

TRANSFORMATION OF THE LANDSCAPE SPACE OF DRIKSA IN THE URBAN ENVIRONMENT OF JELGAVA

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ABSTRACT

As a popular walking place for the townspeople, the bank of the Driksa River was already characterized a hundred years ago, when the city had not yet been devastated by wars and their misery. Dozens of postcards with nice recreational areas of Old Jelgava have toured the world. Currently, it is only possible to compare Jelgava with what it has once been in the memories. New view points, building scale, architectural stylistics, street widths, adapted to the technological requirements and comfort of the 21st century. However, the functional meaning and the German name of the Driksa bank has not changed - promenade – for a city which brings overlaying of a very dense urban space from the beginning of the 16th century.

A hundred years away from the period, when the city was ravaged by the Bermontian venturers, the time cycle is particularly acutely delineated, which has wiped out unique artistic values of the urban construction into the rubbish of history. Also, along the waterfront of the Driksa River. Reconstruction of the promenade - a small fragment of the middle reach of the Driksa River, which vividly demonstrates a good cooperation result between the municipality, architects, landscape architects and engineers that can give an aesthetically valuable contribution to the urban space.

Key words: urban structure, urban landscape, visual and aesthetic quality, contextualism, harmony, space transformation

INTRODUCTION

In awarding Jelgava with the name of the best European city, it is worth noting that the urban constructed space has rapidly progressed over the last decade in terms of the quality of the environment. Several post-Soviet “bastions” have fallen that visually have degraded the city - low-value warehouse building, overgrown trees, functionally awkward green areas, crossed by narrow muddy walkways, traffic systematization, rainwater systematization. Particularly problematic is the issue of the discharge of the surface water, as the flat terrain of Jelgava and the height marks of 2.0-4.5 m above the sea level are the cause of high groundwater, creating extensive flood zones.



Figure 1. The place of the perspective promenade of the upper reach (Source: photo by author, 2014)

The huge difference in water levels of the seasons is an indicator, which gives the city a strange character of uniqueness in different seasons. The pulsating character of the Lielupe River and the Driksa River in July, when during hot summers the banks are exposed and the water flow in the river is not even noticeable - until ice piles in spring, which swirling across the flood plains, carry away broken tree and shrub fragments. The moments of observation of the uniqueness of these natural moments are a great advantage. In particular, if the sight lines are located on the high suspension bridge, right next to a residential building. Balancing the architectural composition of the bridge in the urban space with the natural pictorial values, a very high functioning and aesthetic contribution is made to the urban constructed space.

The aim of the research is to assess the green, recreational space of the Driksa River and the scale, density of the adjacent building, conservation opportunities of the cultural and historical landscape space as well. The assignment of the research is based on the study of the historical materials about the city, which is associated with the transformation processes of the urban constructed space. It is mainly based on time periods, which have brought both world wars and the post-Socialism period in half a century. The left bank of the Driksa River of 2.7 km in length is chosen as a separate study area, focusing on searches of synthesis of the cultural and historical space and the ecological values.

MATERIALS AND METHODS

The research includes the study of two parts of the city's urban space for the left bank of the Driksa River:

- The upper reach of the Driksa River – in the section between the railway embankment and Raiņa Street (700 m section, Figure 2);
- The lower reach of the Driksa River between the Palace Bridge and the Northern Bridge under design (2 km section, Figure 3).

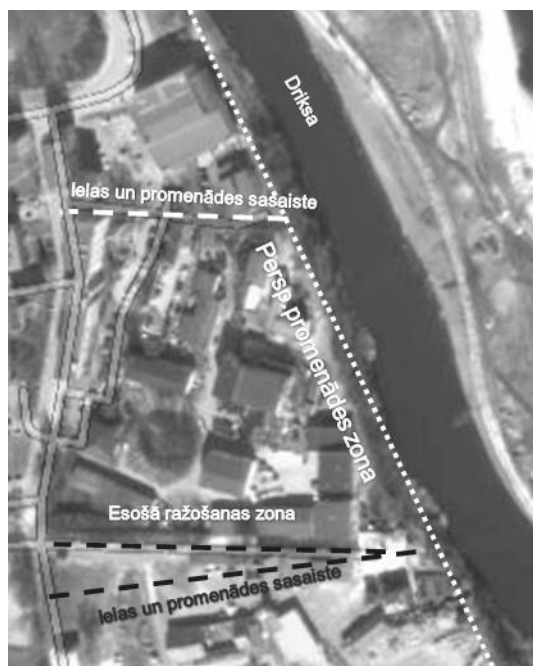


Figure 2. The existing production area and perspective promenade of the upper reach of Driksa (Source: drawing by author, 2014)

Both areas are evaluated in an approximately 20–40 m wide band that outlines the perspective construction zone of the promenade, so forecasting the landscape space of the urban constructed space.

The first waterfront area is characterized by a distant sight line (400 m) from Palīdzības Street on the right bank of the Lielupe River, which is highlighted by the building area of the manufacturing zone, the Science Center, as well as the recreational zone and a beach place. The serene flow of the Lielupe River and the silhouette of the thin building create harmony and peace of the landscape space for the plain area (Īle, 2013). After dismantling of the building volume of the sugar refining factory, the silhouette of Pārlielupe has won a more attractive appearance. Of course, we can discuss the mindless “wiping away” of the historical building, for which reconstruction of the building volume and integration of the architectural

appearance of the building into a new production zone have been possible. Unfortunately, the conditions of the funding of the European Union are

harsh and narrow from the point of view of the heritage conservation. The silhouette of the opposite bank in the northern part is somewhat hidden by the tree growth of Pasta Island and elements of the improvements on the island.



Figure 3. The existing functional territory of the lower reach bank of the Driksa River (Source: drawing by author, 2014)

The second area of the research is the lower reach of the Driksa River that is characterized by closer and further sight lines to the floodplain meadows of Palace Island. Palace Island is a closed area with birds nesting in the wild, wild horses grazing and where a rare plant vegetation can be found.

In the plain area, the lower reach of the Driksa River is marked as being the base of the natural area, while the upper reach of the river is characterized as an urban landscape with a more or less dense building load.

There are only a few cities in Latvia that can boast of such a long bank line of the river that enters the urban environment. Such structure of the geomorphological urban construction creates not only an aesthetically high-quality living space, but also a serious search for engineering solutions to ensure easy operation of the street and underground communications. This is attributable to the fact that Jelgava is situated approximately 4.0 m above the sea level where the river flow to the sea is relatively long (70 km). At the same time, it is linked with the evaluation of the city's historical and cultural building, the existing elements of the natural base and the architectural space of the new architectural building.

By overlaying of the urban environment – from the city's protective canal and the construction of the ramparts in the middle of the 17th century up to the construction of new blocks of houses through the old burial areas in the middle of the 20th century and the beginning of the 21st century (Jāņa Cemetery, Literātu Cemetery), a new structure, building density and scale of the urban constructed space are created.



Figure 4. The landscape of the lower reach bank of the Driksa River near the promenade. The market building in the distance (Source: photo by author, 2014)

The research includes the summary of the information of the archaeological and architectural and historical study. The research is based on the comparative method, evaluating the historical and the current transformation processes of the landscape space for the building of the left bank of the Driksa River. The material of the study through the comparative method describes separate functional and green areas along the waterfront in a more detailed way.



Figure 5. The Boat moorage to market. end of the 19 century (Source: Jelgava History and Art Museum)

The methodology is based on the research findings, which are summarized in the scientific works of Prof. Briņķis and Prof. O. Buka (Brinkis, Buka, 2008) when evaluating the models of the development of the urban constructed space. Regionally, in the planning of the spatial, balanced and sustainable urban development processes, an important role is played by prognostics, which by

scientific and analytical methods determines the ways of attaining the goals of the development of the regional settlement and their optimization in a specific time period. In the planning practice, the first short-term phase of the development forecasts includes the immediate transparent 12 years. The second, long-term or distant phase includes a relatively transparent prognostic period of 20-25 years.

Two main methodological approaches are used in the prognostics:

1) The genetic and descriptive method – the forecast of the territorial unit under the development is based on the description of the historical and the current situation, and the analysis the processes within a specific period of time;



Figure 6. The garden of the Villa Medem (end of the 19 century (Source: Jelgava History and Art Museum)



Figure 7. Villa Medem. View from the Uzvaras street (end of the 19 century) (Source: Jelgava History and Art Museum)

2) The target predictability method is based on the result of a specific project development program and the expected conceptual setting, which should be provided in the process of the development perspective.

When planning the attainment of the forecasted goals, the specifics, time and tempo of the structural, spatial development of the already existing environment should not be ignored. When predicting the development processes of the structural construction of the modern architecture and spatial planning, such as integration, differentiation, transformation, reconstruction, regeneration, etc. - a balanced and sustainable or threshold development of

these processes must be ensured. The forecasted development of Jelgava in the 21st century perspective must be linked not only with the regional-spatial and socioeconomic cooperation settings of the countries of the European Union and the Baltic Sea Basin, but also with the urban construction potential of the Jelgava agglomeration region. In forecasting the development potential, it is important to take into account the population growth rates, specifics of the demographic structure and optimization.



Figure 8. Villa Medem (55 Uzvaras street). Instead of the historical fencing there is a new masonry fence. The Westermann and Döring flax-spinning mill in the rear (Source: photo by author, 2014)

Forecasting is one of the main components of the professional activities of architects-urban planners in the processes of the spatial development of the environment. It is associated with a responsible decision making, working on plannings of various settlements being different in the spatial scale, as well as on the implementation of projects. But the urban development processes must not only be forecasted by architects, it should be done in a close cooperation with ecologists, economists, transport planners, engineering specialists, etc.. It generally makes the urbanization process prognostic for a closer and perspective period.



Figure 9. After the disappearance of the historic wooden building, the land properties are surrounded by a seamless fence line (Source: photo by author, 2014)

Consequently, the research includes several criteria:
-The evaluation of the changes of the landscape space of the Driksa River and the urban environment over the next 12 years;

- The study of the current and the forecasted functional load (the Northern Bridge, the forecasted building and transport load);
- Visually aesthetic quality transformation in the next few years (building intensity, the green area of the area changes, infrastructures).
- The current degraded industrial landscapes and their change (or transformation) options;
- High-quality view lines and points, their availability and the context in the development of the urban constructed space.

The total area of Jelgava is 6032 ha, of which 293 ha - in open water areas. The city's territory has very low height marks as the lowland itself:

up to + 2.0 m above the sea level - 523h, from + 2.0 to + 3.5 m above the sea level - 1257h, from + 3.5 to + 4.5 m above the sea level - 2825h, but higher than 4.5 m - 1427h or 1/4. (Information of Municipal institutions of Pilsetsaimnieciba Jelgava, 2014).



Figure 10. Uzvaras street opposite Villa Medem. The tree, shrub overgrowth along the Driksa River, which hides its picturesque bank. (Source: photo by author, 2014)

Thus, 5% of the territory of the city is covered by water. But following the statistical data, the flood areas are so huge that the building foundation height mark is not permissible less than 4.00 m above the sea level. Hence, a half of the city's area is under the flood threat. It has been vividly demonstrated by the rains of October 14, 2014, which within 24-hour time has paralyzed the collection of the city's surface water, washing out the slope of the left bank of the Driksa River that fits tight to the city's streets. Such geomorphological feature of the city seems to devote particular attention to the consistency of the infrastructural utilities, without undermining the visual and aesthetic quality of the urban space. Besides, the high water area ratio against the total building area of the city should be evaluated. These features of the natural base should be synthesized in the overall context of the building of the urban space. This is especially true for the landscape space of the recreational holidays.



Figure 11. The former flax-spinning mill. The expression of the masonry architecture.
(Source: photo by author, 2014)



Figure 12. The former flax-spinning mill. The opportunities of transformation of the industrial heritage in creating the functional application of new buildings.
(Source: photo by author, 2014)

Thanks to the successful stabilization and development of the city's economic policy, an enormous contribution has been made in the regeneration of the green recreational area of the urban constructed space. This is attributable to the creation of the pedestrian area along the right bank of the Lielupe River and the left bank of the Driksa River, as well as the improvements of the island separating the two rivers (The spatial plan of Jelgava city, 2009). Of course, in order to escape from the flooding of the island and not to reduce its recreational significance, the geomorphological form of Pasta Island is changed - i.e., its artificial raising has been done by raising the bottom in the height of 3-5 m. Thus, the level difference and the slopes of both banks of the Driksa River are visually balanced. The nature of the bed of the Driksa River in the north-south direction and 5.4 km in length – is repeated by Zemgale prospectus - Akadēmijas street - Uzvaras street, observing the distance parallelism between the bank and the street within one block of houses, which is 50 m (in the lower reach) to 300 m (in the upper reach of the river near the railway embankment).

Carefully studying the current building and the green wedge-type areas along the left bank of the river in the direction of the city center or in the westerly direction, it is possible to divide the left embankment

of the Driksa River into several urban construction spaces:

- The landscape space near Sporta-Palīdzības streets and the adjacent cultural and historical building;
- The section between Palīdzības and Raiņa streets marks a dense production and warehouse area of 400 m in length with a solid cover for the areas up to the river slope;
- The area from Raiņa street up to Aspāzijas street that creates a landscaped and aesthetically attractive promenade;
- From Ausekļa street to Lapskalna street - the market warehouse building with a large solid surface cover area;
- From Lapskalna street up to the perspective Northern Bridge (900 m) – an expressive landscape space with the cultural and historical building. Currently, the area is deserted and it “hides” the likelihood of restoration of the historic building in itself, in the perspective obtaining architectural and landscaped spaces of very high quality.
- The floodplain meadows of the Driksa River and the Lielupe River.



Figure 13. The floodplain meadow in a 50 m narrow band along Uzvaras street to the perspective Northern Bridge. (Source: photo by author, 2014)

RESULTS AND DISCUSSION

The upper reach of the left bank of the Driksa River –within the section of 700 m from the railway embankment up to Raiņa street.

The upper reach of the Driksa River is characterized as a an area of manufacturing and warehouse building between Sporta street and Raiņa street. The last post-war “bastions” (a prison, warehouses of the construction base, power supply facilities, etc.), which takes around 200 m wide band of the bank with a dense building. Among the current industrial building volumes, the values of the cultural and historical heritage are “hidden” - the Red Cross buildings and the brick architecture of the old prison building, a wooden residential building and the former Reijers shelter (Ziemeļniece,2014).

For the functional provision of the adjacent city railway terminal near the railway embankment, not

only the transport access is necessary, but also a network of pedestrian walkways. One of the best aesthetically solutions is the extension of the promenade (700 m) along the upper reach of the Driksa River. Hence, it is possible to obtain new wedge-type green/blue areas, associated with the adjacent green areas –Stacijas Park and Alunāns Park. This makes it possible to synthesize the historical heritage building, by reconstructing a small portion of the square near the former Red Cross building and the Reijers shelter on Palīdzības street (Figure 14). Currently, the urban environment is separated from the river bank by the building of low-rise warehouses, hiding the sight lines to the picturesque river bank. The 700 m long waterfront forms around a half of the total length of Akadēmijas street and Zemgale prospectus. From the point of view of the urban construction, it is a long and significant area adjacent to the street with a high quality visual contribution to the urban space. This is particularly true for the opportunity of transforming the silhouette of the present production building to architecturally high quality one, where it is possible to find the link of the historical and modern building.



Figure 14. The tree group to the old Red Cross building to Driksa river (Source: photo by author, 2014)

The reconstructed portion of the promenade from Raiņa street to Ausekļa street.

The middle of the flow of the Driksa River (450m) has been renovated and it creates a visually appealing waterfront promenade from Raiņa street to Lielā street. The reconstruction is attributable not only to the waterfront landscaping, but also the adjacent building and the creation of a new pedestrian bridge to Pasta Island (Īle,2013).

Downstream of Driksa Bridge near the palace, the reconstructed promenade creates a different harmony with the natural base as its bank is retained without building of concrete load-bearing walls. It raises awareness of the historical river bank, keeping the place that historically has been a boat quay next to the old market (Figure 4,5). A rubble covering is built for the purpose of the bank defenses near the bridge during ice drifts.



Figure 15. Calvinist Church. Uzvaras street end of the 19 century (Source: Jelgava History and Art Museum)



Figure 16. The old trees of the former Calvinist Church garden on the side of the altar part. (Source: photo by author, 2014)

One of the most expressive prospects of the promenade development belongs to the area near the former Calvinist Church (Figure 15,16). The church was demolished in the war, but the big trees clearly outline the place of the semicircular altar. The old trees near the former church date back to the “delineation” of the mosaic-type cultural and historical sites in the landscape space of the lower reach of the Driksa River. These are the sites where it is still possible to recognize and to renew (synthesize) the current city's fast-pace landscape space. After 100 m in the rear of the Calvinist Church, downstream the Driksa River, the gateway of the city ramparts and a canal with the flow into the Driksa River were once located. After the demolition of the ramparts and filling of the canal in the beginning of the 19th century, the city building rapidly developed in the northerly direction. During the post-war years in the rear of the Calvinist Church, the boat pier and the market were built, which exist even today. The warehouse building occupies around a band of 200 m, which is situated close to the waterfront.

The river bed creates a beautiful, picturesque bending opposite Ausekļa street, where in the far sight lines it

is possible to enjoy both the floodplain meadows on Palace Island and the river bed.

The tree growths from the waterfront up to the intersection of Lapskalna street and Uzvaras street create the “green” bridge or a wedge (1.0 h) and its coming up to the old pre-war building site (1.4 ha of the area) between these streets.

The building on Uzvaras street in the section from 49 Uzvaras street up to the former flax-spinning mill (a 300 m long band).

The street section, which retains the most vivid cultural and historical building – a wooden residential building at 49 Uzvaras street, a masonry residential building at 8b Uzvaras street and at 62/64 Uzvaras street, Villa Medem and the former building of the flax-spinning mill.

In the postwar years, Uzvaras street (the former Ezera or Lilienfeld street) has kept only a



Figure 17. Building on Uzvaras street 49 (Source: photo by author, 2014)



Figure 18. Building on Uzvaras street(Lilienfeld street) 51 end of the 19 century (Source: Jelgava History and Art Museum)

few buildings and the former street width. With the disappearance of the seamless building of the street along the river bank, a chaotic household and warehouse building zone has been created in the post-war years, which concludes with a seamless fence line, surrounding the land areas with tree and shrub growths and hiding the banks of the Driksa River.

After the demolition of the ramparts and backfilling of the canal (the start of the 19th century), in 1835/1836 near the Lake gate Count Johann Christoph Friedrich von Medem (1763-1838) Medem finished the Classical-style recreational palace Villa Medem designed in 1818 by the architect Johann Georg Berlitz (1753-1837), creating a recreation park near it. The sculpture of the beautiful Dorothea created by the sculptor Eduard Schmidt von der Launitz (1797-1869) from Paris was located in the park (Tomašūns,2014)). Villa Medem is a Classical-style building where both sides of the building are surrounded by exaggerated large-scale ionic four column porticos. In the center of the building, there is the hall characteristic to the Classicism (Krastiņš, 2014).

Historically, opposite Villa Medem there has had an access to the river that visually has united the building volume with the expressiveness of the river. Currently, the double fence on both sides of the street (along the property at 62/63 Uzvaras street and Villa Medem) does (Figure 6,7) not allow the bank meadow to come into the urban environment. The positive fact is that at present, between the river and the villa, there is no building created in the post-war years. This enables the municipality to acquire privately owned green areas, thus connecting the perspective promenade band with the cultural and historical building.

Close to Villa Medem (12 m) in the northern part, the former Westermann and Döring flax-spinning mill was built (1889), which gave a good contribution to the city's industrial boom at the end of the 19th century (Asaris, 1938; Figure 8). By no means, its location in the lower reach of the river was cost-effective and convenient for loading of the mill's products and raw material in ships. The river dredging or cleaning was done regularly because of the slow flow of the Driksa River and the spring debris overgrowing in a fast way (Figure 9,10).

The brick architecture of the 4-storey building volume of the flax-spinning mill beside Villa Medem - highlights the dual perception of the second half of the 19th century about the nature of the urban constructed space (Figure 11,12) beside the luxurious villa with a beautiful garden for walking, a production building of a huge building volume has been built. Currently, the building of the flax-spinning mill is abandoned, but its uniqueness consists of brick architecture and small window panes. As an industrial heritage, in the perspective it is to be reconstructed both as a public character and a multi-flat residential building. In particular, this applies to the nearest ten years, when the Northern Bridge will be built.

Uzvaras (Ezera) street by the end of the 19th century is characterized by one-storey wooden building with tiled roofs, which during the war has been burned down (Figure 17,18). Part of the street building has been lost during World War I as the city's liberation

from the Bermontians started in the direction from Ložmetējkalns to the city center, where exactly here severe street battles continued. After the liberation of the city in 1919, Ezera street was renamed into Uzvaras street.

The cultural and historical building of the street in the length of 200 m, hides a good perspective of the urban construction, the economic growth of which will be brought by a new traffic infrastructure around the year 2020. The area of the historical heritage under the reconstruction is located in a geographically advantageous position between the two overpasses of the Lielupe River, the connection of which is possible through the connection with Uzvaras street. Parallel to the transport streams, the pedestrian and bicycle path along the Driksa River will play an important role. The waterfront of the lower reach of the river comes closest to the historical building (40 m), thus making it possible to create linking of the public outdoor spaces with water. Here starts the floodplain meadow about 600 m in length, which goes up to the perspective location of the Northern Bridge. After 2.5 km down the Lielupe River, its mouth into the Lielupe River starts and the city's administrative boundary closes. In the sight point of the place of the Northern Bridge in the upper reach of the Driksa River, the city's building silhouette is readable (Figure 19,20). The solutions of the development problems of the urban constructed space lie also in the fact that the new overpass crosses the ornithological closed area, which must be protected from noise of the transport, thus seeking opportunities for construction of noise damping barriers. The opposite side of the river is an island that is formed between the beds of the Lielupe River and the Driksa River.

The previously discussed building zones of the upper reach waterfront of the Driksa River and the green areas form a wedge in the direction from the river to the city, in turn, in the lower reach of the Driksa River – the floodplain meadows are seamlessly connected to the city in the area of several hectares. Here, in the 20th century a new high-rise residential building was created – the building of Dzilnas – Satiksmes and Ganību streets, which forms the extra-urban closing ring. Predicting the situation in the next few years after the construction of the Northern Bridge, undoubtedly, the extra-urban green areas will form the infrastructure of a new character.

Downstream along the Driksa River between Villa Medem and the bypass of the Northern Bridge a natural base is formed - meadows with overgrowth (6 ha), thus creating a protective zone along the city's water treatment plant and the prospective transport artery.

In the sight lines from the Northern Bridge, entering the city from the side of Riga, this will form a symbolic "green gate".



Figure 19. The city's skyline in the lower reach of the Driksa River(end of the 19 century) (Source: Jelgava History and Art Museum)



Figure 20. The city's skyline in the lower reach of the Driksa River (Source: photo by author, 2014)

Between the new Northern Bridge bypass and the end of the 19th century wooden building along Kazarmes street, in the post-war years there has been built a low-rise residential building with gardens and the street network that is broken apart by the scale of separate infrastructure units - the school and the production zones between Kārļa street and Meiju Road, creating multi-rings in the urban construction plan, which repeat the line of the old city ramparts.

These functional zones mark the periods of the political and economic development of the urban space, which is particularly well readable in the northern and western part of the city's building. This is true for the building height, density and the functional role:

- The historic center of the urban construction from the end of the 17th century to the end of the 19th century,
- The construction period before World War I from the end of the 19th century to the start of the 20th century,
- The free state period building from the start of the 20th century to 1940,
- The post-war building from '60-80s of the 20th century,
- The period of the start of the 21st century.

The dynamic growth of the elements of the urban planning and their inter-weighted spatial correlation is akin to a living organism — its ability to purposefully grow and structurally



Figure 21. The flow of the Driksa River – a river of the lowland, to the sea

emerge, develop through self-regulation. In the elements of the urban planning, the developmental stages specific of a living organism are also visible - birth, youth, maturity and old age. In the process of self-regulation of the urban construction of the region, the interaction of the urban space with the surrounding natural environment, the range of settlements, transport, as well as the transformation processes with all of these factors in space and time

is important. The basis of the regional spatial environment is generally created by single, structurally complex systems of the local settlements.

CONCLUSIONS

Sawing out of the overgrown huge trees in the post-war years and the creation of a new promenade on the left bank of the Driksa River has given a fresh breath to the city and a symbolic fullstop to the elimination of the war devastations in the city's skyline.

It gives a new impetus to the organization of the waterfront on the southern and the northern directions. The task of the next phase is more difficult because of the need to seek synthesized solutions, where the scale of the cultural and historical building, the contemporary modernist requirements and the avant-garde of the engineering solutions should be considered. In addition, it is made more difficult by the fact that the city is characterized by a high level of the groundwater, threatening the city during spring floods and summer and autumn rainfalls. Balance, equilibrium and harmony both in the architectural and functional expression, it all means to create important conditions for the acquisition of aesthetically high-quality public spaces.

References

- Asaris H. (1938) *Latvijas pilsētas valsts 20 gadus*. Latvijas pilsētu savienības izdevums, p. 219.-242.
- Briņķis J., Buka O. (2008) *Reģionālā attīstība un prognostiska pilsētplānošanas kontekstā*. Rīga: RTU, p. 154.-155.
- Grosmane E. (2010) *Senā Jelgava*. Rīga: Neputns, p. 33-72.
- Īle U. (2013) The silhouette of the east side of the Jelgava city. *Proceedings of the Latvia University of Agriculture, Landscape Architecture and Art*, vol.3, number 3, p. 14-22.
- Jelgavas pilsētas pašvaldības iestādes "Pilsētsaimniecība" dati. Jelgava, 2014.
- Jelgavas pilsētas teritorijas plānojums 2009.-2021.gadam. Jelgava, 2009.
- Krašņiņš J. Arhitektūras stili Latvijā. [online] [accessed 01.11.2014.] Available: e.znet.lv/arhitekt_stili_Latvija_Text.pdf
- Skujeņieks M. (1927) *Latvija. Zeme un iedzīvotāji*. Rīga:, p. 167.-172.
- Tomašūns A. (2014) Mana Jelgava, [online] [accessed 01.11.2014.] Available: http://www.jelgavniekiem.lv/pict/res/mana_jelgava.pdf
- Ziemeļniece A. (2014) Transformation of the landscape space in the post years. Jelgava example. *Proceedings of the Latvia University of Agriculture, Landscape Architecture and Art*, volume 4, p. 67-76.