. 2.1 and Table 2.1). and analysed urban forest planning and management practices in the study areas (see Fig. 2.1 and Table 2.1) in Latvia and Europe, combining theoretical and empirical research methods. The methods used in the study were selected in accordance with the research strategy and are summarized in Table 1.1.

The theoretical part involved an analysis of scientific literature and regulatory frameworks, as well as the selection of study areas in order to studying urban forest development trends and classification approaches (Publications I and III), stakeholders (Publication V). Particular attention was paid to the regulatory framework for urban forests in Latvia (Publications II, V, VI).

The empirical part analysed the ecosystem cultural services provided by urban forests and their related functions (Publications III and IV). A selection of study areas was carried out to understand urban forest development trends and classification approaches, and for comparative analysis between different study areas (Publications I, III, VI). Stakeholders and their role in the planning and management processes were also identified (Publication V). The study included qualitative and quantitative field research: surveying the study areas in nature, inventorying and photographing them, conducting structured interviews with urban forest management experts (Publication VI), as well as *Go-along* interviews with everyday users of the study areas (Publication VII). In some cases, a psychological method was also used – the Schulte table test (Publication IV) – to analyse aspects of user perception.

Methods used in the study

- **Theoretical methods:** analysis of scientific literature, analysis of the content of normative acts and planning documents;
- **Empirical methods**: selection of the study areas, field surveys, inventory and photographic documentation, structured and semi-structured interviews, *Go-along* interviews, questionnaires, document analysis, Schulte table test, as well as quantitative and qualitative analysis of the data obtained.

2.1. Description of the research object

Taking into account practical work experience in forests owned by the city of Riga (2003-present), the study provides a detailed analysis of urban forest development in Latvia, based on the experience of urban forest development in Europe. Various urban forest areas in Latvia were selected to characterize the object of study using the case study method.

Part of the study on urban forest management experience in Latvia at a strategic scale (Publication VI) focuses on the analysis of the current situation in six cities with a significant proportion of urban forests (from 13% to 47% in the city, an average of 20% urban forests), comparing the situation in all statistical regions of Latvia (at NUTS 3 level) (Par Latvijas Republikas statistiskajiem reģioniem .../ 2024): Riga (separately designated until January 1, 2024) and Jūrmala are located in the Riga statistical region, Jelgava and Ogre in the Zemgale and Vidzeme statistical regions, and Daugavpils and Liepāja in the Latgale and Kurzeme statistical regions (see Table 2.1 and Fig. 2.1). Figure 2.1 shows forests in the territory of municipalities that include cities, in order to illustrate the fragmentation of urban forests or their connections with other forest areas.

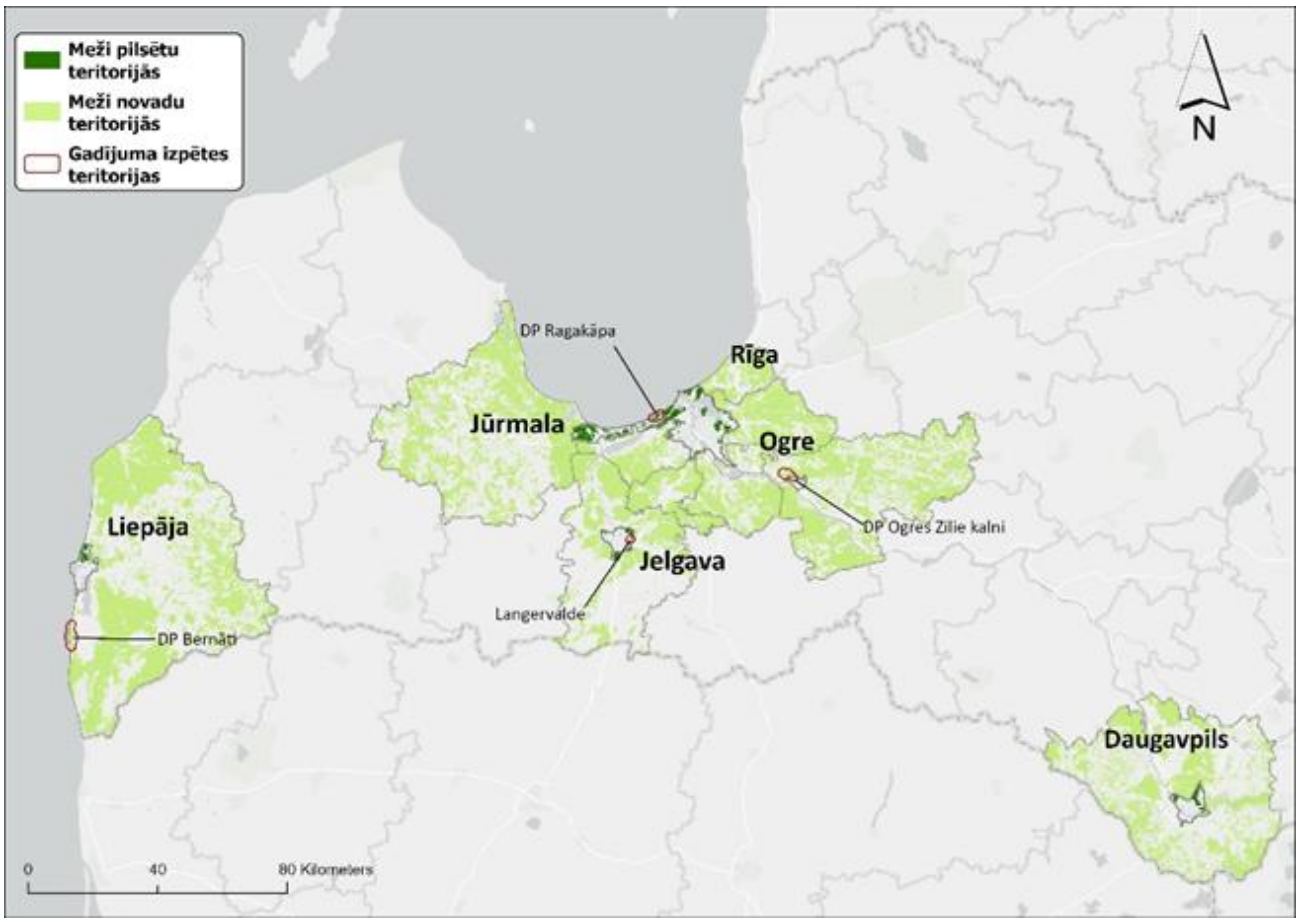


Fig. 2.1. **Urban forest study areas** (technical implementation by E. Jūrmalis)

From **six cities with a significant proportion of urban forests, four case study areas** (at the site scale) were selected, with different geographical locations and a size acceptable for case studies. In order to delve into the various aspects relevant to urban forests, the selection of specific areas was largely dependent on the characteristics of the area: all four selected areas are urban forest areas within city limits or in the suburbs, vary in size (at least 50 ha and more), are intensively used for recreation (Jūrmalis, Lībiete, & Bārdule, 2022), have infrastructure for recreation, are managed by the municipality, the state or their structures, and have various provisionally identified problem situations – Nature parks "Ogres Zilie kalni", "Ragakāpa", "Bernāti", and Langervaldes forest (see Tables 1.2 and 2.1). The Langervalde Forest was selected to test whether the functions, typology, and management principles of urban forests are also applicable to urban forests with different conditions (not a protected area, flat terrain with excessively moist, fertile soil, no water bodies suitable for recreation, smaller area). Riga's urban forests have been studied in Ilze Jankovska's doctoral thesis (Jankovska, 2013), and the situation of Daugavpils' urban forests is similar to that of Riga. Due to the large scope of the study, they are not included in the case study area overview.

Table 2.1. **Urban forest study areas of the Doctoral thesis**

Urban forests of Latvia						
Cities with a high proportion of urban forests (strategic scale)	Rīga	Ogre	Jūrmala	Jelgava	Liepāja	Daugavpils
NUTS 3	Rīga LV006	Vidzeme LV008	Pierīga LV007	Zemgale LV009	Kurzeme LV003	Latgale LV005
Case study area (site scale)	-					-
	-	Nature Park Ogres Zilie kalni	Nature Park Raga kāpa	Langervaldes forest	Nature Park Bernāti	-
Publication	I, VI,	I, II, III, IV, V, VII, VII	I, II, VI, VII	I, VI, VII	V, VI, VII	VI

Although the selected urban forest areas have unique natural values and recreational opportunities, they are also representative of other areas with similar characteristics and recreational use patterns. The results of the study can be used in other urban forests in Latvia by analysing the specific existing situation, assessing common and different problems, and proposing appropriate solutions.

2.2. Case study method

The case study method (selection of study areas, field surveys, inventory and photographic documentation was used to determine the landscape perception of urban forest users in the selected areas, at the site scale. Field surveys of forest areas were carried out as part of the study. Within the framework of the study, 3 similar urban forest areas and 1 relatively different area were selected, in which field surveys of forest areas were carried out, taking an inventory of the existing situation.

Taking into account the availability of information, the main study area is the "Ogres Zilie kalni" Nature Park. The "Ragakāpa" Nature Park was selected as an area that is similar to the "Ogres Zilie kalni" Nature Park in terms of many parameters (nature park, Natura 2000, similar pine forest landscape on pronounced dune or esker relief, location in an urban environment, relatively small area, green-blue structure, management problems/challenges), while the Nature park "Bernāti" was chosen as an area similar to the previous two, located far from Riga, but close to the state city Liepāja. The Langervaldes urban forest in Jelgava was chosen because it is not a nature park but is located close to Riga, see Table 2.2.

Table 2.2. **Case study for the doctoral thesis**

Case study area	Nature Park "Ogres Zilie kalni"	Nature Park "Ragakāpa"	Nature Park "Bernāti	Langervaldes forest
Location	Ogre Municipality, between Ogre and Ikšķile	Jūrmala city, along the Gulf of Riga coast in Buļļuciems	Along the Baltic Sea between Bernāti and Jūrmalciems	City of Jelgava

Case study area	Nature Park "Ogres Zilie kalni"	Nature Park "Ragakāpa"	Nature Park "Bernāti	Langervaldes forest
Specially protected forest habitat	Light pine forests on eskers	Wooded sea dunes s	Boreal forests, wooded sea dunes	-
Protection category	Nature Park *Natura 2000* territory	Nature Park *Natura 2000* territory	Nature Park *Natura 2000* territory	-
Code	LV0305200	LV0303300	LV0303600	-
Area, ha	312	150	794	50
Managed by	Municipality	State Municipality	State Municipality Natural persons	State
SPNA* year of establishment	2004	1962	2004	-
Green-blue structure	Forest and Dubkalni watercourse	Forest and seashore of the gulf	Forest and seashore	Forest and ditch systems
Problems	• High anthropological load • Different user interests • Chaotic trail network • Trampling of the underlay			Moist soil and thick undergrowth

SPNA* specially protected nature areas (Latvijas Republikas Saeima , 1993; Par-Ipasi-Aizsargajamam-Dabas-Teritorijam, 2020)

2.3. Comparative method – literature review

An analysis of scientific literature, regulatory acts, and planning documents at various levels was carried out with the aim of identifying previous experience and accumulated knowledge on urban forest development and management. The research topic was examined from various perspectives in order to reveal common trends and differences in national and institutional practices, as well as in the conceptual views of various authors. This approach allowed for the formation of a scientifically sound and critically evaluated research position.

The comparative analysis was used in the following aspects -

- Analysis of international and Latvian experience, particularly in the context of urban forest landscape, function and management (including sustainable planning, conservation, and management) practices, based on local government and management company strategies, forest management plans, and other relevant planning documents (Publications I, II, VI);
- Analysis of regulatory framework, comparing the scope of legislation and policy documents that influence urban forest development in Latvia and internationally (Publications II, V, VI);
- Interpretation of empirical data, comparing the results of surveys and interviews in different study areas (Publications III, V, VI, VII).

Visual comparative analysis was applied -

- To determine the landscape characteristics and functions of urban forests by analysing cartographic materials, photographic documents, and other visual information, as well as by conducting field surveys and photographic documentation (Publications I, III, IV, V, VI, VII);
- To study international management experience, using visual sources to supplement the analysis of policy and planning documents (Publication I).

2.4. Sociological research methods – surveys and interviews

The study used both qualitative and quantitative research methods characteristic of sociological research (Carpiano, 2009; Douglas, 1985; Holstein & Gubrium, 1995; Homiča, 2009; Melnikov & Kotarba, 2017). The methodological approach included the development of interviews and questionnaires, data collection, and structured analysis of the data obtained. The data was obtained using several approaches, including *Go-along* interviews with everyday users of urban forests (Publication VII), structured and semi-structured interviews with experts (Publication VI), as well as research into residents' preferences and opinions through surveys (Publications III, V, VI).

The collected data includes text, audio, and visual recordings, including interview transcripts, photographs, maps, and visualizations of the routes taken by respondents. These materials were qualitatively analysed using thematic coding and content analysis approaches.

2.4.1. Structured sociological survey of expert focus groups

In order to gain an in-depth understanding of urban forest management practices in Latvia, a **structured focus group survey** was conducted as part of the study. The aim of the survey was to ascertain the opinions of professionals and experts (i.e., urban forest managers) on current issues, challenges, and opportunities in urban forest management in Latvia (Publicaton VI).

The survey included **10 specifically designed questions** covering the following topics:

- definition and main functions of urban forests (social, environmental, environmental education, nature conservation, aesthetic, and economic),
- the inclusion of urban forests in municipal spatial planning documents,
- the role of stakeholders,
- regulatory framework,
- identified challenges and necessary improvements in management practices.

An essential part of the study was the **assessment of the need to improve the regulatory framework**, as well as the **identification of issues** that hinder a sustainable and systematic approach to urban forest management in Latvia.

The expert survey was conducted from May to November 2024. During this period, the researcher visited all the selected cities and their urban forest areas in person, where she held face-to-face meetings with local government representatives and urban forest managers. The meetings included **structured interviews** based on a set of pre-prepared questions. The questions were sent to the respondents in advance to give them the opportunity to reflect on their answers, thus promoting a **deeper and more thoughtful expression of opinions**.

This method made it possible to gather a multi-layered, professional view of the urban forest management situation in Latvia, as well as to identify trends, challenges, and regulatory gaps that should be addressed in the context of improving planning and management.

2.4.2. In-depth qualitative *Go-along* interviews

The study used the **in-depth qualitative *Go-along* interview method** with the aim of understanding the use of urban forests from the perspective of everyday users, with a particular focus on the social function of forests and their impact on people's leisure habits in urban environments (Publication VII).

The *Go-along* interview is a location-based data collection method in which the researcher moves around with the respondent in an environment familiar to the latter, providing an opportunity to directly understand their perception of the surrounding environment, feelings, and ways of use. The method is based on S. Kusenbach's (2003) concept, in which the

researcher “walks” (or drives) through the respondent's everyday space, allowing the participant to determine the route and focus of the conversation themselves, revealing significant places and connections with the environment.

In the study, the *Go-along* interviews were conducted as -

- **walks** (walking together with the participant),
- **trips** (travelling by transport),
- or a **combined form**, depending on the size of the territory and the respondent's choice.

The study areas covered four different urban forest areas in Latvia -

- **Ogres Zilie kalni Nature Park** (in the Ogre and Ikšķile area),
- **Bernāti Nature Park** (in Liepāja Municipality),
- **Ragakāpa Nature Park** (in Jūrmala),
- **Langervaldes forest** (in Jelgava).

A **total of 26 interviews** were conducted between March 3, 2022, and January 25, 2025. During the interviews -

- routes were documented using the **ArcGIS QuickCapture** app,
- **photographs** were taken at the locations highlighted in the main interviews,
- conversations were recorded in audio format, later **transcribed** and thematically coded for content analysis.

During the interviews, respondents were asked to take their usual route in the respective urban forest area, sharing their experiences of the environment, their perception of it, its use (also across different seasons), emotional significance, and suggestions for its improvement.

A **targeted** and, in part, **“snowball sampling”** strategy was used to **select respondents**, especially in areas where the researcher had no prior personal or institutional connections. Several respondents were recruited through cooperation with local non-governmental organizations, community activists, or recommendations from previous participants.

It should be noted that one of the challenges of this method was the **motivation and availability of respondents**, as participation requires both time (on average from 40 minutes to 2.5 hours) and a willingness to share personally meaningful experiences related to the use and significance of urban forests in everyday life.

2.5. Psychological method for assessing attentional stability

The study used a psychological method for assessing the attentional and concentration stability – Schulte tables – to evaluate the psycho-emotional impact of the “Ogres Zilie kalni” trail environment on human perception. This approach allows us to analyze how different environmental stimuli (e.g., trail configuration, spatial structure, aesthetic elements) affect human attentional abilities and their dynamics during movement (Publication IV).

The Schulte Table Test was developed in the mid-20th century by German psychologist Walter Schulte with the aim of diagnosing attention concentration and mental endurance. The test is based on a 5x5 matrix in which numbers from 1 to 25 are arranged in random order. The participant must find the numbers in ascending order while recording the time taken to complete the task. The test results allow for the assessment of attention intensity, reaction speed, and changes in cognitive processes before and after exposure to different types of environments.

In the study, Schulte tables were used in electronic format on a mobile device with a pre-installed test app. Data was collected at three measurement points:

1. before the walk,
2. after trail A (simplified, linear route – less stimulating),
3. after trail B (winding, more natural, potentially more psycho-emotionally intense).

At each measurement location, a series of five Schulte tables was completed, with the time taken to complete each table being accurately recorded. Number of participants: 18 respondents who participated on several days of the experiment. The order of the routes was changed to neutralize the habituation effect. The total length of the walk was approximately 2

km, with an average duration of 40 minutes; the average length of each trail was 1 km, approximately 20 minutes.

This method allowed the study to link the spatial characteristics of the environment with changes in cognitive activity, emphasizing the importance of structural elements of the landscape and environmental quality in human psychological well-being.

2.6. Quantitative methods

Using the quantitative research method – obtaining quantitative (empirical), numerical information – creating graphs, tables, the available statistical data on forest area in the territories of research cities in Latvia were analysed (Publication VI), data from psychological resilience tests, expert surveys, and *Go-along* interviews were analszed (Publications IV, VI, VII). A large part of the quantitative data served to collect information, analyse, and draw conclusions, but were not directly reflected in the publications.

3.RESULTS AND DISCUSSION

This chapter summarizes the main results of the doctoral thesis research, divided into six subsections. The first subsection includes an explanation of the concept of urban forests and planning experience in Europe and Latvia. The second subsection describes the regulatory framework for urban forest management in Latvia. The third subsection analyses stakeholders and their role in urban forest areas. The fourth subsection identifies the ecosystem services and functions of urban forests. The fifth subsection reviews the experience of urban forest management in Latvia. The sixth subsection explores the experiences and interests of urban forest users.

3.1. The experience of urban forest planning in Europe and Latvia

This subsection reviews the experience of urban forest planning in Europe and Latvia.It summarizes urban forest planning experience in Vienna, Stockholm, Copenhagen, and Riga. These cities were chosen because they have a lot of urban forests (according to the definition given in the introduction), and have accumulated many years of experience in planning and managing urban forests at various levels.

Comparative research and analysis allow for effective familiarisation with previously accumulated experience and the situation in the field of research related to urban forests. By selecting cities with a similar urban forest situation, it is possible to find solutions suitable for a specific situation more quickly. Vienna, Stockholm, and Copenhagen, like Riga, are national capitals with a relatively large proportion of urban forests that merge with larger forest areas surrounding urban areas. Extensive information is available about the forests in these cities, and they are examples of good practice that can be used in urban forest situations of various scales.

In Latvia, attention is gradually increasing to the issues of urban forest planning, which in the European context has long been an important aspect of urban development (Akmar et al., 2011; Carreiro et al., 2008; Konijnendijk, 2003; Konijnendijk et al., 2006). Urban forest planning includes existing or purposefully created green areas, the function of which is to reduce the risk of urban sprawl and ensure spatial balance in the urban structure.

Planning in European cities takes place simultaneously with planning at the level of cities and suburban areas or regions. Vienna, Copenhagen, and Stockholm have large green areas that are preserved despite the expansion of urban areas.

Intensive and practical urban forest planning and development began in **Vienna** as early as the 1960s, when large areas of existing forest were incorporated into the city and more than 500 hectares of new recreational forest were planted. The politicians' goal was to preserve a green belt between Vienna's built-up areas (Erhart, 2002; Weidinger, 2011). In Vienna, planning documents are either legally binding or informal. Informal planning documents include the Vienna Greenbelt Plan 1995 (Plan Greenbelt Vienna 1995) and the city's ten-year development plans (Stadtentwicklungsplan 94, STEP 94, STEP 2005, and STEP 2025 (Wieshofer et al., 2015), which provide for various measures for the preservation and development of green areas at each stage. The 9,900-hectare Vienna Forest is the “green lung” that forms part of the Green Belt. In 2005, UNESCO also declared the Vienna Woods a biosphere reserve - an area with a special cultural and natural landscape (Vienna Tourist Boardwww.wien.info, 2025.).

Urban forests in Sweden are mainly used as commercial forests. It was only in the 1990s that the social value of forests began to be emphasized. Falck's definition of urban forests includes all forests in urban and suburban areas with uncultivated vegetation (Rydberg & Falck, 2000). Since 1998, **Stockholm's** urban plans have emphasized “Build the City Inwards” – developing the city without expanding its territory, especially preserving green and urban forest areas, and actively using degraded areas (Stockholm, 1999; Stockholm City Plan 2018, 2018).

In 2001, Stockholm approved a regional urban development plan that provides for development hubs and green areas to be preserved, combining two main functions – recreation and the preservation of biological diversity (Nelson, 2009). Since 2004, Stockholm has been using the Green Map as a planning tool, which includes information on biotopes, resource renewal, and sociotopes. Sociotope maps include urban forests and other green areas that are important to people, their quality, and development (Ståhle, 2006; Xiu et al., 2017). In an urban setting, a forest covering at least 50 ha, with various opportunities for active recreation by the water and cultural and historical attractions, should be accessible within 1 km (Nelson, 2009; Ståhle, 2010), which means that attractive green areas should be accessible on foot or by car within 10-15 minutes. The important thing is that main urban forest areas must be large enough to ensure the needs and well-being of residents and environmental protection (Stahle, 2002).

Copenhagen's Green Network plan includes a system of scenic nature parks for recreation, interconnected by greenways and ecological corridors, which ensure the preservation of urban forest areas (Vejre, Primdahl, & Brandt, 2007). Green space planning at the municipal level is influenced by regional and national plans (Nordh & Olafsson, 2020). Copenhagen's 5 Finger Plan envisages urban development in narrow zones, between which undeveloped green wedges are preserved, ensuring that people can live very close to green areas (Cahasan & Clark, 2005; Vejre et al., 2007).

The living space of **Riga** and **Pierīga** forms a unified structure, intertwining rapidly growing urban areas and wide forest areas. As early as in 1924 and 1936, the master plans for Riga, based on the recommendations of architect Arnolds Lamze, included the idea that planning should be developed for a broader economic region (Lamze, 1932), similar to what was done in Copenhagen and Stockholm. Although in recent years, especially after the Covid-19 crisis, more attention has been paid to improving the urban forests of Riga and Pierīga, it is still insufficient. In intensively used areas, the only way to protect forests from significant anthropogenic pressure (Bell, 1997; Emsis, 1980) and soil erosion (Emsis & Tuktens, 1988) is through targeted environmental amenity development.

In general, extensive information and data are available about the selected cities and urban forest management, and they have many similarities with the situation in Riga. Based on the experience of European cities, a Riga-Pierīga model has been developed for the preservation of the strategic scale of urban forests, which is an integral part of urban planning, sustainable development and management (Publication I). It in turn can be further used and adapted for the management of other urban forest areas.

3.2. Regulatory framework for urban forest management in Latvia

This subsection reviews international and national policy and planning documents and regulatory acts related to urban forests and applicable to Latvia. For a more detailed study of the extent to which urban forests are reflected in European and Latvian regulatory acts and planning documents, see Publication II.

The regulatory framework for forest areas is a set of legal norms that regulate the relationship between forests and people – part of the state's economic policy, a set of management and action measures (Strods et al., 1999). The roots of traditional forestry are old, with the first written records of forest management appearing in 1814 and 1840 (Indriksons, 2025), while urban forest planning and management is a newer field not only in Latvia but also worldwide. It has become a professional and scientific field that gained significance in Europe in the 1990s (Konijnendijk, 2003; Krajter & Konijnendijk, 2015).

Continuing to analyse aspects of urban forest management in depth, the findings presented in Publication II are supplemented with a historical perspective, emphasizing that Latvia has also had an understanding of the importance of urban forests in the past. As early as the mid-20th century, A. Zviedris (1949) and Ž. Sūna (1979) emphasised the special management requirements and regulations for green belt forests located around cities. As a

result of urbanization, some of these areas now function as fully-fledged urban forests, thus confirming the need for a targeted and location-based planning approach.

The set of regulatory acts is very broad and multi-layered, constantly evolving and changing. Through research and practical work, their significance in reflecting and solving specific urban forest problems has become clear, thus making it possible to expand the regulations and findings discussed in Publication II (see Tables 3.1 and 3.2).

Table 3.1. **International regulations for forest policy and planning**

Normative document	Urban forests in document
UN Framework Convention on Climate Change (Apvienoto Nāciju Organizācija, 1997)	Forests and urban forests are not particularly highlighted but are important for achieving the objectives set out in the documents.
UN Framework Convention on Climate Change Doha Amendments to the Kyoto Protocol (United Nations Organisation, 2015a)	
Council of Europe Landscape Convention (Eiropas Padome, 2000)	
European Parliament Directive 2009/147/EC on the conservation of wild birds, "White Paper"(European Parliament, 2009)	
European Parliament Directive No 1143/2014 on the prevention and management of the introduction and spread of invasive alien species (Eiropas Parlaments, 2014)	
UN Convention on Biological diversity, launched in Rio de Janeiro (Apvienoto Nāciju Organizācija, 1995)	Urban forests are not directly highlighted but are part of sustainable forest management practices
Kyoto Protocol to the UN Framework Convention on Climate Change (Apvienoto Nāciju Organizācija, 1997)	Urban forests are not directly highlighted but are part of sustainable forest management practices
UN Framework Convention on Climate Change Paris Agreement (United Nations Organisation, 2015b)	
Council of Europe's Berne Convention on the conservation of European Wildlife and Natural Habitats (Eiropas Padome, 1996)	
European Commission, Green Paper,(European Commission, 2010)	
European Commission, The European Green deal (European Commission, 2020)	
Forest Europe, EU Forest Strategy 2030 (European Parliament, 2022)	Contribution of multifunctional forests
EU Biodiversity Strategy (European Parliament, 2020)	Cities with more than 20,000 inhabitants should create biodiverse and accessible urban forests

Based on the Rio Convention (United Nations, 1995), biodiversity protection issues are incorporated into sectoral strategies and action plans, including in the forestry sector. The European Union has developed a biodiversity policy and adopted legislation aimed at ensuring the conservation of biodiversity (Birds and Habitats Directives, Invasive Species Management Regulation).

In accordance with the United Nations Framework Convention on Climate Change (UNFCCC) adopted on 9 May 1992, the main supervisory body was established — the Conference of the Parties (COP), which meets at least once a year to review the implementation of the convention and decide on further measures. Based on this convention, several important

international legal acts and policy documents have been adopted, including the Kyoto Protocol (United Nations, 1997), the Doha Amendment to the Kyoto Protocol (United Nations Organisation, 2015), the Paris Agreement (United Nations Organisation, 2015b), which set out international commitments to limit greenhouse gas emissions and mitigate climate change. These documents form the basis for national climate policy frameworks, including those relating to land use, forestry, and biodiversity conservation.

According to the Forest Europe report (Forest Europe, 2020), the Forest and Forestry Issues Working Group is responsible for coordinating forestry policy and addressing forest-related issues at the European Union and international level, representing national interests in various international forums and processes, including in the areas of climate change, biodiversity, and sustainable forestry -

- UN Forum on Forests (UNFF; UN ECOSOC),
- Voluntary cooperation on forest protection in the European region takes place at the level of ministerial conferences (Forest Europe),
- Food and Agriculture Organization of the United Nations (FAO) Committee on Forestry (COFO).

The Working Group on Forestry mainly deals with the following issues (Forest Europe, 2020) -

- Presentation of UNFF and COFO sessions,
- Legally binding agreement on European forests, EU Timber Regulation and FLEGT Regulation (licensing system for imports and general regulation) (https://international-partnerships.ec.europa.eu/policies/climate-environment-and-energy/forests_en),
- EU Forest Governance and Value Chains Programme (FGVC) (https://www.fao.org/in-action/legal-sustainable-wood-assurance-programme/forest-governance-value-chains/en/), which is the main mechanism for implementing forest partnerships established by the European Union and partner countries. The FGVC provides technical and financial assistance to countries involved in forest partnerships to improve forest governance and sustainable forest management so that they can fulfill their economic, social, and environmental roles.

Another important institutional player in forest policy-making in Europe is the European Forest Institute (EFI) (European Forest Institute, 2003).

Its main objective is to conduct interdisciplinary research on forest policy at the European level, covering a wide range of topics – forest use, conservation, and the development of sustainable management, promoting science-based decision-making in the field of forestry. The European Forest Institute is an international organization headquartered in Joensuu, Finland. Latvia joined it in 2007 in order to become more actively involved in international cooperation in forestry and forest research, including urban forests.

It is important to supplement the initial list of regulations with the European Biodiversity Strategy for 2030 – Bringing nature back into our lives, which aims to ensure that by 2030, biodiversity is on the road to rejuvenation in the interests of nature, humans, and the climate (European Parliament, 2020). The strategy is an essential part of the European Green Deal, which aims to protect, preserve, and strengthen the EU's natural capital (European Commission, 2020). The strategy supports climate change mitigation and adaptation through nature-based solutions.

An important task in terms of urban forests is the long-term greening of cities with more than 20,000 inhabitants. These should include measures aimed at creating biodiverse and accessible urban forests and other urban green structures that improve the connectivity of green areas, limit excessive mowing and other practices harmful to biodiversity (European Parliament, 2020). This is one of the few strategic documents that explicitly mentions urban forests.

The current document is the European Forest Strategy 2030 (European Union, 2022), which aims to increase the balanced contribution of multifunctional forests to the achievement

of the Green Deal objectives and the EU Biodiversity Strategy 2030, where sustainable green growth, job creation, environmental sustainability, the circular economy, and achieving climate neutrality by 2050 at the latest are particularly important. The strategy emphasizes that forests not only contribute to climate and biodiversity goals, including protecting soil and water, but also provide economic and social benefits and a wide range of services, from livelihoods to recreation (European Union, 2022).

The European Forest Strategy highlights the essential role of forests for human health and well-being, the special importance of urban and peri-urban forest areas in urbanized areas, where green, biologically and recreationally important areas are particularly important. It is necessary to strengthen the adaptability and resilience of forest ecosystems to climate change, urbanization, and anthropogenic pressures through sustainable and active management.

Table 3.2. **Latvian national policies, strategies and regulatory acts**

Normative document	Urban forests in document
Plant Protection Law (Latvijas Republikas Saeima, 1998)	Forests and urban forests are not particularly highlighted, but are important for achieving the objectives set out in the documents
Species and Habitat Protection Law (Latvijas Republikas Saeima, 2000)	
Environmental Protection Law (Latvijas Republikas Saeima, 2006)	
Spatial Development Planning Law (Latvijas Republikas Saeima, 2011)	
Local Government Law (Latvijas Republikas Saeima, 2023)	
Cabinet Regulation No. 257 By-law of the Commission for Projects to be Jointly Implemented under the Kyoto Protocol to the United Nations Framework Convention on Climate Change (Latvijas Republikas Ministru kabinets, 2003)	
Cabinet Regulation No. 115 On the Procedure for Approving, Implementing, and Monitoring the Kyoto Protocol Project Mechanisms of the UN Framework Convention on Climate Change (Latvijas Republikas Ministru kabinets, 2006)	
Sustainable Development Strategy of Latvia 2030 (Latvijas Republikas Saeima, 2010)	Generally identifies the need for forest development, urban forests are not particularly highlighted
Landscape Policy Guidelines 2013-2013 (Latvijas Republikas Ministru kabinets, 2013b) 38	
Latvian National Development Plan 2021-2027 (Latvijas Republikas Saeima, 2020)	
Environmental Policy Guidelines 2021-2027 (Latvijas republikas Ministru kabinets, 2021)	
Law on Specially Protected Nature Territories (Latvijas Republikas Saeima, 1993)	Identifies, inter alia, forest land activities
Cabinet Regulation No. 264 General Regulations on Protection and Use of Specially Protected Nature Territories (Latvijas Republikas Ministru kabinets, 2010)	
Protection Zone Law (Latvijas Republikas Saeima, 1997)	
Cabinet Regulation No. 248 Procedure for Assessing Sustainable Forest Management (Latvijas Republikas Ministru kabinets, 2013a)	Determines the procedures for assessing sustainable forest management, urban forests are not particularly highlighted
Latvian Forest Policy (Latvijas republikas Ministru kabinets, 1998)	Defines long-term strategic and tactical objectives of forest sector development, basic principles, urban forests are not particularly highlighted

Normative document	Urban forests in document
Cabinet Regulation No. 63 Methodology for Determining Forest Protection Zones Around Cities (Latvijas Republikas Ministru kabinets, 2003)	Establishes the methodology for determining forest protection zones around cities
Cabinet Regulation No. 628 Regulation on Local Government Spatial Development Planning Documents (Latvijas Republikas Ministru kabinets, 2014)	Covers, inter alia, forests and urban forests in planning documents
Law on Forests (Latvija Republikas Saeima, 2000)	Regulates sustainable management of Latvian forests and urban forests, association with development of spatial plans

Regulatory acts contain direct and indirect references to the importance of forests and urban forests, and both international and national regulations are relevant and applicable to specific urban forests (see Fig. 3.1). However, conventions and strategies mention forests and urban forests only in isolated cases. Laws and Cabinet Regulations already contain more specific information about forests, but the concept of *urban forests* still does not appear, even though there is very specific talk about forests in urban areas or near them (e.g., forest protection zones around cities). The allocation of urban forests as a separate category in regulatory enactments could facilitate a more precise definition of their specific functions and ensure more appropriate management, harmonizing it with spatial planning documents at various levels.

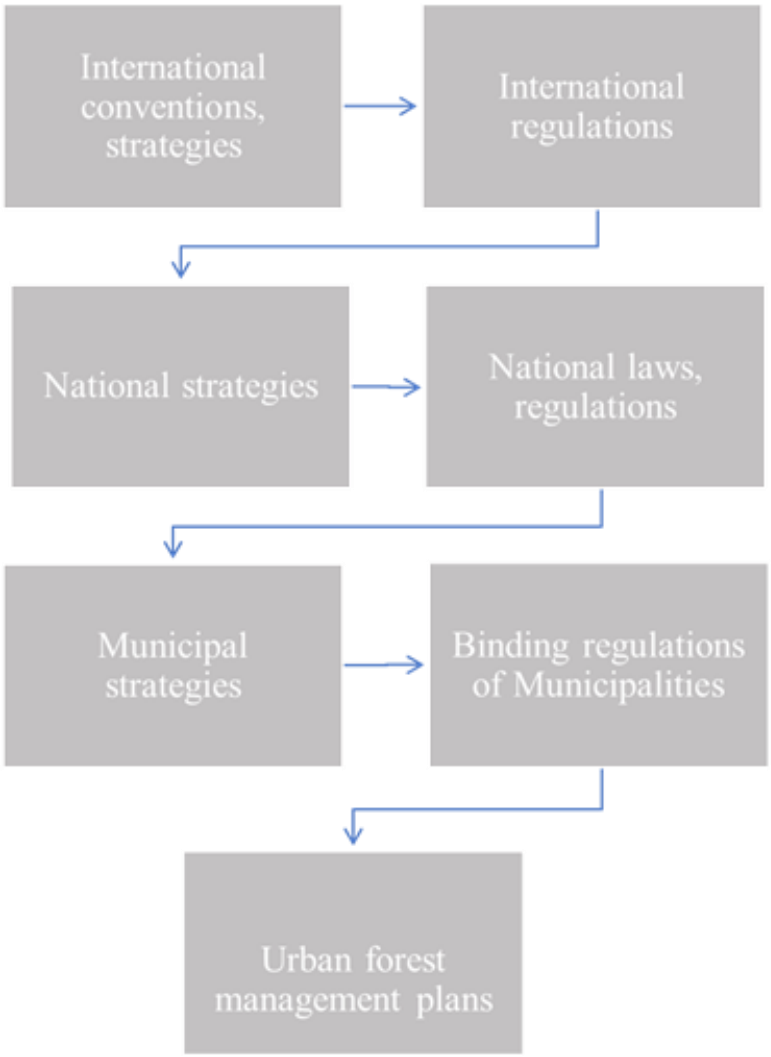


Fig. 3.1. **Hierarchy of regulatory acts and planning documents related to urban forests**

The regulatory framework is also discussed in Publication VI, which examines the experience of urban forest managers and concludes that managers have adapted to the regulatory framework, but that changes are still needed, especially in the regulations for the management of specially protected forests and coastal areas, taking into account the invasion of pests and diseases – providing opportunities for individual solutions.

3.3. Stakeholders and their role in urban forest areas

This subsection summarizes the part of the study on stakeholders in urban forest areas, including both public and private entities. (Publications III, V). Urban forest management must comply not only with modern forestry principles, but also with good governance as a principle of administrative law (Kovaļevska, 2009), which applies to state, sectoral or corporate processes. The main principles of good governance mean observing the transparency and justification of processes, rules and decision-making, a responsible, economical, constructive, and effective approach in any activity, involving the people affected by decisions in the decision-making process, providing equal information to all about opportunities, taking into account the needs of interested parties, and personal disinterest (Jones, 2007; Kovaļevska, 2009).

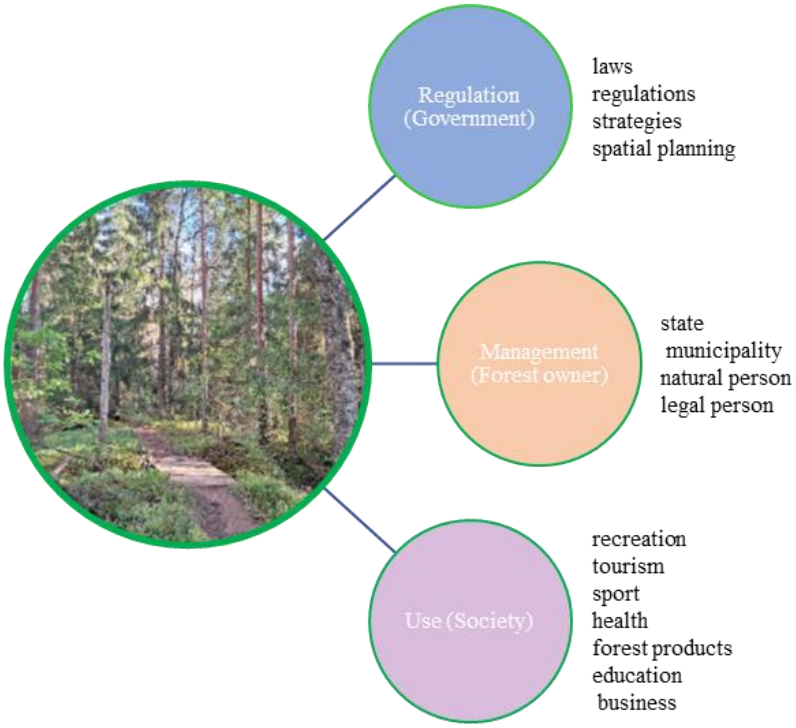


Fig. 3.2. **Diagram of stakeholder involvement and role distribution in urban forest areas**

The participation of stakeholders, especially local residents, plays a key role in urban forest planning and management. Various forms of public participation can be used to express the views of residents (Jones, 2007), including the right to submit petitions, public inquiries, local referendums (e.g., signature collection), the activities of residents' associations and councils, representative mechanisms, open seminars, public consultations, as well as other activities that provide an opportunity to proactively express the ideas, proposals, and needs of the public in the development of the urban environment (see Fig. 3.2 and Table 3.3). After assessing regulatory acts, planning documents, and the activities of stakeholders, as well as public sentiment and varying demands, the owner or manager of an urban forest is under significant pressure — there are many factors to consider that restrict urban forest management and require significant explanatory work.

Table 3.3. **Distribution of roles and interests among stakeholders**

Structure	Role	Stakeholders	Interests	Description of interests
State	REGULATION	Parliament	Legislation	Issues laws regulating the field
		Cabinet of Ministers	Regulations	Issues Cabinet Regulations binding on the field
		State Forest Service	Supervision	Monitors all forest-related issues
		State Environmental Service	Supervision	Supervise issues related to the preservation of the forest environment within the competence
		Nature Conservation Agency	Supervision	Supervise matters related to the preservation of the forest environment within the scope of competence
		The State Police	Supervision Assistance	Investigating crime
		State Fire and Rescue Service	Assistance Supervision	Provision of fire protection Training of employees
Municipality		City Council	Regulations	Issue regulations binding on a particular municipality
		Building authority	Supervision	Supervision of the construction process
		Structural units of spatial development planning, etc.	Supervision Realisation	Development planning etc. documents that also apply to forest areas
		Municipal Police	Supervision Assistance	Performs maintenance of public order
Owner	MANAGEMENT	State	Governance	Forest management, recreation, environmental conservation, environmental education
		Municipality	Governance	Forest management, recreation, environmental conservation, environmental education
		Legal persons	Governance	Forest management, preservation of the environment
		Natural persons	Governance	Forest management, preservation of the environment
Society	USE	Locals	Use	Recreation, sports, gathering of seafood, photography, informal burial of animals
		Residents of Latvia	Use	Tourism, recreation, sport, pilgrimage, photography
		Foreigners	Use	Tourism, recreation, sport, pilgrimage, photography
Educational institutions		Preschool, primary, secondary, professional, special, interest, higher	Use	Sports activities Environmental education Forestry practice Other training sessions in the forest environment
Armed Forces		National Guard New Guard	Use Participation	Training Competition Participation in events

Structure	Role	Stakeholders	Interests	Description of interests
Entrepreneurs	USE	Tour operators	Use	Tourism, sightseeing, hiking
		Event organisers	Use	Sports competitions Concerts Theatre and circus performances
		Service providers	Use	Horse riding Dog-haul rides Rope trails Rental of sports equipment Food and beverage service activities
		Service providers	Services for forest owner	Construction of forest maintenance infrastructure
NGO		NGOs in various fields	Supervision	Environmental issues
			Use	Survival School
			Use	Sport

Cooperation within the forest sector is essential at various levels of governance — local, municipal, regional, and national (Kenney, Wassenaer, & Satel, 2011). This cooperation can cover both regulatory and practical management interests. At the same time, public involvement and consideration of interests in the use of urban forests are also important.

3.4. Ecosystem services and functions of urban forests

3.4.1. Ecosystem services

Ecosystem services are all the resources and processes that nature provides to humanity, usually divided into 1) provisioning or supply, 2) regulating and supporting, and 3) cultural or intangible ecological services (Millennium Ecosystem Assessment, 2005). The classification of ecosystem services was based on the Common International Classification of Ecosystem Services (CICES) (Haines-Young & Potschin, 2012), taking into account the typology (De Groot, Wilson, & Boumans, 2002), with particular emphasis on four categories of cultural ecological services: Physical (recreation); Experiences (aesthetics); Intellectual (scientific and educational, cultural heritage and identity); Inspiration (spiritual and religious, inspiration) (Clemente et al., 2019).

The study shows that all ecosystem services are essential in urban forest areas, but cultural or intangible ecological services are especially important for humans as social beings – various types of recreation in nature, improvement of physical and mental health, sports, tourism, visual perception of landscapes, inspiration. When balancing all ecosystem services and various forest functions, the fusion of individual parts and the improvement of the result, rather than the reduction of total benefits, is important (European Parliament, 2022).

The Nature Parks “Ogres Zilie kalni”, “Ragakāpa”, and “Bernāti” are well-known natural areas in Latvia with various recreational opportunities, which have especially shown their importance during the Covid-19 pandemic. Based on the case of the Nature Park “Ogres zilie kalni” (Publication III), the ecosystem services inherent in urban forests and the resulting functions of urban forests were initially studied, which were also examined in the context of other study areas in the course of further research (Publication IV, VI). All of the above-mentioned ecosystem services can be seen in each study area.

Within the framework of urban forests, we can talk about 1) biological or natural forest resources, which can develop without human intervention and 2) recreational forest resources, the development of which requires conscious human activity (Randrup et al., 2005). In urban

forests, and even more so in specially protected nature areas, habitats with relatively high biological diversity are found (Alvey, 2006; Laiviņš, 2011).

3.4.2. Functions and classification of urban forests

Analysing urban forests through the prism of ecosystem services, the main functions and nodal points characteristic of urban forests can be identified (according to K.H. Grosser – places in the landscape space where human interests collide with the forest) (Bāra et al., 2003; Melluma, 2023), the realization of which in space depends on the type and intensity of forest-human interaction, which determines the methods and prism of management and practical management of the specific territory.

In practice, they are most often based on economic, social and ecological functions, previously the economic factor was emphasized as the most important (aProjektā FUTURE Forest gūto atziņu piemērošana..., 2011). Nowadays, the social function has gained the largest share - urban forests are a place for active and passive recreation, sports, collecting forest plants, enjoying the beauty of nature, environmental education and research (Akmar et al., 2011; Konijnendijk et al., 2006). The second most important function is the provision of the natural environment and the function of climate regulation (Konijnendijk et al., 2006) and as the last one remains economic in modern times – it is implemented if it does not contradict the other functions. When planning urban forests as a multifunctional system, it is important to evaluate the compatibility or conflicts of functions, choosing the dominant one – it will also determine the type of management (rojektā FUTURE Forest gūto atziņu piemērošana..., 2011). Based on theory, previous experience, and field research, **six essential functions of urban forests are identified: social, environmental, environmental education, nature protection, aesthetic, and economic**. As a case study area, where all the main functions of urban forests were identified, the "Ogres zilie kalni" Nature Park was initially used (see Fig. 1 of Publication III), but as the research continued, the "Ragākapa" Nature Park, "Bernāti" Nature Park and Langerevaldes forest were also used (Table 3.4), which is also confirmed by the survey of urban forest area experts (Publication VI) and the *Go-along* user survey on urban forest usage habits (Publication VII).

Table 3.4. **Overview of urban forest functions in the case study areas included in the research**

Urban Forest function	Ogres Zilie kalni	Ragakāpa	Bernāti	Langervalde
Social				
Places with amenities	Many places with public amenities	Minimal amenities	Separate areas with amenities	Minimal amenities
Trails and tracks	Mainly natural trails, staircases, individual sections of gravel trails, ladders over ditches	Mostly natural trails, with stairs, separate sections of gravel and boardwalk trails	Mostly natural trails, with stairs, bridges	All main trails are built with chipped pavement, bridges over ditches
History testimony	Hillfort World War I burials Old ski jumping site	Jūrmala Open-air Museum	Pūsēna Hill Resort objects Old stage venue Old ski jumping site	Old stage venue
Environmental	Has	Has	Has	Has

Urban Forest function	Ogres Zilie kalni	Ragakāpa	Bernāti	Langervalde
Environmental education	Scientific research Studies for students Guided tours	Scientific research No data	Scientific research Studies for students Guided tours	Scientific research No data
Nature conservation	SPNA	SPNA	SPNA	No SPNA
Aesthetic	Variety of distinctly attractive landscapes	Variety of attractive landscapes	Variety of distinctly attractive landscapes	No distinctly attractive landscapes
Green-blue structure	Forest and Dubkalni Reservoir	Forest and seashore of the gulf	Forest and seashore	Forest and ditch systems
Economic	Restricted City Suburb SPNA	Very Restricted City SPNA Seaside	Very Restricted Suburb SPNA Seaside	Restricted City

1. Social functions. Nowadays, social forestry has been practically implemented in urban forests (Konijnendijk et al., 2006), with the broadest focus on recreational functions and services. The forest is the most suitable place for maintaining a healthy lifestyle – regular walks, Nordic walking, running, skiing, and cycling.

In order to ensure the successful implementation of all functions and minimize the pressure of social functions on environmental and nature protection functions, sports and recreation infrastructure has been created and is being improved in the "Ogres zilie kalni", which can be divided into 3 groups:

1) point-type areas with amenities, which are localized in the most intensively used areas near the Dubkalni reservoir, the ski slope Starting area, the children's active recreation area, etc. – where the necessary infrastructure is created: parking lots, toilets, benches, tables and grills, garbage cans, changing cabins. An observation tower and wooden sculptures are located in the territory as attraction and recognition points. Activity areas created by entrepreneurs – rope trails, bike and ski rental.

2) linear objects – forest roads, walking, cycling, dog sledding and horse riding trails, a 10km long illuminated cross-country ski trail.

3) cultural and historical heritage sites from different historical periods have been identified, which may also include landscapes with symbolic meaning (Nitavska, 2023).

The same or similar infrastructure has been identified in all study areas (see Table 3.5). In many places, amenities have been created that must be regularly maintained, renovated, and supplemented, preventing spontaneous unauthorized use of the area, vandalism and responding to problems caused by intensive anthropogenic load (soil erosion, trampling of the ground cover, soil compaction, waste disposal).

Table 3.5. **Overview of the amenities of the study areas included in the research**

Social functions Amenities	Ogres Zilie kalni	Ragakāpa	Bernāti	Langervalde
Point-type areas with amenities				
Parking lots	x	x	x	x
Swimming areas	x	x	x	-
Beach dressing rooms	x	x	x	-
Toilets	x	-	x	-
Toilets with amenities	x	x	x	-
Benches	x	x	x	x
Waste bins	x	x	x	x
Direction signs	x	-	x	-
Information boards	x	x	x	x
Observation tower	x	-	x	-
Lighthouse	-	x	x	-
Stone sculptures	-	-	x	-
Wooden sculptures	x		x	x
Catering services	-	x	x	-
Bike and ski rental	x	-	-	-
Rope aerial trails	x	-	-	-
Water sports (kiteboarding, windsurfing) Motorized watercraft rental	-	x	-	-
Trails and tracks				
Natural trails	x	x	x	-
Gravel trails	x	x	-	-
Boardwalk trails	-	x	-	-
Woodchip trails	-	-	-	x
Bridges	x	x	x	x
Wooden stairs	x	x	x	-
Lighted ski track	x	-	-	-

2. Environmental function. It is performed by the entire forest territory and is the most important, it exists independently of humans. Urban forest territories regulate water flow and water quality, improve and stabilize soil, prevent wind and water erosion, bind carbon dioxide, enrich the air with oxygen, phytoncides (Emsis, 1980; Melluma, 2023; Sūna, 1979), reduce the spread of air pollution (Pilecka Uļčugačeva, 2024), smooth out sharp temperature fluctuations, wind and draft force, reduce noise pollution. In all case study areas, the manifestation of the environmental function of the forest is clearly visible, in accordance with or despite human activity.

3. Environmental education functions. The urban forest serves as a specific nature laboratory for scientists, a classroom for the whole society, creating an understanding of processes, regularities in nature, in the forest, specifically in the urban forest, showing the way to reducing adverse impacts. The new generation tends to completely disconnect from nature, even in countries with extensive green areas (Abdel, 2023), therefore, getting to know the forest, participating in educational events, classes, workshops create an environmentally friendly behavioral model in people's everyday lives, reducing alienation from the understanding of nature.

In all case study areas, various environmental education events, workshops, excursions, scientific research take place to a greater or lesser extent, which ensure environmental education functions.

4. Nature protection function. The nature protection function is relevant in the planning and management of urban forests. Many species have adapted to life in an urbanized environment. Urban forests contain vast areas with high-value biodiversity, which is also confirmed by examples of study areas – "Ogres Zilie kalni", "Ragakāpa" and "Bernāti" are specially protected areas, nature parks (Cabinet of Ministers of the Republic of Latvia, 2010; Saeima, 1993). Various protected habitats and species are found in all areas (for more information, see the nature protection plan of each area) (Par-Ipasi-Aizsargajamam-Dabas-Teritorijam, 2020).

Urban forests with high-value or rare species or habitats are areas where the protection and preservation of natural values is primary; such places do not want an influx of people. Often in reality, these places are also particularly visually attractive and interesting for recreation - bans on visiting them do not work, the most effective means is a well-thought-out and as high-quality infrastructure as possible, which reduces the anthropogenic load on habitats or species, and scientifically based habitat management.

5. Aesthetic functions. Urban forests, as large natural or semi-natural structures, have significant landscape value, which is especially important in urban environments with man-made buildings and infrastructure landscapes. Even if the forest landscape is not particularly visually attractive, its maintenance can create more attractive, more pleasant landscapes for people (Heyman, 2012). Ilze Jankovska has studied the landscapes of Riga's urban forests, which are preferred by visitors – intensively landscaped forest predominates – with cleared undergrowth, harvested dry branches and fallen wood, constructed landscape infrastructure – the preferred landscape resembles a park, a "savanna-type" forest stand with low ground cover, transparency and accessibility (Heyman, 2012; Jankovska, 2013). Taking into account the findings on the importance of fallen wood and dry wood in the forest ecosystem, the amount of wood to be preserved has already been determined in regulatory enactments in Latvia (Cabinet of Ministers of the Republic of Latvia 2012; Saeima, 1993). Only knowledge and understanding of natural processes can improve visitors' assessment in favor of less cultivated, but more biologically valuable landscapes (Gobster, 1999; Jankovska, 2013; Straupe et al., 2012).

Nature parks "Ogres Zilie kalni", "Ragakāpa" and "Bernāti" are attractive to visitors with their distinctive and changing forest landscapes on articulated terrain (ash hills or seaside dunes) – sparse stands of old pine trees, stands of deciduous trees, small swamps, alternating with water landscapes (Dubkalni water body or the vast landscape of the Baltic Sea), which makes the overall landscape interesting and full of surprises.

6. Economic functions. Forest areas produce and accumulate usable raw materials, such as wood, needles, fruits and berries, mushrooms. Nowadays, in urban forests, the smallest role is assigned to the acquisition of wood, which is more related to the care of forest stands, in case of damage by diseases or pests, and felling for landscape improvement and creation. In nature parks, this opportunity is even more limited.

The collection of non-wood forest materials – mushrooms, berries, fruits, cones, acorns, flowers, leaves, branches, roots, sap for human consumption in urban forests is considered more of a social recreational function, since nature protection regulations, property rights or urban pollution do not allow the use of the obtained products for food.

Very limited forestry is possible in all study areas, especially in nature parks and even more so in coastal areas – sanitary felling to eliminate dead and dangerous trees, which in some cases must be left in the forest area (Cabinet of Ministers of the Republic of Latvia, 2010). The study areas have extensive and popular mushroom and berry picking areas (their quality can be reduced by overgrowth with shrubs), which disperse visitors throughout the entire territory in late summer and autumn.

Classification allows for more successful management of urban forest areas, setting and observing the necessary restrictions and tasks of economic activity. Urban forests are characterized by multifunctionality, but guided by the existing conditions of the site, one of them is dominant. Places where significant functions that are important to society in the long

term are identified should be shown in forest management plans of various levels and also in municipal territorial plans or in thematic planning sections.

Classification groups of urban forests, including the main defining parameters/criteria and relevant specific provisions for planning and management -

1. Recreational urban forests – include forest territories with limited use in forestry, where the main type of use is active recreation of residents in urban forests. Objects related to sports and recreation (well-maintained recreation areas, nature trails, observation towers, ski slopes, etc.) are to be located. Location selection criteria – easy accessibility within 15-30 minutes, access roads, parking options, attractive, expressive landscape (transparent or distinctive forest landscape, particularly pronounced relief, proximity to water, landscape dominants, distant views, etc.), public/user demand, opportunity for convenient, effective development and maintenance of amenities, as well as further expansion).

2. Protected urban forests – the main use, site selection criteria are related to the values of protective zones, environment, species and habitats, their protection, improvement and appropriate conservation forest planning and management. Recreational areas are usually not established in particularly valuable natural objects and habitats, but if there are great public interest and load, limiting high-value infrastructure should be planned and created to reduce anthropogenic impact.

3. Visually significant urban forests – site selection criteria can be all forests whose internal structure (attractive landscapes for walks) or view of them from the outside (roadside, separation of various urban structures) is visually significant. Landscape felling is recommended; clear cutting is also permitted, especially considering the visual impact of felling on the forest landscape, carrying out careful planning and design of felling and forest restoration.

4. Cultural and historical urban forests – the selection criteria and main use are related to the existence of cultural and historical values in the territory, their preservation, careful display and appropriate planning, improvement and forest management.

5. Economic urban forests - their main use is forestry and the extraction of forestry products. The criteria for selecting these territories may be difficult accessibility, unsuitability for recreation, lack of special natural or cultural-historical values. Considering that these forests can be visually significant with their visual volume, landscape felling is recommended, clear cutting is also permitted, especially considering the visual impact of felling on the forest landscape, carrying out careful planning and design of felling and forest restoration.

Considering that the care of forests of recreational, scenic importance and cultural and historical importance is similar from a forestry point of view, during the development of the work, a discussion arose about combining these forests into one group. In the doctoral thesis, these groups are identified separately to highlight their significance in urban forest areas and to encourage discussion about their potential and specific uses.

Urban forest planning and management takes place both at the strategic, city-municipal level, and at the local-site-forest stand-landscape level (see Fig. 3.3), in accordance with the urban forest management plan, or in the case of amenities – in accordance with the technical project.

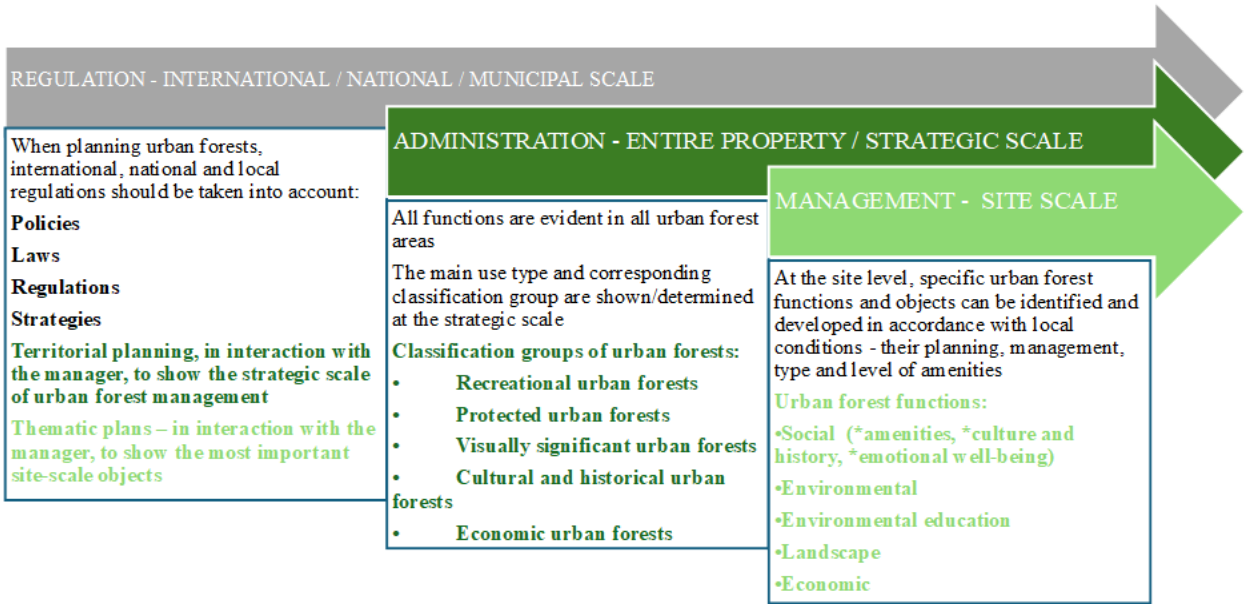


Fig. 3.3. **Urban forest planning approach at strategic and site scale**

Steps for assessing urban forests.

Step 1. **Identification of core functions.** The primary functions that the area fulfills must be identified. In strategic planning for urban forests, all urban forest functions will be evident to a greater or lesser extent in all forest areas, and they will often overlap.

At the local level, the dominant functions of urban forests help to understand the values and potential of specific urban forest areas—and thus the appropriate type and level of planning, management, and improvement. The different functions should be reflected in site-level forest/landscape management plans and technical designs. Sustainable and significant urban forest sites can be highlighted in the thematic planning section of municipal plans.

Step 2. **Evaluation of urban forest typology criteria and identification of dominant functions.** Functions with designated national or municipal protection status (natural, cultural-historical) are prioritized. If multiple protection statuses apply, priority is given to sites with unique characteristics in a specific location; it is essential to preserve and not jeopardize the protected values. Social functions are subordinated to protected values by creating appropriate infrastructure or redirecting visitor flows. In areas where other functions are not significantly pronounced, the economic aspect remains the primary one. The owner or manager of an urban forest plans their activities, assesses and sets priorities for further development and management, and determines the dominant forest type and the necessary management measures. When planning, one should choose a type that is strategically significant and appropriate for the dominant land use.

Step 3. **Incorporating urban forest management plans into spatial planning documents.** During the development of plans at various levels, forest managers should collaborate with local governments, spatial development planners, and the public to establish a shared vision for territorial development, with particular attention to the future of areas of public significance and their reflection in local government spatial plans and thematic plans. The dominant classification group of urban forests may be included in local government spatial plans or in a section of thematic plans.

The processes, scales, regulations, knowledge, and needs associated with urban forests and their management are linked to various interests and are in close, comprehensive interaction, which is enhanced by cooperation (see Fig. 3.4.). The state, local governments, organizations, and individuals may have different roles, perceptions, understandings, influences, needs, and responsibilities in urban forests depending on the situation, which manifest as regulatory, ownership, management, or user perspectives.

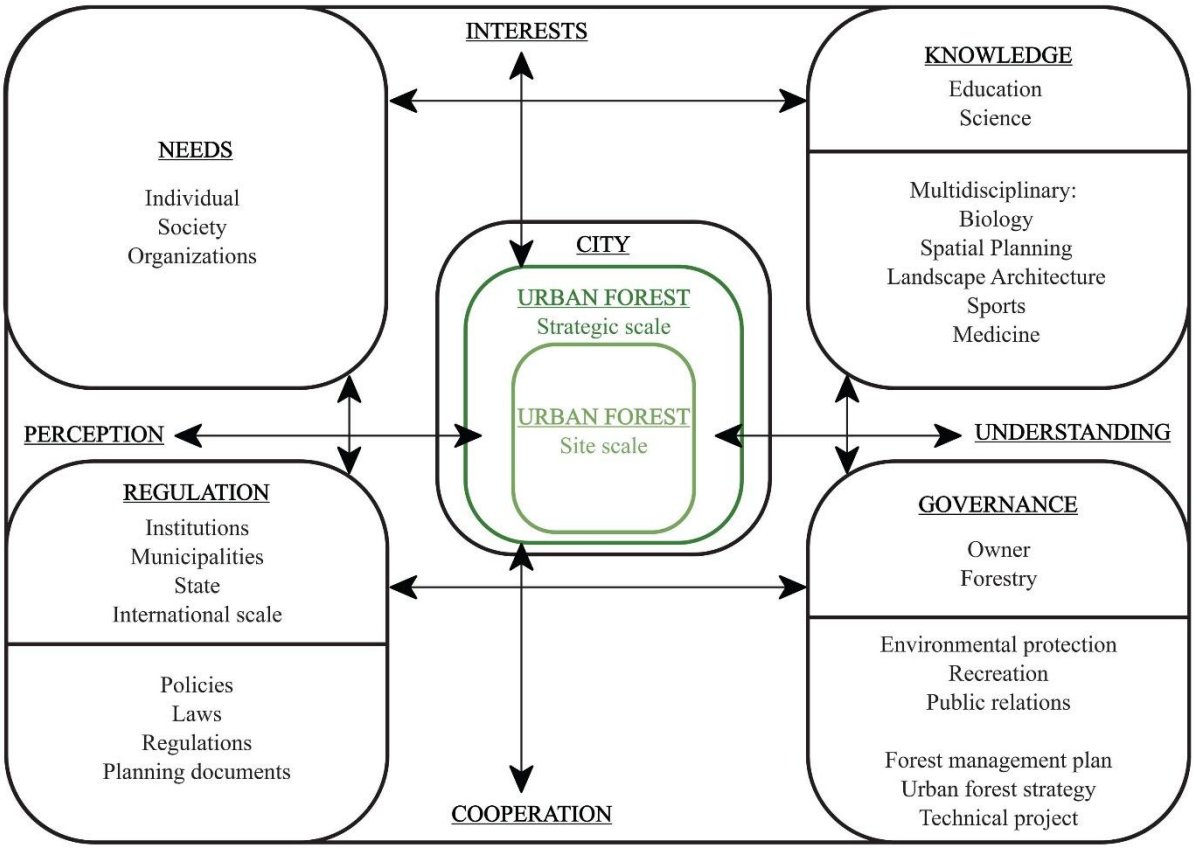


Fig. 3.4. **The interaction of urban forest processes, interests, and scales**

Urban forests are multifunctional territories encompassing six primary functions: social, environmental, environmental education, nature conservation, aesthetic, and economic, whose hierarchy and dominant function determine the classification, planning, and management approach of the area.

3.4.3. Psycho-emotional aspect as another function of urban forest

In the study in "Ogres Zilie kalni", it was observed how different stimuli and trail routes and configurations affect people's attention. The volume and diversity of different stimuli are very important in determining the flow of information, which is important when planning walking trail routes to assess psychological well-being. (Publication IV).

In urban social psychology, happiness is the most attractive emotion in the flow of information (Lidin, 2021). The Covid-19 pandemic showed that the natural environment can minimize the negative manifestations of social interaction (Weinstein, Przybylski, & Ryan, 2009).

Accessibility of any natural area is ensured by a network of trails. In "Ogres Zilie kalni", and in the other case study areas, it has developed because of long-term use by visitors. Several of the trails were created as paths separating forest blocks, created in straight lines, squares. Some trails have also been formed in very straight lines – in places of former high-voltage lines, existing cable lines or forest trails created in the buffer zones of high-pressure gas pipelines. The purpose of trails is not only to take visitors through a specific territory, but also to provide physical and emotional well-being and joy. One of the characteristics of trails is their surface cover and its quality – comfortable for walking (flat, bumpy, with exposed tree roots, overmoistened, muddy, or sandy), natural or specially constructed (woodchips, stable soil, gravel, pebbles, various types of stone chips, boardwalks, stone or concrete paving, concrete, asphalt, and other surfaces). When planning a trail network, not only its functionality is important, but also the emotional perception, which is determined by the number of different

stimuli and the flow of information – landscape "openings" and "closings" in order to achieve a sense of horizontal balance, observe harmonious scale and proportions (Olszewska-Guizzo, 2023; Raven-Ellison, 2019). Landscape layers or distance zones (foreground, middle ground and background) are of great importance in landscape perception (Olszewska-Guizzo, 2023; Raven-Ellison, 2019). Both in "Ogres Zilie kalni" and in both coastal case study areas, trails with views of water expanses are popular, in "Ogres Zilie kalni", behind the water mirror in the middle ground, the distant background forest landscape is visible again, and as the path continues, the trail will weave into the closed landscape of the forest, ensuring a change of views. The design principle of at least two landscape layers is also important in organizing forest trails.

When planning walking routes, direct sensory diversity should also be taken into account (Salonen et al., 2012), offering different information and different stimuli, for example, linear, straight distant views, winding paths with a change in the direction of the landscape view, changes in surface height and opening width, the use of different road surface materials and much more. The diversity of the environment, the landscape serves as a stimulus for cognitive development – "enriched environmental stimuli can affect neuromorphological structure and behavioral functions" (Zhang, Chen, & Zhou, 2018).

The effect of rich information is beneficial for a person; it provides psychological comfort and, consequently, a positive effect on human health (Ulrich, 1977).

Seven important aspects of the environment that improve health and stimulate cognitive health: include the need for a natural, aesthetically pleasing environment that is informative and comfortable. The environment has diversity, dynamics, involvement, cognitive enhancement, five-sensory stimulation, and evoking a range of emotions (Zhang et al., 2018). The environment and landscape should be clear, precisely defined and easy to use, without potential dangers, for example, clear path direction, sufficient transparency of the undergrowth (Ulrich, 1977). Various studies have emphasized the important role of the infrastructure of natural areas in improving health (Hipp, 2011; Ulrich, 2000).

The main attraction of the urban forest landscape lies in the relief that is distinct for the Latvian scale – coastal dunes or aspen hills with light pine forests, alternating with spruce or deciduous stands in wetter areas. Langervaldes forest has a distinctly flat relief, but various types of forest habitats provide sufficient landscape diversity. A pronounced feature of the landscape is the water mirror, which has a particularly beneficial effect on human psycho-emotional well-being (Zhang et al., 2021) – Dubkalni water body or the Baltic Sea. In the simplest landscape of Langervalde, the pronounced network of drainage ditches is complemented by the pronounced grid of melioration ditches, which brings a rectilinear pattern to the irregular nature of the forest's internal plant structure and trail structure, creating a natural plain forest landscape. In our hurried everyday life, spatial order, where individual stimuli do not disturb, but create inner silence, diverts the visitor's thoughts from the outside to reflection and contemplation (Olszewska-Guizzo, 2023; Salonen et al., 2012). Landscapes play a significant role in developmental psychology at all ages. When creating a network of walking trails in urban forests, an imaginative, natural, clear, and lively infrastructure is of great importance (Raven-Ellison, 2019). Research shows that activities in the forest can improve attention and self-regulation skills in preschool children (Ulset et al., 2017).

The latest studies confirm that the period from 2019 to 2022 has created new habits of using natural areas (World Health Organization, 2025.), when people like to distance themselves and use more secluded small recreation areas (Kraukle, Stokmane, & Vugule, 2022b).

Attention is the way a person actively processes a limited amount of information (incoming stimuli) (Sternberg, 1999). Working too intensively, focusing on several tasks at the same time significantly tires attention (Schumann et al., 2022), focusing on one object improves the dynamics of attention (Kaplan & Kaplan, 1989). To switch from one task to another more quickly, some external method is needed – a walk in nature, especially if it is a daily routine,

improves overall mental and physical health (Zhang et al., 2022).

The results summarized in Publication IV show that attention improved after the second or third measurement, which typically lasted 20–30 minutes, which is consistent with the theory that a 20-minute walk in nature is enough to restart attention. At the end of the walk (40-60 minutes), the dynamics of attention decreased due to physical fatigue. See Fig. 2 of the Publication IV for the trail routes used in the study.

Understanding the mechanisms that determine decision-making when choosing a walking trail should include not only psychological, but also social aspects, which would provide a more comprehensive understanding of trail planning in order to create psychological well-being and an emotionally positive behavioral model. Seek solutions for the improvement of the territory – how to promote more comprehensive recreation and how to ensure that walking trails provide the greatest possible physical and psycho-emotional comfort. Consider the positive impact of a 20–30-minute walk on the dynamics of human attention. Plan the accessibility of important objects within a 20-minute walk. The specific type of trail (straight or winding) had no discernible effect on the dynamics of attention, which can be explained by the influence of forest vegetation and terrain, which visually blur the distinction between winding and straight trails. Given the scenic similarities with the case study area and other similar urban forest areas, the results can be generalized.

3.5. Experience of urban forest management in Latvia

This subsection presents the results of the experience of urban forest management in Latvia, since the study selected distinctly forested Latvian cities in all statistical regions of Latvia: Riga, Jūrmala, Jelgava, Ogre, which are located in the immediate vicinity of the capital Riga, respectively, as well as Daugavpils and Liepāja, see Fig. 2.1 and Table 2.2, more information in Publication VI.

Looking back in history, the forests of the cities selected for the study have been significant already in the past (Zviedris, 1949), from 1978, when the forests of Riga, Jūrmala, Ogre, Daugavpils, Liepāja, and Jelgava were included in the forest areas of green zones of cities under the jurisdiction of the Republic, the city of Riga had a forest park district, Jurmala and Ogre with their forests were included in the Riga green zone (Sūna, 1979).

Nowadays, urban forest managers especially need a comprehensive scientific understanding of natural processes in forest stand development, planning, and integrating ecological and economic goals (Franklin et al., 2002; Donis, 2003;). Urban forests, like any natural system, are characterized by a certain tolerance to anthropogenic loads (Emsis & Tuktens, 1988; Seidler & Bawa, 2013). The recreation process must be planned, controlled and purposefully managed to protect intensively visited places from negative changes in the natural forest environment – anthropogenic loads or human-caused impacts on the environment and nature (Bisht et al., 2024).

The urban forest landscape is threatened by the expansion of urban development. Larger forest areas are fragmented, a process where continuous habitat areas are divided into smaller, more numerous fragments (Franklin et al., 2002). The negative impact of fragmentation is reflected in the finding that 10 fragments, each with an average area of 1 sq. km, retain less biodiversity than a single fragment with an area of 10 sq. km (Ehrlich & Kremen, 2001; Seidler, 2017; Seidler & Bawa, 2001).

The most significant problem in urban forests is soil erosion and compaction in intensively used areas. Instead of biologically valuable landscapes, ruderal landscapes with a poor species composition are formed. Green public areas of the city must be regularly improved and maintained (Straupe et al., 2014; Straupe et al., 2012).

According to data by Jānis Donis (Donis, 2001), on average 20% of the city's territory in Latvia is urban forest. As can be seen in Fig. 2 of Publication VI (2021 data from the Latvian Association of Municipalities (Latvijas Pašvaldību savienība & Upenieks, 2021)), the area of

the Latvian capital Riga is more than twice as large as the other cities examined and has the most urban forest territories (5494 ha, 18% of the city's territory). Jūrmala (4802 ha, 47%) stands out as the second largest city with a large area of urban forests. Daugavpils (1592 ha, 22%), Liepāja (1192 ha, 18%), and Jelgava (1121 ha, 19%) are similar in terms of city area and volume of urban forests. Ogre (209 ha, 13%) is the smallest of the cities examined, but with an equivalent proportion of urban forests.

Publication VI examines the characteristics of urban forest management, which are summarized here in Table 3.6 (notations used: X – is present, - – is absent, nd – no data).

Table 3.6. **Characteristics of urban forest management**

Characteristics of management	Riga	Jūrmala	Daugavpils	Jelgava	Liepāja	Ogre
1**. Management**						
1.1 Managed by the municipality	x	x	x	x	x	x
1.2 Managed by the state	-	x	-	x	-	-
2. Integrity is present	x	x	x	x	x	x
3. Strategy						
3.1 Strategy of the municipality	x	x	x	x	x	x
3.2 Company strategy	x	-	-	-	-	x
3.3 Forest Management Plan	x	-	-	x	x	x
3.4 Ecological plans for landscapes	x	-	-	-	-	-
3.5 Forest inventories	x	x	x	x	x	x
4. Multidisciplinary management						
4.1 Environmental educational activities	x	nd	x	nd	nd	x
4.2 Voluntary assistance	x	x	x	x	x	x
4.3 Improvement of recreational areas	x	x	x	x	x	x
4.4 Maintenance of undergrowth	x	x	x	x	x	x
4.5 Cleaning up of waste	x	x	x	x	x	x
4.6 Felling of hazardous trees	x	x	x	x	x	x
4.7 Sale of growing wood	x	nd	x	x	x	x
4.8 Growing of forest planting material	x	-	-	-	-	-
4.9 Forestry work	x	-	-	-	-	-
4.10. Resort as a form of multidisciplinary management	-	x	-	-	x	-
5. Participation - involvement of different interest groups in management						
5.1 Explanatory publications, surveys, voluntary assistance	x	x	x	x	x	x
5.2. Public consultation of planned works	x	-	-	-	-	-
6. Additional restrictions on forest management						
6.1 Additional restrictions on Forest Management	x	x	-	-	x	x
6.2 Seaside areas	x	x	-	-	x	-

Considering that all 5 management characteristics are evident in the studied urban forest territories, we can talk not only about management, but also about full-fledged urban forest management in these cities. Item 6 shows important additional provisions for urban forest management.

Figure 3.5. **Urban forest management at the strategic and site scale**

All features of urban forest management include both strategic scale, which includes all owned territories, and site-scale activities, which are shown in Fig. 3.5.

Management can be defined as a consistent, transparent, and sustainable system in which strategic goals, decisions, and practical handling are mutually coordinated, based on common ecological, social, and ethical principles at both the strategic and site scale.

In May-November 2024, a survey of 10 experts involved in urban forest management was conducted from 6 study areas - cities with a pronounced proportion of urban forests (interview questions in Appendix 2).

As part of the expert survey, opinions were sought on the definition of urban forests, the range of stakeholders involved, their functional significance, classification, information to be confirmed in planning documents, and the need for regulatory regulation (see Fig. 3.6.).

The majority of experts recognized the developed definition of urban forests as appropriate. However, several respondents emphasized that environmental functions should be prioritized in such a context. There was also unanimous support for the proposed range of stakeholders – regulatory institutions, owners or managers and users – adding that in certain cases, non-governmental organizations for nature conservation can also play a regulatory role.

The experts mostly agreed with the proposed classification of urban forests - recreational, protected, visually significant, culturally and economically significant forests. However, some believed that such a division could be too detailed and make practical application difficult. The proposed range of urban forest functions, including social, environmental, environmental protection, environmental education, aesthetic and economic dimensions, was also mostly supported.

Opinions on the integration of these functions into the spatial plan were divided. Only a

small number of experts believed that the inclusion of functions would be an essential step towards improved management and cooperation with the public. The opinion was expressed much more often that overly detailed regulation could restrict property rights and make management processes even more complicated, especially taking into account changing conditions. A solution was proposed - to use zoning and determine functions in forestry plans, rather than firmly establishing them in the spatial plan.

Some experts believed that thematic plans could serve as a useful tool, promoting communication with the public and helping to understand the development directions of urban forests. However, these plans should not be legally binding. They should be interpreted as informative, explanatory documents that help to establish a dialogue between stakeholders.

Regarding the regulatory framework, most experts expressed the opinion that the existing legislation is not flexible enough and hinders effective action. Although some indicated that municipalities already have the necessary tools for urban forest management, the need to facilitate and simplify various procedures, such as clear-cutting conditions and the procedure for permitting urban forest maintenance work, was generally emphasized. It was also indicated that such changes would also promote the regeneration of natural species, such as Scots pine (Pinus sylvestris), which is characteristic of the Latvian urban forest landscape.

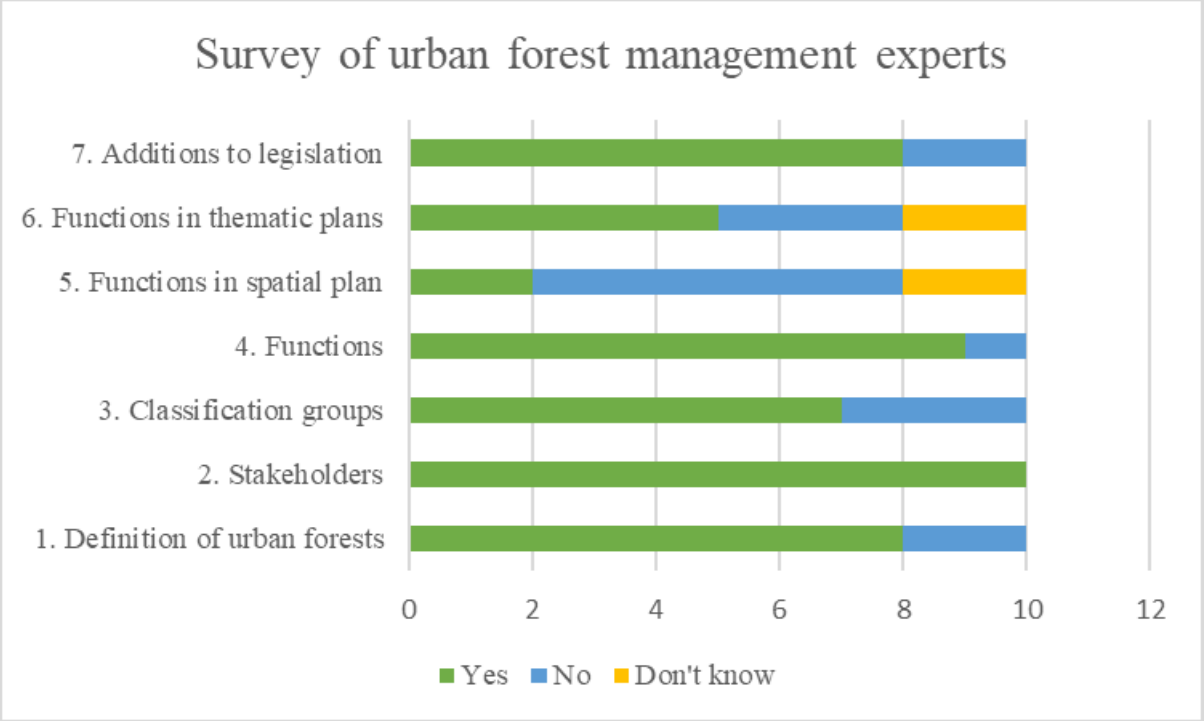


Figure 3.6. **Survey of urban forest experts (2024 data)**

The survey also included several open-ended questions, where a more detailed explanation was requested, including on the specifics of coastal forest management. Three respondents did not have such experience. The main finding is that coastal forest ecosystems are sensitive and require protection, which in the case of Latvia is strictly regulated in the regulations, for example, in Jūrmala and Liepāja, overlapping regulations apply to urban areas, coastal dune protection zones, and specially protected nature areas, as well as the sharp negative stance of the public, which actually leads to a situation where even permissible forestry work is not carried out. In turn, another part of the public criticizes that the forest is not maintained. A significant problem is the large number of visitors, which creates a significant anthropogenic load on forest habitats and generates a large amount of waste.

The main challenges in urban forest management are the diverse interests and opinions of society, which are often contradictory, and communication and building trust with society. Education and information are important to promote public understanding of the values of

forests and the importance of care.

The following challenges were also mentioned -

- Devastating climate change, which is seen as more frequent and destructive storms, the spread of pests and invasive species.
- Political influence on decision-making, which can change depending on the results of local government elections.
- Lack of resources - financing and human resources, which limits quality.

The experts also named the necessary improvements in urban forest management-

- Public education and regular communication are very important, organizing regular educational events, various workshops, explaining planned forest care work.
- Waste control, placement of waste bins is being significantly reviewed; most managers no longer place them.
- High-quality and professional care of urban forest stands and continuous improvement of infrastructure. Zoning of territories and determination of different work intensities.
- Involve the public, municipalities and experts in the planning process.
- Facilitate and make more flexible regulatory acts, such as clear-cutting regulations, to promote the regeneration of coniferous species, the fight against pests and diseases.
- Create a mutual exchange of experience among urban forest owners and managers.

3.6. Research on the experiences and interests of urban forest users

The subsection describes the research on the experiences and interests of urban forest users in 4 urban forest territories - nature parks “Ogres Zilie kalni”, “Bernāti”, “Ragakāpa” and Langervaldes forest. The issue is discussed in more detail in Publication VII. To clarify the habits and opinions of urban forest users regarding the use of urban forests, several previously completed surveys were analyzed and the Go-along method was used (see Chapter 2.4.2) in order to, based on the research results, maintain cultural ecosystem services, ensure the implementation of social functions, develop and improve urban forest planning and management practices. A total of 26 interviews were conducted, the results of which supplemented and correlated with the previously conducted surveys.

When studying the habits of specific urban forest users [number of respondents indicated in square brackets], it is clearly seen that walking [22] in the forest is the main, dominant activity, many take their dogs for a walk [10] and walk with their children/grandchildren [6]. The next most popular activity is swimming [11] and even swimming all year round [2] in areas where this is possible. The third most popular activity is skiing [9] and sledding [9] during the snowy season. Equally active visitors run [8], Nordic walking [8] and cycle [8]. Some respondents pick mushrooms [6], take photos [6], go hiking [4] or lead excursions [3]. Some respondents note that they pick berries [2], pick nuts [2], collect materials for floristry [2]. In addition, it is typical for “Bernāti” to collect “sea dung” [2] and cones for smoking fish [1].

As a significant aspect in all 26 interviews, respondents express positive emotions that they get from staying in the forest, excitement about large-scale landscapes, specific plants, stumps, fallen trees, spiders and dew drops, delight in the smells of the forest (maple flowers, forest after rain, in autumn, etc.), bird songs or silence. Many note that they relax from stress and everyday worries. Most often, the route and duration of the visit depend on the mood and weather conditions. More specific routes are marked for visitors who play sports and want to cover a specific distance. Respondents who play sports note that they choose specific territories because they are visually attractive to them.

There are several respondents who have been visiting territories since early childhood, youth, and have various sentimental memories associated with it. Many are happy to talk about historical events they know in the territory, including places of interest to them in the route.

During the interviews, photographs were taken of places that the respondents particularly focused on, mostly indicating their significance or attractiveness.

4.CONCLUSIONS AND PROPOSALS

Based on the doctoral thesis's research tasks and proposals, the studies conducted during the study process have generated results, led to conclusions, and yielded recommendations that can improve the management, planning, and maintenance of urban forests.

1. A study of regulatory enactments binding on urban forests has been carried out. Urban forest management is a branch of forestry that is significantly different from classical forestry. There is a lack of clear legal norms that would define and regulate urban forests in accordance with the current situation and sustainability.

It is necessary to introduce and popularize a single definition of urban forests in Latvia. As well as to create a single definition in the European Union, considering significant country differences.

It is important to more clearly outline the role of forests and urban forests in international and local legal acts, policies and planning documents, emphasizing their essential importance in reducing CO2 emissions, maintaining and preserving biodiversity and natural habitats, and ensuring social and economic functions.

Based on the findings of the study, urban forest management issues require more comprehensive regulation, preventing forest fragmentation, maintaining the possibility of creating recreational infrastructure, and managing them in accordance with the current situation and sustainability. Provide for the possibility of maintaining territories in the protected area of the dunes, located in the city territory. One of the solutions could be special regulations, when deviations from general rules are allowed, to solve specific problems.

2. The values and functions of urban forest landscapes in the case study areas have been identified.

Given the results and conclusions of the study, as well as the positive experiences of leading urban forest managers, it is necessary to continue defining and identifying valuable natural, recreational, landscape, and culturally and historically significant territories in nature, paying additional attention to the social issues of urban forests, their positive psycho-emotional impact, their management planning, and their inclusion in spatial planning thematic plans, in order to assess whether their consolidation in binding municipal regulations is needed.

3. An approach to classifying urban forests for inclusion in urban planning has been developed.

Based on the ecosystem services and corresponding urban forest functions studied in the doctoral dissertation, urban forests can be classified into five groups: **recreational, protected, landscape, cultural and historical, and economic forests**.

Based on the results of the study and the following conclusions, a more significant role should be given to urban forest planning both at the strategic – city and site– scale of a specific forest stand. A more significant role should be given to urban forest planning both at the strategic – city and site– scale of a specific forest stand. At the city/municipality scale, the main urban forest function should be determined, to which the others that are simultaneously identified in the territory are subordinate, as well as it can be shown in the spatial planning documents of the municipal level. To ensure the best implementation of the main function, planning and subsequent management should be directed. At the forest stand scale, specific local zones and objects should be planned, developing forest/landscape management plans, improvement, infrastructure technical projects.

4. Recommendations have been developed for sustainable / integrated urban forest landscape management (planning, management) in Latvia.

Modern urban forest management encompasses many aspects – the urban environment and scale, the specific forest massif and local scale, natural processes that occur without human participation, processes that are influenced by humans – from the global to the individual level, intertwined into a single sustainable and integrated process. A forest is a relatively stable, self-sufficient, natural ecosystem, and its existence and maintenance require much fewer resources

than the maintenance of man-made parks. In fact, the largest funds are needed to ensure social and recreational functions.

Taking into account the results and conclusions of the study, as well as the experience of leading urban forest managers, the process of planning and managing urban forests should include knowledge not only in forestry, environmental sciences, but also in administration, landscape and spatial development planning, sports, medicine (physical and psycho-emotional health), public relations, and involve specialists, experts, students, and stakeholders and users from various fields, because everyone has their own knowledge, experience, and needs, which can often be radically opposite - different interests must be reconciled as much as possible. The planning and management process should assess the wishes of users, state and local government regulations, obligations of owners/managers, opportunities, and expert insights.

Greater public education and participation are needed. To reduce conflict situations and disagreements between stakeholders, it is very important to explain to users the environmental protection requirements or management specifics, which initially cause a sharp user backlash. When developing plans for urban forest territories at different levels, it is important to identify the needs and interests of various stakeholders. In close interaction with stakeholders, a modern multi-purpose green infrastructure planning and maintenance approach should be developed and implemented, aimed at increasing the sustainability of urban forests and territories and their resilience to climate change.

Based on the conclusions drawn during the preparation of this doctoral thesis, it is essential to prevent the further spread and fragmentation of forests. To reduce the expansion and fragmentation of urbanization, spatial planning documents should more strictly set restrictions on the creation of new buildings in urban forest territories, allowing for structures necessary for recreation. Green territories should not be reduced. “Green wedges” of urban forests are a type of planning aimed at limiting the continuous expansion of urban territories, leaving no room for natural territories necessary for the preservation of environmental diversity and the provision of forest ecosystem services. Viable forest territories that cover sufficiently large areas and diverse structures and age-old tree stands, as well as biodiversity, should be maintained, not forgetting about amenities and equipment for the recreational needs of residents. A variety of smaller structures (green corridors) connecting urban forests and larger parks should be created and maintained. Green corridors are very important for preserving biodiversity in cases where green areas are too fragmented.

Taking into account the results of the research, it is important to ensure that green areas, preferably urban forests, are accessible in urban areas within 10-15 minutes on foot or by car. When planning and designing specific walking trails and recreational infrastructure, the physical, psychological and social aspects on which visitors' decisions about choosing trails are based should be included. Considering the dynamics of people's attention, important objects should be planned within a 20-minute walk.

Based on the results and conclusions of the doctoral thesis, recreational infrastructure plays a significant role. Resilience against anthropogenic loads, soil compaction and erosion should be promoted. For anthropogenic load not to negatively affect the existing habitats in the territory, the use of intensively visited places can only take place through comprehensive development of amenities – creating specific paths with a sustainable surface suitable for the site (natural soil, gravel, rubble, various types of hard surface, metal, concrete, other modern materials). The creation of boardwalk paths and stairs should be chosen in cases where there is no alternative – the site is overly wet, very pronounced terrain, there is no alternative for placing the path, financial restrictions. Wooden covering is not recommended because in Latvian climatic conditions it is often slippery, it is not long-lasting – structures must be replaced every 5-8 years, the quality of construction and maintenance must be monitored very carefully so that they are safe for users. Stairs and wooden covered paths (if they must be crossed perpendicularly) restrict visitors with strollers or people with mobility impairments, cyclists. When planning urban development, one of the most important tasks should be to develop and

improve tourism and recreation infrastructure, ensuring sustainable and balanced natural values, especially the management and use of urban forests for the widest possible range of visitors. In terms of amenities, an important role should be played by the inclusion of environmental education, cultural and historical and other information in landscaping and communication (information stands, signs, links to additional information in the digital environment)

Greater attention should be paid to the planning, creation, and maintenance of the visual landscape of the forest and recreational areas. Urban forest landscapes should be maintained, especially in areas with dense undergrowth, by regularly maintaining it along paths 4-10 m wide. It is desirable to vary the width of the maintained strip, as well as to preserve individual clumps of bushes, assess the need to cut down dead trees for safety purposes, perform maintenance felling, remove remaining trees, and preserve/create scenic views and openings.

The large number of visitors requires improving the minimum services The large number of visitors to natural areas requires improving minimum services, their infrastructure must be designed so that they are accessible and usable by all population groups (accessibility and basic principles of universal design) – parking lots, recreation areas, benches, garbage cans, toilets, accessibility for people with special needs. Zoning of the intensity of a wide range of maintenance works, taking into account the environmental, cultural and historical values/potential and anthropogenic load. Sufficient funding is important for the creation of infrastructure to organize and optimize visitor flows, and for all types of maintenance works (waste collection, undergrowth care, grass mowing, etc.).

Taking into account the findings of the doctoral thesis, the diverse opinions of users, and the Covid-19 experience, one of the solutions is to create different areas with more and less intensive infrastructure and maintenance, so that visitors can choose the intensity of amenities and visitors that suits them. Large areas are needed where a large number of visitors can stay at a sufficient distance. It is not possible to develop only large areas that gather a large number of people, small trails and individual recreation opportunities must also be developed.

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PIELIKUMI / *ANNEXES*

1. pielikums

Pētījuma realizācijas finansiālie avoti

Latvijas Biozinātņu un tehnoloģiju universitātes Meža un vides zinātņu fakultātes, Ainavu arhitektūras un vides inženierijas institūtā laika posmā no 2020. līdz 2025. gadam Ieva Kraukle izstrādāja promocijas darbu. Promocijas darba – (tematiski vienotu zinātnisko publikāciju apkopojuma) izstrādes laikā notikusi dalība divos zinātniski pētnieciskos projektos, kas ir cieši saistīti ar darba tēmu, dodot atbalstu atsevišķām zinātniskajām publikācijām un darba rezultātu prezentēšanas iespējām:

1. 2024.g.-2026.g. Tēma R129-„Ietekme uz vidi un apsaimniekošanas izaicinājumi rekreācijai nozīmīgās meža teritorijās Latvijā, Nr. lzp-2023/1-0137", Valsts pārvaldes iestādes finansēts projekts, zinātniskais asistents.

2. 2025.g.-2026.g. Akadēmiskās karjeras doktorantūras grants "Urbāno mežu ainavas funkcionalitāte un attīstības perspektīvas ilgtspējas un klimata pārmaiņu kontekstā" (AF25), kas iekļauj izmaksu segšanu Atveseļošanas projekta Nr. 5.2.1.1.i.0/2/24/I/CFLA/002 "LBTU institucionālās kapacitātes stiprināšana izcilībai studijās un pētniecībā" ietvaros.

2. pielikums

Eksperta aptauja

Pilsētmeži

Vārds uzvārds	
Amats	
Datums	
Pieredze pilsētmežu apsaimniekošanā:	
Laika periods	
Uzņēmums	
Amats	
Vieta	

1. Vai varat piekrist pilsētmežu definīcijai
Latvijā oficiāli nav apstiprināta pilsētmežu definīcija, piedāvāju savu skaidrojumu: Pirmā daļa ietver Latvijas meža likumā noteikto: • dabiska, pusdabiska vai mākslīgi veidota ekosistēma visās tā attīstības stadijās • kurā dominē koki, kuru augstums konkrētajā vietā var sasniegt vismaz septiņus metrus • pašreizējā vai potenciālā vainagu projekcija ir vismaz 20 procenti no mežaudzes aizņemtās platības Atbilstoši pilsētas mežu specifikai meža definīcju papildinu: • Mežs, kas kalpo kā publiskā ārtelpa pilsētu administratīvajās robežās un ārpus tām esošā urbānā vidē, • primārās ir sociālās un vides funkcijas, • nepieciešama regulāra kopšana un atjaunošana, saglabājot vai uzlabojot teritorijas sociālo, estētisko, kultūrvēsturisko un ekonomisko vērtību.
Jā
Nē
Komentārs
2. Vai varat piekrist apgalvojumam par pilsētmežu ieintersētajām pusēm
Pilsētmeži, ieinteresētās puses: **Regulējošās puses:** Latvijas republikas Saeima un Ministru kabinets kā likumdevēji, Valsts meža dienests, Valsts vides dienests, Dabas aizsardzības pārvalde kā uzraugošās institūcijas, Valsts policija un ugunsdzēsēji kā uzraudzība un palīdzība atbilstoši kompetencēm. Pašvaldība kā saistošo noteikumu izdevējs, pašvaldības būvvalde un pašvaldības policija kā uzraugošās institūcijas. **Īpašnieks kā apsaimniekotājs:** īpašniekā lomā var būt valsts, pašvaldība, juridiskās un fiziskās personas, kas veic meža apsaimniekošanu, vides saglabāšanu un izglītošanu. **Lietotāji:** visa sabiedrība, izglītības iestādes, bruņotie spēki, uzņēmēji, nevalstiskās organizācijas. Lietošana galvenokārt izpaužas kā rekreācija, sportošana, sacensības, koncerti, meža velšu vākšana, vides izglītība, mācības meža vidē, zirgu un suņu pajūgu izbraucieni, virvju takas, pakalpojumu sniegšana citiem apmeklētājiem un apsaimniekotājiem.

Jā
Nē
Komentārs
3. Ieinteresētās puses, sadarbības problēmas, izaicinājumi, veiksmes
Komentārs
4. Vai varat piekrist apgalvojumam par pilsētmežu klasifikācijas grupām:
Pilsētmežu klasifikācijas grupas: 1. **Rekreācijas pilsētmeži** - ietver meža teritorijas ar ierobežotu izmantošanu mežsaimniecībā, kur kā galvenais izmantošanas veids izvirzīta iedzīvotāju aktīva atpūta pilsētmežos. Izvietojami ar sportu un rekreāciju saistīti objekti (dabas takas, skatu torņus, slēpošanas trases u.c.). 2. **Aizsargājamie pilsētmeži** - Galvenā izmantošana ir saistīta ar vides, sugu un biotopu, aizsargjoslu aizsardzību un atbilstīgu meža apsaimniekošanu. 3. **Vizuāli nozīmīgi pilsētmeži** - Galvenais lietošanas veids ir mežsaimniecība, ieteicamas ainavas cirtes, atļauta arī kailcirte, īpaši izvērtējot ciršu vizuālo ietekmi uz meža ainavu, veicot rūpīgu cirsmu un meža atjaunošanas plānošanu un projektēšanu. 4. **Kultūrvēsturiski pilsētmeži** - Galvenā izmantošana ir saistīta ar teritorijā esošu kultūrvēsturisku vērtību saglabāšanu, saudzējošu eksponēšanu un atbilstīgu meža apsaimniekošanu. 5. **Saimnieciskie pilsētmeži** - to galvenais izmantošanas veids ir mežsaimniecība un mežsaimnieciskās produkcijas ieguve.
Jā
Nē
Komentārs
5. Vai varat piekrist apgalvojumam par pilsētmežiem piemītošām funkcijām:
Balstoties uz ekosistēmu pakalpojumim var izcelt galvenās mežiem, un īpaši pilsētmežiem piemītošās dažādās funkcijas: **sociālā, vides, vides aizsardzības, vides izglītības, estētiskā un ekonomiskā.**
Jā
Nē
Komentārs
6. Ar kādām no nosauktajām funkcijām ir nācies saskarties/darboties savā praksē, kuras ir biežāk sastopamas, vieglāk īstenojamas
Komentārs
7. Vai varat piekrist apgalvojumam ka pilsētmežu funkcijas nostiprināmas teritorijas plānojumā:
Lai veiksmīgāk organizētu pilsētmežu apsaimniekošanu nepieciešams pilsētmežiem piemītošās dažādās funkcijas parādīt un **nostiprināt teritorijas plānojumā**, kas ir saistošie noteikumi.
Jā
Nē
Komentārs
8. Vai varat piekrist apgalvojumam pilsētmežu funkcijas parādāmas tematiskajos plānos:
Mežam piemītošās funkcijas parāda, apraksta **tematiskajos plānos**, nenostiprinot tos kā saistošos noteikumus
Jā
Nē
Komentārs

9. Piejūras pilsētmežu apsaimniekošanas un plānošanas īpatnības.
Komentārs
10. Vai nepieciešami papildinājumi likumdošanā saistībā ar pilsētmežu apsaimniekošanas, kādi?
Jā
Nē
Komentārs
11. Galvenie izaicinājumi pilsētmežu apsaimniekošanā
Komentārs
12. Nepieciešamie uzlabojumi pilsētmežu apsaimniekošanā
Komentārs

3. pielikums

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PLANNING OF URBAN FORESTS IN RIGA AND MAJOR EUROPEAN CITIES

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Abstract
With the increase in the number of the global population, that is likely to grow also in the nearest decades, the expansion of cities continues at the expense of forests and farmlands, and in these new areas, a more significant role is granted to the interaction between cities and countryside, revealing diverse interests of stakeholders. It is necessary to preserve, and it is even desirable, to expand the green spaces of the urbanized territories. Vienna, Stockholm, Copenhagen and Riga were selected for the study. The authors looked at the experience of the urban and green area planning through the literature review of city planning documents. Analyses of results show that planning takes place at the city, suburban or regional level and in the case of Riga, its development is similar to the development of other large European cities. The share of the urban forests in the territory of Riga city and its suburbs is comparatively large. In the European cities, which are rich in forests, the territories of the urban forests are often owned by local municipalities, and the development axes are created along highways, separating the diverse green territories. The authors offer a schematic model of the urban forest and urban area development for Riga city, which will ensure the preservation of forest areas and the non-confluence of urban areas.
Key words: urban forests, green belt, 5 Fingers Plan, urban development, social functions.

Introduction

During the last 100 years, global and radical changes have been occurring in society, and a large share of committed rural people has become typical city or town inhabitants. The processes of urbanization cause a lot of challenges and issues (the merging of urbanized territories, decrease of the areas of green spaces and their quality, and their fragmentation) revealed in the interaction of cities and their peripheries (Carreiro *et al*., 2008). The resilience of the cities is argued due to the socio-political consequences, climate change and also COVID-19 pandemics. Nature-based solutions are more frequently considered to be sustainable (Bayulken *et al*., 2021). The density of many built -up areas is increased, but not expanded at the expense of the green spaces. In the green territories of cities and their suburbs, alongside with environment protection, the social function has become one of the most vital functions diminishing the role of commercial wood production. The dominance of the social function of forests is critical, particularly under the Covid-19 conditions; and not only specialists are aware of the values of the forest, but also a wider community is developing awareness of the values of nature and the significant role of forest management.

The impact of COVID-19 has disclosed how critical for the wellbeing of people are the urban forest territories located on the outskirts, and, under the emergency situations, they are in a much higher demand than ever before. The recreation areas in urban forests are extremely significant. Taking into account the latest experience of the virus prevention in the nature park Ogres Zilie kalni gained by I.Kraukle working as a park director, the development of disperse recreation zones that limit the concentration of visitors, is particularly important.

In terms of spatial planning, comprehensive and integrated planning of the city and its periphery shall be addressed (Akmar *et al*., 2011; Hawkins & Selman, 2002). Intensive balancing and satisfaction of needs is vital that can be achieved via a modern approach for spatial planning: an integrated evaluation of environmental, economic and social aspects (for instance, transport planning, use of sustainable resources, pollution reduction, landscape planning, taking into account the interests of the community (Konijnendijk *et al*., 2006). In the 21st century, the structure of the 'City Fabric' has become looser resulting in less used areas within the city of Riga. However, zones of intensive urbanization are appearing in Pieriga that is located very close to Riga. Diverse phenomena such as economic, social and physical links, housing, employment and recreation are functioning beyond the administrative borders of Riga and Pieriga. The current experience of Latvia shows that, contrary to the experience obtained by other European countries (Akmar *et al*., 2011; Carreiro *et al*., 2008), too little attention has been paid to the planning of urban forests.

The urban forest is a natural or partly natural, or artificial ecosystem in all its stages of development. It is dominated by trees, the height of which in a particular location and time can reach at least 7 m and the projection of its current or potential canopy is at least 20% of the area covered by a forest stand (Meža likums, 20000. In the urban forest, the main functions are the social and environmental ones. The urban forest serves as a public outer space in an administrative environment and the urban territory beyond it.

A high number of residents are concentrated in a small territory adjacent to Riga. In the past, we could talk about urban forests within the territory of Riga and suburban forests in the periphery of Riga. The

urban forests near the living areas were used mainly for walking and cycling on workdays, but suburban forests for recreation on weekends, reaching the forests by cars or public transport.

The urban forests are a constituent component of the multi-functional urbanized territories that improve life environment in the city. Forests are sustainable and self-sufficient structures on condition that people do not interfere with their natural processes. In the city environment, people exert their impact on it even without intensive cutting of trees, but they do that through their constant presence, recreation activities, and emission gases from cars, heating equipment and production facilities (Straupe *et al*., 2012).

Due to the changes and dispersion in the structure of the populated areas and due to the increase of the number of vehicles used by people, differences between urban and suburban forests have been decreasing. The populated areas have stretched into the suburban forest zones and are accessible via a 15 minute walk. The same 15 minutes are sufficient to reach a suburban forest on the outskirts of Riga by car (Jankovska, 2013). Because differences between the use of urban and suburban forests are decreasing, suburban forests require an equal approach to their planning and management, and they can be considered as urban forests (Jankovska, 2013).

The aim of this study is to analyse the systems of the urban forests in, Vienna, Stockholm, Copenhagen and Riga, which extend to the settlement structures of the cities as 'green fingers' or 'wedges', or separate the city settlement areas that tend to expand and merge and to offer a model for Development of Urban Forest Areas in Riga, on the basis of the international experience The 'green wedges' of urban forests is a mode of planning with the aim to limit the continuous expansion of urban areas that do not leave space for natural areas that are necessary for maintaining the environmental diversity and provision of services for forest ecosystems.

Materials and Methods

Territories in Vienna, Stockholm, Copenhagen and Riga have been chosen for the analysis of these capital cities with their nearest development zones, including the existing or purposefully developed green areas that restrict the merging of the urban areas. The selected cities are similar to Riga with many of the city forests, other green and water areas. Similar urban and suburban development is taking place in the areas, preserving green areas of different scales, with an emphasis on urban forests.

The available planning documents (Wieshofer *et al*., 2015; Stockholm, 1999; Stockholm City Plan 2018; Stahle, 2002) (and others described more detailed for each city below) characterizing the urban forest areas, were analysed as well as the city planning documentation and public mapping materials on the green areas in the above mentioned cities have been evaluated and compared. In the study, planning documents from 1990s until present days are reviewed.

Results and Discussion

The Urban Forests in Vienna, Their Planning and Governance

The green areas cover almost half of the territory of Vienna, including a vast range of green structures from small neighbourhood parks and green areas along the streets and in the yards, and trees and alleys to major historical parks, nature protection areas and urban forests near the city border (Erhart, 2002). In 1950s, the territory of Vienna was expanded by attaching large forest areas to it. The purpose of the city politicians was to keep the green belt around the area with the erected buildings, and new and large parks were constructed (Erhart, 2002).

The forests owned by the city of Vienna are being managed by the Office of Forestry and Agriculture. Specific management plans are developed for all these areas. Since 1960, more than 500 ha of forests have been planted for recreational purposes (Weidinger, 2011).

In the City of Vienna, the planning tool is the Law on the Industry of Building, the Community Development Plan and the legally binding Land Use Plan that are combined into one document (Wieshofer *et al*., 2015).

Informal planning documents that are not authorized by law are: the City Development Plan 94 (Stadtentwicklungsplan 94, STEP 94), the Plan Greenbelt Vienna 1995 and the Plan for Strategic Development of Vienna. The City Development Plan 94 sets the framework for the development of a planned land-use, and it prescribes 11 development axes for the city development, and between these axes large green areas are planned that shall be preserved and united in a network of green structures (Wieshofer *et al*., 2015). The Vienna Green Belt Plan 1995 demonstrates the network of green areas that shall create a belt around the built-up areas (Erhart, 2002).

It was followed by STEP 05 developed since 2005, and it included the mission statement 'The Green Spaces of the Urban Region' aimed at *Development for Sustainability*. Pursuant to the mission, landscapes are constituent components for the development of the economic region and they form a foundation for protection of long-term high quality standard of living within the city region (Wieshofer *et al*., 2015).

The purpose of the mission statement "Green Spaces of the Urban Region" is to protect and develop landscapes, and to establish the settlement border of the city territory. The STEP 05 mission statement

"Green Spaces of the Urban Region" remains the same regarding its principles for STEP 2025) (Wieshofer *et al*., 2015).

When drawing parallels with the case of Riga (described below) and its region, a conclusion can be made that both cities have comparatively large areas of urban forests with all functions typical of urban forests, and these functions are supported by the forest areas, and these spaces are managed by a municipal forestry organization. The planning situation is also similar, as no unified planning authority for the city and its region has been established neither in Vienna nor in Riga. Thus, high quality planning and the use of green spaces and urban forests for community needs are hampered.

Urban Forests in Stockholm and the System of the Green Areas

With the aim to find similarities in the Stockholm case and the Riga case regarding their population number, characteristics of the climate and plant species, this study has characterized the green structure of the capital city of Sweden, Stockholm.

The green structure covers 1/3 of the territory of the city, 60% of the urban forests of Stockholm are owned by the municipality; thus, the use of these areas for the public recreation functions is enhanced.

Earlier, the Swedish urban forests were used mainly for production functions. In 1990s, the social values and functions of forests were identified, and new developments in the management of urban forests appeared. As Falck defines the urban forest, it includes all forests growing in the territory of the city and its suburbs. And he adds that the vegetation of land in urban forests is uncultivated (Rydberg & Falck, 2000).

In the 30s of the 20th century, territorial planning in Stockholm was started, and radial development schemes with wedges of green spaces, separating the development areas, were drawn up. In the city development plan, fingers of intensive settlement were drawn along the highways keeping green wedges of non-urbanized areas between them not to allow merging of the urbanized areas. The green wedges have been developed up to now, and they are extending across the whole region forming easy accessible and usable green areas with high ecological value (Nordh & Olafsson, 2020). As Figure 2 shows, the green structure of Stockholm comprises the natural habitat, green wedges, recreation areas and green connections.

In 1998, the mapping of degraded areas was initiated. In 1999, the mapping of the city of Stockholm under the title 'Build the City Inwards' (Stockholm, 1999) was started with the aim to develop the city without its expansion at the expense of the green spaces and urban forests particularly, but through an intensive use of the degraded or rarely used city areas (Stockholm 1999). In the Stockholm City Plan 2018, an increased city density was also stated as a possibility for development (Stockholm City Plan 2018).

In 2001, the City Council approved the first regional development plan for the Greater Stockholm (Nelson, 2009). The regional plan included two main objectives: to form regional development centres and to maintain the green structure and values of the territory within the city and outside of it. The major priority of the Stockholm Plan was to combine and preserve two functions of the green areas: recreation and preservation of biological diversity.

Stockholm has created the Green Map as a planning tool, consisting of three parts: the map of biotopes, the map of reuse of resources, and the map of socio-topes (Xiu *et al*., 2017) based on the concept of socio-topes that has been introduced into planning (created in 2004 and 2005). The maps of socio-topes are used for planning at the level of boroughs, and they focus on the qualities of urban forests and other green spaces, and on their development. At present, maps of socio-topes have been created not only in Stockholm, but also in Uppsala, Malmo, Gothenburg (Xiu *et al*., 2017).

Contrary to the concept of 'biotope' (ecologically defined environment*)*, the socio-tope has been defined as a homogeneous place (topos) of a particular culture, community or group of individuals (socio) regarding the objectives for the use of that particular place, its social meaning and values. Pursuant to this concept, questions: 'For whom?', 'For what purpose?' and 'Where?' are put (Stahle, 2006).

In the urban environment, the urban forest should be available at the distance of 1 km, providing swimming, fishing, skating and skiing possibilities, cultural-and-historical objects, broad views, waters; or a nature reservation with the area of more than 50 ha (Nelson, 2009; Ståhle, 2010).

The most important requirement for the urban forest is to have a sufficient area in order to meet the needs of the inhabitants of the city and suburbs, to preserve the environment and to provide comfort for people. The objective of the city of Stockholm is to have dense green structures of high quality for the achieving of which the following major strategies are described in the Park Programme (Stahle, 2002):

- Expansion of the green zones,
- Diversity of activities and elements,
- Concentration- renovation of the territories of the existing open spaces, enhancing their quality and accessibility,
- Management for maintaining well-functioning structures.

The map of the socio-tope and the guidelines of the Park Programme have been used for several city planning projects, and based upon them, the maps of

socio-topes and the concept of green wedges have been created in other cities (Uppsala, Malmo, Gothenburg and Helsinki). For the planning and management of the green territories of Riga and other cities and towns of Latvia, it is recommended to use the Stockholm experience for the evaluation of the quantity of the green territories and for enhancing their qualities, taking into account the interests of individuals and community.

The Green Structure of Copenhagen Urban Forests

The Green Network Plan was first drawn up in Copenhagen in 1936. A comprehensive recreation network plan was developed that included a system of nature parks connected in the north and northwest of Copenhagen. The Plan marked territories with highly valuable landscapes and the connecting corridors as greenways and ecological corridors, and the main landscape management principles for them were developed after several decades (Vejre, Primdahl, & Brandt, 2007).

The origin of the regional structure of the Copenhagen 5 Fingers Plan dates back to the 1940s (Cahasan & Clark, 2005). At the end of the 1960s, due to rapid development, the green wedges in several locations had turned into narrow lines, however, in the beginning of the 1970s, the planning and legislative instruments stopped the destroying of the green territories and reduction of areas (Vejre, Primdahl, & Brandt, 2007). The green infrastructure planning at a municipal level is influenced by the national rules and guidelines as well as regional plans (Nordh & Olafsson, 2020).

The 5 Fingers Plan includes several basic principles that contribute to the integration of new green elements into the existing structures of the city and its suburbs (Cahasan & Clark, 2005):

- The urban environment is developed into narrow zones-fingers,
- The undeveloped green wedges are retained between the development fingers,
- The development of the fingers occurs along the public transport zones (with a focus on railroads),
- The peripheral urban areas are developed as individual elements of the common structure (as 'individual pearls in a bead'),
- The population shall reside close to the green spaces.

H. Verje states that, in general, the new landscapes can be characterized as modern gardens, forest recreational landscapes with some pasture and arable soil remains (Vejre *et al*., 2007). The functionality of the landscape has also changed respectively: the primary function is recreation, followed by the function of the nature biotopes for providing ecosystem services, then housing functions follow and, to a limited extent, production functions do.

The latest versions of the icon of the 5 Fingers Plan encourage us to reconsider also the situation in the Greater Riga where some parallels can be drawn with the green structures of Stockholm, Copenhagen and Vienna and their green structures in the peripheries.

Characterization of Urban Forests in Riga

In the opinion of the architect Arnolds Lamze, revealed in the General Plans of Riga back in 1924 and 1936, the plan shall be developed for a larger economic region (Lamze, 1932). The urban forests in Riga and the Greater Riga have been retained and expanded due to the intentional afforestation of dunes. Until the 1980s, for the purpose of restricting erosion caused by winds, mainly pines (*Pinus silvestris*) were planted, and their plantations were supplemented by grasses, willows (*Salix*), sea buckthorn (*Hippophae*) and other shrub species (Mangalis, 2004). Preservation of the forests was also fostered by the Soviet normative enactments, strictly limiting production activities in urban and peri-urban forests with the aim to create the 'green shield', as well as to keep timber resources that could be available easily and quickly in case of military conflicts.

The lifestyle area of the urban environment of Riga and its periphery that includes the shared 'urban fabric' of the City municipality and the neighbourhood municipalities, and the green territories create a unified structure that is not limited by any administrative borders.

The scheme of the settlement areas and forest wedges has been included in the map, schematically specifying densely populated, larger and smaller spaces, and the urban forest in Riga and its periphery. Thus, a focus is on the urbanized territories, which extend from Riga to the suburbs of Riga along the main road axes, showing the scattered urban forests in the periphery of Riga, as well as the dense wedges which are stretching from the green way of Riga.

Having generalized the scheme of the settlement areas in Riga and the forest wedges, the authors of this article offer a model for the territories of the urban forests in Riga and its periphery. In the scheme of the urban forests and green territories of Riga, the authors have found some similarity with the 5 Fingers Model of the Greater Copenhagen, and even five coastal extensions of settlement are present in this scheme.

As Figure 1 shows, the Riga Model includes radial extensions of the settlement areas, elements of the circle of the urban forests supplemented and connected with forest wedges structures.

Having compared the above model with the recommendations for the spatial planning of the Riga Planning Region, drawn up in 2007, the author I. Kraukle argues that the green wedges do not extend from Riga urban area, but, on the contrary, they extend into Riga from the large forests of the green belt, surrounding Riga.

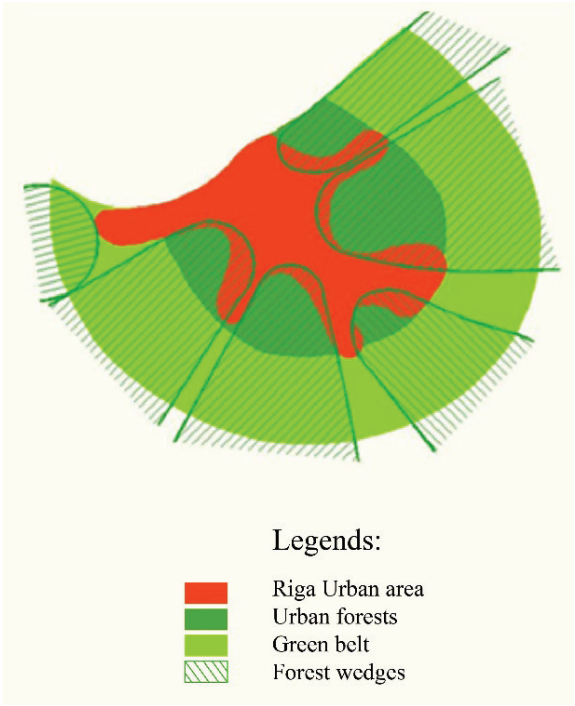

Figure 4. Model of Territories of Urban Forests in Riga (Authors made, source Kraukle, 2013) (Kraukle, 2013).

The scheme of the green network of Riga included in the Strategy for Sustainable Development of Riga City 2030 shall be supplemented. In spite of the fact that the outer green circle is outside of the border of Riga, the existing link between the forests of the green belt, which provide a higher vitality and effectiveness of the urban forests, is not depicted.

Kraukle reveals (Kraukle, 2013) the radial settlement extensions and the circle of the urban forests that separate these extensions and are actually created by the green zone forest wedges that sprawl to the Riga urban area.

The level of provision with amenities and facilities in the urban forests of the Riga urban area is still low, and insufficient attention is still paid to them. In many places, the only way how to protect the forest from the anthropogenic load is to update the existing amenities and facilities (Bell, 1997; Emsis, 1980). Also, measures for the soil re-cultivation/ tillage are critically necessary in many places in order to prevent soil erosion (Emsis & Tuktens, 1988).

During the recent years, the municipalities of Riga and Pieriga have been creating recreation zones within the territories of the urban forests.

Conclusions

Viable forest territories, covering spaces with sufficiently large areas and tree stands of diverse structures and ages, and biological diversity shall be maintained not forgetting about amenities and facilities for recreation needs of the population. Diverse smaller structures (green corridors) that connect the urban forests and the largest parks shall be created and maintained. The green corridors are vital for the maintenance of biological diversity in the cases of excessive fragmentation of the green territories. The accessibility of the green territories via walking or driving 10–15 minutes becomes especially important.

As the analyses of the international experience shows, planning in European cities takes place simultaneously with the planning at the levels of the urban and suburban areas or regions. It is so in Copenhagen and Stockholm where the planning and governance of large green structures, including the urban forest territories, is implemented more successfully. All the examples, discussed above, refer to the territories around the country capitals. These particular territories of increased development include large green spaces, which are preserved in spite of the expansion of the urban areas.

In Vienna, the planning documents–are legally binding or informal. The informal planning documents include the plan of the Vienna Green Belt 1995 and the City Development Plans for a decade that–prescribe diverse activities in each stage for preservation and development of the green spaces.

Since 1998, in the plans of the City of Stockholm, the focus has been on the mission "Build the City Inwards" that emphasises the need to develop the city without any expansion of its territory, particularly preserving the green and urban forest areas and actively reusing the degraded and almost abandoned city territories. Stockholm has been using the Green Map as a planning tool since 2004 including information on biotopes, renewal of resources and socio-topes.

The Copenhagen Green Network Plan includes a system of interlinked nature parks, ensuring non-confluence of urban areas. The Copenhagen 5 Fingers Plan prescribes the development of the urban environment in narrow zones or fingers following the zones of public transport between which undeveloped green wedges are preserved ensuring that people have a possibility to live very close to the green spaces.

Planning documents in Riga do not strengthen and preserve the status of green territories enough. A territorial planning document in Riga is necessary in order to expand the status of the green territories not allowing their reduction. The Riga Model presented by authors will provide preservation of forest wedges, which will separate urban areas in Pieriga – Riga urban area.

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LEGAL FRAMEWORK OF URBAN FORESTRY MANAGEMENT IN LATVIA

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Abstract
Urban forestry is a relatively new branch where such issues as planning, governance and management of urban forests play an important role considering spatial planning of urban or suburban territory. The aim of the article is to find out the extent to which urban forests are reflected in European and Latvian regulatory enactments and planning documents, as well as to define the main recommendations for further actions; therefore, the regulatory enactments and planning documents of the European Union and Latvia were studied. Research showed that urban forests do not have any specific regulatory and planning framework at a European or Latvian scale. The standards that apply to urban forests can be found in regulatory enactments applicable to forest management, environmental protection, preservation of biological diversity, protection zones, plant protection, etc. In both European and local strategies, the forest issues as such and the issues of urban forests in particular appear as general, indirect issues, usually as the matters of biodiversity preservation or environmental sustainability. At the scale of Latvian legislation (laws and regulations of the Cabinet of Ministers), forests are mentioned in general, except for certain forestry laws, where forests are the main subject, which contain some provisions that are also directly applicable to urban forests. Urban forests are not reflected in these documents; to some extent they only appear in the plans as forest protection zones around cities.
Key words: Urban forests, urban forestry, legislation, planning documents, management of urban forestry.

Introduction

Compared to the general history of forestry, urban forestry planning and management is a new branch not only for Latvia, but also in the world scale. Urban forests do not have any specific regulatory standards and planning framework, it can be seen within the regulatory context of European Union, state and municipal forest management and development planning. The European Commission (EC) recognizes green infrastructure as one of the planning tools that contributes to the implementation from many field of the policy, such as biodiversity and nature protection, regional development, climate change adaptation, catastrophe risk management, etc. (EC. Green Infrastructure (GI) – Enhancing Europe's Natural Capital. Communication From the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Region, 2013). EU member states are expected to contribute to the implementation of these policies. Green infrastructure is defined as 'a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services' (EC. Green Infrastructure (GI) – Enhancing Europe's Natural Capital. Communication From the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, 2013).

Forest legislation has always been and still is a part of forest policy. Forest legislation is a set of legal rules regulating the relationship between the forest and a human. As it follows from Heinrihs Strods (Strods *et al*., 1999), forestry policy is a part of the economic policy of the state or its influential groups, a set of management tools and methods of action. Forest legislation has always been particularly closely linked to public economic policy. In Latvia, more serious actualization of nature protection issues in forest legislation began only shortly before the 1990s. Respecting of public interest in forestry has only begun in recent decades. Public participation in forestry processes is a topical issue that is still difficult for conservative foresters to accept, but it is increasingly a matter of solving difficult situations.

The aim of the article is to find out the extent to which urban forests are reflected in European and Latvian regulatory enactments and planning documents, as well as to define the main recommendations for further actions.

Urban forestry has become a professional and scientific field and partly horticulture, and it is used for urban management and the management of urban forests (Konijnendijk, 2003).

This concept gradually acquired importance in Europe in the 1990s (Konijnendijk, 2003; Krajter & Konijnendijk, 2015). However, there are different interpretations of what is or should be considered urban forests and urban forestry (Randrup *et al*., 2005).

It is widely acknowledged that urban forestry is a cross-sectoral and cross-disciplinary concept, and the forestry sector is only a stakeholder in the urban forestry mosaic (Randrup *et al*., 2005). An important role in this belongs to forestry and foresters, a number of other industries and / or disciplines, such as landscape architects, urban planners, gardeners, arborists (Krajter Ostoi *et al*., 2020).

The authors believe that an urban forest is a natural, semi-natural or artificial ecosystem at all stages of its

development, dominated by trees that can reach a height of at least seven meters and have a current or potential crown projection of at least 20% of the forest stand. Forest, which serves as a public outdoor space within and outside urban administrative boundaries, where the primary social and environmental functions require regular maintenance and renewal, preserving or enhancing the social, aesthetic, cultural and economic value of the territory (Kraukle, 2013).

In terms of urban forests, nowadays we can no longer talk about traditional forestry but about social forestry, whose main tasks are related to the provision of social functions and services (Konijnendijk *et al*., 2006), as well as environmental education (Akmar *et al*., 2011).

More and more studies provide data that there are areas in urban forests with relatively high biodiversity (Alvey, 2006); it is also considered to be one of the functions of urban forests.

Materials and Methods

To investigate the level of understanding and implementation of regulatory frameworks and policies of the European Union and Latvia applicable to the forestry sector, especially to urban forest issues, the policy documents were reviewed and analysed. In order to assess the regulations and policies related to urban forests and the effectiveness of institutional arrangements to enforce them, available and documented policies, legislations and strategic plans of three local counties of Latvia – Ikskile, Ogre and Jurmala, were reviewed. The planning documents of Ikskile, Ogre and Jurmala were selected for the study, because the urban forest areas are located in a large part of the territory of these municipalities; therefore, it is useful to study the local planning documents of these territories, taking into account that Ikskile county has merged with the new Ogre county.

Results and Discussion

International framework. The international and especially EU regulatory framework is also a regulatory instrument in Latvia; it sometimes serves as a basis for the provisions of local laws.

The Rio Convention on Biological Diversity, which has been in force in Latvia since 1995, stipulates that Latvia must take measures to ensure the preservation of biological diversity. Existing national strategies, plans and programs for biodiversity preservation must be developed or adapted (The Rio Convention on Biological Diversity, 1995). Urban forests are not explicitly mentioned in the convention, it is mentioned only in the context of preserving environmental diversity.

The Berne Convention on the Conservation of European Wildlife and Natural Habitats, the aim of which is to protect wild species and their natural habitats, has been in force in Latvia since 1996. Urban forests are not explicitly mentioned in the Convention, they are mentioned only in the context of the protection of wildlife and natural habitats. These are just two of a number of international documents to which Latvia has acceded and which indirectly and generally regulate the sustainable management of all forests, including urban forests.

The aim of the European Landscape Convention is to promote landscape protection, management and planning, and to organize cooperation on landscape issues in Europe. The Convention applies to the territories of all the parties and includes natural, rural, urban and suburban areas. It includes land and sea areas and inland waters. It applies to landscapes that can be considered outstanding, as well as to everyday or degraded landscapes (European Landscape Convention, 2000).

Green Paper on Forest Protection and Information in the EU: Preparing forests for climate change; the aim of this Green Paper is to launch a debate on the EU's approach to forest protection and forest information in line with the EU Forest Action Plan. Forest protection in the EU must be planned to ensure that all the productive, social economic and ecological functions of forests are maintained in the future (Green Paper, 2010).

Law on the Convention on the European Forest Institute (EFI), acceding to the Convention is necessary for Latvia to become more actively involved in international cooperation in forestry and the research of forest, including urban forest. The tasks of the EFI is to promote, lead and cooperate in research on forests, forestry and forest products at European scale, and to report on the results of research, in particular in the field of policy formulation and implementation, to promote the preservation and sustainable management of forests in Europe (Convention on the European Forest Institute, 2005).

The area of the development of forests and urban forests is also influenced by various statements and decisions of the European Commission and the Parliament.

Vienna Resolution – The MCPFE Ministerial Conference on the Protection of Forests in Europe in Vienna in 2003 emphasized the interrelationship between the forest sector and other sectoral policies. The documents of this conference mark the necessity to balance the economic, ecological and social role of forests and to continue working to protect European forests and ensure their sustainable management. The role of sustainable forest management in overall sustainable development was stated in Vienna. The Vienna Declaration on European Forests – Common Benefits, Shared Responsibilities and a number

of resolutions were signed on this conference, including: strengthening synergies for sustainable forest management in Europe through cross-sectoral cooperation and national forest programmes; preserving and enhancing the social and cultural dimensions of sustainable forest management in Europe (Ministerial Conference on the Protection of Forests in Europe, 2003).

On 11 December 2019, the European Commission presented the European Green Deal, proposed as a new EU growth strategy to transform the EU into a climate-neutral, fair and prosperous society with a modern, resource-efficient and competitive economy (European Green Deal, 2019). The Green Deal is a cornerstone of the European Commission's (EC) strategy to achieve the United Nations 2030 Agenda and the sustainable development. The issue of forests is considered indirectly, through the prism of climate neutrality. United Nations Forum on Forests (UNFF) Subdivision of the United Nations ECOSOC organization, a Working Party on Forestry. https://www.consilium.europa.eu/lv/council-eu/preparatory-bodies/working-party-forestry/

In the European region, voluntary cooperation at the political (ministerial) level takes place within the framework of the Ministerial Conferences on the Protection of Forests in Europe (Forest Europe). As part of the Forest Europe process, the Oslo ministerial decision was taken at the 2011 Oslo Conference and a new EU Forest Strategy for the State of Europe's Forests 2020 was developed in 2013, (EU Forest Strategy for 2030, 2021).

Under the auspices of the United Nations, various internationally important documents have been developed, which indirectly include the conservation and development of forests and urban forests. There are many protocols to the United Nations Framework Convention on Climate Change. For example, the Kyoto Protocol to the United Nations Framework Convention on Climate Change of 11 December 1997 stipulates, among other issues, that a specific target is set for forest management, the so-called forest management reference level of 16.302 million tonnes of CO2 eq.

National framework. In Latvia, with the legislation related to planning, it is difficult to find any indications about the forest, especially on planning of urban forests. Forests in Latvia, including urban forests, are planned and managed in accordance with the guidelines for forest management in the documents mentioned further on.

The Sustainable Development Strategy of Latvia for 2030 generally determines the need for the development of the forest sector while preserving biological diversity (Sustainable Development Strategy of Latvia until 2030, 2010).

The National Development Plan of Latvia 2021-2027 generally determines the need for the development of the forest sector. Direction 'Nature and environment – The Green Deal', Preservation of biological diversity, Implemented environmental, sustainable management of natural resources and energy policy, creation of green zones in urban environment (National Development Plan of Latvia 2021-2027, 2020).

Latvia's Forest Policy - adopted in 1998 defines the long-term strategic and tactic goals of forest sector development and the basic principles which among others included objectives such as to ensure avoiding of reduction of the forest areas by defining the limits of forest land transformation; to ensure the preservation and increase of the productivity and value of the forest lands; to promote afforestation of lands which are not used in agriculture of other unused lands, to apply the promotion mechanisms at the disposal of the state. The economical goal of the Forest Policy is to ensure the sustainable development and profitability of the forest sector considering the ecological and social requirements, as well as to create the higher possible growth of added value (Latvia's Forest Policy, 1998).

One of the most important principles included in the Forest Policy is that forest management needs to be improved, considering the role of the forest ecosystems in local and global processes – carbon sequestration and stabilization, protection of watercourses and water bodies, soils and landscapes, etc. In forestry, methods reproducing natural processes are desirable, bringing ecosystems closer to their natural structure and preserving elements that maintain biodiversity (Latvia's Forest Policy, 1998).

There are also some social principles issued within the Forest Policy, for example, that in forest management, the cultural and historical value and the protection of landscapes should be taken into account, or that the state promotes the development of social infrastructure in forest.

Guidelines for the development of the forest and related sectors for 2015-2020 - a medium term policy planning document, which formulates the medium term (2015-2020) strategic goals (development policy) for the development of forests and related sectors, the basic principles of the development policy, directions for actions to achieve the goals of development policy, problems hindering the achievement of these goals, as well as the results of the policies and activities, thus marking the future development of the forest sector.

Forest and its products and services are an important source of social welfare. Forest gives wood for construction and furniture making, as well as wood biomass for energy production, a place for living and also food. Forest protects water resources and soil from erosion, it is also a home for a significant part of

biodiversity. Forest is the source of income for people and their families, as well as it provides recreation possibilities. Due to these functions, forest policy and forest management at the global, national and regional levels are changing along with the change of society needs.

Environmental Policy Guidelines for 2021-2027 generally determine the need for the development of the forest sector based on sustainable development activities, preserving the quality of the environment and biodiversity, ensuring the sustainable use of natural resources (Environmental Policy Guidelines for 2021-2027, 2021).

Landscape Policy Guidelines for 2013-2019 generally determine the need for the development of the forest sector. One of its goals is creation of multifunctional and high-quality landscapes that improve the life quality throughout Latvia, promote economic activities and recognition of places, regions and the state, as well as ensure biodiversity (Landscape Policy Guidelines for 2013-2019, 2013).

The Law on Forests - its aim is to regulate the sustainable management of all Latvian forests by assuring equal rights, inviolability of property rights, independence of economic activity and defining equal obligations to all forest owners or legal possessors. (Law on Forests, 2000). References to urban forest planning and its link with spatial planning are given in Section 2 Paragraph 4 of the Law, which provides that 'Binding regulations of local governments shall also provide for additional conditions for the forest management in city and village territories' and in Section 2 Paragraph 5 (Law on Forests, 2000) – 'Forest management may not be in contradiction with the requirements specified in the spatial development planning documents'.

The Protection Zone Law, among other things, defines forest protection zones around cities (Protection Zone Law, 1997).

The Law on Specially Protected Nature Territories provides for the activities in specially protected nature territories located in forest lands (Law on Specially Protected Nature Territories, 1993).

The Environmental Protection Law, the Law on Protection of Species and Habitat, the Plant Protection Law – forest and urban forest issues are included indirectly through environmental and habitat protection issues (Environmental Protection Law, 2006).

Applicable Cabinet regulations are usually linked to a specific sector of forest issues, which they define specifically.

- Cabinet Regulations No.248 'Procedure for Assessment of Sustainable Forest Management' define the procedure for sustainable forest management (Cabinet Regulations No. 248 'Procedure for Assessment of Sustainable Forest Management', 2003).
- Cabinet Regulations No.63 'Methods of Establishing Forest Protection Belt around Cities' define the methodology for the establishing of forest protection zones around cities (Cabinet Regulations No. 63 'Methods of Establishing Forest Protection Belt around Cities', 2003).
- Cabinet Regulations No.264 'General Regulations on Protection and Use of Specially Protected Nature Territories' define the actions on the specially protected nature territories in forest lands (Cabinet Regulations No.264 'General Regulations on Protection and Use of Specially Protected Nature Territories', 2010).
- Cabinet Regulations No.628 'On Local Government Territorial Development Planning Documents' relates to the forest, urban forest, more often – to specially protected nature territories included in the planning documents (Cabinet Regulations No.628 'On Local Government Territorial Development Planning Documents', 2014).

The hierarchy of regulatory enactments and planning documents related to urban forests is presented in Figure 1.

Territorial planning documents have been selected from Ikskile, Ogre (within the territorial reform 2021 Ikskile is included in the territory of Ogre county) and Jurmala city, as these areas contain territories of urban forests (right now they do not have a specific title of urban forest territories though), and they can be used as pilot territories in Latvia to examine urban forestry management in the future. Besides the territories of Ogre and Jurmala urban forests are located on specially protected nature areas. During the research the guidelines for territorial planning of certain territories in relation to urban forests were studied (Table 1).

The documents on territorial planning contain a very limited and general information on forest areas. The long-term development strategy of Ikskile county for 2011-2030 determines that the main values of the county are natural and landscape resources (The long-term development strategy of Ikskile county for 2011-2030, 2011).

The strategy of sustainable development of Ogre county for 2013-2037 sets the goal-of responsible nature management. The use of natural resources (forests and natural resources, including those found in swamps and waters) must be careful and complex, making maximum use of all the extracted materials and performing high-quality restoration / development of forest stands or transforming the used areas into other economically usable territories (Ogre 2013). The strategy of sustainable development

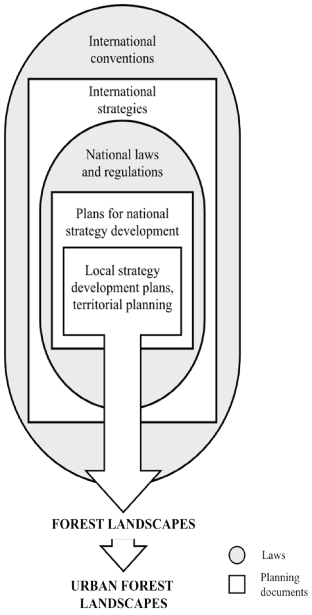

Figure 1. The hierarchy of regulatory enactments and planning documents related to urban forests.
Source: Created by author.

of Ogre county for 2013-2037 guidelines that in the long run Ogre county will take care of the reasonable, complex and reduced-impact use of natural resources in the economic activities and will protect landscapes and biotopes that are important for the preservation of the biological and landscape diversity of the county and high-quality living environment (The strategy of sustainable development of Ogre county for 2013-2037, 2013).

Sustainable Development Strategy of Jurmala City for 2010-2030 states that the city successfully combines careful use of local rich natural resources (forests, vast beaches, mineral water and healing mud, coastal climate), the preservation of cultural and historical heritage and gaining economic benefits from resorts, sports, health, cultural and conference tourism services. Priority sets the protection of natural values insuring the preservation of the resort environment, without fragmenting large forest massifs (Jurmala, 2010). Forests appear on the map of Jurmala resort possibilities, Appendix 2 'The Resources for the Development of a Resort Town' and Appendix 'Green Areas of the City'.

Concerning the local spatial development programmes forest areas as such do not appear in the title of the such programmes, it refers to specific actions that appear under the section Specially Protected Areas as a general description.

- Ikskile County Development Program for 2019-2025 – action 'Natural resources and environmental protection' provides the implemented environmental protection projects in the nature park 'Ogres Zilie kalni' (Blue Mountains in Ogre) (Ikskile County Development Program for 2019-2025, 2019).
- In Ogre County Development Programme for 2014-2020, in section 'Forests and swamps', notes that the diversity of bedrock, relief forms and the differences in rainfall resulted in great diversity of soils and vegetation. Forests play an important role in the formation of landscape and economic activity (Ogre, 2014). The areas of the Blue Mountains are mentioned in Specially Protected Areas section and are also marked as a recreation area (Ogre County Development Programme for 2014-2020, 2015).
- The Development Programme of Jurmala City for 2014-2022 only provides for certain activity Implementation of the infrastructure improvement plan of the Nature Reserve 'Ragakapa', which envisages the creation of walking paths, observation tower, information signs, toilets provided by the Nature Protection Plan, which will be implemented by Jurmala City Council (Development Programme of Jurmala City for 2014-2022, 2013).

The territory planning documents in Latvia usually show forest areas and specially protected nature areas, but, in some cases, they include only nature areas without separating forest areas. Forest protection zones of adjacent cities appear in regional plans.

- Ikskile County Territory Planning documentation contains regulations for the use and building development of the territory, where nature and greenery territories and forest territories appear, as well as other forest protection zones around the

Table 1

Representation of forests in the territorial planning documents

Territory planning	Representation of the forest protection zone	Representation of the specially protected areas	The forest territories are shown in the plan
Ikskile county	The planned use of the territory on the map	The planned use of the territory on the map	Forest territories
Ogre county	The planned use of the territory on the map	The planned use of the territory on the map	Green areas
Jurmala city	Encumbrances on the map	Encumbrances on the map	Natural territories and green spaces

cities; the explanatory article briefly mentions the nature park 'Ogres Zilie kalni' (Blue Mountains in Ogre) (Ikskile County Territory Planning, 2021).

- In the Territorial Plan of Ogre County, only the green areas appear on the map, while forests are not even singled out. The map also shows the forest protection zone around the city of Ogre (Territorial Plan of Ogre County, 2012).
- The Territorial Plan of Jurmala defines only natural area and green spaces, which include also forests (Territorial Plan of Jurmala, 2016).

Conclusions

EU scale resolutions, conventions and conferences, as all strategic documents, are very general and therefore can be applied in general to the necessary areas, including urban forests. Latvia has ratified and actively supports many resolutions and conventions and is using them in its legislation and strategic planning; ideas on urban forests are also indirectly and generally expressed in these planning documents, as it is used to be in strategic documents. It would be important to mention the role of forests already in the top-level documents, such as the Berne Convention on the Conservation of European Wildlife and the Rio Convention on Biodiversity, emphasising the topicality of forests and urban forests in maintaining and preserving biodiversity and natural habitats as well as in the main governing documents. It is important because forest is relatively stable ecosystem, and it requires much less resources to maintain than man-made parks.

Considering the international conventions and resolutions, national scale planning documents are also very general and mention forests in some cases only, never singling out urban forests, which in some cases are more important than regular forests, given their location in the urban environment, where their contribution to biodiversity is especially important.

Laws and Cabinet regulations already contain more specific information on forests, but the concept of urban forests does not yet appear although forests located in or near urban areas are definitely mentioned (forest protection zones around cities). Failure to single out urban forests makes it difficult to identify their specific functions and, consequently, to manage ensure their further proper management.

Local planning documents and binding regulations at the strategic level mention forests in general terms when referring to the forests located on the territory, and also indirectly mentioning specially protected areas. As indicated in Table 1, separately allotted forest areas may not appear in the territorial plans at all, they are included in the maps under other names - green spaces or natural and green areas. The name 'urban forests' does not appear at all, but it would be the most precise way to define the forest areas located in a city or nearby, also demonstrating the special functions of urban forests.

When reviewing the above regulatory enactments and planning documents, it is necessary to introduce a unified definition of urban forests in general. There is a lack of legislation identifying and regulating urban forests although urban (suburban) forests actually exist. The issues of urban forest management may need more comprehensive regulation with less emphasis on strategic planning. Forests, including urban forests, should be more specifically mentioned in the international and local legislation and planning documents, considering their substantial significance in reducing CO_2 emissions, providing biodiversity and social services.

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The Ogres Zilie kalni park urban forest management

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Abstract. The impact of the Covid-19 pandemic demonstrated the importance of urban forests for human well-being at a time of tight constraints, when large forests close to urban areas were in high demand. Increased use affects the management of territories. Urban forests play an important role in providing ecosystem services. Urban forests show a close link between ecosystem services and forest functions. A literature review was carried out, exploring the ecosystem services and specific urban forest services provided by such territories. This article examines the experience of the Ogres Zilie kalni during the Covid-19 pandemic, taking into account the peculiar functions of urban forests. Different types of recreation that take place in the Ogres Zilie kalni, and their impact on park management are discussed. The aim of the article is to analyse and present the challenges of urban forest governance and management under the influence of Covid-19, looking through the functions of urban forests. Taking into account the classifications of ecosystem services available in Zilie kalni, zoning and assessment of the territory have been carried out. Cartographic material has been created based on practical experience and employee interviews.

The practical experience of territory management gained during Covid-19 is important and should be taken into account in the future development of green spaces, respecting the new habits of visitors potentially affected by the pandemic, where one of the most important proposals is to develop more small localised recreation areas on smaller paths.

Key words: Urban forests, Covid 19, ecosystem services, planning documents, management of urban forestry

Introduction

Forest areas are one of the main providers of ecosystem services, contributing in many ways to the provision and maintenance of ecological processes [1]. Such areas, regardless of the type of urban forest [2], contribute to the Sustainable Development Goals (SDGs) and provide a wide range of opportunities of use of forest areas for people's needs [2; 3], most often for recreation, leisure, exploration, sports, berry or mushroom picking and enjoying nature. Urban forests and natural areas in general are an invaluable asset for promoting people's physical and mental health [5; 6], which was particularly important during the Covid-19 pandemic, when pressures on such areas increased manifold, raising questions about the suitability of the management model and user infrastructure for such areas in a changing environment. The increased awareness of the role of public green spaces in everyday life is a huge benefit that was experienced during the Covid-19 pandemic, which will also contribute to more effective action in future disease and pandemic outbreaks [7]. The Covid-19 pandemic has highlighted the need to provide accessible urban green spaces to meet the needs of different population groups [7]. Pandemics have changed the way populations interact with the surrounding environment [8]. During the pandemic, developed locations where one-way traffic could not be ensured, such as Cena Moorland Footpath, were closed [9]. These were followed by other natural objects to which access was denied, such as various lookout towers and footpaths. Unfortunately, during the period from December 2020 to May 2021, basically all natural sites with boardwalks, lookout towers and other restrictive infrastructure were closed. And as of the end of May 2021, those environmental facilities were opened which could ensure one-way and/or circular traffic [10]. The Ogres Zilie kalni lookout tower was also closed during this ban, but people used the tiniest walking trails that have not been previously noticed.

People's desire to use natural areas more and more for active and passive recreation, regaining strength, exploring new places, has been not only influenced by the pandemic, but also by climate change, when we increasingly appreciate the gifts of nature and the need to take care of it.

The Ogres Zilie kalni nature park is a well-known natural area with extensive recreational opportunities. During the Covid 19 pandemic, the area was particularly used for walking and other activities allowed during the restrictions.

The aim of the article is to analyse and present the challenges of urban forest governance and management under the influence of Covid-19, looking through the functions of urban forests.

For implementation and integration the latest insights from Covid 19 into the management of the Ogres Zilie kalni, it is necessary to analyse the new patterns of amenity use, assess their sustainability and the need to redesign and change the amenity. It is important to assess the experience of the agency's staff in planning and implementing various development projects and to update it with the latest scientific knowledge.

Materials and Methods

In order to be able to assess the conditions and challenges of urban forest governance and management, an analysis of the literature was carried out, highlighting the main ecosystem service functions and uses provided by such areas. The assessment of situation regarding changes in the management of urban forest areas was carried out for one of Latvia's urban forest areas – the Ogres Zilie kalni nature park, which is widely visited and popular with both local residents and tourists. The site has undergone both legal and management changes, influenced by various factors, including the effects of the pandemic, assessing visitor flows and trying to find the best and most efficient solutions for the management of the site.

Analysing the theory about the main ecosystem services available in the Ogres Zielie kalni nature park, a functional classification the territory was created. Further research consisted of surveys of the territory, interviews and assessment of Covid 19 influence on the park management. Schematic cartographic material was created based on the classification of ecosystem services available in the territory and practical experience of park management

The study analysed the laws and regulations governing the management of the Ogres Zilie kalni nature park. The stakeholders and interested parties involved in the management and use of the Ogres Zilie kalni urban forest area were also identified and analysed through interviews with Agency and municipality specialists, non-governmental organisations representatives (Agency project manager, Ogre Tourism and Information Centre, society "Nesēdi mājās").

The Ogres Zilie kalni nature park is a 312 ha urban forest located between Ogre and Ikšķile. The Ogres Zilie kalni provide the widest range of ecosystem services. Some parts of the forest are located right next to multi-storey housing and are intensively used for people's daily outdoor recreation. The territory of the urban forest is a specially protected nature area - the nature park Ogres Zilie kalni, which is also a Natura 2000 site protected at European level. The Ogre Municipality Agency has been established for the purposeful management of the urban forest area. Most of the territory historically belongs to Riga City Municipality, although it is located outside the territory of Riga. The territory is supervised by the Nature Conservation Agency, which monitors all specially protected nature territories in Latvia. At the suggestion of the Nature Conservation Agency, a nature management plan is drawn up for specially protected areas, setting out the main lines of action aimed at conserving and enhancing biodiversity and providing recreational resources for visitors. The Ogres Zilie kalni are in a special situation, with specially protected biotopes located right next to multi-storey residential estate in Ogre city. The protected area is widely used by the residents for their daily recreation and sports. The area is actively used for school trips and by other interested visitors, accompanied by guides and teachers.

Results and Discussion

We use the resources provided by ecosystems all the time and everywhere - at work, on vacation, in education and even just breathing the air that surrounds us. Ecosystem services are the environmental, cultural, historical, social and economic basis of our lives.

Ecosystem services are all the resources and processes that nature provides for people. Usually we speak about provisioning, regulating or supporting, cultural or intangible ecosystem services [11]:

1. Provisioning services are vital for our existence – food, raw materials of all kinds, fresh water, medicinal resources.
2. Regulatory and support services ensure climate and air quality, prevent natural disasters, prevent erosion and maintain soil fertility, habitats for species, maintain genetic diversity.
3. Cultural or intangible services are essential for people as thinking, social and creative beings – recreation, mental and physical health promotion, tourism, aesthetic inspiration. Cultural or intangible ecological services are essential in urban forest areas - the widest range of outdoor recreation, promotion of mental and physical health, tourism, aesthetic enjoyment and inspiration from natural landscapes.

The availability of all the above ecosystem services can be found in the Blue Mountains. Certain ecological services are particularly important and need to be developed. A specially protected area is primarily a habitat for species and a place to preserve genetic diversity. With reference to the Ogres Zilie kalni Nature Conservation Plan, [12] the area is primarily a habitat for typical species of Latvian forests and 18 rare species of vascular plants (*Arenaria procera* Grass-leaved sandwort, *Dracocephalum ruyschiana* Northern Dragon-head, *Onobrychis arenaria* Hungarian Sainfoin, *Peucedanum oreoselinum* Mountain parsley, *Platanthera bifolia* Lesser Butterfly-orchid, *Pulmonaria angustifolia* Cowslip Lungwort, *Pulsatilla patens* Spreading Pasqueflower; *Trifolium alpestre* Trefoil Clover - species personally observed by I. Kraukle).

Urban forests are also associated with many environmental and economic benefits, including improved air and water quality, noise reduction,

flood control, prevention of soil erosion, reduction of urban heat islands and increased property values. The costs of maintaining the system such as treeplanting, upkeeping, ensuring the recreation function, have to be taken into account.

Nowadays, in terms of urban forests, we can no longer speak of traditional forestry, but of social forestry, whose main tasks are related to the provision of social functions and services [13]and environmental education [14]. Every year, the Ogres Zilie kalni nature park serves as a training and survey site for architecture and landscape architecture students, who not only learn and educate themselves from what they see in the park, but also make certain proposals for the improvement and development of various sites. In 2020, in collaboration with Riga Technical University students, certain proposals were developed with a number of noteworthy ideas, but the need to create various pavilions and shelters for visitors to relax emerged in all the works.

As A.Alexis points out, more and more studies are showing that urban forests contain patches of relatively high biodiversity [15], which is also considered to be one of the functions of urban forests.

Urban forests are classified in different ways, both in terms of their uses and their functions. One division of urban forests is given by Konijnendijk and Nilsson, who point out that there are two large groups:

Biological or natural forest resources that can develop without human intervention.

Recreational forest values that require deliberate human intervention for their development and use [16].

In practice, a general classification of forest functions is most commonly used with three cornerstones: economic, social and ecological functions, with the economic component being the first [17]. Along with urbanisation, changing demographics and lifestyles, the importance of urban forests have also increased, with a shift in the distribution of functions [13; 14].

According to A.N.Akmar, C.Konijnendijk and other authors, the social function has become the most important one nowadays - urban forests are places for active and passive recreation, sports, gathering of wild harvest, provide an opportunity to enjoy the beauty of nature, serve as a natural laboratory for scientists and researchers, protect unique species [13; 14].

The second most important function of urban forests is environmental provision and climate regulation: urban forests regulate water flow and water quality, improve and stabilise soils, provide habitat for wildlife, dispose of debris, act as noise and wind attenuators, regulate climate, microclimate, absorb carbon dioxide and act as a major carbon sink [13]. “Observations show that on a warm sunny day, 1 ha of forest releases 150-220 kg of oxygen, which is enough for 40-50 people to breathe, by sequestering 220-280 kg of carbon dioxide” [18]. Air quality improvement functions also include the enrichment of air with phytoncides and its ionisation, whose beneficial effects on human health are well recognised and widely used in health resorts [19].

The third is the economic function, which importance has greatly reduced and can be exercised to the extent that it does not contradicts with all the others. Urban forests also produce and store usable raw materials - wood, green matter from various plants, mushrooms, berries, leaves, sap, which can be used both by people and by domestic and wild animals, birds, fish, amphibians, insects.

There is also a distinction between inherent and acquired functions of forests [17]:

The inherent functions of forests, which derive from the nature of forest: productive, i.e. the production of material goods; territorial, i.e. carrying; regulating function; information (storage) function; aesthetic function; cultural and historical function.

The acquired functions of forest are defined by legislation or rules, and can also be considered as targeted functions. For example, protected areas, buffer zones.

As a further subdivision in the detailed analysis of forest areas, it is useful to distinguish between the internal and external functions of forest territories. Internal functions are those that occur within the boundaries of the forest, inside the forest - primarily all the functions of the forest environment and, in some cases, also acquired functions. External functions are those that are formed by the forest expanse as a whole and are expressed outwards from the forest - the role of the forest edge in shaping and enclosing landscape spaces, in the flow of migration of substances [17].

When assessing and planning an urban forest as a multifunctional system, it is essential to assess different functions in terms of their compatibility or incompatibility and to clearly identify compatible and incompatible functions in order to further assess which of them will be dominant and therefore determine the type of forest management [17].

Considering an ecosystem services approach, a number of intrinsic functions of urban forests can be identified. The spatial manifestation of urban forest functions depends on the relationship between forest and human activity. Urban forests are located at a point of particularly intense human-forest interaction. In urban and peri-urban forest environments, the social function and recreation in particular will become the most important and

dominant function in determining the management practices of particular forests.

Based on theory, previous experience and field studies, the authors identify six key functions of urban forests: social, environmental, environmental education, nature conservation, aesthetic and economic.

Distribution of urban forest functions in the area of the Ogres Zilie kalni complex, everyday situation (Figure 1). An essential role belongs to the social function of recreation and sports, provided by amenity areas (1.1), paths and tracks (1.2). Historical evidence (1.3) adds to the range of social functions in the area. The environmental function (2) is fulfilled by the urban forest as a whole. The environmental education function (3) is fulfilled by individual routes, where children's trips and training are most often held. Nature conservation function (4) covers the whole area of the nature park, the map shows the nature reserve area, which requires more attention in management. The aesthetic function of the forest (5) is more pronounced in the areas near the Dubkalni reservoir and in the light pine forests, which, in a relatively closed forest landscape, nevertheless allow to see a sufficiently wide visually attractive surroundings. The economic function (6) can potentially be realised by logging in the area outside the nature park. Sanitation cutting is also possible in the nature park, but it is more exceptional. Mushrooming and berry picking are counted as both social and economic functions, but are not shown in Figure 1. The mushrooming and berry picking sites are shown in Figure 2.

1. Social functions. Today, urban forestry is no longer about traditional forestry, but about social forestry, whose main tasks are to provide a wide range of recreational functions and services. The forest is the most suitable place for active and passive recreation, various types of popular and professional sports, especially for maintaining a healthy lifestyle - systematic walks, Nordic walking, jogging, skiing, cycling. The Ogres Zilie kalni already have a sports and recreation infrastructure - existing walking trails and forest paths are maintained, and a 10 km illuminated cross-country ski trail has been created. Improvements to the Dubkalni water reservoir have been made and will be developed in the future. It is planned to improve the surface of the busiest paths with gravel/dolomite chippings. There is a need to improve the bicycle paths that are heavily used and to create a bicycle park.

The forest still allows the expression of one of the oldest human activities - gathering bounty of nature – berry picking, mushroom picking, using other natural materials, which today is no longer a matter of survival, but allows us to relax from everyday worries, connect with the oldest instincts and simply be close to the natural processes. In the Ogres Zilie kalni, berry picking and mushroom picking are very common and most often part of a walk.

Urban forests provide an opportunity to enjoy the beauty of nature even for people living in an urbanised environment. Urban forests allow or make you philosophise, to contemplate that a dead, half-decayed and moss-covered tree trunk or a scarred water spout can be beautiful in nature – we cannot use it, but for someone it is their only home.

The ability of forests to hide and protect unique places and historical evidence that would otherwise be destroyed by intense human, wind or water activity has been noted as a social function, as exemplified by the strong traces of trenches preserved not only from World War I, but also from much earlier times. A nationally protected hillfort "The Ogres Zilie kalni – hillfort" (State List of Cultural Monuments – No 1861, protected since 1998) [12] is found in the Blue Mountains, as well as World War I trenches and other historical evidence.

2. Environmental functions. In particular, woodlands regulate water flow and water quality. As rainfall increases, the ability of woodlands to slow and balance the movement of rainwater, preventing it from flowing rapidly into water bodies and causing flooding, is essential.

The continuous formation of a layer of herbaceous vegetation and its complex root system improve and stabilise the soil and prevent wind erosion. The ecosystem of forests, including urban forests, is mostly composed of wild plants and provides habitat for wild animals, insects, amphibians, micro-organisms, which in turn provide for the disposal of various biological remains and other processes as a result of their life-sustaining activities.

One of the most important environmental functions of urban forests is that of sanitation and hygiene, and they are considered to be the most accessible and useful to society. This is reflected in the ability of forests and other green spaces to reduce the concentration of carbon dioxide in the air, to bind it and use it to support life processes, and at the same time to enrich it with oxygen.

Today, when global warming is constantly being discussed, with hot temperature fluctuations, stabilising the temperature and humidity regime in cities - hot in summer, cold in winter - is very important. Climate change is also bringing stronger winds, from which even relatively small areas are physically protected by trees and shrubs. Sufficient green spaces in urban environments reduce the heat and draught effects of thermal plumes. Noise reduction around city motorways, streets and industrial areas is also increasingly important.

As an urban forest, the Ogres Zilie kalni regulate water flow and water quality, stabilise soil, provide habitat for wildlife, act as a noise and wind buffer, regulate climate, microclimate, absorb carbon dioxide, act as a major carbon sink, enrich the air with phytoncides and ionize it.

Figure 1. Urban forest functions in the Zilie kalni complex, daily situation

No.	Designatiom	The six essential functions of urban forests	Characteristics	Location
1.1		Social function	Places with amenities	Sites scattered throughout the complex
1.2		Social function	Trails and tracks	Trails and tracks scattered throughout the complex
1.3		Social function	Historical evidence	Some historical evidence readable in the terrain
2		Environmental function	All natural areas	Entire complex area
3		Environmental education function	Educational routes	Trails and their immediate surroundings
4		Nature protection function	Nature conservation area. The strictest protection zone	The entire nature park area
5		Aesthetic function	Visually attractive forest, waterscapes	Extensive forest, water areas
6		Economic function	Forest areas with potential for logging	Complex area, outside the nature park
7	—	Ogres Zilie kalni nature park border		
8	----	"The agency for development of the Zilie kalni tourism, sports and recreation complex" managed area outside nature park borders		

Fig. 1. Urban forest functions in the Ogres Zilie kalni complex, daily situation [created by authors]

3. Environmental education functions. Environmental education is an important function that has emerged in recent years. Urban forests are like a specific natural laboratory. They provides research opportunities for scientists and researchers and calls for the best answers for conservation and development of the environment, using the latest scientific findings. Educating the public about the main patterns of the forest ecosystem, information about the processes occurring in the forest stimulates public interest and willingness to go to forest. Public participation in litter pick activities and competitions promotes environmentally friendly behaviour and reduces the negative anthropogenic impact of holidaymakers in urban forests. Diligent forest visitors do not litter the forest with small household waste, do not allow the idea of dumping waste in the forest, are careful during the fire season, are careful even with small plants in the forest if they have planted tiny tree seedlings themselves, which not only the forester, but also the participant of a litter pick is waiting for to grow up. Raising awareness of the importance of sustainable forest management is essential. The Blue Mountains host various environmental education events, litter picking activities and trips that provide environmental education.

4. Nature protection functions. Recently, nature protection functions have also become more prominent in urban forest planning and management.

Many species have adapted to living in urbanised environments. Urban forests contain large areas of high biodiversity. A striking example is the Ogres Zilie kalni nature park in Ogre, where various protected biotopes, plants, insects and birds can be found throughout its territory, for more information see the nature protection plan [12].

Urban forests have areas with the priority of protection of natural values (species and habitats). Pin planning for urban forest development, including recreational use, an influx of people into such areas would not be encouraged. However, where areas are particularly popular for recreation, the highest possible level of amenity can serve to protect the environment.

Nowadays, the conservation of a natural asset is often misunderstood as preservation, which often leads to its disappearance, as most modern ecosystems require wise human management.

5. Aesthetic functions. Forests in and near cities have a high scenic and aesthetic value. Even if the existing landscape is not of high quality, it can be significantly improved by maintaining it. The forest stands out in contrast to the urban environment as an element of the natural landscape and is valuable by its very existence. The urban forest as a landscape element separates the individual urbanised parts, preventing their complete fusion, but in turn weaves the individual urban elements into the overall urban structure and pattern, which then, together with the buildings and inhabitants, creates the characteristic image of each city. Forest areas screen unpleasant views, allowing even relatively small areas to accommodate a variety of land uses - such as manufacturing, health and education facilities, housing and recreational areas. The Ogres Zilie kalni have long been famous for their attractive pine forest landscapes and distinctive topography of the narrow hills, as well as pine groves, deciduous areas, small marshes and the Dubkalni reservoir, which make the overall landscape interesting and full of surprises.

6. Economic functions. Forest areas produce and store usable raw materials such as wood, needle, fruit and berries, mushrooms. Today, the use of urban forests is less about timber extraction and more about faster regeneration, maintenance after pest or disease infestation, and improving their scenic value through various coppicing and landscaping activities. The collection of non-timber forest materials such as mushrooms, berries, leaves, twigs, roots and saps for human consumption is seen more as a social recreational function, as the ecological state of the urban environment does not always allow the urban forest products to be used for food.

Urban forests produce food and other materials for domestic animals and wildlife, as well as birds and fish, to sustain an ecosystem that must withstand greater anthropological pressures and require more careful maintenance than other forests, which can more fully express their capacity to maintain and regenerate their autonomous system.

In the territory of the Ogres Zilie kalni, outside the nature park, logging is potentially possible, and it is necessary to carry out salvage logging throughout the complex area to remove dead and dangerous trees. The Ogres Zilie kalni have extensive and popular mushroom and berry picking areas, where visitors in late summer and autumn disperse virtually throughout the area.

Visiting the urban forests in the territory of the Ogres Zilie kalni complex (Figure 2). Daily visits (1) – used for places with facilities, main paths and tracks. Seasonally, during berry picking and mushroom picking season (2) the landscaped areas are used, as well as the main trails and tracks, and in addition all forest areas where mushrooms and berries grow, regardless of trails. During the Covid-19 pandemic (3), the observation tower could not be visited. The main trails were full of visitors. To avoid contact with other people, small trails are used throughout the territory, even where mushroom pickers and berry pickers do not go, the existence of trails is important.

Wise land management is needed to ensure that the above functions work. As an example, the territory of the Ogres Zilie kalni and the legislation regulating its management are considered:

The Law on Nature Conservation establishes the administration and management of the Ogres Zilie kalni nature park. A nature park is an area that represents the natural and cultural values of a particular locality and is suitable for public recreation, education and upbringing. Recreation and economic activities in nature parks shall be organised in such a way as to ensure the preservation of their natural and cultural heritage [20].

Interested parties

The management of the territory is carried out by the Nature Conservation Agency of the Ministry of Environmental Protection and Regional Development [20] (Section 25), which also organises and coordinates the monitoring of protected areas. The development of the Nature Management Plan is supervised and coordinated by the Vidzeme Regional Administration of the Nature Conservation Agency, and its implementation is promoted after its approval. The Ogres Zilie kalni nature park does not have its own public administration body. Control of environmental protection and use of natural resources is exercised by the State Environmental Service (Lielrīga Regional Environmental Board of the State Environmental Service).

Compliance with forest management laws and regulations is monitored and sustainable forest management is ensured by the Riga Regional Forest Inspectorate of the State Forest Service.

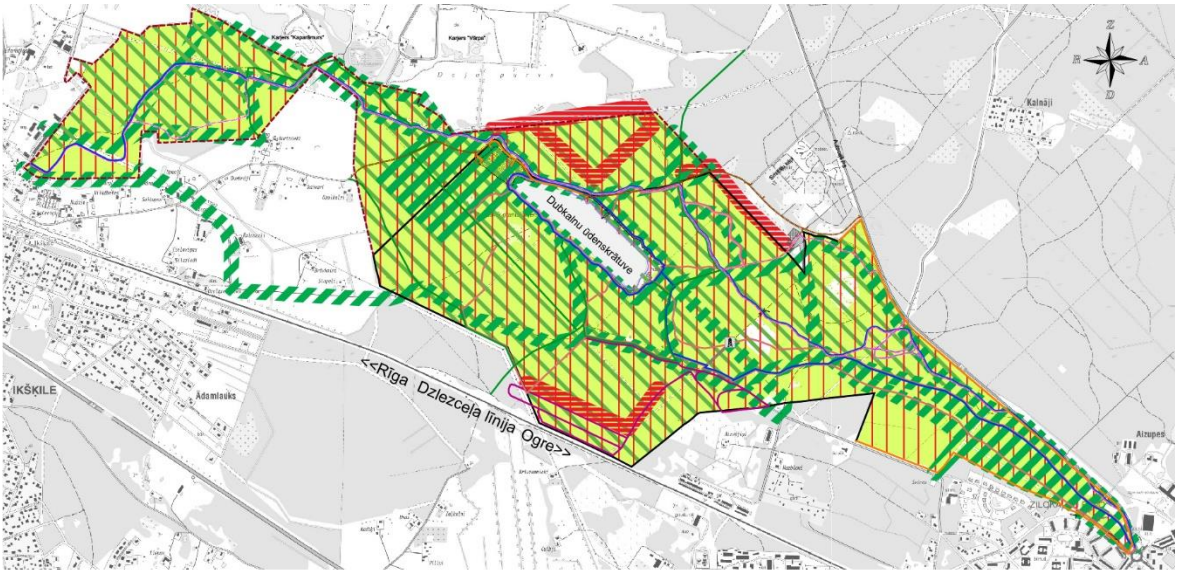

Figure 2. Visiting the urban forests in the territory of the Zilie kalni complex

No.	Designation	Visits to urban forests	Characteristics	Location
1		Daily visits	Places with amenities, paths and tracks	Places with amenities, main paths and tracks
2		Seasonal during mushroom and berry season	All forest areas where mushrooms and berries grow, regardless of trails	All suitable forest areas in a continuous line. Trails and tracks are used to get to the chosen mushroom picking and berry picking spot
3		Visits during the Covid-19 pandemic	It is forbidden to visit the observation tower. Places with amenities, main paths and tracks, all minor paths.	Vietas ar labiekārtojumu, galvenās takas un trases, sīkās takas visā meža teritorijā
4	—	Ogres Zilie kalni nature park border		
5	----	"The agency for development of the Zilie kalni tourism, sports and recreation complex" managed area outside nature park bordersm		

Fig. 2. Visits to the urban forests of the Ogres Zilie kalni complex [created by authors]

Owners and operators:

The management of the site and compliance with the rules for its protection and use are ensured by the owner or user of the land [20] (Section 24). The owners of the urban forest area in the Ogre Ogres Zilie kalni nature park and the entire territory of the complex are limited liability company of Riga City Municipality SIA Rīgas meži and Ogre Municipality. On the basis of a long-term lease agreement, the management and development of the territory is carried out by the Ogre Municipality Agency "Tūrisma, sporta un atpūtas kompleksa „Zilie kalni" attīstības aģentūra" (The agency for development of the Zilie kalni tourism, sports and recreation complex).

The main focus areas of the managers are integrated management, multifunctional use and ecosystem sustainability. The Agency has defined medium-term strategic objectives, divided into administrative, social, environmental area [21].

The objectives of the administration area are to ensure effective governance for a sustainable enterprise and to create a regulatory framework for effective governance and environmental protection.

The social area includes 3 strands. Creation and development of environmentally friendly landscaping infrastructure for quality tourism, sports and recreation services. Enhancing knowledge of the social environment, cultural history – for a better understanding. Public involvement and information about the complex - to promote participation.

The aim of the environment area is to preserve natural diversity for the sustainability of Latvian and European ecosystems and to increase the value of the environment.

Recreation

Recreation, as one of the essential social functions of the forest, is one of the main, traditional and enduring uses of the Ogres Zilie kalni. The urban forests within the complex provide recreational opportunities for people of all ages and physical condition. The main users of the territory are the residents of Ogre municipality, tourists from surrounding municipalities and Riga, visitors from Latvia and abroad. The complex is an important place for athletes, regularly used for training and competitions (runners, Nordic walkers, cyclists – XCO cyclocross, Dovnhil, skiers, orienteers, biathletes, sled dog racers).

Recreational opportunities in the Ogres Zilie kalni can be divided into several groups according to their activities, need for facilities and infrastructure. The impact of recreation types on the urban forest area and the intensity of management varies.

The largest group of holidaymakers indulge in **unorganised, low-activity recreation.** People regularly go for walks in the park to enjoy nature and the forest. There is a significant group of pleasurers who go outdoors with children of different ages. This recreation was particularly active during Covid 19 in 2020 and 2021, when many recreation areas had restrictions on visitation. Although the Ogres Zilie kalni area was freely accessible during Covid-19, people made much more use of the small forest trails, which have not been noticed previously, putting extra strain on the environment. Unfortunately, people also brought litter into the large area, which used to be collected mostly along the major paths and at the Dubkalni reservoir. There was a huge influx of cars on the forest roads and they had to immediately organise traffic using parking restrictions.

Dog walking is one of the most common types of walking. On the eastern edge of the nature park, in the territory of Ogre city, and especially in the vicinity of the Ogres Zilie kalni housing estate, dozens of people walk their dogs every day.

Unorganised active recreation – individual jogging, walking, Nordic walking - these activities are mainly associated with the eastern and central part of the complex, but since the beginning of 2015, with the creation of a skiing track, activities have also extended into the western part, increasing activity on the Ikšķile side.

Cycling has become increasingly popular in recent years. Individual cyclists train throughout the park, but the greatest flow of riders is in the western and central parts of the park, where the articulated terrain is also suitable for mountain biking.

Unorganised skiing covers the whole area of the park. In 2016-2020, 10 km of floodlit cross-country skiing trails linking Ikšķile and Ogre have been created. In good snow conditions, skiers from Riga, Salaspils and other places come to the Ogres Zilie kalni. Thanks to systematic maintenance, cross-country skiing is regaining popularity and attracting more and more people of all training levels. Even during the Covid 19 restrictions, the ski track continued to operate as it was possible to comply with the cross-country rules due to the large forest areas.

The open corridors on the steep slopes of the hills are traditionally used by a small number of people for downhill skiing, snowboarding, tobogganing and other riding. Rides in these areas are spontaneous and disregard safety. Security barriers are often destroyed. A solution is still being sought.

In the less visited areas of the complex, horse riding with horses from the nearby stables (Mangaļi, Birzītes, Zaļkalni) takes place. In 2017, some approved areas for horse walking in the southern, south-western part of the park have been marked to reduce the risk of collisions. Sometimes walking or cycling paths or ski tracks are used for horse riding, which causes disagreements between users because the surface of the path is significantly damaged by horseshoes, a fast cyclist can spook a horse, a pedestrian can be frightened by a horse, etc. To minimise conflicts of interest and dangers for different users, the network of paths and trails shall be separated as far as possible and defined in the binding rules [22].

In recent years, the association “Sniega suņi” (Snow Dogs Association) has been organising dog sledding rides in the complex to train the dogs, which are now also offered for the entertainment of visitors. Dog sledding rides take place in the less used south-eastern part of the nature park, in some places creating the possibility of collisions between horse riders, dog walkers, pedestrians, joggers and cyclists. To prevent this, dog sledding trails were marked in 2017.

After gravel extraction ceased in a gravel pit in 2003, a water body formed. Swimming in the Dubkalni quarry is very popular, as well as recreational activities on the ice in winter. The water body is also used by divers and anglers. During the swimming season, lots of people relax by the water. Even in the cold season, there is a wide range of swimmers who especially appreciate the boardwalk and stairs in the water, which make it easier to make an ice hole.

In the territory of the nature park near Ogre, there is a rope adventure park, Giant’s Trail (Milžu taka), which was created on the basis of a long-term contract by SIA MGH.

In 2017, SIA Velo SKI also started renting electric bicycles and skis at the ski track starting platform, providing visitors with easily accessible rental services not only in Ogre, but also in the territory of the nature park.

Organised active recreation and sport

Currently, all competitions and training are coordinated with the Agency and carried out in accordance with the law. To reduce the negative environmental impact of the races and training, the 1 ha starting platform established in 2014 is used as the starting point for the races. Previously, the area had turned into a rubbish dump, which was removed as a result of landscaping work.

When planning competitions, it is necessary to take into account Part 5, Sub-paragraph 12.2 of the Nature Protection Plan of the Ogres Zilie kalni park, which states that it is prohibited to cross the nature reserve zone of 142 sq. for the participants of sector 2, 5, 6 public events, whose movement takes place off the paths and roads, and the rest of the zone – if more than 40 participants take part in the event. The checkpoints required for the competition shall be located in such a way that the areas included in the reserve do not have to be crossed by the participants during the competition. In particular, these rules apply to the non-location of orienteering checkpoints in nature conservation areas, as orienteers often navigate without using the trail network, which creates additional anthropogenic pressure.

Initially, it was necessary to promote the newly created amenities. In 2015, the Agency started organising the Ogres Zilie kalni Triathlon, which included skiing, running and cycling competitions. Until 2017, the popularity of sports infrastructure among organisers of sports competitions has grown significantly. It was already decided in 2018 that the Agency would no longer organise sporting events, but would carefully consider permits for sporting events organised by other organisers in order to limit the impact on the environment and the created infrastructure. The restrictions during Covid in 2020 and 2021 effectively minimised the number of traditional competitions. Some activists organised unconventional competitions, which could be done individually.

Running and orienteering are popular sports at the complex. Runners and orienteers train and compete on the ski slopes, major trails and forest roads. The race series “Apkārt Zilajiem kalniem” (Around the Ogres Zilie kalni) has been popular for many years, as well as school competitions at regional and national level, as well as the “Reljefs” (Relief) orienteering competition. In 2017, the trail-running series “Stirnu buks” (Roe Buck) was held at the complex for the first time.

Since 2008, the park has seen a rapid development of cycling, including MTB mountain biking. For cyclo-cross races, the ski trails are mainly used. The most well-known cycling events, which also include the territory of the complex, are the MTB cycling trails, which are minimally maintained for the time being. To reduce soil erosion, trail markings have been placed and critical sections of the trail surface are being repaired. In some places, MTB, XCO and Downhill cycling enthusiasts are arbitrarily creating trails and trail facilities without taking into account nature protection and safety requirements. Considering this high demand, the possibility of a dedicated track, with sections of varying difficulty for cyclists of different abilities, is being considered

If motorised vehicles are not used, events and competitions can also be organised on the ice of the water body subject to sufficiently thick ice.

Unauthorised recreation. Unauthorised forms of recreation in the protected area can be still found in the territory of the complex. In some cases, quadricycle, motorcycle and car drivers enter unauthorised areas, leave roads and drive on or off tracks, trails, glades and, in rare cases, on ice in winter.

Conclusions

Having analysed the situation in the nature park, it is clear that the main management actions of the Agency should remain integrated management, multifunctional use of the territory and sustainability of the ecosystem. To ensure the sustainable development of the nature park in the future, it is necessary to elaborate a development strategy for the area, maintaining the defined administrative, social and environmental objectives. When developing the strategy, it is important to identify the interests and opportunities of various stakeholders (Ogre Municipality, land owners, residents of the municipality, visitors from other nearby municipalities such as Salaspils, Stopini, Riga, tourists from Latvia and abroad, sports organisations and NGOs, nature conservation institutions, etc.).

The previous planning documents of the municipality and the Agency are relevant. New insights into the development of the territory have been taken into account in the analysis of the previously identified action plans of the strategy, which include activities that have not yet been implemented. In order to judge the changes in the situation in the territory of the complex, the six essential functions of urban forests should be taken into account: recreational, environmental, environmental education, nature conservation, aesthetic and economic. When assessing these functions, it can be seen that they overlap throughout the territory of the nature park, especially in the areas of the created amenities.

Good ideas are being found in cooperation with universities training young professionals in planning, landscape architecture, architecture, design and arts.

In summarising the impact of the Covid 19 pandemic, the Agency's experience and recent studies have highlighted the importance of urban green spaces in promoting the physical and mental health of urban residents. Recent findings on the Covid 19 pandemic, which requires extensive areas where large numbers of visitors can stay at a sufficient distance, should be taken into account. We can no longer develop only large sites that bring together large numbers of people, we need to develop many small trails and individual recreational opportunities.

It is now clear that further development of the site's infrastructure can only take place through the comprehensive development of amenities. The existing infrastructure can no longer ensure that the existing number of visitors does not adversely affect the habitats in the area. A large number of visitors demand improved minimum services – parking, leisure areas, benches, rubbish bins, toilets, accessibility for people with special needs.

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Kopsavilkums. Covid–19 pandēmijas ietekme parādīja pilsētmežu lielo nozīmi cilvēku labsajūtas nodrošināšanā strikto ierobežojumu laikā, kad plašās, urbānām vietām pietuvinātās meža teritorijas bija īpaši pieprasītas. Palielinātā noslodze ietekmē teritoriju apsaimniekošanu, atgādinot, ka pilsētmežu teritorijām ir būtiska loma ekosistēmu pakalpojumu nodrošināšanā, un uzsverot, ka tāpēc jo svarīgāka ir šādu teritoriju pareiza plānošana. Pētot pilsētmežus, redzama cieša ekosistēmu pakalpojumu un mežam piemītošo funkciju ciešā saite. Pētījumā veikta literatūras avotu analīze, apskatot ekosistēmu pakalpojumus un specifiskās pilsētmežu funkcijas, ko šādas teritorijas nodrošina. Rakstā pētīta Zilo kalnu pieredze Covid–19 pandēmijas laikā, ņemot vērā pilsētmežiem piemītošās funkcijas. Kā būtiskākā pilsētmežam piemītošā funkcija, kas ietekmē apsaimniekošanu, ir apskatīta rekreācija, tās dažādie paveidi. Raksta mērķis ir analizēt un iepazīstināt ar urbāno mežu pārvaldības un apsaimniekošanas izaicinājumiem Covid–19 ietekmē, raugoties caur pilsētmežiem piemītošajām funkcijām. Vadoties pēc Zilajos kalos pieejamo ekosistēmu pakalpojumu klasifikācijas, veikts zonējums un novērtējums. Izveidots kartogrāfiskais materiāls balstoties uz praktisko pieredzi, darbinieku intervijām. Covid–19 laikā uzkrātā praktiskā pieredze teritorijas apsaimniekošanā ir svarīga un jāņem vērā zaļo teritoriju turpmākā attīstībā, respektējot apmeklētāju jaunos paradumus, ko potenciāli ietekmējusi pandēmija, kur viens no būtiskākajiem priekšlikumiem ir vairāk attīstīt nelielas lokālas atpūtas vietas uz mazākām takām.

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Thoughtful paths of Nature Park „Ogres Zilie kalni”

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Abstract: In many countries around the world, urbanization has led to a disconnection from nature within major cities and this has prompted increased research into the significance of nature in the daily lives of urban residents. In the wake of COVID-19 pandemic, people began to visit the walking trails en masse and the habit has continued even after the COVID-19 pandemic. This study, which was conducted in July of 2023 is a part of a broader research initiative aimed at enhancing recreational opportunities and optimizing the physical and wellness benefits provided by walking paths.

The research is centered on the "Ogres Zilie kalni" nature park, which features recreational and activity trails. For a majority of residents, these walking paths and ski tracks are vital for recreation. The research's objective is to outline the planning principles for the nature park's trail network, drawing not only from landscape architecture but also from the field of environmental psychology. This holistic approach is expected to yield better recreational outcomes and subsequently improve human health.

The primary goal of this study is to investigate how different types of nature walking trails impact human attention dynamics. Using Schulte's Tables, a psychological method, the study assessed how various stimuli in trail planning and route selection influence human attention. The research results do not offer a definitive answer regarding the influence of path type on attention dynamics. However, the findings indicate that attention dynamics tend to improve after the second or third measurement, typically occurring at 20-30 minute intervals. This aligns with the theory that 20 minutes is sufficient for attention reset. Attention dynamics then diminish towards the end of the walk due to physical exhaustion. It was hypothesized that adequate rest could lead to improved dynamics.

In the modelling of the walking path network and route selection, cognitive factors such as the purpose of the walk, group participation, individual walks, social interactions, and the perception of the three-dimensional spatial environment serve as the foundation for designing the layout of walking paths. The study raises intriguing and complex research questions, further complicated by the diverse groups involved, including students, families, and the elderly. Social factors play a pivotal role in determining the optimal path for both fundamental research and practical applications. Understanding the mechanisms and information sources guiding decision-making in path selection should encompass not only psychological but also social aspects. This comprehensive approach will contribute to a better understanding of path planning for psychological wellness and the cultivation of emotionally positive behavioural patterns.

Keywords: urban forestry management, walking paths, environmental psychology, attention, COVID-19

Introduction

Nowadays, due to urbanization, the connection with nature has been lost in cities in many countries. The new generation, who have grown up in an era of computerization and digitization since early childhood, tend to have a stronger bond with digital tools than with nature. There is a growing trend among the new generation of completely disconnecting from nature, even in countries blessed with abundant green spaces [1].

In the administrative unit known as "Zilie kalni" (Blue Mountains), a network of walking paths, ski tracks, and cycling trails has been established, along with infrastructure for dog sledding and horseback riding. For most residents, walking paths and ski tracks are the primary means of recreation. In this study, we examined the structure of these walking paths, identified the most popular routes, and delved into the specific characteristics of individual routes. We also analysed the planning principles used in developing these paths, taking into account the need to protect natural habitats, avoid areas with protected plant species, assess landscape characteristics, consider expert opinions on improvement and landscaping requirements for preserving ground vegetation and soil, and prioritize psychological wellness. We observed how various stimuli and modifications to path and route layouts impact human attention. The quantity and diversity of stimuli play a pivotal role in influencing information flow, which is crucial in the planning of walking paths for assessing psychological comfort.

This study is part of a larger research effort aimed at facilitating more comprehensive recreation and ensuring that walking paths offer maximum physical and psych emotional comfort. The objective of this research is to illustrate the principles underlying the planning of a network of nature park paths, drawing not only from landscape architecture but also from findings in environmental psychology. This holistic approach is expected to yield superior recreational outcomes and subsequently contribute to positive effects on human health. THE RESEARCH OBJECTIVE: To investigate the influence of different types of nature walking trails on human attention dynamics. The research tasks are as follows: 1) Describe the theoretical framework of walking paths and its relationship with human

neurocognitive processes; 2) Design a quasi-experimental research methodology involving walking paths and attention measurement methods; 3) Analyse and interpret the obtained data. RESEARCH QUESTION: How does the type of nature path affect human attention?

Theoretical background

Walking paths and nature park "Ogres Zilie kalni"

Throughout history, people have consistently sought ways to lead comfortable and happy lives. The concept of happiness can take various interpretations, but in the context of urban environments, happiness has gained particular significance in recent decades. Urban social psychology defines happiness as an emotional state characterized by maximum attractiveness, where emotions are considered integral to the flow of information [12].

This definition has guided our study towards investigating the potential for achieving enhanced recreational outcomes in the "Ogres Zilie kalni" nature park, which is situated within the administrative unit of "Zilie kalni." Ogre, a city in Latvia, is located in close proximity to the "Ogres Zilie kalni" nature park. Notably, Latvia boasts ample green spaces within short distances of its cities and towns, with forests covering 53 % of the country's territory, and recreational areas making up eight percent of this total [13].

Andrew Przybylski, a professor at Oxford University, highlights that nature has the capacity to alleviate the negative aspects of social interactions that tend to alienate individuals from each other, particularly evident during the challenges posed by the COVID-19 pandemic [24].

Ogre, being easily accessible to the residents of Riga, transformed into a tranquil resort town during the first half of the 20th century. Following the Second World War, the adjacent pine forest area became part of Ogre's green belt. In 2003, the first nature protection plan was formulated for the urban forests of Ogre and Ikšķile, leading to the establishment of the specially protected nature territory known as the "Ogres Zilie kalni" nature park [11]. In 2010, an administrative unit was created to manage the territory efficiently, encompassing the "Ogres Zilie kalni" nature park, which constitutes 312 hectares of the administrative unit's territory [14]. Situated conveniently between Ogre and Ikšķile, the urban forests of the "Zilie kalni" administrative unit are not only ecologically valuable due to their biodiversity but also serve as crucial recreational resources. One notable feature of these extensive green areas is their suitability for modular and decentralized projects, offering operational flexibility. A primary responsibility of the administrative unit's management is the establishment and enhancement of environmentally friendly improvement and landscaping infrastructure, which includes optimizing the path network and developing path layouts.

It is essential to recognize that a nature park, or any park for that matter, cannot be fully utilized without an appropriate walking path structure, as paths serve as the lifeblood of a nature park. The goal is not only to ensure that visitors can traverse the territory but also to provide them with a sense of physical and emotional satisfaction and contentment. One of the traditional criteria for path use is the walking path's surface covering, which can be either comfortable or uncomfortable (even, covered in tree roots, bumpy, too wet, or too sandy), natural or artificial (gravel, woodchips, cobblestone, or concrete paving, concrete, asphalt, or other surface materials). In today's planning considerations, path network layout is equally crucial, taking into account the emotional perception of the path layout, where factors such as the number of stimuli and the flow of information are significant. The landscape view should incorporate "openings" and "closings" to achieve a sense of horizontal balance, with a recommendation for harmonious scale and proportions [15, *77*].

Within the administrative unit of "Zilie kalni," the path network extends for over 40 kilometers, gradually forming over time as people regularly visit the area. This territory is a favored destination for walkers, joggers, cyclists, skiers, and holidaymakers who gather at the Dubkalni Water-reservoir. Over an extended period, certain visitor groups, notably skiers and cyclists, have undertaken unauthorized efforts to enhance and landscape areas used for their fitness activities.

A ski track runs alongside the water-reservoir, offering skiers a captivating panoramic view of the reservoir and the picturesque forest landscape beyond it. Further along the track, it meanders into the forest. Through deliberate and incremental efforts spanning from 2014 to 2020, ski tracks were established, and maintenance activities were implemented during the winter months. Notably, approximately ten kilometres of these ski tracks are illuminated by lighting fixtures, contributing to both the physical and emotional safety of visitors and providing a sense of psychological comfort. Consequently, this well-maintained network attracts a significant number of visitors.

The appeal of a trail and the level of emotional comfort it offers are influenced not solely by landscaping efforts. Layers of the landscape or distance zones (foreground, middleground, and background) play a crucial role in landscape perception [15, *77*]. Along the trail adjacent to the Dubkalni Water-reservoir, for instance, visitors are presented with a distant view encompassing both the foreground and the midground (water) in addition to a varied and evocative background. This design principle, which incorporates at least two landscape layers, holds significance in organizing paths through forests as well, whether it involves an open landscape adjoining a forest, a forest with a panoramic view of a body of water, or other combinations. The planning of walking routes should also account for direct sensory diversity [18], providing distinct information and various stimuli, such as the linear view of a path extending straight ahead, alterations in the

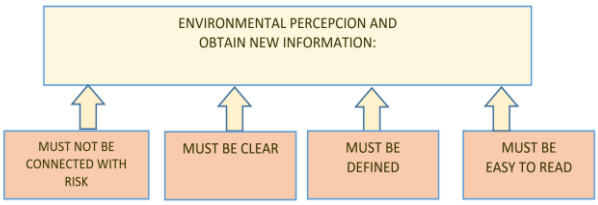

Fig. 1. The important for an individual to obtain new information [Ulrich, 1977]

viewing direction of the landscape, changes in path elevation, the utilization of diverse path surface materials, and more. Environmental diversity serves as a stimulus for cognitive development, as suggested by Zhang et al. (2018), who noted that "enriched environmental stimuli may affect neuromorphological structure and behavioural function" [26].

The nature park's unique characteristics impose significant constraints as it is situated within a specially protected natural territory. The Environmental Protection Plan for "Ogres Zilie kalni" Nature Park (2011-2026) [11] stipulates the need for optimizing the existing dense network of paths by eliminating redundant parallel routes. Therefore, a meticulous assessment is essential to determine which walking paths should be preserved and further developed.

Presently, the situation reveals that smaller paths are considerably widening due to the substantial anthropological foot traffic. This results in soil compaction, making it harder to traverse, with tree roots encroaching on the path, causing visitors to stray from the designated route, further widening it unintentionally. To counteract this spontaneous path expansion, improvements in path surface coverage are imperative to enhance comfort and walking path direction planning must be undertaken to strengthen the emotional connection. However, this task is complicated due to the nature park's management restrictions.

Creating panoramic views emerges as a pivotal factor in determining the desired walking path direction. Nevertheless, there are limitations on logging activities for the purpose of establishing open panoramic vistas or crafting new walking paths. Consequently, a comprehensive analysis of visitor behaviour patterns becomes essential.

Walking path impact on human wellness and attention

In the contemporary landscape, stress and the shift to remote work during the COVID-19 pandemic have opened up new avenues for the development of green spaces. According to information available on the website of the Centre for Disease Prevention and Control of Latvia (SPKC), "*the good mental health of an individual and society as a whole is a key prerequisite for shaping a stable, safe, and prosperous society [...]. It is crucial that an individual can reach their full potential, effectively manage the daily stresses of life, work productively, and contribute to society*" [16]. Drawing from studies in environmental psychology, it is evident that individuals benefit from exposure to diverse and abundant information, thereby ensuring psychological comfort and subsequent positive impacts on human health [22].

One study highlights seven overarching environmental aspects that enhance health and stimulate cognitive activity. These aspects include the necessity for a natural, aesthetically pleasing environment that is informative and comfortable. Furthermore, the environment should possess qualities such as being engaging, diverse, and dynamic, while also contributing to cognitive improvement across various dimensions, including the differentiation between cognitive phases, engagement of the five senses, and elicitation of a range of emotions [26]. Psychologist Roger Steffen Ulrich posits that throughout the course of human development, those who thrived were often the best-informed individuals, as situations allowing the acquisition of new, biologically rewarding information were favoured. It is vital that information acquisition does not involve undue risk. Therefore, the environment or landscape must remain clear, well-defined, and easy to navigate, devoid of hidden dangers – such as darkness in a forest or an incomprehensible walking path direction (Figure 1) [22].

A number of studies emphasize the significant role of nature, environmental conditions, and the infrastructure of natural territories in improving health [5; 21]. The primary attraction of this administrative unit lies in its captivating landscape relief, characterized by eskers and protected open pine forests interspersed with extensive stands of firs and deciduous trees. A prominent landscape and recreational feature is the Dubkalni Water-reservoir, which was formed in 2003 following the closure of a gravel pit.

The paths are used for walking by the elderly, families with children, as well as by groups of pupils and students. This is associated with the natural need to maintain a connection with nature and to be in a scenic environment that stimulates all five senses. On the other hand, Chinese-born American geographer Yi-Fu Tuan and interior architect Heinrich Hermann emphasize that spatial order [4], where stimuli do not disturb but create inner silence, diverts the visitor's thoughts from the external to reflection and contemplation [15, *78*]. This becomes increasingly necessary every year in today's fast-paced life.

The key role played by the landscape in developmental psychology must also be taken into account from childhood to old age. Considering the choice of environments to promote the development of children's neural plasticity and cognitive abilities as much as possible, as well as to fundamentally facilitate their physical and mental health, the landscape must be stimulating. This stimulation can be achieved through diversity, among other factors. Specific sections designed for children may be included in the layout of walking paths, with additional signs pointing out environmental objects, panoramic views, and major focal points in the

landscape to capture a child's attention and develop their observational skills. When creating a network of walking routes, researchers emphasize the importance of a green, clean, and cheerful infrastructure that fosters imagination [17]. Outdoor activities can significantly enhance the physical and mental health of children. The results of a Canadian and Norwegian study show that activities in the forest or garden can improve attention focusing and self-regulation skills in preschool-age children and help prevent symptoms of attention deficit hyperactivity disorder [23].

The same aspects are equally important for other age groups with a high incidence of cardiovascular diseases. When planning trail directions, it should be taken into account that in the "Ogres Zilie kalni" nature park, eskers alternate with the so-called 'ice pits' – deep, crater-like pits with high sides formed in places where buried icebergs melted [3]. Here, on hot summer days with temperatures above 25-27°C, a zone of oxygen depletion can form, which may cause breathing difficulties for certain groups of senior citizens. Simultaneously, we must consider the mental health of the elderly, which is especially relevant today, as the number of people affected by dementia is on the rise. Recent studies have found that the period from 2020 to 2022 [2] has led to new habits among visitors to natural territories. This process of improvement and landscaping has prompted the idea of developing a larger number of small local recreational sites [10]. This approach is highly beneficial for the elderly, ensuring safe and enjoyable outdoor activities. Creating resting places next to walking paths encourages greater involvement of the elderly in longer walks, which can slow down the progression of dementia symptoms. Being active for just 20 minutes outdoors can stimulate the brain, releasing hormones that create an environment suitable for the growth of new cells. Outdoor activities also promote neural neuroplasticity, stimulating new connections among cells in the areas of the cerebral cortex responsible for speech, information processing, interpretation of sensory stimuli, coordination, and complex reasoning.

One of the ways in which these benefits manifest is through human attention. Attention is the means by which humans actively process a limited number of incoming stimuli [20]. When people are stressed, fail to take breaks, and actively try to focus on more than one thing at a time (multitasking), they expend their mental resources, further fatiguing their attention and other cognitive processes [19]. The way people focus their attention determines their neural pathways, and in turn, it affects their wellness [7]. If humans focus on negative, critical aspects, they develop negative thought habits (automatically), which in turn diminishes their mental wellness [6; 19]. When people allow themselves to focus on only one thing at a time, allow their attention to wander, and generally relax, their mental resources renew, and their ability to focus, attention span, switch attention from one object to another, and overall attention dynamics improve [8]. The issue is that our neurons can't switch off as quickly as people would like, and humans need an external method to facilitate this process. One effective method, as proven in experimental research designs, is walking in nature. This approach is also proposed by the attention restoration theory. Walks in nature stimulate the flow of oxygen to the brain, reduce stress, and promote wellness among trees. By developing these as habits, overall mental and physical health improves [25].

Materials and Methods

DATA OBTAINING METHOD: In order to obtain data about attention dynamics, Schulte Tables test electronic version was used. Schulte Tables test originally is a per-and-pencil test placed in a 5x5 matrix which has random numbers from 1 to 25 and usually the researcher asks to find consecutive numbers from 1 to 25. Usually, the researcher asks to identify and point with a pencil or pen at the numbers from 1 to 25 arranged in a jumbled sequence, recording the time for each table with a stopwatch before moving on to the next table that the researcher presents to the respondent. Due to the conditions of the research, this test would be difficult to administer in a group in this per-and-pencil format. Thus, the test is readily available as a mobile application. Each of the respondents downloaded the application in their phone, then instructed what to do and then they began the test. Respondents were asked to find consecutive numbers from 1 to 25 in a table by pressing with their finger in the mobile phone application. They had to fulfil five tables in each test. The time to complete each table was electronically recorded. In total the measurement was taken 55-times

RESPONDENTS: A total of 18 respondents, aged between 25 and 73, took part in the study. It is important to notice that all of the respondents are not residents of Ogre and does not visit the hiking trails on a regular basis, thus the trails were relatively unknown to them. The participation was voluntary, and respondents could leave the procedure at any moment they wanted to.

PROCEDURE: In order to be able to assess the layout of the nature park paths on the dynamics of attention, an analysis of cartographic material and a topographic analysis of the path plan were carried out, as well as an assessment of the situation in the nature park. The intensity of the use of the paths that had been designed in different ways and the effect on the dynamics of attention were analysed and compared. After a face analysis of the mood of visitors and their choice of routes, principles of planning on the basis of environmental psychology have been proposed that are aimed at providing a higher level of psychological comfort. During the development of the strategy, findings of studies were used that show the impact of aesthetic informational stimuli, as well as landscape arrangement, proxemics, and landscape structure stimuli on sensor receptors [15].

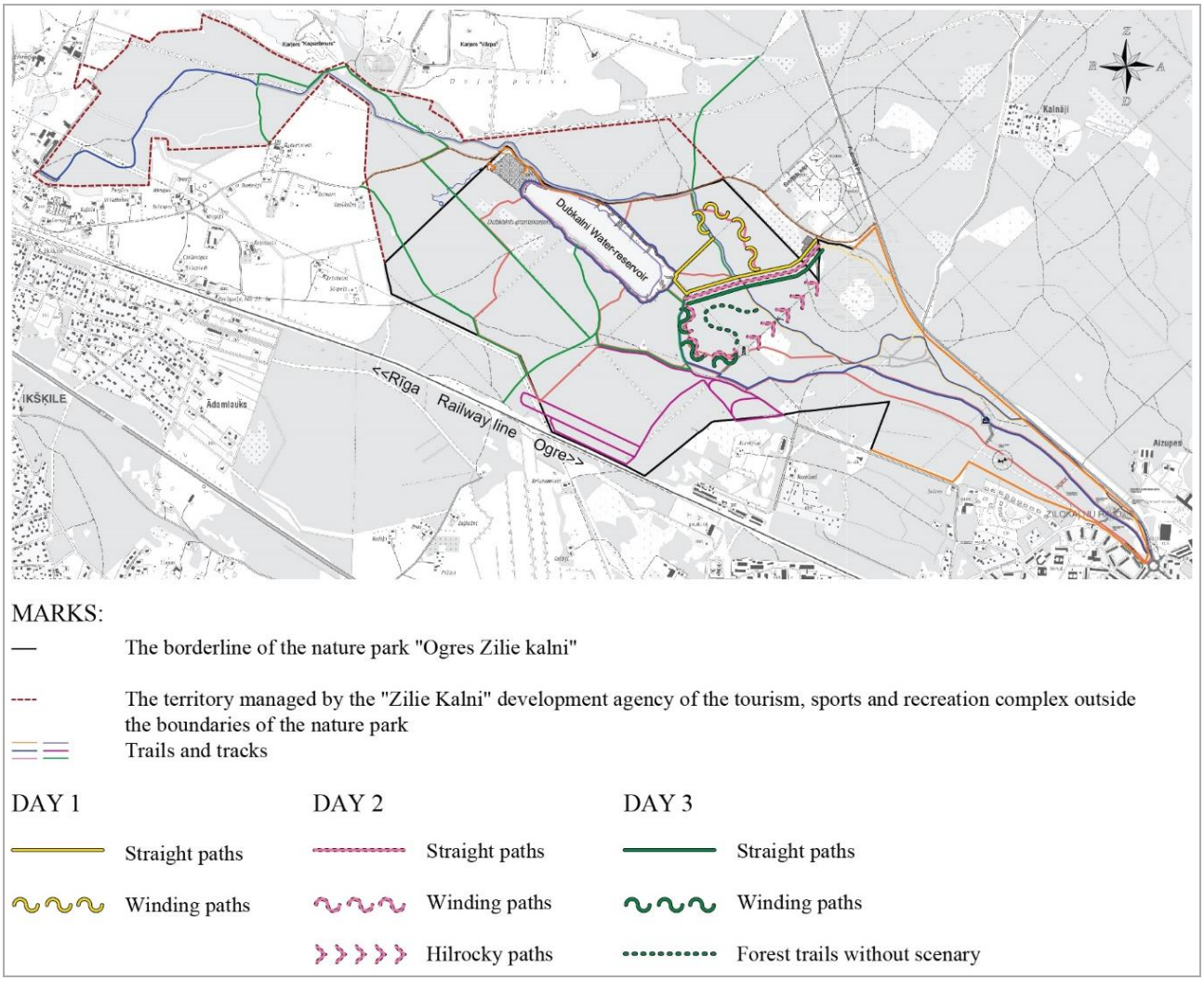

Fig. 2. The routes of the analysed paths of Nature Park „Ogres Zilie kalni" (Day 1, 2 & 3) [Created by I. Kraukle]

After assessing respondents' readiness, they completed a series of 5 Schulte Tables test. Different types of paths were chosen – (A path), with a simplified, straighter route (less stimuli) and (B path) a winding, calmer and remote reflection-inducing paths (Figure 2). Respondents completed a series of 5 tables before starting the walk, then completed a series of tables completing the A path, and at the end of the walk completing the B path, totalling three measurements that were then compared with each other. Measurements were made several times, slightly changing the route. The total average length of the walk is 2 km, the average walking time is 40 min. The average length of each trail is 1 km, time – 20 minutes.

Results and Discussion

To study the influence of different pathway structures, total of 55 measurements were performed, using the Schulte Tables. Both simpler and more complex layouts of walking paths were chosen for the measurements. The measurements (Mr) were compared, and their ratio expressed as a percentage (Tab. 1).

The results demonstrates that on Day 1 and Day 2, the attention is most effective after winding paths which was

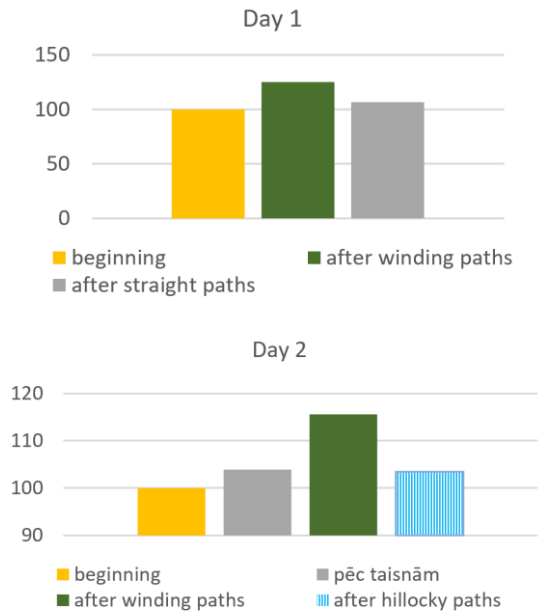

Fig. 3., Fig. 4. Summary results on the dynamics of attention (Day 1 and Day 2) [Created by R. Čaupale]

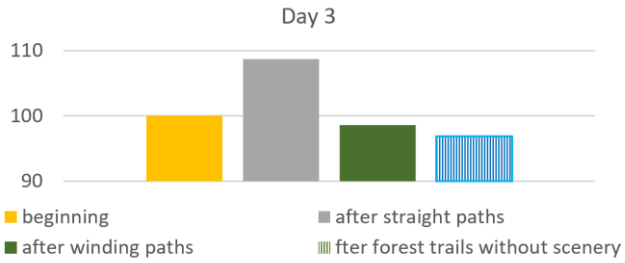

Fig. 5. Summary results on the dynamics of attention (Day 3) [Created by R. Čaupale]

TABLE 1

Improvement of the dynamics of attention (IDA), where Mr1 – measurement at the start of the trail section, Mr2 – measurement after the outlet trail section [Created by R. Čaupale]

Characteristics of the operation	Improvement of the dynamics of attention (IDA) IDA = Mr1/Mr2
Day 1	
Beginning.	**100 %**
Average Mr after winding paths.	**125.3 %**
Closing. Average Mr after straight paths.	**106.6 %**
Day 2	
Beginning.	**100 %**
Average Mr after straight paths.	**103.90 %**
Average Mr after winding paths.	**115.56 %**
Closing. Average Mr after hillocky paths.	**103.40 %**
Day 3	
Beginning	**100 %**
Average Mr after straight paths.	**108.7 %**
Average Mr after winding paths	**98.6 %**
Closing. Average Mr after forest trails without scenery.	**96.9 %**

the 2nd measurement on Day 1 and 3rd measurement on Day 2. On the Day 3 results indicated the same, attention peaked after winding paths, which was the 3rd measurement. Attention dynamics subsided at the end of the walk due to physical fatigue. Since the measurements were taken at different intervals time wise in each day, the attention dynamic peaked either on 3rd or 2nd measurement. On Day 3 the attention dynamics decreased at the end because this was the longest of walks and the physical fatigue impacted it. The aggregated results show distinct improvements in attentional dynamics, well-illustrated by the graphs (Fig. 3, 4, 5).

Observations over the last couple of years, especially during the COVID-19 pandemic, show that nature park visitors prefer paths that lead mainly towards remote contemplative routes. Even small bends that form organically in the forest reduce the impression of the walking path being a straight line. A trend of avoiding distinctly wide and dusty paths that are too straight if their route is oriented in a single direction only. As the small paths were not comfortable enough (possibly due to the characteristics of the surface covering), the large paths saw a concentration of an influx of visitors, and it was difficult to achieve the desired distancing, which goes against the principles of proxemics when attempting to provide psychological comfort.

Conclusion

The obtained research results do not provide an unequivocal answer about the influence of the type of path on the dynamics of attention. Results indicate that attention dynamic improves after 2nd or 3rd measurement, which was usually 20-30 minutes. This is consistent with theory that 20 minutes is just enough to reset attention. Attention dynamics diminished again at the end of the walk due to physical exhaustion. It was be hypothesized that after appropriate rest, the dynamics would improve. It can also be speculated that the results were impacted by the fact that respondents were communication amongst one another, thus disturbing them to focus on the environment and rather kept their attention engaged in social interaction. It would be beneficial to further research attention dynamics when people have less interaction and pay more attention to the paths and environment. In order to obtain more qualitative measurements, the research needs to be expanded, by performing the task on a larger number of respondents, supplemented with other methods, and taking into consideration 20–30-minute time limit per walk. In the next study, it is planned to evaluate whether the improvement of emotional wellness, which is also related to the quality of the dynamics of attention, is associated only with walking or is associated with different types of external stimuli, and what type of planning improvements (changes in the linear planning of trails, diversity of landscape layers, etc.) would be more successful.

When modelling the walking path network and path route, cognitive factors such as the goals of the walk, participation in a group or walking alone, social relations, as well as the perception of the three-dimensional spatial structure of the environment, which serves as a basis for creating the structure of the walking path layout. The study raises a number of interesting yet complex research issues, which are made more complex by the characteristics of the interacting groups of individuals – pupils and students, families, the elderly. Social factors play a key role in setting the right path both for fundamental studies and practical applications. Understanding of the mechanisms and information sources that drive decision-making in the choice of a walking path must include not only psychological but also social aspects, which would provide a more comprehensive understanding of path planning to create psychological wellness and an emotionally positive behavioural model.

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Kopsavilkums. Šodien daudzās pasaules valstīs urbanizācijas dēļ lielpilsētās ir zudusi saikne ar dabu. Tas aktualizē pētījumus par dabas nozīmi pilsētas iedzīvotāju ikdienā, it sevišķi pēc COVID-19. Esošais pētījums ir daļa no plašākas pētnieciskās ieceres, kā nodrošināt pilnvērtīgāku atpūtu, lai takas maksimāli sniegtu gan fizisku, gan psihoemocionālu komfortu. Izpētes teritorija – dabas parks "Ogres Zilie kalni", kur ir iekārtotas atpūtas un aktivitāšu takas. Lielākai daļai iedzīvotāju atpūtai svarīgākas ir pastaigu takas un slēpošanas trases. Pētījumu mērķis ir parādīt dabas parka taku tīkla plānošanas principus, kas balstīti ne tikai uz ainavu arhitektūru, bet arī uz vides psiholoģijas zinātni. Tādejādi var sagaidīt labāku rezultātu rekreācijai un secīgi labvēlīgi ietekmēt cilvēku veselību. Pētījuma mērķis: noskaidrot dažāda veida dabas pastaigu taku ietekmi uz cilvēka uzmanības dinamiku. Pētījumā, izmantojot psiholoģijas metodi *Šultes tabulas*, tika vērtēts, kā atšķirīgi stimuli taku un maršruta plānojumā, kā dabas taku veids ietekmē cilvēka uzmanību.

URBAN AND PERI-URBAN FOREST AREA STAKEHOLDER IDENTIFICATION, CASE STUDY OF 'BERNĀTI' AND 'OGRES ZILIE KALNI' NATURE PARKS

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Abstract
Stakeholders and involved parties are crucial in a proper management of forest areas, more so in nature park areas. Urban nature areas and more remote peri-urban areas have objectively the most complex management issues due to the potentially high density of visitors and a diverse range of stakeholders. Such areas can also be valuable nature conservation and biodiversity hotspots, further making stakeholder interactions more complex. In this research, we conduct stakeholder identification for two case study areas – an urban forest nature park and a peri-urban forest nature park, with the aim of developing detailed lists of involved parties, including both public and private entities. We identified three main blocks of stakeholders (regulatory, usage, management), and detailed each group and sub-group for the case study areas. Our main results and conclusions include the identification of minor differences particularly explained by geographical and socio-economic contexts for each of the areas, with the regulatory stakeholder group overlapping the most between the two areas. The potential use of such analysis can improve or develop cooperation between previously unobserved stakeholders, and in research contexts, allow for a greater input from various parties that could have been missed in a more broader analysis of a research area.
Key words: stakeholders, urban forest, peri-urban forest, nature park.

Introduction

In the management of urban and peri-urban forests, in addition to the specific principles of forestry, good governance is also necessary. This applies both to the organization of state, sector or company processes, which are based on their management principles, methods and techniques, and to the principle of good governance as a principle of administrative law (Kovaļevska, 2009). According to Kovaļevska and other authors, good governance in any sector or company activity requires transparency, responsibility, accountability, involvement of people affected by decision-making, responsiveness to the needs of the population, efficiency, resource saving, accommodating, constructive and interested attitude, which is directed towards problem solving, equal information for everyone about opportunities, clearly understandable rules and decision-making process, personal disinterest, justification of decisions and substantive responses (Jones, 2007; Kovaļevska, 2009).

A form of public participation which can also be applied in urban forest planning and management includes the right to submit a request, public investigation, local referendums and consultation committees, residents' discussion clubs, communication and discussions on the internet, children's councils, minority representation, open seminars, proactive expression of residents' ideas and desires (Jones, 2007). It is also necessary to use the internal cooperation resources of the forestry sector, cooperation at the local, municipal and regional levels (Kenney, van Wassenaer, & Satel, 2011).

Forest management nowadays is based on the principles of sustainability and focuses not only on timber yields but also strives to integrate and ensure the environmental and social functions of forests. Urban and peri-urban forestry differs significantly, because timber production takes a secondary role or is not employed at all due to nature protection requirements, with the social function being highlighted as the most important. In Latvia, all forestry work planning and operations take place in accordance with the Forest Law, which requires the development of a forest management plan (FMP) for the actual forestry activities. This is a second-level plan based on forest inventory data, which sets out the basic principles and volumes of forest management and use, and updates the nature conservation and protection action plan for the next ten years until a new forest inventory. Initially, the municipality had no influence on forestry planning. Significant changes were brought about by amendments to the Forest Law - Article 2, Paragraph 5, which stipulates that forest management must not contradict the requirements of territorial development planning documents (Latvijas Republikas Saeima, 2000). Foresters had to reconcile with the rules that introduce a new stakeholder in forest management - the municipality. The greatest dissatisfaction of foresters was with each municipality's 'individual forest policy', which provides for rules different from the Forest Law. Until 2012, the role of foresters in the development of municipal territorial planning was mostly more or less passive, limited to the role of information provider (for example, general data on the forest in the municipality, on logging volume and the like can be found in development plans.

The most interested party in the management of forests and urban forests in Latvia is the state, which forms the general normative base, supervision, and assistance. The Saeima issues laws regulating the forestry sector (Latvijas Republikas Satversmes sapulce, 1922). The Cabinet of Ministers issues binding Cabinet regulations, which more precisely regulate specific activities (Latvijas Republikas Saeima, 2008). The State Forest Service (SFS) within its competence supervises forest management and use and compliance

with regulatory acts regulating hunting, supervises and implements forest fire fighting, and participates in the development and implementation of state forest policy (Latvijas Republikas Saeima, 2000). The State Environmental Service's goal is to ensure compliance with regulatory acts in the field of environmental protection, radiation safety and nuclear safety, and natural resource use, as well as to promote sustainable use of natural resources and energy. One of the functions is to carry out state control of environmental protection and natural resource use in Latvia in the manner prescribed by regulatory acts governing environmental protection (Latvijas Republikas Saeima, 2004). One of the functions of the Nature Protection Board is the management of specially protected nature territories (hereinafter - protected territory) established by the Saeima and the Cabinet of Ministers (Latvijas Republikas Saeima, 2009), many of these territories are also forest territories. The State Police is a direct administration institution under the supervision of the Minister of the Interior, which, within its competence, implements state policy in combating crime and protecting public order and safety, as well as protecting the rights and legitimate interests of individuals (Latvijas Republikas Saeima, 2005), in the Law 'On Police' and other regulatory acts regulating the activities of the State Police (Latvijas Republikas Saeima, 1991). State Fire and Rescue Service. Forest fire fighting is a set of measures that in the forest and forest lands ensures the detection of the forest fire site, containment and extinguishment of the fire, and monitoring of the fire site (Latvijas Republikas Saeima, 2003).

One of the autonomous functions of the municipality is to promote the sustainable management and use of natural capital, as well as to determine the use of municipal property in public use, if not otherwise provided by laws (Latvijas Republikas Saeima, 2022). The Building Authority, in fulfilling one of the autonomous functions of the municipality, ensures the legality of the administrative process related to the construction process (Latvijas Republikas Saeima, 2022), among other things, also in all forest territories. Municipal police. The autonomous function of the municipality is to participate in ensuring public order and safety, including establishing and financing the municipal police (Latvijas Republikas Saeima, 2022). The municipality establishes a municipal police, the duties of which include the prevention of violations, control over the fulfillment of binding regulations of the municipality (Latvijas Republikas Saeima, 1991).

In essence, municipalities are tied to forest management in their territory, but in practice, they usually have little influence on the forestry process, including urban forests. Forestry indirectly affects the economic life of the municipality's territory, promotes employment, and maintains or creates traditions. If income from forestry directly affected municipal income, it would more carefully consider a strict stance on the economic use of forests. All forestry work planning and implementation takes place in accordance with the Forest Law, in which the municipality is assigned a negligible role. As mentioned before, Paragraph 4 of Article 2 of the Forest Law provides that additional conditions for forest management in urban and rural areas are also provided by binding regulations of the municipality (Latvijas Republikas Saeima, 2000). Significant for spatial development planning is Paragraph 5 of Article 2, which provides that forest management must not contradict the requirements of territorial development planning documents, (in force from 01.01.2012) (Latvijas Republikas Saeima, 2011), which also imposes an obligation on foresters to consider the interests of municipalities in forest management. A certain problem is caused by the fact that municipalities do not have a convincing opinion on forest territory planning, functional zoning, and appropriate management yet. So far, in most of the Riga agglomerate municipality territory plans, the forest is marked as a continuous green mass, without distinguishing different forest functions; therefore, it is not shown which of the forest functions has a leading role in a particular territory, what level of improvement is needed. Forest improvement, creating parks, forest parks falls on the shoulders of municipalities, but unfortunately, for this purpose, municipalities can afford to allocate limited resources, at best performing negligible improvement work.

An association is a voluntary association of persons established to achieve the goal set out in the statutes, which is not of a profit-making nature (Latvijas Republikas Saeima, 2003). Urban forests are resources that a certain group of people manage to raise the well-being of other involved groups, so the mutual communication of these groups is important to achieve the set goals. In city forests, not only forest specialists, but also representatives of other sectors - landscape architects, city planners, spatial development planners, environmental specialists, health institution representatives, and other professionals are gaining more and more influence. The urban forest manager has to work in interaction with other involved professionals and society. Latvia lacks, transparent public discussion and decision-making procedure for the balanced use of the ecological, economic, and socio-cultural value of the forest, the economic viability of forest management is threatened. As a result of poor mutual communication, unnecessary conflicts can arise between all involved participants (forest owners, foresters, municipalities, state administration, society, press), followed by incorrect use of available work resources (for example, emergency actions to resolve conflicts) and a fragmented management system. Such a situation also limits public participation, as it is not clear to the public who is responsible for what and who to turn to in each specific case. All this can affect sustainable

urban forest planning and management. Participation is rarely a simple process. In foreign countries, various groups and participants are involved in urban forest management (Konijnendijk *et al*., 2005), which should also be achieved in Latvia.

Participation of society in decision-making processes in any municipality is an integral part to ensure effective governance. The participation of interest groups at the initial stage of the planning process allows for the development of various compromise options that satisfy the target groups. However, in reality, public involvement still occurs in very small volumes, or in cases of sharp conflicts. The reasons for this can be attributed to societal inertia, low levels of trust in the existing power, formal interest of municipalities in public participation, and the historical secrecy of forestry planning.

Considering all these issues, our research goal includes the identification of stakeholders and setting a baseline for further identification of conflicts or synergies. This is important to not miss a crucial involved party and to draw a holistic picture of the state of management of an area.

Materials and Methods

In this case study, we utilized various base sources and described the state of the stakeholder relationships in the context of our two case study areas. We analyzed the study areas through the following resources – national laws (including Forest Law and others), regulations and municipality level regulations. The 'map' of stakeholders was created by going through the corresponding levels from top to bottom (starting with the national body of regulations, ending with the public use of the area. We consolidated the main stakeholder groups and activities in a single table for both case study areas and checked for subsequent differences in the types of stakeholders or nuanced uses of the forest area. Inferred experiences and observations through the viewing glass of researchers and forest area managers were also employed, but the main body of this case study consists of using formal documents, with the inferred views only adding details to the overall context.

For our research, we selected two relatively distinct, yet similar forest areas – *Ogres Zilie kalni nature park* (located in the vicinity and immediate agglomeration of Riga), the area we classify as urban, and *Bernāti nature park*, located approximately 220 km from Riga, at the coast of the Baltic Sea, see 'Figure 1'.

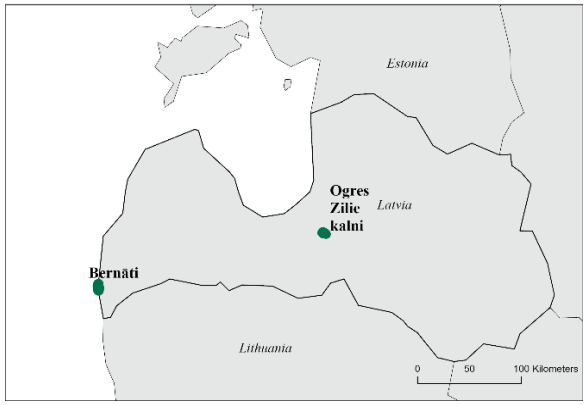

Figure 1. Location of the case study areas.

We classify Bernāti as a peri-urban forest area, since the immediate vicinity of the nature park contains a small village and agglomeration of rural houses, and a major city approximately 15 km away. The two areas share features of the status of a protected nature park but consist of different management and ownership zoning. While the Ogre case study area is a major hotspot for recreational activity and visited by tens of thousands of visitors in the context of Riga agglomerate (capital city of Latvia), Bernāti is less popular on the national scale, thus, inferring population distribution in Latvia and has fewer total visitors. Bernāti nature park is more focused (through zoning and regulation comparisons) on nature conservation and species diversity issues, which are increasingly problematic in the context of an influx of recreational visitors in the past 10 or so years. Foreign tourists and locals increasingly utilize the area for recreational activities, and the land owners and managers are adapting by introducing various infrastructure projects and steering visitors from sensitive nature protection zones.

Results and Discussion

Our main result is the analysis of stakeholder distribution for the two case study areas (the stakeholders we have identified) (Table 1). We divided the identified stakeholders according to the main stakeholder groups, and subdivided by specific case study stakeholders (the ones identified in our research). Thus, we can compare which stakeholders are transient and overlap despite geography or type of area, and which are unique.

Table 1

Identified stakeholders and comparisons between the two case study areas

Stakeholder group	Stakeholder	Function and involvement	Ogre Zilie Kalni nature park (urban)	Bernāti nature park (peri-urban)
National Government	Saeima (Parliament)	Lawmaking and regulations	State and municipal divisions (regional offices) of various regulatory, enforcement or oversight services are functionally the same and with unified standards on the national scale.	
	Cabinet of Ministers	Regulatory rules		
	VMD (Forest Service)	Enforces laws and rules based on forestry management		

Continuation of the Table 1

	VVD (Environmental Agency)	Environmental protection and regulations concerning forest protection aspects		
	DAP (Nature Protection Agency)	Nature protection enforcement, territory management		
	VUGD (Fire and Rescue Service) and Police	Fire safety, rescue and criminal investigations and prevention		
Local Government	Municipality council	Local laws and regulations	Ogre municipality	Dienvidkurzemes municipality
	Construction, planning and inspection services	Oversight and allowances of buildings, proper use of territory type	Ogre municipality	Dienvidkurzemes municipality
	Municipal Police	Enforcement of public safety, decency	Ogre municipality	Dienvidkurzemes municipality
Landowners	State owners	Management of state owned land	No state owned land	Latvian State Forests and Government of Latvia
	Municipality owners	Management of municipality owned land	Ogre municipality and Riga city	Dienvidkurzeme municipality and Liepaja city
	Public owners	Management of public entity land	Municipality owned 'Ikšķiles māja'	Undefined public or state ownership of smaller land parcels
	Individual owners	Management of privately owned land	None	Groups of small (~10ha each) historically privately owned forest parcels
Community, society	Individuals, local citizens	Recreational use, sports, hunting, photography, foraging and others	Both areas are inclusive and open to recreational activities outside restricted nature protection zones. Camping (tents, fireplaces) is regulated by law	
	National scale citizens	Tourism, as above		
	Foreigners	Tourism, as above		
Educational institutions	All-levels of educational system, interest based education	Environmental education, sports, internships	Various educational institutions in the Ogre municipality and from Riga actively use the area	No known organized activities by educational institutions on a regular basis, closest educational facilities are around 6 km away
Armed Forces	National Guard, Youth Guard	Field training, competitions, other events	Various National Guard or Armed Forces units	No activities published or announced
For-profit business	Tourism and guided tour related	Guided tours, tour services, nature education services	Proximity to Riga defines broader services and organizations offering services	Lesser active promotions of guided services
	Services	Craft services, bed and breakfast, event spaces, services related to forest management	Not directly in area, but proximity to Ogre city and Riga provide large amount of services	Locally owned caffes (2), large number of lodgings (private and public) due to proximity to the sea coast
NGO's	Nature protection and civic activity related	Involved in oversights on strict nature reserve territories, species and biodiversity issues	'Nature protection club', other state wide environmental NGO's	Residents organization 'Mēs Bernātiem' (local community NGO), other state wide environmental NGO's
	Educational	Nature education events, programmes, campaigns	State wide events and campaigns for both areas, no distinctive events found	

Continuation of the Table 1

	Sports, fitness, survival schools	Miscelleanous events, programmes, campaigns and events	Biathlon club, skiing club, orienteering club, bikeriding federation, other sports clubs	Orienteering club, mountain biking club. Events by other state wide organizations rare

Considering the stakeholder relationships and structures in the context of an urban or peri-urban forest area, we identified three main groups or clusters – regulatory, management and usage stakeholders. As seen in the schematic, see 'Figure 2', the relationships all 'meet' at the center, the forest area itself, and this can also be interpreted as a pressure point, as all of the stakeholders contend or enforce their interests or necessities.

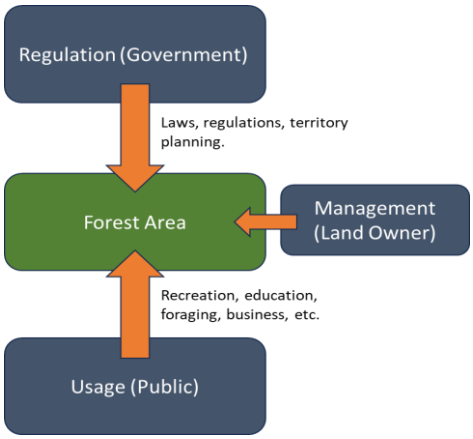

Figure 2. Schematic representation of the stakeholder involvement and role distribution for a general forest area.

As expected, there were miniscule differences in the regulatory aspect of stakeholders – both areas are essentially under the state law as nature parks and contain nature protection reserve. Regulatory stakeholders differ only by their regional location, but are all with the same rules, enforcements, laws. Main differences arise in the land ownership and management aspects – Bernāti nature park is more fragmented, due to either historical or chance factors. In comparison to the Ogre case study area, a more undefined cooperation must exist between the two municipalities, the state owned forest areas and a reasonable amount of small private land holders. We were unable to delve deeper into these relationships in the Bernati case, but in comparison to Ogre Zilie kalni, where the ownership is more homogenous, it is debatable whether this increases or decreases certain development projects or management issues.

In terms of public usage (multitude use by the wider community of both visitors and locals), the characteristics of both forest areas show similarities, yet certain aspects are missing in either case – there are no skiing or other winter sports clubs in Bernati, compared to Ogre, even though the nature park does contain elevation aspects. This could be explained by stricter zoning concerning nature protection areas. In Ogre, no public/local resident's NGO was identified – this differs from Bernāti, where a reasonably active NGO is present and even organizes the development and community events in the nature park. Few differences arise from certain other aspects, like the the use of areas by armed forces. In the Bernāti case, we could not identify any known use by the National Guard, as was in the case for Ogre Zilie kalni. This could be explained once again by the more nature protection centric regime of the Bernāti area. Bernāti also showcases a difference in the use of tourism attractions - in the vicinity and the immediate location (including one such site inside the nature park, which is a municipality owned camping/resort site) is filled with guest houses, RV and tenting sites. This differs from Ogre, where the close vicinity to the urban area might have an adverse effect on the willingness to spend a night or develop such housing. As both areas differ by the classification we employed (one is peri-urban, other is urban), these differences also show in a more nuanced analysis of stakeholders. The aspects of forestry management in terms of logging, was unexplored thoroughly, but was not a critical element of this analysis due to the fact that the areas are nature protection areas *a priori*.

Conclusions

1. In both research areas, all relevant stakeholder domains are visible, including regulatory activities and property rights - management and utilization. Uncertainties rise from the public and private use of the areas, as all recreational or other types of uses are difficult to identify.
2. No informal resident's association has formed in the Ogre Zilie kalni to address territorial development issues. It can be concluded that the comprehensive development functions of the territory are carried out by the municipal agency, which manages the area and actively communicates with residents/visitors by listening to their opinions and explaining actions.
3. Continuing research on the interests of the Ogre Zilie kalni and Bernāti to supplement the specific engagement of interested parties is necessary. Further study of other urban areas would confirm our claims regarding interested parties or expand their enumeration.

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Projektā FUTURE forest gūto atziņu piemērošana meža nozares un pašvaldības sadarbībai ilgtspējīgai attīstībai Talsu novadā (Application of the lessons learnt from FUTURE Forest to cooperation between the forest sector and local government for sustainable development in Talsi municipality). (2011).

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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 km^2 tend to support less biodiversity than a single fragment of 10 km^2 (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.

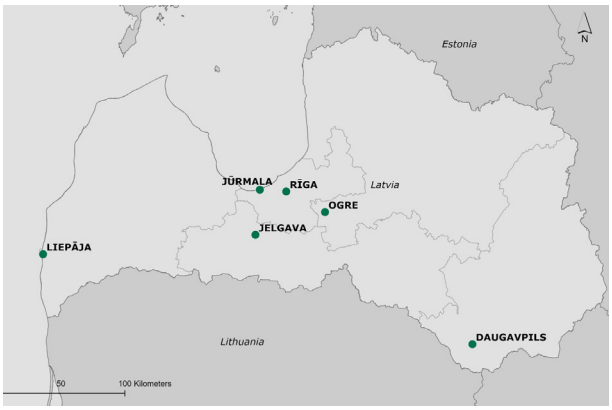

Fig.1. Case study areas (cities) selected for the research (created by authors)

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)

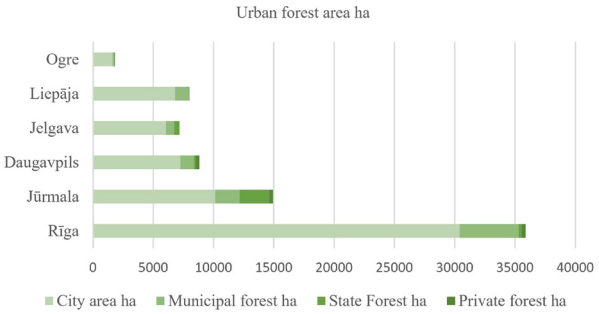

Fig. 2. Urban Forest Areas and Ownership Distribution
(2021 data, created by authors)

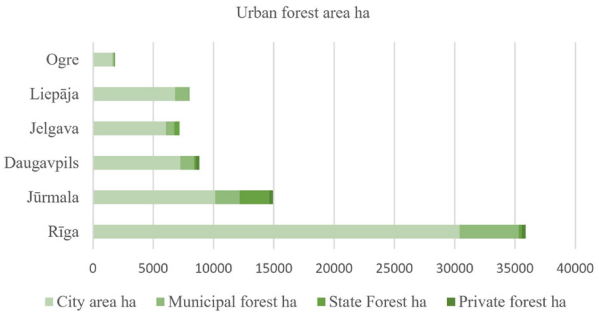

Fig. 3. Urban Forest Areas and Ownership Distribution in Percentages
(2021 data, created by authors)

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

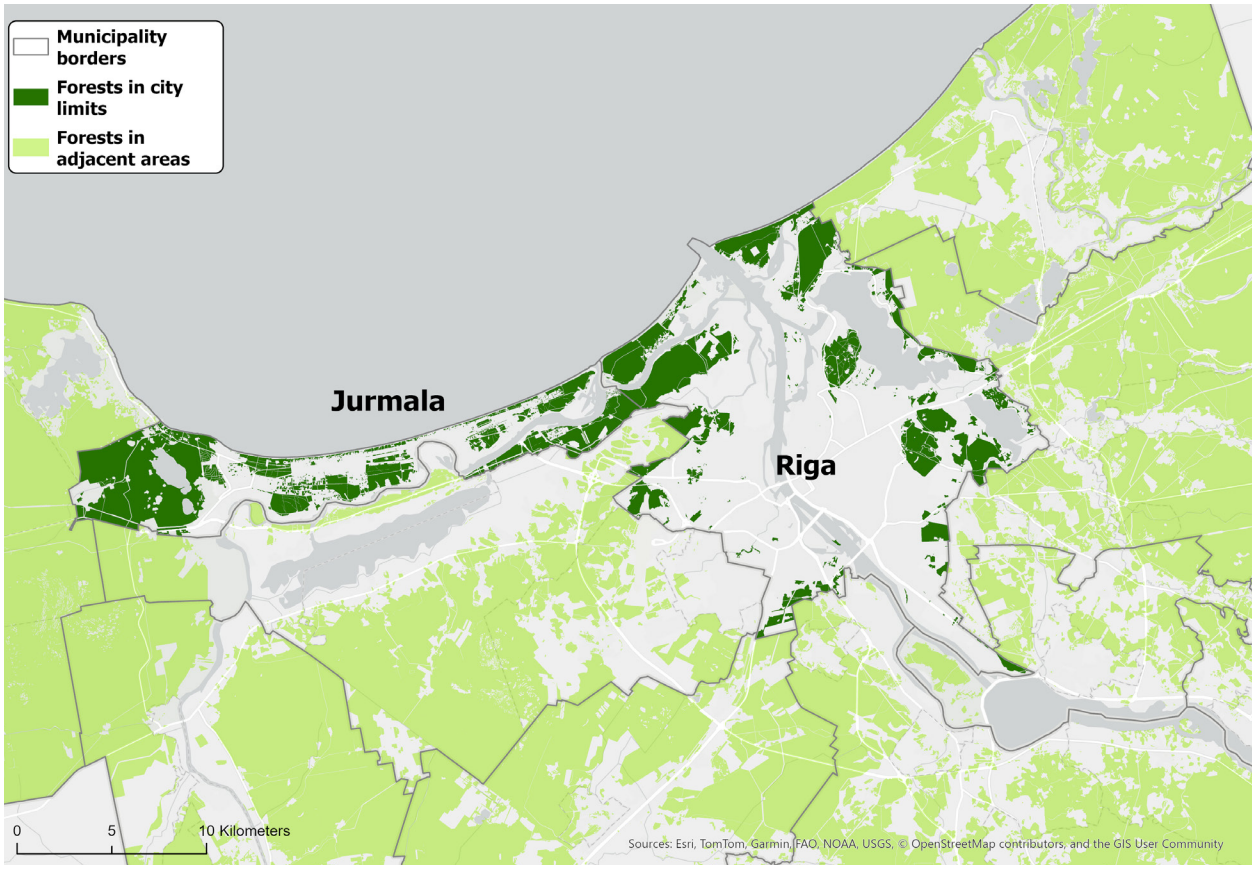

Fig. 4. Illustration of Urban forest coverage in Riga and Jurmala (created by authors)

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

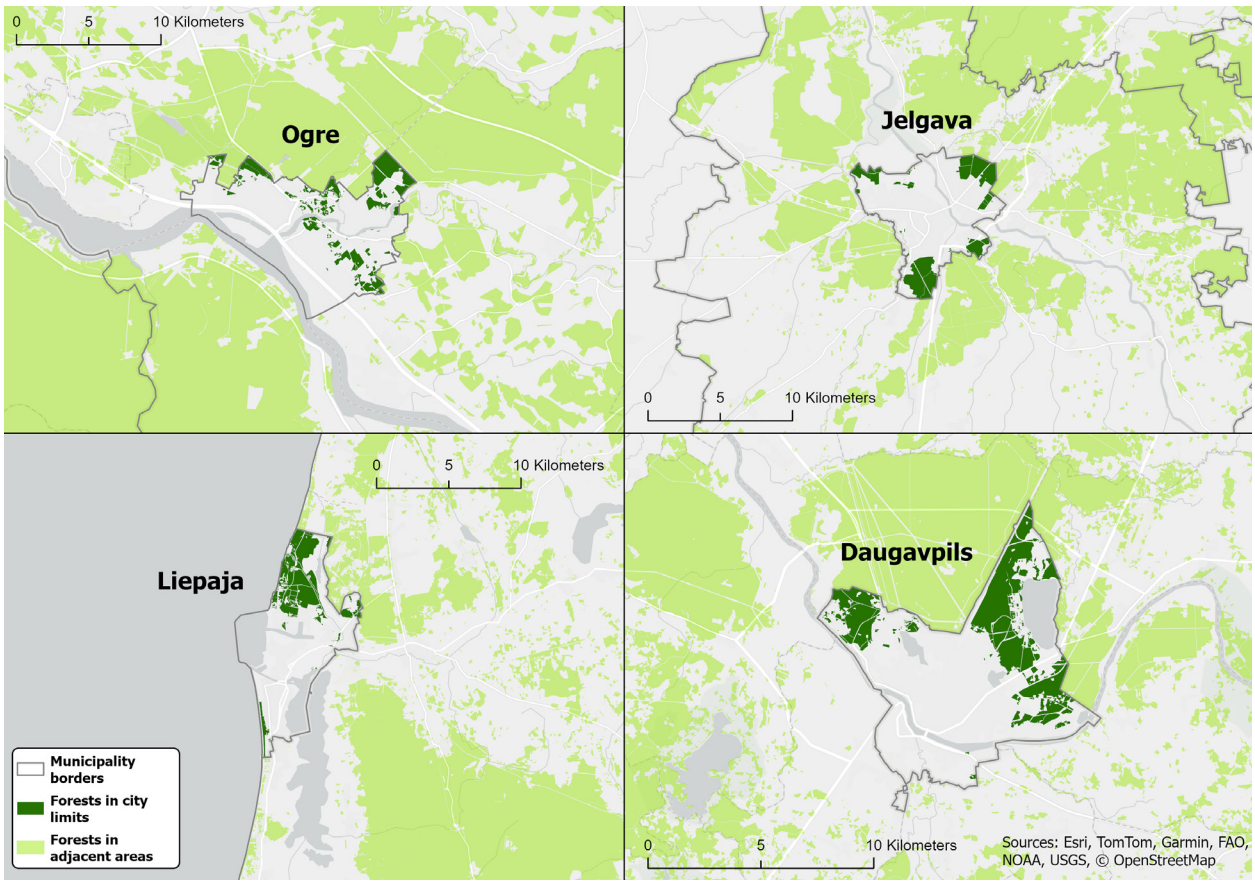

Fig. 5. Illustration of Urban forest coverage of Ogre, Jelgava, Liepaja and Daugavpils (created by authors)

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.

THE 'GO-ALONG' INTERVIEWS FOR ASSESSMENT OF USERS' ATTITUDES TOWARD URBAN FOREST MANAGEMENT

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Abstract
Different stakeholders in urban forests have different interests, which are best captured through 'go-along' interviews. The aim of the research was to identify residents' views on the use of urban forests to ensure the delivery of social functions and to improve urban forest management practices. The 'go-along' interview method is a variation of qualitative interviewing used alone or in combination with other methods to explore and then improve understanding of people's experiences, in which people move when carrying out their activities or practices. The study looked at 4 urban forest areas in Latvia: the nature parks Ogres Zilie kalni, Bernāti, Ragakāpa and Langervalde forest. A total of 26 'go-along' interviews were conducted, where the principle of the researcher being guided by the interviewer was observed within the method used. The routes taken during the interviews were recorded in the *ArcGIS* application *QuickCapture*, in addition to taking photographs of places of interest and recording on a dictaphone the interviewee's perspective on the use of the particular urban forest in daily life, views on management and other insights. The planning and management process needs to consider and balance user preferences, national and local regulations, owner/manager commitments, opportunities and expert knowledge. Areas of varying levels of landscaping and maintenance should be created, so that visitors can choose the appropriate landscaping and intensity of visitation. People who choose to visit the forest have very positive feelings, which contribute not only to physical health, but also to a positive psycho-emotional state and relaxation.
Keywords: urban forest management, cultural ecosystem services, go-along, walk-along, landscape preference.

Introduction

When studying urban forests in Latvia, the authors were already familiar with the different interests of different stakeholders involved in urban forest processes in the Ogre Zilie Kalni and Bernāti Nature Parks - regulatory, management and user stakeholders (Kraukle et al., 2024). Visitor/user interests, evaluations and perceptions of urban forest processes and amenities can be very diverse, as was already evident in the authors' surveys of Latvian urban forest experts in 2024. Participatory interviews were used to find out the views of users. The aim of the research was to analyse the habits and attitudes of the public on the use of urban forests to maintain cultural ecosystem services, assure the realization of social functions, develop and improve urban forest planning, management practices. The go-along method is a practical way for citizens and urban planners to exchange ideas on how to make urban forests more accessible for walking (Miaux et al., 2010), all types of recreation, sports and other socially relevant activities.

Research and practice should take an integrated human-natural systems approach; urban forest planning and design should take into account not only scientific research and local knowledge, but also the interests and priorities of local people (Beckley et al., 2006; Janse & Konijnendijk, 2007; Stokmane, 2022; Wolf & Kruger, 2010). Understanding the green identity of a particular place can help to design urban forests that better meet the needs of the local community (Carpiano, 2009). Local residents, long-term and regular visitors can provide insights into specific local knowledge, local aesthetic and cultural preferences, social systems and attitudes to inform researchers and planners about appropriate design solutions (Barron et al., 2021). In line with these needs, go-along interviewing is a type of qualitative interviewing technique that is highly useful (alone or in combination with other methods) for exploring and subsequently improving understanding of people's experiences, relational perspectives on place and space, and the wider local area in which people move as part of their activities or practices (Carpiano, 2009; Cummins et al., 2007).

Materials and Methods

The go-along interview method is a type of in-depth qualitative interview conducted by researchers who accompany individual informants in a familiar setting, such as their immediate neighbourhood or a larger local area. 'Go-along' can be conducted as a 'walk' (i.e. while walking with the participant), a 'drive' (i.e. while driving) or a 'mixed' form that combines the two previous types (Kusenbach, 2003). The way in which this commuting takes place can vary depending on the context and size of the neighbourhood, but essentially all commuting involves an interview with the participant while getting to know their neighbourhood or other local context. In this sense, the researcher 'walks through' people's lived experience of their neighbourhood. As a method, therefore, 'walking through' offers the researcher a unique opportunity not only to observe people's surroundings, but also to study their perception, processing and navigation of the environment (Carpiano, 2009).

The study covered 4 urban forest areas in Latvia: the nature parks 'Ogres Zilie kalni' (between Ogre and Ikšķile), 'Bernāti' (near Liepāja), 'Ragakāpa' (in Jūrmala) and Langervaldes forest (in Jelgava). A total of 26 go-along interviews were conducted between 3 March 2022 and 25 January 2025.The method used followed the principle of the researcher being guided by the interviewer (see Table 1).

Table 1
Study areas and number of surveys

Urban forest study areas	***Nature park Ogres Zilie kalni***	***Nature park Bernāti***	***Langervalde Forest***	***Nature park Raga kāpa***	***Total***
Number of go-along surveys	10	6	5	5	26
% Number of go-along surveys	39%	23%	19%	19%	100%

The routes followed during the interviews were recorded in *ArcGIS QuickCapture.* Additionally, photographs were taken at key locations and the conversations were recorded using a dictaphone. These conversations were later transcribed, and the themes that emerged were organized into tables for further analysis and the development of conclusions. In this study, the interviewer was asked to follow a routine route in the area to describe feelings, perspectives on the use and management of the urban forest in question. Photographs were taken in places that were highlighted in the interview.

In practice, different terms are used to describe walk/go-along interviews (Bartlett et al., 2023) in qualitative research. There are numerous 'go-alongs or go-along interview' (Bell & Bush, 2021; Duedahl & Stilling Blichfeldt, 2020; Garcia et al., 2012) 'walking interview' (Lynch & Mannion, 2016), even 'wheeling with a wheelchair' (Parent, 2016). The variety of terms used shows that the method is widely and diversely used to describe walking/interviewing and can be used by researchers in different fields. In our case, depending on the specific area and the interviewee's habits, 'going along', 'driving and going along' (6), 'walking with the family' (5), 'walk along with your dog' (6) were actually used. Several of the interviewees (3) cycle in the area on a daily basis, but in order to be able to conduct and record the interview, it was conducted on foot.

In areas where one does not know many personal acquaintances, it can be challenging to find people willing to participate in interviews. People must be willing to share their personal experience and devote a significant amount of time ranging from approximately 40 minutes to 2.5 hours in our case. Most of the people who responded to the invitation to participate in the interviews were socially active people whom we approached through a contact person they knew personally. When approached, they were asked to show and tell us about their habits and ways of using the particular area of the forest, things they liked and disliked about the area.

Results and Discussion

A wide range of information was obtained in the interviews. In this study, the main focus is on the use of urban forests for recreation in order to improve their social function in planning and implementing urban forest management.

Based on the results of the study, we can agree with Kusenbach (Kusenbach, 2003) who identifies five themes that the 'go-along' method is well suited to explore and illuminate: [1] perceptions (i.e., informants' knowledge and values that shape their experience of the everyday social and physical environment); [2] spatial practices (i.e, the spatial ways in which people engage with their environment); [3] the link between biography and place; [4] the social architecture of the natural environment (i.e., different types or forms of human relationships and how informants position themselves in this social environment); and [5] social domains (i.e., patterns of interaction and how place shapes the nature of interactions). The following text in [square brackets] links to the relevant topics. The analysis of the data emerged a certain structure and correspondence with the urban forest functions previously proposed by the authors (Kraukle, 2013; Kraukle et al., 2022), extracted on the basis of the most relevant urban cultural ecosystem services (see Table 2). Cultural or non-material ecological services (Millennium Ecosystem Assessment, 2005) are important for people, providing socialisation and creativity, which in urban areas takes the form of various forms of recreation in natural environments to improve physical and psycho-emotional health, enjoying attractive landscapes and being inspired.

The psycho-emotional aspect of visitors - personal experiences [1], emotions [2], attitudes [4], aesthetic feelings - from the appreciation of landscapes, plants, landscaping [4] to vivid memories of visiting the forest in childhood and youth [3] - emerged as an important aspect in all the interviews. An important aspect of the stories is the emphasis on sensations [1] - beautiful sights in the landscape and small mosses or spider webs, the smell of May flowers (*Convallaria majalis*), the scent of chervil (*Ledum palustre*), blueberries, lingonberries (*Vaccinium myrtillus, Vaccinium vitis-idaea)*, the taste of nuts (*Corylus avellana)*, the special texture of sand on the beach or the cover of dead needles on the path, the taste of melting snow, the wind on the beach and the breeze in the forest. The different interests [4, 5] of the respondents in using the area, from quiet relaxation to intensive sport and competition, are also significant. Historical traces in the forest area are also of interest to people - hill forts, military heritage from the World War I and II, the Soviet era, cultural traces of resorts, entertainment facilities, sports infrastructure, industrial infrastructure heritage. Many mentioned the impact of Covid 19, with a huge influx of visitors to the nature parks, for which 'the municipality and the local population were not prepared [5]. People also draw attention to climate change, which they see in urban forests in the form of stronger storms, rainfall contributing to soil and

coastal erosion, trees uprooted by storms and damaged by insects and disease. Of particular note were the individual interviews conducted with people who typically lead tours in the areas, which tended to be longer and packed with information about the history and natural values of the area [4, 5]. There were significant differences in the interviewees' understanding of natural processes, natural values, conservation methods and opportunities [1, 4, 5].

Table 2

Urban forest features in Go-along interviews [1, 2, 3, 4, 5]

Urban forest functions	***Survey responses***	***Study areas***					***Comments from respondents***
		Zilie kalni	***Bernāti***	***Langervalde***	***Raga kāpa***	***Total***	
		Surveys mentioning the issue %					
Social	landscaping elements	35	23	15	12	85	different views on the need for landscaping
	trails, tracks	35	23	11	19	88	differing views on the need for amenities, with a strong aversion to boardwalks, which are very slippery and difficult to cross in wet weather
	history	32	19	19	15	85	historical facts are mentioned by the majority of respondents
Environmental	plants	19	19	19	16	73	specific plants are often mentioned
	invasive plants	8	0	11	4	23	an awareness of invasive plants, which are not very common in Bernāti, but very common in the Langervalde
Environmental education		4	8	0	0	12	environmental education not mentioned directly by any of the respondents, but 3 of them lead excursions in which they talk about environmental issues
Environmental protection	habitats	16	12	15	15	58	contradictory, sharply contrasting assessments
	positive attitude	11	11	8	8	38	positive attitudes among respondents involved in the environment or forest sector
	negative	7	4	8	8	27	lack of understanding of nature protection issues, considering dry trees to be ʿa mess in the forestʾ, not in favour of weeding invasive undergrowth species
Aesthetic	landscape attractive-ness	19	12	15	12	58	attractive, changing landscapes, beautiful plants; mainly attractive landscapes are landscapes that are well-tended, transparent, in 2 cases wild landscapes are more beautiful
Economic	income generation	0	8	4	0	12	berry picking for sale, floristry materials for work, forest thinning
Psycho emotional	emotions	39	23	19	19	100	all participants express their emotions
	positive	39	23	19	19	100	like the forest, silence, peace, landscapes
	negative	9	15	7	7	38	unmaintained forest, undergrowth, toilet malfunctioning, cyclists damaging the forest

There is a clear need to further explain environmental processes to the public, as well as the importance of deliberate, planned management an issue examined from an expert perspective in the authors` study on the experience of urban forest management in Latvia.

Urban forests are most often visited by people who live nearby or can reach the area within 15-20 minutes (Jang et al., 2022; Mcgrath et al., 2024; Moreno et al., 2021), which is the case in our study [2]. Most visitors live close to the forest (38%) or travel up to 5 km (46%), with only 15% of respondents travelling around 30 km, i.e. less than 30 minutes. Several of the visitors note that they are willing to travel further to visit particularly scenic or interesting places. The surveys show that visitors from Riga and other nearby cities go to the Ogres Zilie kalni, from Liepāja, Grobiņa and Rucava to Bernāti, from Jelgava to Langervalde Forest and, if they have more time, to Ķemeri National Park.

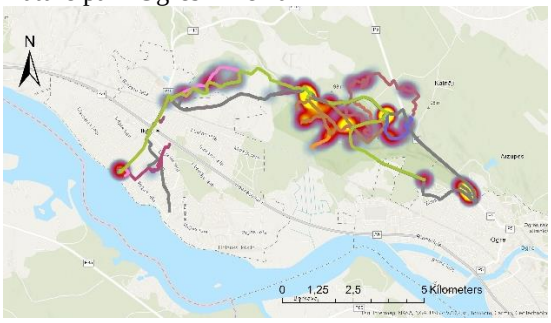
The respondents have been visiting urban forests for a long time [3]: interesting and emotional are the stories of people who have been visiting the area since childhood, or 'since birth' - in the case of our study - more than 40 years (35%), 30 years - 19%, 20 years - 8%, 10 years - 35%, only one respondent became acquainted with the forest 1 year ago.

Several respondents stated that they visit the area several times a week - every day or even several times a day during the summer bathing season [1, 2]. They use different routes every day, depending on the weather conditions, the amount of time allocated for activities, their health status and mood [1, 2, 5]. The routes followed during the interview are summarised on maps, highlighting the visitors` favourite routes [2] (different colour for each respondent) and the landscapes, places, plants or facilities mentioned by the interviewees and photographed by the interviewer are shown in 'cloud form' (thickening of dots, more intense colour) in the places of most activity [1, 2, 3, 4, 5], see Figure 1. The interviewees expressed their attitudes to the different places by simply stating the facts, noting the positive (attractive landscape, walkable paths, psycho-emotional rest, few people, silence, positive memories) or negative aspects (too many people, too many or too few amenities, lack of benches, trail surfaces, too many/too few litter bins, toilets that malfunction, garbage) [1, 2, 3, 4, 5].

Figure 1

Go along interview routes and photo locations [1,2]

Nature park Ogres Zilie kalni



Nature park Bernāti

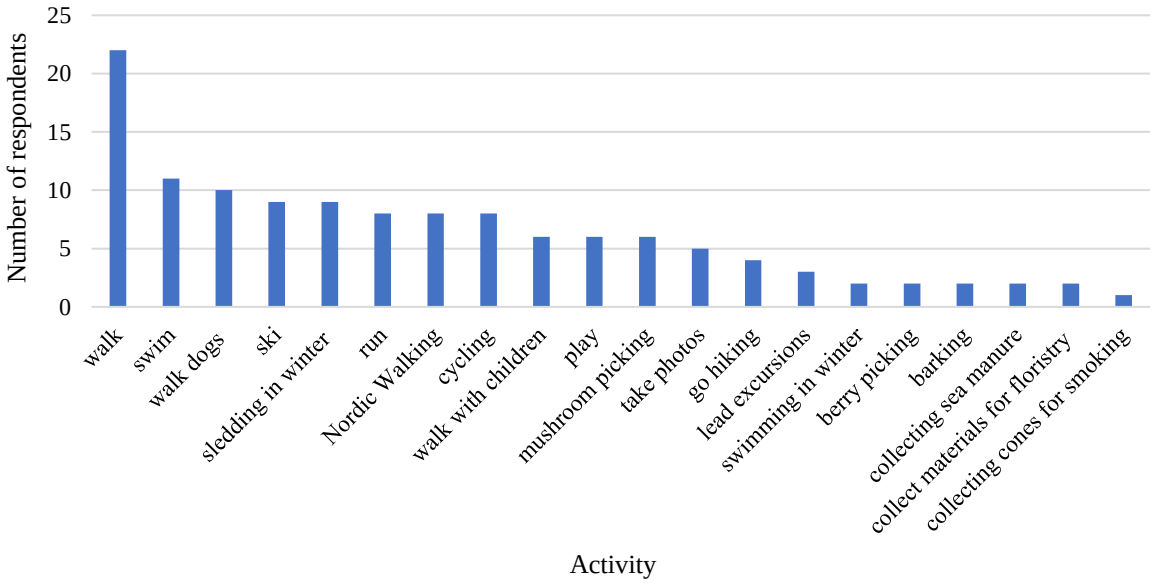
Nature park Ragakāpa

Langervalde Forest

The list of activities performed is interesting [4], see Figure 2, with walking, swimming and walking the dog being the most popular. The most frequently mentioned activities are the traditional, even archaic ones that have survived from very ancient times: nut-cracking (picking *Corylus avellana* fruits), collecting sea dung (washed up sea plants) to fertilise and improve the sandy garden soil, and collecting pine cones (*Pinus sylvestris)* to smoke fish caught in the sea.

In the urban forests, the green-blue structure with an articulated topography - a sufficiently transparent forest with hills bordering the water surfaces - is considered particularly attractive to visitors. In all three nature parks, the scenic, visually appealing extreme pine forests, fresh, dry air are particularly highlighted.

Figure 2
Respondents' activities in urban forests [1, 2, 4, 5]



The flat landscape of the Langervalde Forest, with frequent undergrowth, is considered boring or 'nothing special'. Free access to the beach is essential, building is forbidden, 'a nature park is a place where you can relax if you don't have your own fields'. Visitors understand the situation [4, 5] - it is good that it is managed and maintained according to a plan. Fellow citizens appreciate the improvements in public attitudes 'people have become tidier' and 'clean up after themselves'. During the interviews a rating was given to the facilities [1, 2, 4, 5]. Table 3 and 4 show how many people mentioned and rated a particular type of amenity positively (+) or negatively (-) in the interviews.

Table 3 shows respondents' ratings for site-specific and linear landscaping, Table 4 - landscaping features and small architectural forms. Briefly describing the amenities in the Ogre Zilie kalni, the majority of respondents appreciate the existing amenities, but also expect them to be further improved and developed. In Ragakāpa (5-) and Bernāti (3-), the local people do not really use the existing amenities, in fact, they avoid them, except when showing the area to visitors, tourists. The Ogre Zilie kalni are dominated by gravelly hills, Bernāti and Ragakāpa by sand dunes, which are well drained and suitable for natural paths, avoiding the swamps and wet vigas in these areas. The Nature Park areas have an extensive network of paths that have been walked over time, with individual information signs; in Ragakāpa there are individual boardwalks, some of which were dismantled in 2024 and replaced with gravel paths. The Langervalde Forest is very different, with mostly waterlogged ground, which is only easily accessible via specially created woodchip mulched paths and bridges over the many otherwise impassable gullies.

There are very different views on cycle and motorbike tracks. They are undoubtedly of interest to one group of users, but also a potential source of soil erosion, a source of noise in the case of motorcycles, and potentially dangerous to other visitors due to speed. If the people of Bernāti are happy that they have 'dealt with' motorcyclists by eliminating their activities in their territory, in the Ogres Zilie kalni there is a proposal from the people to find a place for them. The same goes for cyclists - in Bernāti and Ragakāpa there are no dedicated cycle paths, and their activities are restricted. Informal MTB trails have been established in the Ogres Zilie kalni for a long time and, according to the manager, they will be reviewed in 2024-2025, and a technical project will be developed to improve them, make them more interesting, safer and avoid impacts on the surrounding habitats. The gravel hills in the Ogres Zilie kalni are more resistant to soil erosion. In Bernāti and Ragakāpa, sand dunes are exposed to water and wind erosion due to loss of vegetation. In the Langervalde, the black soil is waterlogged and mobility is only possible on specially constructed paths with frequent mulching, which is not suitable for cycling.

Due to the high anthropogenic impact, the required campfire/grill sites have been created in 6 locations in the Ogre Zilie kalni and in 2 locations in Bernāti. In the Ogre Zilie kalni, Bernāti and Langervalde, wooden or stone sculptures and other artistic environmental elements have been created to attract visitors and serve as landmarks and signposts in the large forest areas.

Table 3

Amenity ratings in Go-along interviews, spot and linear landscaping [1, 2, 4, 5]

Facilities	***Casestudy areas (abbreviation)***				***Respondents' comments***
	Zilie kalni (ZK)	***Bernāti (BE)***	***Langervalde (LA)***	***Raga kāpa (RK)***	
	Rating in surveys (positive+; negative-)				
Spot/square landscaping					
Swimming places	7+	4+	no	2+	Used extensively everywhere, swimming is often the main purpose of a visit.
Observation tower	4+	2-	no	no	BE - no sea view, height restricted due to Nature Park regulations.
Lighthouse	no	3+	no	3+	Lighthouse serves as a landmark and destination.
Viewing places	3+	1+	no	1+	ZK - lookout at Dubakalns water body, BE - lookout at Mount Poussin, view of the surrounding forest, sea not really visible, RK - lookouts with view of the surrounding forest.
Gazebo	1+	1+	no	no	None of the respondents use.
Activity places	4-	5+	no	2+	ZK -Nature concert hall site, Rope paths - undergrowth trampled at activity sites, BE - big stand as a cinema screen, LOC recreation base, Dzintariņš café, RK - Open-air Museum; 36-line restaurant kiosk.
Car parking	2+5-	3+	no	1+	Areas without asphalt pavement have dust in the air in dry weather or mud and potholes in wet weather.
Linear landscaping					
Ski track	5+5-	1+	no	1+	NK - 10km of specially constructed ski slopes with lighting, BE and RK skiers enter the slopes themselves.
Trails	7+2-	4+4-	4+4-	5-	In all areas, local visitors do not use the marked, signposted trails, nor do they use the boardwalks, which are slippery in wet weather, difficult to cross with pushchairs and bicycles. Marked trails are used by visitors in a strange place.
Cycling trails	3+	1-	no	3+	There are spontaneous cycle paths in the NC which are heavily used. BE cyclists are restricted as soil erosion is encouraged. RK - used to have stricter rules, now they are less strict.
Horse trails	2+	no	no	no	ZK - horse riding damages the trail surface and makes it difficult for pedestrians and cyclists to use.
Access roads	1+3-	2+	0+	0+	NK driveway mostly gravel, dust in the air in dry weather, elsewhere there are tarmac driveways which are appreciated.

In the territory of the nature parks, there is a desire (forbidden by Latvian law) to spend the night in tents or on branch poles, which are visible in places in the territory. In Bernāti, there is a strong negative attitude towards caravans (2-), as there has been a large influx and this has caused inconvenience to the local population. The NC observes that there are only a few visitors with caravans who do not cause too much burden and inconvenience to other visitors.

Table 4

Amenity ratings in Go-along interviews, landscaping features and small architectural forms [1, 2, 4, 5]

Facilities	***Casestudy areas (abbreviation)***				***Respondents' comments***
	Zilie kalni (ZK)	***Bernāti (BE)***	***Langervalde (LA)***	***Raga kāpa (RK)***	
	Rating in surveys (positive+; negative-)				
Amenities					
Benches	6+	6+	2+	2-	Benches are not used by sports visitors in all areas, but all agree that benches are needed for visitors who cannot walk long distances, in areas with attractive views.
Waste bins	2+3-	1-	1+	0+	ZK: 36 bins in activity areas, near benches, BE: 36 bins in a small area, which is disproportionate. LA - deliberately not placed RK - placed by benches. Sharply different opinions in all areas: more are needed, but mostly no bins at all. The principle of 'what you bring you take away' should be followed.
Information boards, signs	3+	3+	3+	3+	Many mention the need for them, even those who use them more often say that signs help orientation, especially if the place is less well known.
Fire and barbecue areas	5+	0+	no	no	As the number of visitors increases, the equipment needs to be renovated and the layout rethought. None of the interviewees use them.
Wooden, stone sculptures	4+	6+	2+	no	Positive attitudes of respondents, they are popular attractions, included in walking routes, for weddings and other celebrations.
Toilets	5+	3-	no	0+	Positive about well maintained WCs, especially with water and heat. BE - particularly negative assessment of defectively constructed toilets that do not actually work.
Bridges	0+	1+	5+	0+	LA, BE - positively appreciate, especially note larger, specially built bridges, where without their construction it would be difficult to use the territory, ZK, RK small bridges on dry ditches, uneven terrain are not even noticed by visitors, not mentioned.
Changing cabins	1+	0+	no	0+	Important changing facilities on all beaches.
Stairs	3+	no	no	2+1-	rated better than boardwalks, but noting that they can be slippery, cannot be used by cyclists, pushchairs, people with disabilities.
Exercise, sports equipment	3+2-	no	no	no	ZK - good appreciation, need to renew older ones, expand facilities for larger groups of athletes, also for smaller children.
Biathlon shooting wall	1+	no	no	no	ZK - appreciates new, modern activities.
Counters	2+	0+	0+	no	ZK - positive, respondents interested in total number of visitors, BE, LA, RK - respondents do not mention.
Coffee machines	2-	1+	no	0+	ZK - strongly negative attitude, BE - positive, included in the 'ritual' of the visit, RK - is located, not mentioned in the survey
Lighting on trails	2+	no	no	no	ZK - there is lighting on some paths, but should be more

Although the interviewed visitors do not specifically mention this, rangers regularly observe acts of vandalism and deliberate damage to facilities. However, such damage is either promptly repaired or the affected facilities are dismantled entirely, making them less visible to visitors.

Ragakāpa is known for its informal 'policemen', local residents who 'keep order', and in the Ogre Zilie kalni and Bernāti, there is also a high level of public involvement, with visitors reporting irregularities to the local police or managers [4,5].

Visitors make suggestions [4,5] for improving the landscape: Asphalting access roads and car parks, upgrading play and exercise equipment, creating paths parallel to the ski slope, creating a disc golf course, reinforcing the path surface to make it wheelchair accessible, improving route signage (information on the length of the path, approximate time and difficulty of the route (whether it is wheelchair accessible), creating audio guides, creating site signs, wooden sculptures, signposted 'entry gates', the possibility of creating pay-per-visit sites to identify specific sites if their maintenance and service is improved, etc.). These suggestions from visitors help to understand the needs and priorities of the population.

Conclusions

The 'go along' interviews in urban and peri-urban forest areas, the case studies of Bernāti, Ragakāpa and Ogre Zilie kalni Nature Parks and the Langervalde Forest have led to a number of conclusions:

1. People who choose to visit the forest have very positive feelings, sentimental memories of childhood, youth, previous visits, which contribute not only to physical health through exercise and fresh air, calming, but also to a positive psycho-emotional state and relaxation. The results of the study show that the social, ecological, environmental education, environmental protection, aesthetic and economic functions of urban forests are important, but the psycho-emotional function of urban forests, as identified by cultural ecosystem services, is particularly important and should be taken into account in the planning and management of areas.
2. The planning and management process should take into account user expectations, national and local regulations, the commitments of owners or managers, available opportunities, and expert advice. The planning process should involve specialists and experts from various fields, as well as users from different sectors, each bringing their own knowledge, experience and needs, which may often be diametrically opposed. The planning process should, as far as possible, reconcile different interests.
3. In order to minimise conflicts and disagreements between stakeholders, it is essential to explain the environmental requirements or management peculiarities to users, which may initially provoke a strong reaction from users.
4. In most cases, the managers and experts have taken the visitors' suggestions into account in the planning process, but financial constraints make it impossible to implement everything. Suggestions from visitors can help to prioritise work.
5. Taking into account different opinions, one solution is to create different areas with more and less intensive landscaping and maintenance, so that visitors can choose the level of landscaping and visitor intensity that suits them.
6. Given the amount of information gathered in the 26 Go-Along interviews, further detailed research and conclusions should be considered.

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