Enhancing Ecological, Functional, Social and Aesthetic Quality of Street Green Space by Planning Green Pockets

Natalija Nitavska¹, Daiga Skujane¹, Madara Markova¹, Aiga Spage¹

¹ Latvia University of Life Sciences and Technologies, Liela iela 2, Jelgava, Latvia
natalija.nitavska@llu.lv

Abstract. City residents do not always have an opportunity to visit larger parks or nature areas on a daily basis as the rhythm of their daily life does not allow them to spend enough time in a natural environment. More and more time is spent on the way to the place of work or home. As well as tourists on visiting the city use main streets as touristic routes. On the one hand, major central streets affect ecological balance of the city due to the heavy traffic and contamination from it, but on other hand, they are mostly visited public areas because of the public transport and various public buildings and touristic objects concentrated there. Thus, street green space plays an important role in the city landscape pattern and often requires much more diversity of plantings, humane and safer environment than other areas of the city. Street green space can be very limited especially in the centre of the city with dense building areas or places where historic pattern of buildings does not allow to expand green areas. But it is possible to find small green spaces or green pockets in several places along the street. Green pockets that developed as multifunctional, ecological and aesthetical green spaces can compensate insufficiency of street greenery. The socio-economically active, medium-size city of Rezekne in Latvia has been chosen as a pilot area for the assessment of potential to develop green pockets along main streets of the city. The central street of Rezekne is the main axis of the urban landscape which provides access to the city from other regions, although it is historic heritage area with active public life. Unfortunately, within the development of the city there were needs to increase the flow of the main street by reducing the green space. Therefore, it was not possible to develop classic street greenery of tree alleys. Due to the random spatial structure of buildings along the main street, there are open spaces of different size and shape between or in front of buildings. Those are appropriate for development of green spaces. The approach of green pockets was adapted for the main street of Rezekne as a tool for enhancing ecological, functional, social and aesthetic quality of street green space. As well as, this makes it possible to give the street landscape a diverse and multifunctional image and provide necessary functions and environment for residents and tourists. The aim of the article is to analyse problematic issues of the greenery of major central streets of Rezekne and present an approach of green pockets as a tool for their solving.

1. Introduction
Green infrastructure of the city not only improves ecological conditions of the city (reduces the overheating of the city, purifies and humidifies air, captures rainfall, etc.) [1,2], but also plays an important role in formation of a qualitative area of everyday activities and recreation and health improving for the city residents. Aesthetically qualitative green space creates an attractive, interesting and safe environment for tourists and town guests either [3,4,5]. Urban green spaces are often the only public spaces that the city residents can use in everyday life, whether moving or relaxing, sporting or simply dating each other [5]. So, it is therefore essential to ensure the connectivity of green structure of
the city, as well as the availability of individual public green space for different population groups. [6,7,8]. In the areas of the centre of the city, this can often be difficult because of the high density of building, there are limited possibilities for creating green space. As one of the solutions in situations where there is insufficient area to create large parks, is to create several small, known as “pocket gardens”. [9,10]. Pocket garden, as an element of green infrastructure of the city, is also important in situations where, for various reasons, it is not possible to create qualitative and continuous street planting [11]. In these situations, a number of green pockets, which were set up in open areas along the street, between or in front of buildings, are able to ensure the continuity of green infrastructure. So, it is the main streets that often serve as important daily routes. As well as central streets are an important public outdoor area, as there are several public facilities located on it – shops, cafes, offices, etc. Therefore, green pockets, set up in free areas between or in front of buildings along central streets, substantially complement these facilities, enabling the offered services and functions to be provided in the outdoor area. This issue has become more acute in the context of the COVID19 pandemic, which highlighted the benefits of the public outdoor in providing the functions of activities and social networking in such situations. [12].

A number of researchers and practitioners have searched the best solutions for the development of pocket gardens in order to cover both multifunctional applications and to ensure aesthetic and ecological quality in small areas. [13,14]. In the centre of the city, where there is a dense building that is consisted of multi-story buildings, pocket gardens help to build a human-scale landscape. It has a positive impact on human psychological condition [15,16,17].

A diverse landscape pattern, which consists of lawn, ornamental plantings and water elements, is mentioned as one of the main basic principles for creating such small green space. It is also essential to ensure the multifunctional usage of the green space either. The most important functions of pocket garden are mentioned – the possibility to relax and philosophize, to read and to eat/drink. Summarizing the articles of various researchers on the topic of pocket gardens, the preference for greener view and calm atmosphere and safety is mentioned as their benefit [18,19].

If pocket gardens are a part of street plantings, so they in addition play a significant role in noise mitigation, pollution reduction and rain water storage [20,21,22], as well as in promoting of safe movement for pedestrians and cyclists [1,2,23]. The central streets of the city are often either the architectural landmark of the city and creators of the place recognizability. Green pockets along the central street can therefore become important support elements for creating the place recognizability. There are significant city views from the streets, and green pockets make it possible to stay and enjoy the views for longer [24].

The aim of the particular research is to analyse the problematic issues and solutions for the development of street planting of the centre of the city by using green pockets. A medium-sized city of Rezekne in Latvia, has been chosen as a pilot area. The creation of street planting in Rezekne plays an important role in formation of a common planting structure, as a significant part of the city is occupied by residential multi-storey and private building, while only a relatively small area has been left for public planting, or daily routes of residents pass directly through the streets and do not cross planting areas.

1.1. Street plantings, their value in the environment of the city
At the level of urban planning, the planned structure of plantings of Rezekne should form a single network of public planting areas that consists of individual node points (parks, squares, outdoor space at public buildings, etc.) and their connecting elements (street planting).

A network of streets is the creator of the urban spatial structure, which, on the one hand, highlights daily and tourist routes with different places of view and, on the other hand, divides the building and
green areas [3,4,5]. In view of the sustainable development of the urban environment, street plantings are an essential element of the outdoor green structure [25,7], since they: perform the function of the “green corridor” in the context of the common concept of planting [11,25]; detain flue-gases and dust, mitigate the noise emitted by transport [20,21]; create a pleasant and safe environment for pedestrians, cyclists and car drivers, as well as a shade in sunny days and heat [1,2]; separates pedestrian footpath from residential homes and transport traffic [15]; improve the urban landscape with human-scale planting [16].

Noise is a particular problem for the urban environment. Around 72% of the residents of Europe live in cities [26] and environmental noise has been still increasing [27]. Environmental noise is perceived by the public as one of the main environmental challenges. It can affect people both physiologically as well as psychologically, disrupting basic activities such as sleep, rest and work.

The creation of street planting in Rezekne plays an important role in formation of a common planting structure, as a significant part of the city is occupied by residential multi-storey and private building, while only a relatively small area has been left for public planting, or daily routes of residents pass directly through the streets and do not cross planting areas. Green belts are formed for the following purposes:

- Form plantations of the parkways which are designed to protect drivers of oncoming vehicles from blinding. Minimum height of plantings is 1,2 m. Shrubs are selected for these plantings, which are of low soil requirements, dry-resistant, and resistant to soil pollution;
- Form the consolidation of slopes in trenches and embankments. Ground-covered plants, shrubs, perennial plants or lawns are used. If slope ratio is $\geq 30\%$, carpets of natural or synthetic origin are used for consolidation of the slope, which shall be fixed throughout the whole slope ratio by metal staples or by manufacturer’s instructions;
- Create a diverse and expressive landscape. Row plantings are not desirable. Trees are planted in groups at public transport stops or recreational areas, but they must not interfere with the transparency of the road. Trees must not be planted in places where they create an optical warning from a distance about upcoming changes to the track, for example, a sharp bend or terrain changes. Trees must be planted at least 5 m from the edge of the carriageway, the crown of mature trees must be at least 1 m from the overhead lines. Road plantings are created in separated lane, the width of which depends on the technical category of the roads.

Trees planted at the roads are exposed to severe wind, dust and flue-gases, and therefore species suitable for such conditions should be selected [28]. Planting of fruit trees of cultural varieties is not permitted. The surfaces of tree leaves absorb or diffusively reflect sound waves, so plants can be successfully used to noise mitigation. The noise may be reduced by 10 dB if the plantings are formed accordingly. The most efficient are trees with large leaves, the crown of which reaches to the ground. A dense high hedge reduces noise level by only 1 to 1.5 dB. If it is possible, large trees with dense foliage and the same crown, or their combinations with shrubs, should be used. In order to create significant noise protection, dense plantings should be formed, consisting of several rows of trees and shrubs. The height of the trees must be not less than 7 m, the width of the row of 10 m. This option should only be used along the industrial or technical areas at the expense of these areas in the development of new projects. The most efficient solution is the one if you can combine the planting area with an embankment that increases the efficiency of noise mitigation [29,30,31].

2. Material and methods

2.1. The research object – Rezekne, Atbrīvošanas aleja (The Liberation Lane)

The city of Rezekne is located in the Eastern part of Latvia. The city is located 242 km away from Riga. Rezekne is a city of LR importance. The area of Rezekne is 1 748 ha, where the building area occupies 1 211 ha or 69.3% of the city area, and green plants and forests 214 ha. Rezekne is a multifunction transportation hub, not only in Latvia, but also in Europe, because it is located at the intersection of the
main roads and railway lines of the country. Rezekne is located on the transport corridors of international importance – main highways of the country: A12 (Jekabpils – Rezekne – Ludza – the border of Russia (Terehova)), A13 (the border of Russia (Grebņeva) – Rezekne – Daugavpils – the border of Lithuania (Medumi), which are also the EU Trans-European Transport Network (TEN-T) corridors. The town of Rezekne is crossed by the railway lines of strategic importance: Riga – Moscow and Peterburg – Warsaw. Atbrīvošanas aleja (The Liberation Lane) is a functioning route of freight transport A13. Atbrīvošanas aleja (The Liberation Lane) is one of the streets of Rezekne, which has been assigned the status of the transit street. A surface reconstruction over the total length of Atbrīvošanas aleja (The Liberation Lane) was carried out 10 years ago, as well as a lighting was changed by setting up LED luminaires. In view of the importance of Atbrīvošanas aleja (The Liberation Lane), guidelines to the most important city objects and billboards have been placed along it [32].

2.2. The research method

It was essential to define on the urban scale the linkages and anchorages that are linked to the main street of the city – Atbrīvošanas aleja (The Liberation Lane). At the level of urban scale, transport linkages, velo linkages were defined. On the other hand, it is important on the local municipality level to survey the area in detail by evaluating the existing structure, the width of the pedestrian area, the area available for the cycling infrastructure, the existing elements – benches, route signs, lighting elements, surface. The existing green infrastructure was also evaluated, including an evaluation of the available trees. Several knot points can be identified in the planting structure of the cities, and green pockets are one of them. Following a further detailed research of the current situation, in cooperation with the municipality, a detailed summary of sites, problem areas and high-value views areas, which are included in the plan of planned public planting areas network, was created. The plan defined the areas where the green pockets approach should be addressed. Ownership of the property was of great significance in the selection of such areas, with priority developing the areas belonging to the municipality. The definition of specified area in spatial plan of Rezekne is also relevant in the description of the areas and the development solution. As one of the planting areas of Rezekne, Atbrīvošanas aleja (The Liberation Lane) was defined. For the future development of Atbrīvošanas aleja (The Liberation Lane) as a qualitative planting area, a solution of green pockets was defined. In order for the municipality to successfully implement the proposed vision, it is essential to provide recommendations for the implementation of the solution, schematic drawings, an assortment of plants, acceptable variations in the solutions – the main principles for planning of green pockets directly for Rezekne and specifically for Atbrīvošanas aleja (The Liberation Lane).

3. Results and discussions

3.1. Green infrastructure of Rezekne in general

At the level of urban planning, the planned structure of plantings of Rezekne should form a single network of public planting areas that consists of individual node points (parks, squares, outdoor space at public buildings, etc.) and their connecting elements (street planting). The development of a single network of public planting areas is based on the worldwide used approaches of creation of Blue-Green Infrastructure (Green Network) that are capable of providing and promoting: environmental linking of the landscape; the protection of natural values and biodiversity; visual spatial unity and better orientation of the space in the city area; highlighting and accessibility of identity-forming landscape elements; safe movement for residents and tourists.

The highlighting of certain “sub-points” (by creating plantings and environmental sites, allowing activities and recreational facilities, etc.), not only in the centre, but also in the neighbourhoods of the city, allows to activate the city as a whole supported by the idea of Urban Acupuncture, which has already been developed in the planning of several European cities. “Node points” in urban space means publicly available planting areas: urban forests and parks, squares, small planting areas or recreation areas – “green pockets” (pocket gardens), children's playgrounds, sport grounds, public green areas in
the areas of public buildings, residential houses, etc., cemeteries and church gardens, cultural heritage sites, potentially developable public outdoor spaces, etc. Landscape elements are taken for the “linking elements” at the level of urban planning which ensure safe movement between “node points” on a daily basis for the citizens, or also create safe and interesting tourism routes, promoting economic development of the place. The linking elements in the city are landscaped green areas of the streets, pedestrian and cyclist paths, watercourses and tank coasts, linear nature and planting areas, etc. At the same time, such network of public planting areas that consists of node points and linkages between them, also provides the environmental linkage, which is a key task for the development of green infrastructure. The main principles for the selection of the areas which should be included in the establishment of a single network of public planting areas were defined as follows:

- an improvement of the quality of the life environment of the residents and a safe urban environment on a day-to-day basis; at the same time, an attractive and organised public outdoor space is a condition for attraction of young residents, as well as attraction of investors, which is an important aspect for Rezekne, part of which is occupied by the special economic area;
- tourism development, which is also highlighted in the strategic documents of Rezekne, taking into account the beneficinal location of Rezekne for tourists from Russia, Belarus and Lithuania. Rezekne is also one of the largest cities of Latvia, which is characterised by rich cultural and historical heritage and traditions, a multicultural environment, expressive elements of nature (terrain, river, lake) and modern urban environmental and infrastructure projects implemented in recent years.

Areas that are essential in the context of improvement of the quality of the life environment of the residents and attraction of investors are identified and planned to be new according to the following criteria: actively daily used and publicly available outdoor spaces – parks, squares, publicly available areas at schools or other public buildings, sports grounds and other recreational areas; more actively daily used streets, walking and cycling routes.

Areas that are essential in the context of development of tourism are identified and planned to be new according to the following criteria: important/attractive recreational areas for the residents and tourists of the city (beach, parks, etc.), active recreational areas and objects of observation (objects of nature, building, cultural and historical objects and sites, etc.); mains streets and entrance places to the city; viewing sites from where visually high-value views are displayed; historical roads and linkages between cultural and historical objects; existent and planned tourism routes for pedestrians and cyclists.

3.2. The central street of Rezekne city, analysis of the situation

Atbrīvošanas aleja (The Liberation Lane) is the longest street of Rezekne and reaches a length of 5.5 km and stretches north to south through the whole city. The width of a carriageway of the street ranges from 2–4 traffic lanes: the distance between the buildings is irregular, ranging from 40 to 100 m, combining unevenly the historical buildings and buildings of the Soviet period. The street has 18 crossings and crosses the railways and the river of Rezekne.

When the Peterburg-Warsaw Highway was constructed in 1836, the Nicolai Highway was formed, which was named as a tribute to the Emperor of Russian Empire, Nicholas I, who was visiting Rezekne. Later in 1923, the street was renamed Atbrīvošanas aleja (The Liberation Lane), which was related to the declaration of independence of Latvia and liberation of Latgale. At that time there were regular plantations of linden trees along the both sides of the street, but later in 1930 the main dominant of the street – a monument “United for Latvia” was erected, which was built on donations, the amount of which surprisingly exceeded twice the amount that was needed, so therefore the street section was also reconstructed, creating a street that was the most modern in the whole region of Latgale. The spatial structure of the street in the period of 1930s was composed of one – two-story wooden and red-brick building – both residential and public objects, as well as service objects, individual trees or groups of trees, stone covering road and objects of street infrastructure – electricity poles, barrier elements, water abstraction sites, etc.
In the Second World War, the monument was thrown down, and later the street was renamed Lenin Street, and the monument of Lenin was erected in 1950. Several important public and industrial objects of the city were built along this street, a multi-story residential building was formed. The spatial structure of the street during this period was formed – building of a different age – one-story and five-story building, asphalt surface, street lighting, planting of the alley type, other types of planting, elements of street infrastructure.
Figure 3. Rezekne – Atbrīvošanas aleja (The Liberation Lane), 1960.

After regaining the independence of Latvia, the street regained its name – Atbrīvošanas aleja (The Liberation Lane). Building and renovation works of the street had already been launched in 2011, changing the surface and expanding and rebuilding infrastructure. In the process of reconstruction, the street for places had been extended, rebuilding additional infrastructure and pedestrian roads. Atbrīvošanas aleja (The Liberation Lane) is a central street of the city whose functions are much wider than providing flow of traffic only: it is the face of the city and the first of the central sections of the city section to be met by city guests and regularly crossed by residents. The spatial structure of the street is currently composed of a number of public buildings, educational institutions, shops, service institutions. The structure of planting is composed of the individual large-scale plantings, which do not already have enough room for normal development due to surface and other infrastructure of the street. There are raised planters with ornamental plantings in some places.

Figure 4. Modern structure of the street (Google street view)

On analysing the changes in the spatial structure and planting structure of Atbrīvošanas aleja (The Liberation Lane), it has to be concluded that in the last nearly hundred years the spatial form of the street has changed significantly: increasing from a one-story-two-story small-scale street to the one of the central and also the largest streets with intensive traffic, a large number of public objects, as well as a relatively important role in the life of the city, and in creating the overall image of the city. It has to be noted that the structure of the planting did not have the possibility to develop due to the already primary narrow spaces of the street formed by existing buildings, consequently, as the street expanded, free space for plants declined even further.

3.3. Green pockets as a tool for development of the planting of the central street of Rezekne

The concept of the development of the planting of Atbrīvošanas aleja (The Liberation Lane) has been developed as an individual solution, working on the concept of the planting of Rezekne. [33]. In the concept document of planting of Rezekne each planting area is described, highlighting existing values and values to be saved, as well as prioritizing the necessary activities for each of the areas. Full development of the area requires further action – development of technical planting projects, which are
not included in the concept document for planting. It is important to have a single vision of the planting system of Rezekne, of such, where planting areas are like “node points” throughout the whole network of plantings in Rezekne. The concept of planting involves a formation of a planting structure along the streets, dividing them into different types, depending on the functions of the adjacent area and the width of the free lane. Unfortunately, it must be noticed that there is not enough space for plantings within the limits of the street only, therefore, the concept of “Green pocket” has been chosen to formation of the planting system of Atbrīvošanas aleja (The Liberation Lane). “Green pocket” – a concept of “green pockets” that compensates for the lack of free areas on the central street, acts as a stopping sites for residents and tourists, improves and opens the structure of the outdoor space of the street. There is often not enough space in urban environment for formation fully-fledged squares or parks, therefore the concept of “green pockets” is intended to be used not only for Atbrīvošanas aleja (The Liberation Lane), but also for other parts of the city where plants are needed.

The following elements and necessary technologies have been planned for the landscape space of Atbrīvošanas aleja (The Liberation Lane):

- small pockets with recreation areas along the street route – “Green pockets”, also involving in the public outdoor space of the street the adjacent areas after agreement with their owners;
- perennial plantings in the parkways – narrow lane of width of 1.0-2.0 m, using perennial mixed-type plantings;
- interactive environmental objects that define the identity of the place and create place recognizability;
- short-term plants (summer flowers in containers) – which are to be placed along the marketplaces as attractive and bright accents;
- a qualitative surface – the quality of paths for pedestrian and cyclists is one of the key criteria for public outdoor space quality;
- separating elements – railings and ornamental poles to create a safe environment for pedestrians close to the street and for pedestrians moving from parking to railway station along the tracks;
- fragments of individual rhythmic plantations in places where plants have more space (areas more than 5 m wide). It is possible to create row-shaped tree plantations, in preference to trees with compact crowns or rhythmic plantations of bushes with colourful foliage;
- an involvement and opening of adjacent areas – the possibility of increasing the usage of landscape space of Atbrīvošanas aleja (The Liberation Lane) through creating recreation areas and plantings on cooperation between the municipality and owners of private areas should be considered;
- a planning of compact recreation areas and elements.

3.4. Types and forms of Green pocket offered to Atbrīvošanas aleja (The Liberation Lane)
Three types of situations have been identified by exploring the topographical dimension and also understanding the different nature of the situations:

- the area close to the street / the area is in the immediate vicinity of the street;
- the area has an encumbrance consisting of underground engineering communications;
- the area located closer to residential and public building as a part of spatial structure of the street – open-type patio or forecourt.

| Table 1. Type of 3D models |
|---------------------------|
| Current situation / available area m² | close to the street/ territory free from engineering communications | close to the street/ territory with engineering communications | with distance from the street/ territory free from engineering communications |
| 10-30 m² | A1 | A2 | A3 |
| 40-100 m² | B1 | B2 | B3 |
| 100-300 m² | C1 | C2 | C3 |
On analysing the current situation and understanding actually available area for each place, three size groups have been identified that have impacts on selected structure, assortment of plantings, compact size and quantity of plants, as well as the possibility of creating additional functions – all types are summarized in 3D models, showing visually the potential capacity and solution of each type of Green pocket.

![Diagram of Green Pockets Type A1, B1, and C1](image)

**Figure 5.** Current situation modelling - close to the street/ territory free from engineering communications for different areas

Planning principles - green pockets in different sizes close to the street, that are a variety of green areas without a lawn, but with an integrated resting area, which is turned away from the street. Compact-sized woody plants, perennials, grass perennials, and short (up to 0.5 m) shrubs can be used for greenery.
It is important not to cover the visibility of the street and to ensure traffic safety. In larger areas it is recommended to integrate rainwater drainage – raingardens.

**Figure 6.** Current situation modelling – close to the street/ territory with engineering communications for different areas

Planning principles - in order to protect engineering communications, but also to use the space for greenery, it is recommended to create greenery on raised type flowerbeds, at the same time integrating the retaining walls with benches. In the greenery, you can use compact crown trees, ground cover plants, and perennial, grass perennials. For larger areas, greenery and recreation areas are formed as a green area with a square. In larger areas it is recommended to integrate rainwater drainage – raingardens.
Planning principles - the green pocket, which is located further from the street, has greater recreational potential and is also suitable for a more peaceful rest. Environmental objects, sculptures, and water objects can be placed in such places. Such areas are already integrated into courtyards or in the forecourts of public buildings and can be carriers of identity, at the same time serving as street greenery and reducing street noise and pollution.

4. Conclusions

Green pockets are an essential element of the planting structure in the city, because they are one of the node points and are closely connected to the linking elements – the streets. Looking into the challenges of each city and planning a common planting infrastructure, it is essential to evaluate the actually available space for planting along the central main streets of the city. The historical development of cities changes the daily needs, their spatial structure, while still preserving the historical context on the
impact of which building and street load does not always allow the development of fully-fledged and classical row-shaped plantings of the street, which are both decoration of the city and green buffers at the same time. In such cases, the nature of Green pocket plantings is applicable to solving the lack of plants along the busy street. It is important to understand the areas actually available for planting, as well as the burden of engineering communications in each area, because it is a common situation for central streets. There have been found three types of Green pockets in Rezekne which, according to a different situation, have been offered in three more ways bringing together 9 different standard model. The city has already started the planning and construction of these sorts of plantings, which is a welcome initiative by the municipality.

Acknowledgment(s)
Special thanks for the municipality of Rezekne and for its trust in research work of planting of the city of Rezekne and development of the concept for development of planting infrastructure.

References
[1] T. Rantala, P. Metsäpuro, T. Luukkonen, K. Karhula, K. Vaismaa, J. Mäntynen, “Vitality from Walking and Cycling,” Tampere University of Technology, Transport Research Centre Verne, 2014. [available 24.02.2021.] https://trepo.tuni.fi/bitstream/handle/10024/116626/vitality_from_walking_and_cycling.pdf?sequence=2&isAllowed=y
[2] J. M. Cackowski, & J. L. Nasar, “The restorative effects of roadside vegetation: Implications for automobile driver anger and frustration,” Environment and behaviour, 2003, 35(6), pp. 736-751, 2003.
[3] A. Jacobs, “Great Streets,” MIT Press, Cambridge, MA, 1995.
[4] P. Healey, “Urban complexity and spatial strategies: Towards a relational planning for our times,” Routledge, 2006.
[5] P. Parthasarathi, H. Hochmair, D. Levinson, “Street network structure and household activity spaces,” Urban Studies, 52, pp. 1090–1112, 2015. [available 24.02.2021.] https://doi.org/10.1177/0042098014537956
[6] M. Surma, “Green infrastructure Planning as a part of Sustainable Urban Development case studies of Copenhagen and Wroclaw,” Proceedings of the Latvia University of Agriculture Landscape Architecture and Art, 3(3), pp. 22-32, 2013.
[7] J. Parker, M. E. Zingoni de Baro, “Green infrastructure in the urban environment: A systematic quantitative review,” Sustainability, 11(11), 3182, 2019. [available 24.02.2021.] https://doi.org/10.3390/su11113182
[8] V. Giannico, G. Spano, M. Elia, M. D’Este, G. Sanesi, R. Lafratezza, “Green spaces, quality of life, and citizen perception in European cities,” Environmental Research, Vol. 196, 110922, 2021.
[9] K. K. Peschardt, & U. K. Stigsdotter, “Associations between park characteristics and perceived restorativeness of small public urban green spaces,” Landscape and urban planning, 112, pp. 26-39, 2013.
[10] G. R. Gozaloa, J. M. B. Morillasa, D. M. González, “Perceptions and use of urban green spaces on the basis of size,” Urban Forestry & Urban Greening, Vol. 46, 126470, 2019.
[11] Z. Liu, Y. Lin, B. De Meulder, & S. Wang, “Heterogeneous landscapes of urban greenways in Shenzhen: Traffic impact, corridor width and land use,” Urban Forestry & Urban Greening, 55, 126785, 2020. [available 24.01.2021.] https://www.emeraldnetwork.info/power_of_the_network
[12] S. Pouso, A. Borja, L. E. Fleming, E. Gomez-Baggethun, M. P. White, M. C. Uyarra, “Contact with blue-green spaces during the COVID-19 pandemic lockdown beneficial for mental health,” Science of the Total Environment, Vol. 756, 143984, 2021.
[13] W. Klemm, B. G. Heusinkveld, S. Lenzholzer, B. van Hov, “Street greener and its physical and
The effects of air pollutants on vegetation and the role of vegetation

M. Dobson, & J. Ryan, “Trees and shrubs for noise control,” Arboricultural Practical Notes, Vol. 6, 2000. [available 24.01.2021.] https://www.trees.org.uk/Trees.org.uk/files/8c/8c69f2126c82e-424b-96d1-c8ff6dc02403.pdf

I. F. Gheorghe, & B. Ion, “The effects of air pollutants on vegetation and the role of vegetation in reducing atmospheric pollution,” The impact of air pollution on health, economy, environment and agricultural sources, pp. 241-280, 2011. [available 24.01.2021.] https://www.intechopen.com/books/the-impact-of-air-pollution-on-health-economy-environment-and-agricultural-sources/the-effects-of-air-pollutants-on-vegetation-and-the-
role-of-vegetation-in-reducing-atmospheric-pollu

[32] Rēzeknes pilsētas pašvaldība, “Pāreizējās situācijas analīze,” (in Latvian) 2014. [available 24.01.2021.] https://rezekne.lv/wp-content/uploads/2017/08/pasreizejas-situacijas-analize-2014-gads.pdf

[33] N. Nitavska, D. Skujane, & M. Markova, “The Study of the Landscape of Populated areas for needs of the Development of the Concept of Greenery,” IOP Conference Series: Materials Science and Engineering, Vol. 960, No. 3, p. 032109, 2020.