

Researching the Current Situation of Street Greenery in Latvia's large cities

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Abstract. Street greenery is one of the most important public green spaces that enhance the aesthetic and ecological quality of urban environment. Firstly street greenery helps create a city's visual image and it provides extra public space and secondly it ecologically links bigger green planting areas (parks, squares, etc.) and improves the microclimate. The aim of the study was to analyse the current situation and characteristics of street greenery in Latvia's large cities in order to determine the aspects limiting and enhancing aesthetic and ecological quality. Four cities were selected as study objects - Liepaja, Jelgava, Valmiera and Rzekne. Landscape inventory, photo fixation of street greenery, assessment of landscape ecological and aesthetic characteristics and examination of spatial plans of local municipalities were used in the research. The results indicate that street greenery is mainly arranged as street enclosing or bordering elements. They are formed as linear green groups, consisting mostly of trees, grass and hard ground cover. In general landscape ecological and aesthetic characteristics of the street greenery are of low quality and not in mutual accordance. Also the study did not reveal the landscape ecological aesthetic design approach used in the planning of street greenery. Generally, the cities selected for the research pay attention to the regular management and stewardship of street greenery. One of the aspects limiting aesthetic and ecological characteristics of street greenery is the long winter season, city's extreme conditions, vandalism and underground utilities and communication network in the green zones of the streets, which strongly influence the choice of plants. The analysis of spatial plans of local municipalities showed that street greenery is not distinguished as green areas of the cities. The description and recommendations regarding street greenery deal with the street as a unit of technical infrastructure. The main conclusion of the study is that in the future there should be more detailed descriptions of development of street greenery in spatial plans of local municipalities. They should reflect the main principles of development of street greenery either including both aesthetic and ecological characteristics.

Keywords: street plantations, street greenery, urban landscape, landscape ecological and aesthetic characteristics, spatial plans of local municipalities.

Introduction

The recent urbanization, when an increasing proportion of the population is moving from rural to urban life, activates the need for high aesthetic and ecological quality green areas, which include street greenery as well [12]. The proportion of urban green areas is declining over time, so there must be conservancy of the existing greenery system and creation of new green spaces that that would complement the existing green areas. Different patterns of green spaces could be located and included in the city's structure: semi-natural areas (urban woodlands, meadows, etc.), managed parks and gardens, complemented with linear plantings along the streets [12, 20].

A city with high quality and abundant greenery creates a good impression about its planning and management, and about a healthy environment for the residents [11]. Vegetation in the city brings many aesthetic, ecological, environmental, economic and social benefits. There are many benefits from vegetation [1, 11, 20, 22, 23] and woody plants [2, 4, 12, 13, 16, 19] mentioned in examined literature (Fig. 1). Plants, especially trees improve the city environment by shading, intercepting pollutants, attenuating noise, attracting wildlife, as well as by aesthetic preferences and social economic benefits.

City residents spend a great part of the day on the streets. The traditional image of a street consists of trees, shrubs and sometimes flowers [22]. At the same time street greenery is an important public area which additionally should provide safety, functionality, aesthetical and ecological qualities. All that could be achieved with developing street greenery as an urban greenway. Urban greenways are varied systems that include different types of linear green areas that link natural and urban green spaces. The term 'green' is indicated by vegetation and naturalness, however, the term 'way' refers to the movement from one area to another [12, 20].

In Latvia, where the weather includes long winter season with snowfall, the majority of street greenery consists of easy care and resistant vegetation - trees and grass. In Latvia's cities, renewable and newly planted street greenery (plantings where trees have historically been and then disappeared or trees are planned for development of existing greenery system) could be found. Street plantings for reconstruction (street plantings in very poor condition, which could become extinct in the following 15 years), retained and maintained street plantings (street plantings in good condition, which will not

require reconstruction of trees due to aging in the following 15 years) and street plantings with containers and trellises with climbers [3] could also been found there.

One of the most important aesthetic characteristics found in Latvia's climatic zone is the seasonal changes of vegetation. Plants express different seasons through blossoms in spring and summer, fruits and coloured leaves in the autumn and evergreen foliage and peculiar bark in the winter [19]. Therefore it is important to create street greenery not only using trees, but complement them with blossoming shrubs and flowers, thus improving both the aesthetic and ecological quality of a particular area which is enhanced by the biological diversity of the green plantings.

The aim of the study was to analyse current situation and characteristics of street greenery in Latvia's large cities, in order to determine the aspects limiting and enhancing aesthetic and ecological quality and to prepare the starting material for gradation of street greenery types depending on their aesthetic and ecological characteristics. The main tasks stated were the following:

- 1) to carry out a survey of street greenery in four cities: Liepaja, Jelgava, Rezekne and Valmiera;

Materials and Methods

The research objects were the main streets of Liepaja, Jelgava, Rezekne and Valmiera cities. All four cities represent four of five Latvian regions, created after the completion of administrative and territorial reform in 2009 [25]. Liepaja is located in Kurzeme, which is the Western Latvian region near the Baltic Sea. This region is characterized by pine forests, sandy seacoast and plain or wavy terrain. Jelgava represents Zemgale - Central region of Latvia with wide plains. The Eastern region - Latgale is characterized by Rezekne city, which is abundant with hills, lakes and forests. The last selected city Valmiera is located in Vidzeme region - in the North of Latvia, which is rich in forests and hilly landscapes (Fig. 2). All the selected cities, except Rezekne, are the largest in their respective regions in terms of population. Rezekne is the second largest city in Latgale. In the research study, 70 different streets were selected. Most of them were national transit streets and local streets, in the sections of which plantings are designed or will be created.

In the selected cities a landscape survey and assessment of ecological and aesthetic characteristics of street greenery were carried out. A field survey was carried out to collect objective data for further evaluation of aesthetic and ecological characteristics. During the survey,

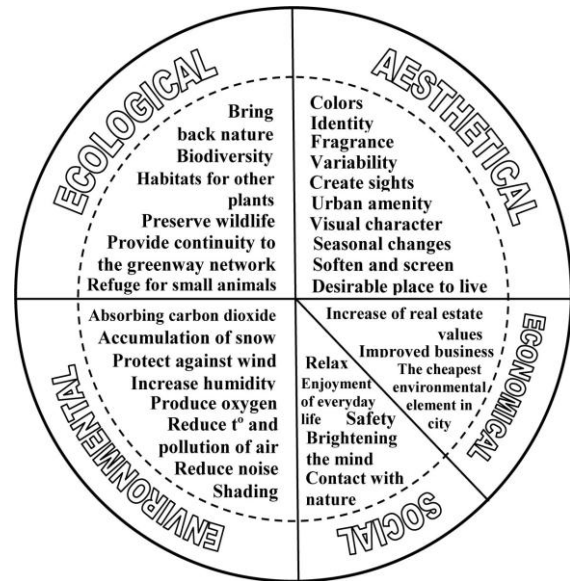


Fig. 1. Benefits from street trees and other plants
[Source: construction by M. Jankevica].

- 2) to analyze landscape ecological and aesthetic characteristics of street greenery;
- 3) to examine planning and normative documents regarding the development and maintaining of street greenery.

landscape inventory of the street greenery and photo fixation was carried out. To evaluate different ecological and aesthetic characteristics, the landscape ecological aesthetics assessment method [6, 7] was used in the landscape inventory. The assessment matrix from this method was adapted for particular research by selecting only those criteria that are appropriate for evaluating street greenery. The following criteria were used in the assessment matrix: *Use of unusual expressive plants* and *Use of native plant species*, *Biodiversity* (different plant species and plantation type were identified), *Quality of man-made elements* (character of landscape facilities), *Visible human intention*, *Wilderness* (applied land management and visible stewardship – human care about the place and landscape) and *Naturalness*, *Compositional coherence* (visual character of the streetscape). The criteria applied in the study are shown in Table 1. Description of the current situation was used for marking each criterion in the assessment matrix. Photos of the current situation were taken during the research from June to October 2012, covering the summer period. Pictures were used as a visual material for further assessment. Visual information available on Google Street view was examined to get a full spatial impression of the selected streets.

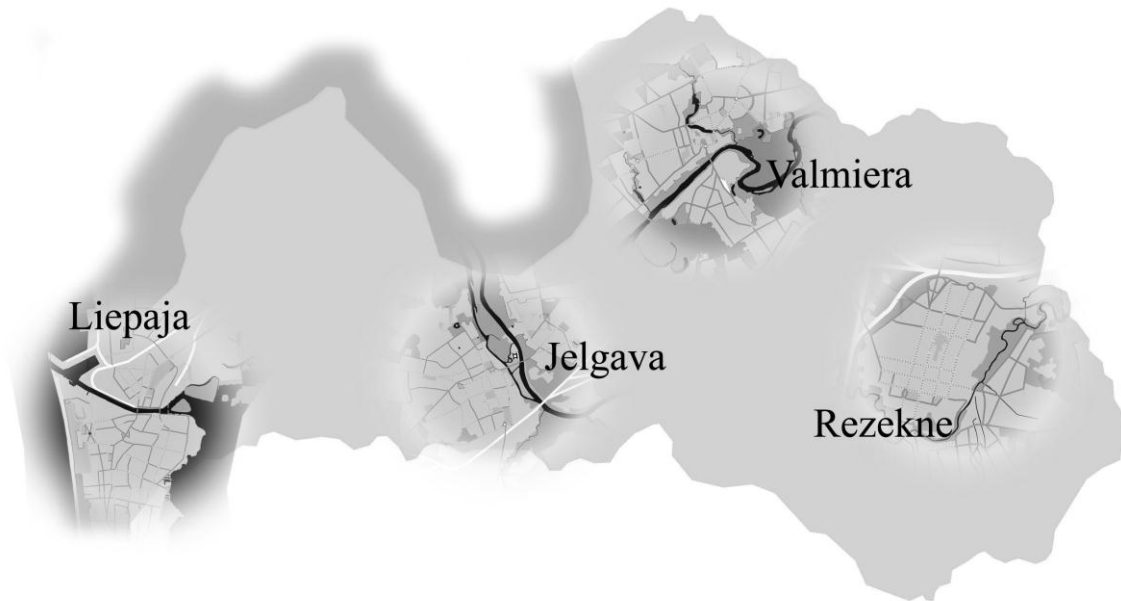


Fig. 2. Location of selected cities on map of Latvia [Source: construction by M. Jankevica].

The last stage of this study was the analysis of planning and normative documents of the four selected cities. There were Local municipalities' spatial plans and information on street greenery and maintenance were analysed. Current Spatial plans (including Explanatory note, Environment report

and Graphic part), Strategy of sustainable development and City programme of the integrated development were analysed in the study to point out the main principles as well as limiting aspects of the development of street greenery.

Results and Discussion

Aesthetic characteristics of surveyed street greenery

Aesthetic characteristics of street greenery were evaluated according to visual character (compositional coherence), quality of man-made elements (street facilities), use of unusual expressive plants (different colourful plantings) and visible stewardship. Most of the street plantings were of linear and regular arrangement along both sides of the street – 54 % (Fig. 3). These types of plantings were found in the centre and next to main streets of the selected cities. Mixed plantings were located along the small residential areas and natural territories – 36 %. These plantings consist of different plant species and are located in asymmetric separate groups. Messy unarranged plantings were detected next to abandoned and neglected city areas – old war town and industrial zones – 10 %. Comparing to other cities, Rezekne and Liepaja have a regular straight street network, which provides a space for linear plantings. Jelgava and Valmiera are limited by rivers so the street network is dependent on the natural topography including curvilinear loop pattern. Accordingly, street plantings in Valmiera mainly consist of mixed plant material.

Street greenery includes different man-made facilities: carriageways, sidewalks, lamp posts and sometimes parking lots. In most cases of Latvia, a carriageway is made of old cobblestone in historical areas or asphalt in other part of the city.

Sidewalks are made of concrete paving, granite cobblestones or round rock cobblestones (found in 8 cases). Trees are planted in lines of grass (found in 40 cases) or cobblestone limited planting beds (found in 13 cases) (Fig. 4). There are some places in Jelgava where turf and grass pavers are used next to the roots of trees.



Fig. 3. Street planting with common lime (*Tilia x vulgaris*) in Rezekne [Source: photo by M. Jankevica, 2012].



Fig. 4. Ash leafed maple (*Acer negundo*) and cobblestone sidewalk in Jelgava
[Source: photo by M. Jankevica, 2013].

The current situation of street materials is different according to degree of street depreciation and the last time of reconstruction. Good quality elements were found in streets with recent improvements while poor quality elements were found in neglected outskirts of the city. In this rated category, Jelgava is notable, because there are many different combinations of sidewalk coverage used to increase the aesthetics of the urban environment (Fig. 5).

In general, 23 different street tree species, 13 non-native species and 10 native species were found in examined four cities. After determination of the surveyed diversity of street tree species, the current situation shows that highest variety of street trees was in Jelgava, where most of the plant species are non-native. The dominant foreign tree species found in surveyed street greenery were common lime (*Tilia x vulgaris*), horse chestnut (*Aesculus hippocastanum*) and ash leafed maple (*Acer negundo*). Lime is a very popular tree in Latvia's cities; it is displayed in both Liepaja and Valmiera emblem. Street greenery in Jelgava is formed by smaller trees as well. Those have longer lasting decorative characteristics also after the short Latvian summer season, for example, Swedish whitebeam (*Sorbus intermedia*), European rowan (*Sorbus aucuparia*) and hawthorn (*Crataegus horrida*). These plants have beautiful blossoms in spring and colourful fruits during the autumn.

A wide variety of plants with coloured leaves is also used: field maple (*Acer campestre*), northern red oak (*Quercus rubra*) and different sorts of Norway maple (*Acer platanoides*). Thus, the urban environment of Jelgava changes with the season and improves the aesthetical quality of the city. In Liepaja different lime species were found – several trees of Caucasian lime (*Tilia x euchlora*) are recognized as trees of national importance (Fig. 6). The results of an unreasonable

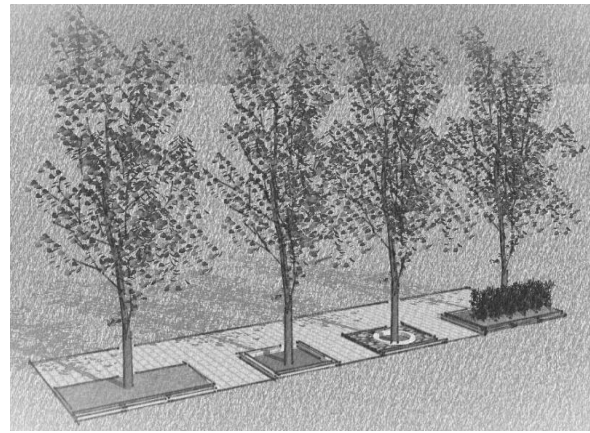


Fig. 5. The most detected design solutions for trees in selected cities
[Source: construction by M. Jankevica].

Soviet nature transformation program in Liepaja are still visible by the poplar species, which were planted in most of Latvian towns because of their fast-growing and easy shaping nature. In the 90s massive destruction of poplars began in Latvia, due to the fluffy white catkins that fill the air and the ground. Compared to other cities surveyed, two poplar species: hybrid black poplar (*Populus canadensis*) and balsam poplar (*Populus balsamifera*) were found only in Liepaja (in war town area, which is relatively sparsely populated, and its development is very slow). Variety of street trees in Valmiera was very poor, but it is improved by the use of shrubs and different flowers. Most of the street trees surveyed in Valmiera and Rezekne was old and tall. Therefore, generally street plantings consist of groups of native plant species.

Street greenery needs human commitment and care. Trees, like lime and ash leafed maple, require regular trimming of the crown. In addition, the lawn beneath the trees also needs regular care. Likewise, vandalism is a serious problem. There were broken new plantings of lime trees found in Rezekne. Similarly in Jelgava and Rezekne annual flower plants tend to be plucked, dug up and stolen. It is important for the city to develop a greenery management plan. Street greenery in the city centre is cared for (86 %), but in the outskirts may notice overgrown lawns and deadwood trees (14 %). Large tree planting groups as detected in Valmiera and Rezekne, do not need regular pollarding. A study of selected cities proved the following - the bigger the city, the more of a problem - regular specific maintenance of street greenery in all urban areas is not possible.

Ecological characteristics of street greenery in selected cities

The following criteria were used for evaluation of ecological characteristics of street greenery: Use of native plant species, Biodiversity (different plant species and plantation types found), Wilderness (applied land management) and Naturalness (visual character). Urban environment is a limited area, which is created principally for human needs. Thereby adapting naturalness in street greenery is a great challenge for city planners. Different grasses, shrubs and wildflowers can create naturally looking environment. However, formation of urban greenery in Latvia largely depends on long winter seasons. This is the reason why there were linear street plantings consisting of trees in most analysed cases from the selected cities. Natural greenery groups are feasible outside the compact city centres next to highways and sparse building areas – 31%. Naturalness as a principle of landscape ecological aesthetics can be adapted in Jelgava because of its wide streets [5], still significant meaning in street greenery planning and establishment is attached to parking lots, thus decreasing the space for new plantings.

A vast majority of different plant species and types can be found in green spaces for recreation – parks, squares and waterfront areas [7]. Comparing similar researches on green spaces and plant diversity of Latvia, street greenery shows poor diversity of the plant species chosen for greenery. The most varied plant types were found in Jelgava and Liepaja. These two cities are similar in total area. Rezekne and Valmiera are smaller, thus the biodiversity of plants is appropriate to small area of these cities. Therefore, different shrubs, annual and perennial flowers shape the street greenery in Valmiera (Fig. 7). Plant diversity and choice of definite plant species are also influenced by street width and free space for greenery. The area of street plantings should be wide enough because it is used for underground utilities and communications network, accumulation of snow in winter, and it is also subjected to the impact of harmful substances from vehicles and road maintenance. The survey of the selected cities shows that conifers are rarely used as street trees in Latvia, except for Liepaja, which is located in the coastal area of the Baltic Sea and there are good conditions for growing of pines.

The most often found native tree species in the majority of street plantings were Norway maple (*Acer platanoides*), English oak (*Quercus robur*), silver birch (*Betula pendula*) and European rowan (*Sorbus aucuparia*). Recent European studies demonstrate poor diversity of tree species used in urban areas [16]. The most popular tree species in Europe are maples (*Acer*), chestnuts (*Aesculus*) and limes (*Tilia*) and criteria for selecting and planting particular tree species are low maintenance,



Fig. 6. Planting next to a pedestrian street in Liepaja [Source: photo by M. Jankevica, 2012].



Fig. 7. City greenery of common box (*Buxus sempervirens*) and marigolds (*Tagetes*) in Valmiera [Source: photo by M. Jankevica, 2012].

avoidance of structural problems, suitability for local conditions and availability in European nurseries [16]. However, this research proves that in Latvia other native plants are frequently used in street plantings. Most of these plants are tall and suitable for large-scale landscapes. Therefore, city planners are looking for new planting options and unconventional tree species.

Wilderness in urban environment can be brought back by masses of local plant species and shrubbery. Street greenery is not suitable for these types of plantings. Wilderness provides wildlife and diversity of native species. Street plantings in city centre demonstrate human care and responsibility for the environment, in that way excluding the unaffected natural regeneration. Wilderness in the analysed cities was detected outside the city centre and next to industrial areas.

TABLE 1

Comparison of street greenery ecological and aesthetic characteristics between selected cities

[Source: construction by M. Jankevica]

Criteria	Selected cities			
	Liepaja, 28 streets	Jelgava, 22 streets	Rezekne, 10 streets	Valmiera, 10 streets
Visual coherence	linear arranged plantings (12), mixed plantings next to natural areas (9), messy plantings in outskirts (7)	linear ordered plantings (16), mixed landscaped plantings outside the city centre (6)	city centre is very compact with linear plantings (5), mixed landscaped plantings next to small residential areas (5)	linear plantings are located next to main streets (2) and alleys of oaks (3), mixed irregular plantings (5)
Quality of man-made elements	30 % of streets are reconstructed (9) with new facilities and pavement	many reconstructed streets (12) with different types of pavement, new facilities	reconstructed main streets (5) with new pavement, other streets need change of hardcover (5)	reconstructed main street and highway (2), hardcover is too close to trees (5)
Use of unusual expressive (foreign) plants	<i>Tilia x vulgaris</i> , <i>Populus canadensis</i> , <i>Acer negundo</i> , <i>Aesculus hippocastanum</i> , <i>Populus balsamifera</i> , <i>Tilia x euchlora</i> , <i>Tilia platyphyllos</i>	<i>Tilia x vulgaris</i> , <i>Sorbus intermedia</i> , <i>Robinia pseudoacacia</i> , <i>Acer negundo</i> , <i>Acer campestre</i> , <i>Quercus rubra</i> , <i>Aesculus hippocastanum</i> , <i>Crataegus horrida</i>	<i>Tilia x vulgaris</i> , <i>Acer negundo</i> , <i>Thuja occidentalis</i> , <i>Aesculus hippocastanum</i> , <i>Crataegus horrida</i>	<i>Tilia x vulgaris</i>
Visible human intention	tree crowns are formed where linear plantings appear (15), mown lawn (24), weedy lawn (4)	tree crowns are formed (14), mown lawn (16), at the end of the centre – weedy lawn edges with seedlings (6)	tree crowns are formed (5), grass is mown in all cases (10)	tree crowns are formed (4), grass is mown in all cases (10)
Naturalness	landscaped greenery next to natural areas – meadows, Liepaja Lake (4), unmown lawn with wildflowers (2)	landscaped greenery where lawn is not groomed (2), natural look landscape next to small residential areas (4)	landscaped greenery next to small residential areas - different species of trees are rhythmically repeated (5)	natural protected areas - historical alleys of oaks (3), landscaped greenery next to nonessential streets (5)
Biodiversity	different trees, annual and perennial flowers, few shrubs, many native plant species	different trees, annual and perennial flowers, few shrubs, local wild plants in unmown lawn	different trees, few shrubs and flowers	different trees, shrubs, annual and perennial flowers
Use of native plant species	<i>Pinus sylvestris</i> , <i>Betula pendula</i> , <i>Acer platanoides</i> , <i>Salix fragilis</i> , <i>Fraxinus excelsior</i> , <i>Alnus glutinosa</i> , <i>Sorbus aucuparia</i>	<i>Quercus robur</i> , <i>Sorbus aucuparia</i> , <i>Alnus glutinosa</i> , <i>Betula pendula</i> , <i>Acer platanoides</i> , <i>Carpinus betulus</i>	<i>Acer platanoides</i> , <i>Quercus robur</i> , <i>Betula pendula</i> , <i>Fraxinus excelsior</i> , <i>Sorbus aucuparia</i> , <i>Picea abies</i>	<i>Betula pendula</i> , <i>Salix fragilis</i> , <i>Quercus robur</i> , <i>Picea abies</i> , <i>Acer platanoides</i>
Wilderness	next to neglected city areas, industrial territories	outside the city centre, next to old unmanaged streets, highways	outside the city centre	outside the city centre

Interaction between aesthetic and ecological characteristics

It is possible to include both ecological and aesthetic characteristics in Latvian city greenery system. The approach of ‘ecological aesthetics’ is not common for Latvian landscapes. The greenery of city centre still expresses more landscape aesthetics, though plantings in the outskirts provide ecological functions (Table 1). There is a need to reach a compromise between those two directions by using wildflowers, natural plantings and ‘messy ecosystems’ [15] where spontaneous and wild vegetation is left. This way of landscaping requires public involvement and change of perception because ‘messy’ landscapes can look attractive if people know the ecological function of what they view. The survey of the selected cities shows, that none of them had green street edges – informally arranged plantings with native and ornamental plants. Vegetated edges are associated with roads and incidental locations to supplement city green spaces [1, 12]. These types of plantings provide landscape ecological aesthetics with masses of coloured and textured grasses and indigenous traditional plants, flowers and shrubs.

At the moment 40 % of analyzed streets are reconstructed and well-kept. In most cases of the selected streets, greenery is not restored. Therefore, much attention has been paid to the maintenance and care of the existing plantings. The criteria to selecting the trees for urban environment are low level of maintenance and avoidance of problems caused by limited conditions. There could be criteria for ecological and aesthetical values.

Currently, the created street greenery system in all the selected cities is average and unconvincing, so the improvement for the city environment can include new possibilities for ecological aesthetics.

Results of analysis of spatial plans and normative documents of local municipalities

Urban greenery and landscape ecological aesthetics deserve attention and financial support using policies and laws. This is the way to enforce different landscape approaches in practice. In most of the analysed documents, streets were mentioned as a technical infrastructure (Table 2) with their main function of providing transport movement [9, 17, 21, 24].

Street plantings were separately divided from transport structure and added to green structure in the spatial plan of Liepaja [21] and a programme of development of Jelgava [8]. Also, in all the plans the future vision of street development was defined by the technical infrastructure and further direction of street plantings was not mentioned.

Possible solutions to the image of the city are referred only in Liepaja spatial plan in the research of green structure [21]: the creation of new street plantings, change of the greenery plant species, the recovery of historic avenues, to create flower plantings on the windowsills, green facades for the limited streets, etc. The spatial plan of Valmiera provides a special protection of trees and alleys, thereby ensuring a spectacular diversity of the urban area [24]. Several protected oak alleys that dominate in the urban street plantings are noted in the land use plan.

Looking at urban care and maintenance provisions, the recommendations for all green spaces of lawn mowing, cleanliness maintenance and branch lopping have been mentioned [10, 14, 18]. In Valmiera these types of rules have not been developed yet (Table 2). At the moment these rules are not so strict as to affect the desire for the landscape of ecological aesthetics, but allow average height of the lawn in summer season (10-15 cm) that limits the design and maintenance of natural grassland.

In general, urban planning documents focus on the cultural space and technical infrastructure of the city. Public green spaces, including street greenery, are only mentioned and play no major role in future development. However, that should not be that way - urban planners need to think more broadly about urban green structure as it was included in Liepaja Spatial plan. Green structure of the city does not confine itself with natural green areas and public spaces. It is a complex system where street greenery has a linking function.

TABLE 2
Street greenery system in planning and normative documents of local municipalities
[Source: construction by M. Jankevica]

Description	Liepaja	Jelgava	Rezekne	Valmiera
Description of current situation of streets	+	+	+	+
Street greenery is separated from street infrastructure	+	+	-	-
Further vision of development of streets	+	+	+	+
Further vision of development of street plantings	+	-	-	-
Description of required management for street plantings	+	+	+	-
Street greenery marked in graphic part	+	-	+	+/-

Conclusions

Street greenery builds a variety of natural and urban landscape interaction, provides nature with high visual aesthetic quality in a limited territory and secured outdoor recreational opportunities. There are many ecological, environmental, aesthetic, economic and social benefits and preferences of street plantings. This type of plantings should connect the current green spaces in the city with rural area and improve the visual character of the city.

There are many limiting nature and human factors preventing the implementation of ecological and aesthetic quality of street greenery - extreme conditions of cities, salt scattering and accumulation of snow in winter time, underground utilities and communications network and vandalism, which restrict plant variety selection.

In the selected cities the following types of street greenery were found: tree-lined streets with grass verges, tree-lined streets with shrubs, streets with grass verges and occasional trees. No green street edges with mixed vegetation, which could provide high ecological and aesthetical values, were found.

Overall, the examination of each city showed that the best current situation is in Jelgava, because more than a half of surveyed streets are reconstructed, the selected plants are varietal and colorful, but there are few native species. There is a lot of abandoned and messy street greenery in Liepāja, but it is positive that

the spatial plan of this city includes recommendations for future development of street plantings. Rezekne has a compact city centre with arranged tree-lined greenery, but there are problems with vandalism. Valmiera currently has homogeneous street greenery; for all that most of the tree species, except for lime, are native. Assessment of aesthetic and ecological characteristics showed that Urban street greenery in Latvian cities is on average level. Usually street greenery provides landscape aesthetics and limiting ecological functions. This gap in Latvian urban planning needs to be filled by a search for new possibilities to improve overall landscape ecological aesthetics – by pleasant visual preferences and requirements for bringing nature back to the city.

Spatial planning documents mention street greenery, but there is a lack of information about the current situation of plantings, further plans and necessity of planting development, preferred types of street greenery, appropriate plant species and desirable composition. The existing greenery system could be upgraded by a database of actual and planned street plantings, including different plant species, age and visual parameters. Street greenery and other green spaces rated according to aesthetic and ecological values will improve the city development and management plans.

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Kopsavilkums. Pilsētas apstādījumi nodrošina vairākas estētiskas, ekoloģiskas, vides, ekonomiskas un sociālas funkcijas. Ielu apstādījumi kalpo gan kā pilsētas vizuālā tēla veidotāji, nodrošinot papildus publisko zaļo telpu, gan arī ekoloģiski sasaista lielākas apstādījumu teritorijas (parkus, skvērus, ūdensmalu teritorijas u.c.) un uzlabo pilsētas mikroklimatu. Pētījuma mērķis bija analizēt Latvijas lielāko pilsētu ielu apstādījumu pašreizējo situāciju, lai noteiktu estētisko un ekoloģisko kvalitāti ierobežojošos un veicinošos aspektus. Par pētījuma galvenajiem uzdevumiem tika izvirzīti: ielu apstādījumu izpēte Liepājā, Jelgavā, Rēzeknē un Valmierā; ielu apstādījumu ainavas ekoloģisko un estētisko īpašību analīze; ar ielu apstādījumu izveidi un uzturēšanu saistīto plānošanas un normatīvo dokumentu izpēte. Ainavas ekoloģisko un estētisko īpašību izpētē tika veikta ielu apstādījumu ainavas inventarizācija, fotofiksācija un plānošanas un normatīvo dokumentu analīze.

Rezultāti liecina, ka ielu apstādījumi galvenokārt darbojas kā ielu norobežojošie elementi. Tie ir veidoti kā lineāras augu grupas, kas sastāv no kokiem, zāliena un cietā ieseguma. Ielu apstādījumos tiek izmantotas dažādas koku sugas, ietverot svešzemju augu sugas ar dekoratīvām īpašībām un pilsētas apstākļiem piemērotas vietējo augu sugas. Pilsētas apstādījumu uzturēšana ietver regulāru zāliena pļaušanu un koku, krūmu formēšanu. Pilsētas centrā šie principi tiek ievēroti biežāk nekā perifērijā. Latvijas klimatiskajiem apstākļiem raksturīgā ilgstošā aukstā perioda dēļ ielu apstādījumos netiek izmantots plašs augu sortiments, galvenokārt dominē dažādas koku sugas un vasaras puķes. Dekoratīvie krūmi un ziemeļietiek tiek izmantoti retāk, jo ielu apstādījumu zona bieži vien tiek izmantota sniega uzkrāšanai ziemā, kā arī tajā nonāk kaitīgās vielas, kas ir ielu pretapledošanas materiāla sastāvā. Dabiska veidola ielu apstādījumi bija sastopami ārpus pilsētas centra blakus privātmāju rajoniem un maģistrāliem ceļiem. Savvaļas izskata apstādījumi tika konstatēti pie industriālām teritorijām. Pētījumā tika secināts, ka analizētajās Latvijas pilsētās ielu apstādījumi pēc estētiskajām un ekoloģisko īpašību izvērtējuma ir vidējā līmenī, un abi aspekti nav savstarpēji saskaņoti. Parasti ielu apstādījumi nodrošina ainavas estētiku un ierobežotas ekoloģiskās funkcijas. Tāpat pētījums neatklāja ainavas ekoloģiskās estētikas dizaina pieejas izmantošanu ielu apstādījumu veidošanā. Galvenokārt pilsētas plānotāji pievērš uzmanību regulārai ielu apstādījumu kopšanai un uzturēšanai. Kā vieni no galvenajiem ielu apstādījumu estētisko un ekoloģisko īpašību ierobežojošajiem faktoriem ir garā ziemas sezona, pilsētas ekstremālie apstākļi, vandālisms, kā arī pazemes inženierkomunikāciju tīkls ielu zaļajās zonās, kas ietekmē augu izvēli pilsētas apstādījumiem. Plānošanas un normatīvo dokumentu analīze parādīja, ka ielu apstādījumi netiek izdalīti atsevišķi kā pilsētas zaļās teritorijas un tiek saistīti kopā ar ielas inženiertehnisko raksturojumu.

Pēc pētījumā iegūto datu analīzes kā viens no secinājumiem ir, ka Latvijas pilsētu apstādījumu plānošanā ir jāmeklē jaunas tehnoloģiskas iespējas, lai uzlabotu ainavu ekoloģisko estētiku – iekļautu pievilcīgus vizuālos skatus, ko kopā ar ielu veido bagātīgi un daudzveidīgi apstādījumi, vienlaicīgi nodrošinot arī ekoloģiskās prasības un ideju par dabas ienešanu pilsētā. Nākotnē būtu jāizstrādā detalizētāki ielu apstādījumu izveides pamatprincipu apraksti plānošanas un normatīvajos dokumentos. Tiem būtu jāatspoguļo galvenie ielu apstādījumu attīstības principi, tostarp ietverot arī ainavas estētiskās un ekoloģiskās īpašības.