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INTRODUCTION

The 14th volume of the scientific collection of articles covers a multifaceted spectrum of research from the spatial development of medieval cities up to the issues of waste management in the cultural landscape of the 21st century. One of the most important is the research regarding aesthetics and composition of urban greenery that reflects the regional nature of the site. The dendrological features of plants are also useful in the creation of memorial parks, symbolically reinforcing the importance of the memorial site, as evidenced by recent research in Ukraine. The harmoniously balanced compositional structure of tree and shrub plantations is particularly important in rehabilitation gardens and parks, not forgetting the allergic effects of pollen and odor on the patients. In turn, the research on the construction of multi-story residential blocks in the 50s–70s of the 20th century and the creation of inner courtyards in Riga, summarizes the results of the survey on the aesthetic quality of the "green landmark" in the blocks. The study of the identity of the Kurzeme coastal landscape in Latvia examines the consequences of the military aggression of the USSR in the post-war years, which have brought both negative and positive transformation processes to the regional landscape. The above research is related to interdisciplinary issues, facing the topicalities of landscape space and sociology, which give an incentive to include them in the academic study process. The second section in the collection of articles comprises cultural and historical research, including the development of the Catholic cathedral type on the southern coast of the Baltic Sea in the 13th–14th centuries and a comparison of its architectural solutions with Catholic cathedrals of Western Europe. Already in the 12th century, the construction of Catholic cathedrals in the Baltic and Finno – Ugric lands influenced local building traditions. The criteria for the preservation and protection of cultural and historical values are summarized in the work of Polish researchers, including comparisons with ICOMOS and UNESCO requirements.

PRIEKŠVĀRDS

Zinātnisko rakstu krājuma 14. sējums aptver daudzšķautnainu pētījumu spektru no viduslaiku pilsētu telpiskās attīstības līdz 21. gs. atkritumu apsaimniekošanas problemātikas jautājumiem kultūrainavā. Kā viens no svarīgākajiem ir pētījums par pilsētu zaļo stādījumu estētiski kompozicionāliem risinājumiem, kas atspoguļo vietas reģionālo raksturu. Augu dendroloģiskās īpatnības ir izmantojamas arī memoriālo parku izveidē, simboliski pastiprinot piemiņas vietas nozīmīgumu, ko labi pierāda jaunākie pētījumi Ukrainā. Harmoniski sabalansēta koku un krūmu stādījumu kompozicionālā uzbūve īpaši nozīmīga ir rehabilitācijas dārzos un parkos, neaizmirstot par ziedputekšņu un smaržu alerģisko ietekmi uz slimniekiem. Savukārt, pētījums par 20. gs. 50.–70. g. daudzstāvu dzīvojamo kvartālu būvniecību un iekšpagalmu izveidi Rīgā, apkopo aptaujas rezultātus par estētisko kvalitāti, ko veido kvartālos esošās "zaļās dominantes". Latvijas Kurzemes piekrastes ainavas identitātes izpēte aplūko PSRS militārās agresijas sekas pēckara gados, kas ir nesis reģionālā ainavā gan negatīvus, gan pozitīvus transformācijas procesus. Minētie pētījumi ir saistāmi ar starpdisciplinaritātes jautājumiem, saskaroties ainavtelpas un socioloģijas aktualitātēm, kas dod ierosmi tās iekļaut akadēmiskajā studiju procesā. Otra krājumā ietvertā sadaļa ir kultūrvēsturisko pētījumu apkopojums. Viens no tiem – katoļu katedrāles tipa attīstība Baltijas jūras dienvidu piekrastē 13.–14.gs. un tās arhitektonisko risinājumu salīdzinājums ar Rietumeiropas katoļu katedrālēm. Jau 12. gadsimtā baltu un somu-ugru zemēs ienestā katoļu katedrāļu būvniecība ietekmēja vietējās celtniecības tradīcijas. Kultūrvēsturisko vērtību saglabāšanas un aizsardzības kritēriji ir apkopoti Polijas pētnieku darbā, ietverot salīdzinājumus ar ICOMOS un UNESCO prasībām.

Aija Ziemeļniece
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CONTENTS

The impact of landscape aesthetic and ecological qualities on public preference of planting types in urban green spaces

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Abstract. Landscape preference in relation to human perception of landscape ecological and aesthetic qualities analysed in different studies. The importance of both qualities is highlighted especially for urban green spaces, where the enhancement of environment quality in conjunction with providing high level aesthetics is becoming a topical issue. This paper analyses seven planting types in urban green spaces in accordance with six landscape ecological and aesthetic qualities. Therefore the aim of this research is to investigate which planting type inhabitants and tourists from four Latvian cities prefer more. Planting types were evaluated according to landscape ecological and aesthetic qualities – attractiveness, naturalness, neatness, necessity of care, wilderness and safety. The method of image simulations of the different planting type alternatives was used. The research results showed a correlation between the landscape preference and respondent`s gender, level of education and place of residence. The research did not display differences in landscape preference in terms of specific regional characteristics of the four selected cities. Results of this research could be used in the decision-making process for development of new and revitalization of current green spaces in the researched cities.

Keywords: landscape preference, urban planning, aesthetics, ecology, public survey, landscape scenarios, landscape architecture

Introduction

An assessment of landscape aesthetic and ecological qualities is related to human preference or attitude to different landscapes [33]. Landscape preference is an interconnected process formed by perception, cognition and evaluation of certain landscape and its qualities [17; 23]. It is a complex matter consisting of the physical characteristics of the place, sight (qualities, dimension and scale of observed landscape, openness or enclosed nature of the view, view point etc.) and the observer`s mental and psychological aspects (personal experience, education, place of residence etc) [17; 13; 30; 5]. In most studies, human perception of certain landscape is evaluated using static representation of the environment – photos etc. [34].

There are various theories on the specifics of human perception in terms of landscape preference (preference of young and old people, landscape professionals and non-professionals, residents of different places etc.). Preference creates an immediate and direct complex interaction between the landscape observer and the environment. Primarily there are specific landscape elements which influence landscape preference [17], for example, natural looking landscape with tree groups or water elements, which gives the possibility for views across the landscape [23; 7; 3; 34].
Landscape preference and interpretation of its aesthetics and ecological qualities is formed by visual, sensorial (hearing, touch, smell, taste) and cognitive perception – the observer`s previous experience and interpretation of previously gained information [25; 27; 39; 34]. Landscape preference is also influenced by genetic / biological and cultural factors [6; 3; 34]. Biological theories highlight a correlation between the observer and his/her place of origin, for example there are advantages of views from places which allow observations of the surroundings and at the same time provide a refuge [1; 2; 6; 10; 31; 34]. Other studies have emphasized the differences in perception of young people and adults based on structural changes of the African landscape in recent years. The results of the research showed that young people like the savannah more than local forest landscapes, but adults often remarked on the attractiveness of more familiar forest landscape [23; 7; 34]. Landscape aesthetician S. Bourassa [6] interpreted various different empirical studies, which demonstrate a high preference for landscapes aesthetic qualities that are formed from tree canopies and open ground level, as evidence for biological limitations and benefits of natural landscapes [6; 23; 34]. Also the research of the forest landscape confirms that the preference of panorama views and other open sights is related to *prospect-refuge* theory, where it is believed that there are two necessities: first, to open the views that provide information about the environment, and, secondly, to have a place to hide [1; 16], thus fallen trees or covered sights can be correlated to risk of attack or barrier for running away [31].

Information processing theories indicate that different knowledge influences the preference of landscape aesthetic and ecological qualities. Legibility theory by Kevin Lynch points at human

preference of urban landscapes with clear wayfinding – landscapes with clear landmarks, corridors and nodes [20; 23; 34]. Rachel and Stephen Kaplans developed an information processing theory that explains landscape preference with four key elements. This theory generalizes the most attractive landscapes using landscapes of complexity and mystery for human exploring and landscapes of coherence and legibility for understanding [18; 23; 14; 34]. Another theory by Kaplans – Attention Restorative theory – is based on natural environment which offers four factors for human recreation: being away, fascination, extent and compatibility. These are not usually offered by the daily urban environment [18; 28; 34; 37]. Cultural traditions also have a direct impact on the landscape. People believe that the yard, park, forest or city should look in a certain way [22; 23]. The concept of natural landscape has historically evolved from human experience, traditions and social norms [22]. There are generally accepted norms and traditions, for the site-specific landscape, for example, in rural areas – a natural green space, in a big city – human influenced, densely populated, architecturally scenic area [22; 11; 29]. Urban green spaces can be used for biodiversity conservation, natural habitat restoration, sustainable management, ecosystem services and the overall improvement of city health, so it is important to see how these areas will be accepted by city residents and tourists [23; 29; 19].

In Latvia there have been a number of regional development studies undertaken within the different disciplines which consider attractiveness of cities for residents and visitors [32; 9; 38]. In the framework of those studies significant aspects for increasing the attractiveness of the city have been highlighted. Those were well maintained historic heritage buildings and sites, modern architecture, accessible for public nature areas and urban green spaces [32; 9]. Studies also showed that urban green spaces are very important for the shaping the image and identity of the city, as well as for improving the ecological quality of the urban environment. Therefore urban green spaces should meet a certain level of ecological and aesthetic quality.

Notwithstanding the appearance of new design ideas, materials and technologies in urban green spaces in Latvia in recent years, the ecological and aesthetic qualities of green spaces developed in the Soviet era are still strongly influenced by the former political system and ideology [26] In some cases, the infrastructure of parks and gardens have been destroyed and degraded, some of the areas are even abandoned which has promoted the spontaneous appearance and development of wildlife and high biodiversity. Those areas now are under the question – to be developed as ornamental squares and gardens or very naturalistic parks with greater biodiversity and important ecological quality. Therefore, a new knowledge is needed that may support the way in which decision-making on development of green spaces will be directed.

The aim of this study is to assess public preference of the ecological and aesthetic qualities of different types of plantings in urban green spaces which were created in Latvian cities during the Soviet era to detect the factors influencing the choice of the respondents. The following tasks were set to achieve the aim of study: to develop models (alternatives) of the seven types of plantings; to analyse them according to six landscape ecological and aesthetic qualities by carrying out a survey of locals and visitors; to investigate respondents` preferences of alternatives of different planting types in the urban green spaces of four Latvian cities; to detect factors influencing the respondents` choice and preference of definite planting type.

Materials and Methods
Research area

Four Latvian cities (Liepaja, Jelgava, Rezekne and Valmiera) were selected for research of aesthetic and ecological qualities of plantings, taking into account the following criteria: 1) each city represents different historic region of Latvia (Kurzeme, Zemgale, Latgale and Vidzeme) and Latvian planning region; 2) each city represents one of geobotanical regions; 3) the cities are related and comparable by area, population and green structure (Figure 1).

Fig. 1. Location of the selected four cities on a map of Latvia. Created by M. Veinberga.

Four popular green spaces were chosen in the four selected cities (most visited, includes a daily route for inhabitants, located in a densely populated city district). All selected green spaces were created in the Soviet era and now have a need for an improvement. Considering that, this is the stage where there is potential to choose the best future scenario for the selected green spaces – conventional artificial landscape or natural and wild park. Currently in Latvia, there are some new ideas appearing which relate to eco-friendly and naturalistic green space planning and management. However, there is still a strong influence from the

Fig. 2. Seven alternatives of different plantings in Jelgava. Created by M. Veinberga.

past planning of public green structure, which maintains traditional, verified design estranged from nature and characterized with wide areas of artificial and ornamental materials, geometric forms and planting which is not typical for the Latvian climate.

Methodology

In the framework of the current research, seven alternatives of different planting types were developed by using image simulations with photomontage. The image simulation method is most often used when consulting with the general public or experts on various landscape scenarios and alternatives. Photomontages are used in different forest landscape research [16; 15], the evaluation of street greenery [35], and the selection of maintenance scenarios for green spaces [19; 37; 12], rural landscapes [4] and suburban landscapes [21]. This method was used in a suburban landscape study in USA. Inhabitants of the Minneapolis metropolitan area evaluated seven landscape images in terms of five characteristics: attractiveness, care, neatness, naturalness and maintenance [21]. In this landscape assessment, the complete results can be obtained when assessing landscape preference depending on the respondent's gender, ethnicity, education and profession [16], using specific aspects related with variations of different landscape elements [4].

Within the current research, photomontages in *Adobe PhotoShop* software were applied to four photos of the most popular urban green spaces located in the central areas of the researched cities. Colour photographs that were used in the image simulation were taken on sunny days in Latvia in summer 2012.

Seven planting alternatives were developed by combining image simulations with photomontage. In all alternatives there were varied improvements to the site through varying the proportion and variety of plants. Plants suitable for the Latvian climate were used in image simulations. Alternatives were developed which ranged from a very conventional landscape with ornamental planting to a more wild and naturalistic landscape. The alternatives provide the presence of aesthetic and ecological qualities in different levels (Figure 2). There were lawn and ornamental plantings – evergreen plants and annuals in the *Alternative 1*, and overgrown park plantings, where a part of grass is replaced with wild (native) vegetation in the *Alternative 7*. One of the alternatives showed a conventional landscape as it would look without care and cultivation – unmown lawn and weeds instead of annuals in flowerbeds (*Alternative 2*). The remaining alternatives for plantings presented different levels of maintenance with focus on increasing an ecological quality of plantings.

Comparison of respondents' data and statistical data of Latvia.

Source: questionnaires of respondents and data of Central Statistical Bureau of Latvia

	Data of respondents, 2015							Total in Latvia, 2013	
Place of residence	Liepaja		Jelgava		Rezekne		Valmiera		%	
Detached house	20		25		16		14		26.0	
Part of detached house or terraced house	1		0		1		1		3.7	
Apartment in apartment house with less than 9 apartments	13		9		5		8		8.5	
Apartment in apartment house with 10 or more apartments	51		59		27		25		61.5	
Other	3		5		6		2		0.2	
Education	M	F	M	F	M	F	M	F	Male	Female
Lower than elementary education	0	0	0	0	0	0	0	0	32 545	40 095
Elementary education	2	0	0	0	0	0	0	1	163 448	169 085
High school education	10	8	11	4	7	7	9	7	193 182	229 662
Professional high school education	5	6	2	2	3	4	3	7	259 359	276 711
University or college degree	15	40	23	51	7	26	4	19	142 950	261 419
PhD degree	0	2	0	5	0	1	0	0	3166	2750

The *Alternative 1* was developed in traditional way by using annual flowers and evergreen plants that require regular care and financial resources for maintenance, and do not provide habitats for wild animals and diversity of native vegetation. However evergreen plants will be visually appealing in the autumn and winter and flowerbeds will not remain empty. The *Alternative 2* expanded on this style but left the plants unmaintained. A variety of weeds appear next to the ornamental bushes; the area loses its visual attractiveness, but starts to attract a variety of wild animals. The *Alternative 3* features mown lawn, trees and bushes. This alternative is financially advantageous because there is no need for seasonal change of plants and regular maintenance. It provides a habitat for small wild animals, but is not so colorful and attractive for people. In the *Alternative 4* a part of the lawn was replaced by grassy perennials which are not so often used in Latvia. However, grassy perennials are a cost-effective solution, they will be magnificent all year round, and such planting is widely used in North American parks and gardens. In the *Alternative 5* a large part of lawn was replaced by different grassy and colourful perennials that are already used in Latvian plantings. *Alternative 4* and *Alternative 5* provide the habitat and food for a variety of birds and small mammals. The *Alternative 6* developed as wildflower meadow with characteristic wild plant species. The *Alternative 7* represented the largest biodiversity; it was made of a combination of native bushes and trees, and plants of meadows. The *Alternative 7* was made with wild vegetation including the photos of typical local natural landscape (Perkone Channel coast in Liepāja, Pasta Island in Jelgava, natural vegetation of Rēzekne

River in Rēzekne and Gauja Valley in Valmiera). Both of the last alternatives show the largest biodiversity and the most natural area for wildlife habitat. These options can also attract unwanted animals for urban population, thereby endangering the safety of visitors of the territory (ticks, wasps). There is no need for regular mowing of the lawn like there is in other alternatives; however, the flowering period of the plants is limited.

Four different questionnaires were electronically prepared for each of the research cities by using the photomontages on photos of planting areas from selected green spaces of each city – Liepaja, Jelgava, Rēzekne and Valmiera. Residents and visitors of the four cities were chosen as respondents because they are more familiar with the current situation of the cities' green spaces and have certain opinions on the further development of those areas. Respondents were asked to evaluate seven alternatives for each planting area by using six landscape aesthetic and ecological qualities - attractiveness, naturalness, neatness, necessity of care, wilderness and safety.

Attractiveness is related with scenic beauty and harmony of landscape in observer's mind. Natural vegetation, relief, water bodies and streams, and the proportion of plants in a green space identify *Naturalness* in the urban environment. *Neatness* is related to the sense of order and indicates the care about the landscape. *Necessity of care* is connected with *Neatness* and shows how much upkeep and management activities are required to increase the visual quality of landscape. *Wilderness* describes unmanaged, visually neglected, abandoned and wild green space and it's the extreme of *Naturalness*. Whereas *Safety* is described as humans' need for well secured and comfortable activities during time

spent in public green spaces. These qualities were selected because they characterize aesthetic and ecological qualities of different type of public green spaces (conventional or ecological design).

291 completed questionnaires were received. Characteristics of the respondents are shown in the Table 1. The average age of respondents was 34 years; the overall age range of respondents was from 15 to 77 years. Most respondents belonged to age group from 25 to 35 years. Less than a half (35 %) of the respondents were men, more than a half (65 %) of the respondents were women.

Respondents were generally well educated; more than a half of the respondents noted that they have a university or college education, and less than one third of respondents have high school education or lower. Out of the total number of the completed questionnaires, 30 % of the respondents stated that their education or occupation is related to architecture, art and design, 9 % to ecology, botany, or natural sciences and 9 % related to agriculture or forestry research. The majority of respondents (82 %) noted that they visit the city public green spaces on the average at least once a week. Most respondents (56 %) live in apartments in large apartment buildings with 10 or more apartments.

All four surveys were analyzed separately, so that the respondent answers for the different cities would not overlap. Respondents' answers were evaluated based on their gender, the field of education and occupation, childhood environment and place of residence. Statistic data analysis was undertaken using mathematical statistics methods with computer programmes *SPSS 13.0* and *MS Excel 2010*.

Results and Discussion

Landscape aesthetic and ecological qualities

Respondents could evaluate seven alternatives of one green space in six landscape aesthetic and ecological qualities - *attractiveness, naturalness, neatness, necessity of care, wilderness and safety*. The results in the context of four cities varied (Figure 3). The most attractive alternative for respondents from Liepaja and Valmiera was Alternative 5 – planting of various perennials. The most attractive alternative for respondents from Jelgava was Alternative 1 with the conventional planting of evergreen plants and annuals. The most attractive alternatives for respondents from Rezekne were both Alternative 1 and 3.

The assessment of landscape aesthetic quality – *neatness* in Liepaja city showed similar results between the *Alternatives 1, 3* and *4*. However Alternative 1 with conventional planting gained more points. In Jelgava city, neatness was found more visible in *Alternative 3* comprising trees and bushes, but in Rēzekne and Valmiera neatness was

found in Alternative 1 with conventional planting. The *Alternative 1* was recognized as a model that requires more regular *care* to keep it in position shown in the photomontages in all four cities. *Alternative 1* was recognized as more demanding for *care* also in Rēzekne. According to the answers of respondents from Liepāja and Jelgava, *Alternative 3* with trees and bushes provides more *safety*. It is contrary to results obtained in other studies [2; 24; 34; 37; 12] which express that a large amount of bushes can lead to a perception of a dangerous and unsafe situation in parks, especially during the night-time. By the contrast, in Valmiera and Rēzekne *Alternative 1* was considered as safe.

In Jelgava and Valmiera, the ecological quality *naturalness* was marked in the *Alternative 6* which comprised wild flower meadow. *Alternative 7* in Liepaja city with the wild landscape also gained high value of *naturalness*. *Alternative 3* was considered the most natural landscape in Rēzekne and Liepāja. In Liepāja and Valmiera the ecological quality *wilderness* was marked by respondents in *Alternative 7* representing the natural landscape as the wild one, but in Jelgava and Rēzekne, the majority of respondents noted that *Alternative 6* with flowering meadows was a wild landscape. This can be explained by the different wild flowers used in photomontages that looked comparable to decorative not wild greenery to the respondents (such as poppy in the sixth alternative of green space in Liepaja).

Using statistical software, relative normalized means where the average is equal to zero (Z-Score) of the six landscapes aesthetic and ecological qualities were calculated. This evaluation took into consideration all the answers given by 291 respondents, regardless of their affiliation to different cities. The six qualities were evaluated in the context of the seven alternatives of planting types (Figure 4). The *Attractiveness* and *Neatness* qualities gained similar positions in five of the seven alternatives. Differences were shown in assessment of *Alternative 3 and 5*, because the fifth alternative with planting of colourful perennials is recognized as more attractive, but the third alternative with trees and bushes as neater. In the natural alternatives (6 and 7) *Safety*, *Attractiveness*, *Neatness* and *Necessity of care* modelled one group, but *Naturalness* and *Wilderness* another group.

Alternative 1 with a traditional planting style was perceived as attractive, neat, and safe, however, it has a high necessity of care. Similar situations were observed in Alternative 4 and 5 with different planting types of perennials and trees. These alternatives were perceived as very attractive, neat with necessity of care, but Alternative 4 does not need such regular care as Alternative 5 and overall it was recognized safer. Vegetation of different herbaceous plants in Alternative 1, 4 and 5
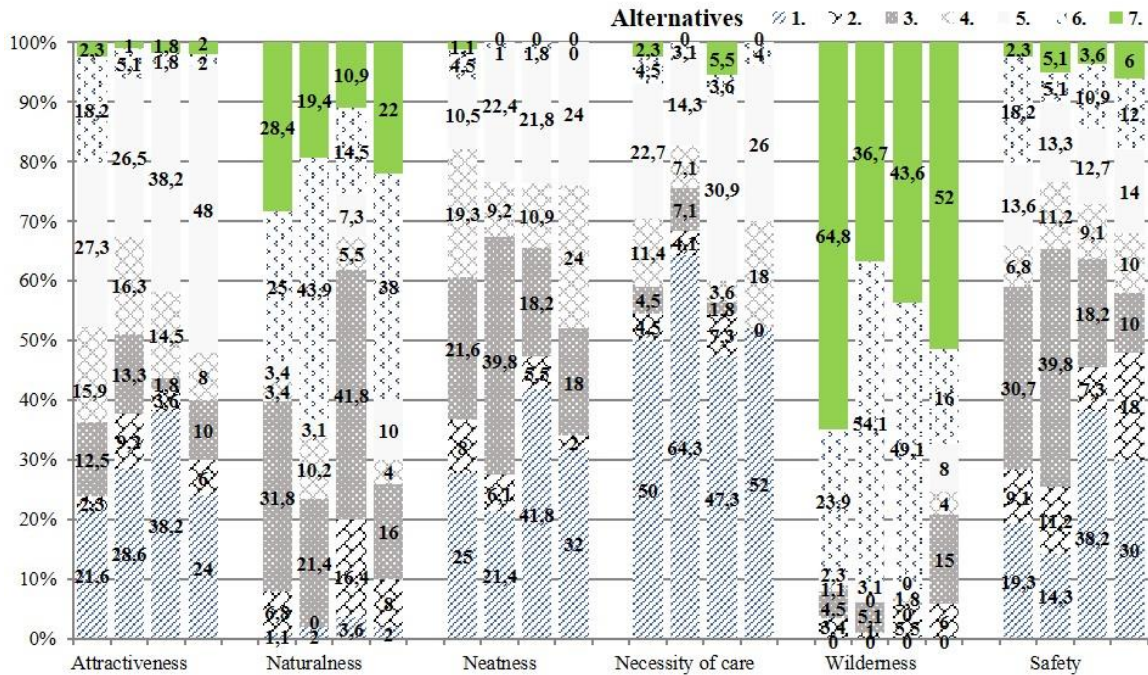
Fig. 3. Evaluation of seven alternatives of urban green spaces, %. The order of cities for each landscape quality follows: Liepaja, Jelgava, Rezekne, Valmiera. Created by M. Veinberga.
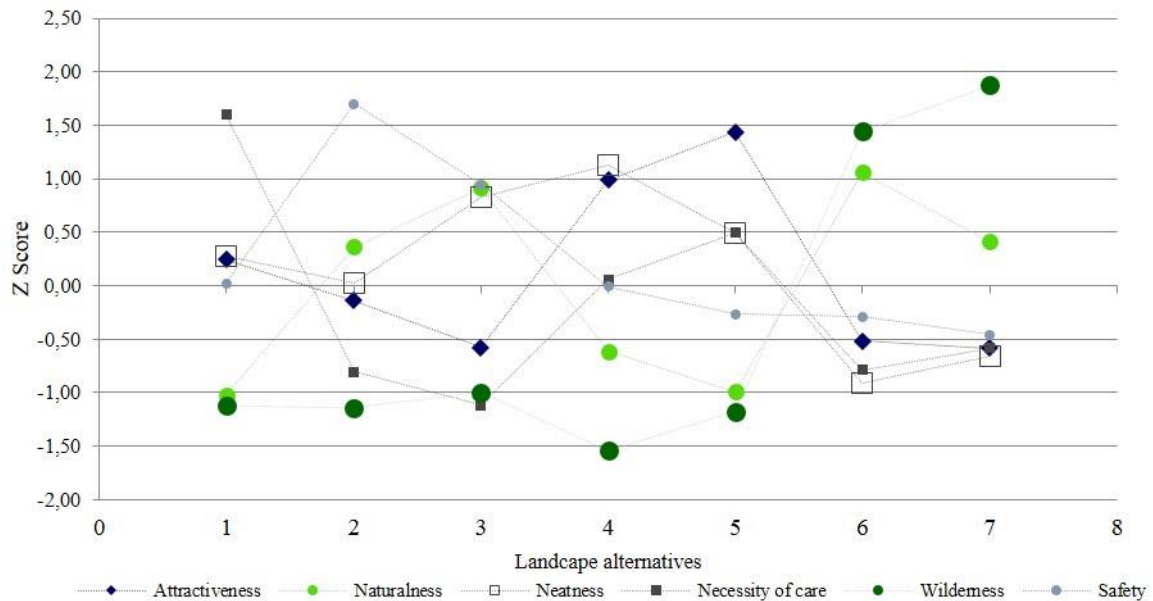
Fig. 4. Relative normalized means for landscape characteristics. Created by M. Veinberga.

were recognized as less natural than the trees and bushes in Alternative 3 and the wildflower meadow in the Alternative 6. Unmanaged planting in Alternative 2 was considered as natural, also safe, but unattractive and not neat, despite the fact that this alternative was chosen by very small number of respondents. The third alternative with planting of trees and shrubs was evaluated as neat, natural, safe, but not so attractive and demanding care more than other alternatives. The first five alternatives that are

the most common in Latvian urban green spaces, did not receive a high value of wilderness.

Landscape preference

In the comparison of alternatives mostly preferred by respondents, the overall results in all cities are very similar (Table 2). Alternative 5 with planting of trees and colourful perennials was considered to be the most attractive and pleasant alternative in three cities, however, in Liepaja the

TABLE 2

Landscape preference by responses of respondents (%)

Alternative No, type	Liepaja	Jelgava	Rezekne	Valmiera
1. Conventional planting	22.7	18.4	30.9	20
2. Conventional planting without care	0	2	0	0
3. Trees and shrubs	25	20.4	14.5	2
4. Trees and grasses	14.8	19.4	12.7	10
5. Trees and different perennials	22.7	34.7	34.5	64
6. Trees and wildflower meadow	14.8	4.1	1.8	2
7. Wild plantings typical to the region	0	1	5.5	2

Fig. 5. The most preferred planting types of respondents of Liepaja, alternatives 3, 1, 5. Created by M. Veinberga

Fig. 6. The most preferred planting types of respondents of Rezekne, alternatives 5, 1, 3. Created by M. Veinberga

most attractive was recognized as the third alternative with trees and shrubs.

Respondents from Jelgava preferred *Alternative 5* with planting of trees and different perennials most of all. Also, Alternative 3, 4 and 1 were often mentioned as the most attractive. The scores obtained by those alternatives were very close to each other, but lag behind the most pleasant alternative.

Among the respondents of Liepāja city, *Alternative 3* with planting of trees and shrubs was recognized as the most pleasant (Figure 5). This can be explained with the following high-rated *Alternative 5, 1, 6 and 4* that divided the rest of the majority of points. In the Liepaja photomontage, *Alternative 6* with poppies in the wild flower meadow was marked as most attractive as in the same alternative developed for other cities. It is highlighting that colourful local plant species in the planting areas of urban green spaces will be always seen more attractive for residents than the humblest plants, although they will be ecologically more valuable [23].

The results of the Rēzekne survey showed that respondents selected *Alternative 1* with evergreen plants and annuals as more pleasant (Figure 6). *Alternative 5* with planting of different perennials and trees also gained the greatest support among respondents. Other alternatives had a very similar distribution and lagged behind the two most commonly chosen alternatives.

Respondents of Valmiera liked *Alternative 5* with planting comprising different perennials most of all. It received more than half of the respondents' points (Figure 7). *Alternative 1* with conventional planting and *Alternative 4* with planting of grassy perennials and trees were also recognized as pleasant. Respondents of Valmiera compared to all of the other respondents did not select the planting of *Alternative 3* with trees and shrubs as often. The reason for that could be the existing situation of the researched park – the large trees and shrubs in the park make the overall image appear dark and gloomy.

The following analysis of the responses of the respondents according to their field of education, gender, level of education, the current housing type, place of residence and childhood environment was carried out. Correlation analysis indicated that

Fig. 7. The most preferred planting types of respondents of Valmiera, alternatives 5, 1, 4. Created by M. Veinberga.

TABLE 3

Correlation of landscape preference and descriptive of respondents

		Gender	Education level	Field of education	Place of residence	Location (city or country)	Childhood environment
Landscape preference	Pearson Correlation	,208**	,155**	-.015	.066	.063	.047
	Sig. (2-tailed)	.000	.008	.794	.260	.288	.423
	N	291	291	291	291	291	291

TABLE 4

Crosstab analysis of landscape preference

		1.	2.	3.	4.	5.	6.	7.
Gender	Male	27.7%	.0%	32.7%	14.9%	16.8%	5.0%	3.0%
	Female	19.5%	1.1%	9.5%	15.3%	46.3%	7.4%	1.1%
Total		22.3%	.7%	17.5%	15.1%	36.1%	6.5%	1.7%
Level of education	With higher education	18.1%	1.0%	17.6%	14.6%	37.8%	8.8%	2.1%
	Without higher education	30.6%	.0%	17.4%	16.3%	32.7%	2.0%	1.0%
Total		22.3%	.7%	17.5%	15.1%	36.1%	6.5%	1.7%
Place of residence	Detached house	26.7%	1.3%	10.7%	17.3%	40.0%	4.0%	.0%
	Part of detached house or terraced house	33.3%	.0%	.0%	33.3%	.0%	33.3%	.0%
	Apartment in apartment house with less than 9 apartments	20.0%	.0%	22.9%	25.7%	28.6%	2.9%	.0%
	Apartment in apartment house with 10or more apartments	21.0%	.6%	19.8%	11.7%	37.7%	7.4%	1.9%
	Other	18.8%	.0%	18.8%	12.5%	25.0%	12.5%	12.5%
Total		22.3%	.7%	17.5%	15.1%	36.1%	6.5%	1.7%
Location	City	22.7%	.8%	18.8%	14.8%	35.2%	5.9%	22.7%
	Country	20.0%	.0%	8.6%	17.1%	42.9%	11.4%	.0%
Total		22.3%	.7%	17.5%	15.1%	36.1%	6.5%	1.7%
Childhood environment	Centre of the city	30.8%	.0%	23.1%	3.8%	30.8%	3.8%	7.7%
	Urban environment	22.7%	1.5%	17.4%	15.9%	31.1%	10.6%	.8%
	Small town	18.2%	.0%	27.3%	18.2%	36.4%	.0%	.0%
	Rural environment	20.5%	.0%	15.6%	16.4%	42.6%	3.3%	1.6%
Total		22.3%	.7%	17.5%	15.1%	36.1%	6.5%	1.7%

respondent's answers to the question "Which of these planting alternatives you like the best?" mostly was influenced by gender and level of education of respondent (Table 3). The data correlation was not detected between the landscape preference and the field of education and childhood environment.

If the comparison of responses of respondents in the context of their gender would be discussed, it can be observed that women most often selected colourful planting (*Alternative 5* – 46 %, *Alternative 1* – 20 %, and *Alternative 6* – 7 %), while men prefer simpler planting (*Alternative 3* – 33 %, *Alternative 1* – 28 % and *Alternative 4* – 15 %) (Table 4). Also the previous studies [8; 7] regarding to the differences of colour choice between both genders, found that men choose specific colours (mostly primary colours), but the women's choice is less homogeneous; they tend to choose more secondary colours and a variety of tonal gradations.

The answers of respondents in the context of childhood environment showed that people who once lived in rural areas, most often chose *Alternative 5* (43 %), as well as the people who lived in small towns or in the suburban areas of cities (31 and 36 % respectively). In addition, they tend to choose the *Alternative 1* (23 and 18 % respectively) and *Alternative 3* (17 and 27 % respectively). People who lived in the centre of the city selected *Alternative 1* (31 %), *Alternative 5* (31 %) or a completely different *Alternative 7* (8 %), which can be explained by a lack of natural landscapes nearby. The level of education also influenced the choice of respondents because respondents with higher education preferred more unconventional greenery that is not currently so popular and visible in urban green space, but respondents with a lower level of education chose alternatives that they can see in everyday landscapes in their nearby neighbourhoods. A large dispersal was detected between respondents of different education levels within the results of the five most popular alternatives of planting style. Respondents with a lower level of education more often preferred the *Alternative 1*, which is most often seen in green spaces in the city center – 31 % of respondents without higher education as opposed to 18 % of respondents with higher education. Respondents with higher education more often noted the *Alternative 1* as more care demanding than respondents with a lower education level (61 % vs. 43 %). It was also noted for *Alternatives 5 and 6. Alternatives 1, 5 and 6* require more care, that means that the differences of assessment were dependent of respondents' knowledge [24]. In this study there were no particularly different answers detected from respondents with ecological knowledge, as it was observed in other similar studies, where respondents with an education in ecology selected more natural landscapes [23; 29; 19].

The residents of private houses frequently chose Alternatives 5 and 1 (accordingly 40 % and 27 %), while residents of apartment buildings chose *Alternatives 1, 3 and 5* (21 %, 20 % and 37 % respectively), but residents of small houses selected *Alternatives 3, 4 and 5* (23 %, 26 % and 27 %). It highlights that residents of private houses perceive green spaces as a continuation of their surroundings and, therefore, prefer the type of planting which contain plants already seen in their own gardens. Residents of private houses less often chose *Alternatives 3, 6 and 7* (11 %, 4 % and 0 %). The reason could be the experience of respondents of care for the environment and their desire for more complex and colourful, less simple planting. Similar results were shown in the studies of forest landscapes [36], where the residents of private houses were more particular to maintenance of the forest, whereas apartment house dwellers had no objection to the left behind trees and dense undergrowth of suburban forests. In other Latvian research on urban forest alternatives, people preferred intensively managed alternatives [15]. The results of this study differ from the results of the research in USA [24], where the owners of private houses chose more traditional landscape design with mown lawns and ornamental plants. Overall, the results of the study showed that, according to the previous studies [21; 16; 7; 24; 15], the choice of people was dominated by the park landscape that depicts the „savannah type" plantings with low vegetation, good accessibility and transparency.

Conclusions

Attractive landscape is related to a neat, orderly and safe landscape, as opposed to natural landscape, which is related to wild elements and human non-intervention in natural processes. However, man-made, neat and orderly landscapes are related to naturalness in people's perception because urban planting with trees, shrubs and perennials was assessed as more natural and visually attractive than the most common traditional Latvian urban planting with annuals and evergreen plants.

The study in the context of four Latvian cities did not indicate significant differences in the respondents' choice of four different urban environments. It is possible that urban green spaces in human perception do not refer to regional characteristics and specifics of the wild environment that would otherwise be seen in the studies of open countryside or forest landscape.

Landscape preference in the perception of city residents and visitors is mostly influenced by human gender, level of education, place of residence and childhood environment. Planting which utilises different flowering and grassy perennials, bushes and trees are perceived as the most attractive and pleasant alternatives by residents and visitors from researched cities. Women most often choose bright floral planting types, while men prefer simple planting types comprising trees and shrubs that do not require special care.

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Kopsavilkums. Ainavas patika cilvēka uztverē iepriekš analizēta dažādos pasaules pētījumos, kur apskatītas gan ainavas estētiskās, gan ekoloģiskās kvalitātes. Abu kvalitāšu mijiedarbība un nozīmīgums atklājas pilsētas apstādījumu teritorijās, kur mūsdienās īpaši svarīgi ir uzlabot vides ekoloģisko kvalitāti, neizslēdzot augstvērtīgu ainavas estētisko kvalitāti. Šajā pētījumā analizēti septiņi ainavas izvēles variant ar atšķirīgiem apstādījumu veidiem četrās Latvijas pilsētās. Pētījuma mērķis bija noskaidrot, Latvijas pilsētu iedzīvotāju un apmeklētāju viedokli un izpratni par pievilcīgu ainavu pilsētvidē. Apstādījumu veidi tika novērtēti balstoties uz ainavas estētiskajām un ekoloģiskajām kvalitātēm – pievilcīgumu, dabiskumu, sakoptību, nepieciešamību pēc regulāras kopšanas, savvaļu, drošību. Rezultāti norādīja, ka pastāv korelācija starp ainavas patiku un respondentu dzimumu, izglītības līmeni un dzīvesvietu. Pētījums neatklāja ainavas patikas atšķirības četru pētījumā izvēlēto pilsētu reģionālo īpatnību kontekstā. Pētījuma rezultāti var tikt izmantoti jaunu apstādījumu teritoriju plānošanā un esošu apstādījumu teritoriju atjaunošanā.

Original historical spatial development research methodology
on the example of the town of Skawina in Lesser Poland

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Abstract. The aim of this article is to present an original methodology that was prepared for the research concerning the history of spatial development of historic towns and their conservation protection. The methodology, already repeatedly verified by the Author in the course of research on the origins, urban model and restoration of selected medieval towns in Poland, is universal and so applicable also during the research carried out in towns outside Poland. In this article it will be exemplified by the studies on the spatial development of the medieval town of Skawina located in Lesser Poland. The methodology consists of five stages. The first stage of research involves the so called "desk study", which is conducted in selected archives, both in the country where the selected town is located, and abroad. The second stage involves field research in the analysed town. The research is accompanied by an inventory of the area of the chartered town, including its preserved elements such as e.g. the market square, the settlement block or the settlement plot. Photographic documentation is also collected during field research. The third stage of research uses aerial archaeology to analyse the urban layout of a given town. The fourth stage involves confronting the research results obtained at previous stages, primarily comparing archive plans and aerial photographs, as well as analysing them in order to identify changes occurring in the urban layout of the studied town. The final, fifth stage involves assessing the cultural values and the necessary methods for protecting the analysed historic town. The discussed methodology allows for drawing conclusions combined with hypotheses concerning the shape and functional-spatial structure of the examined town in the past, as well as its current values in the context of protecting the cultural landscape. The need to prepare it sprang from the current situation in historic towns which are not always properly protected, and scientific studies of their history are often insufficient. The situation and the need for better protection of historic towns has also been indicated in international documents prepared by the ICOMOS and UNESCO, such as the International Charter on the Conservation of Historic Towns of the ICOMOS from 1987, and the UNESCO Recommendation concerning the historic urban landscape from 2011.
Keywords: methodology, historic town, history of spatial development, protection, restoration

Introduction

The title methodology, which was named the historical spatial development research methodology, was prepared by the Author of this article on the basis of years-long experience and research on the history of spatial development in historic towns. The research was carried out in order to broaden and organize the knowledge, as well as to support the process of proper protection and restoration of those historic towns.

It should be noticed that in Europe, including Poland, there are still many towns extremely valuable in the cultural sense. Thus there exists the need to conduct research concerning their origins, urban structure, and urban model according to which they were founded, so that their current development does not contradict their protection and restoration, and allows for preserving their cultural landscapes for future generations. Such conduct is the basis of the current policy of the United Nations both in the context of activities of the United Nations Educational, Scientific and Cultural Organization [15], and popularising sustainable development,

which gave rise to the AGENDA for Sustainable Development 2030, approved and published in 2015 by the UN General Assembly [12]. It is worth mentioning that among the seventeen goals of sustainable development, precisely in goal 11, there are guidelines for "Increasing efforts to protect and preserve the world cultural heritage /../" [13].

The proposed methodology, which will be described further on in the article, is to aid the activities meant to safeguard the values of historic towns via multidisciplinary studies the result of which is documentation including the essential information on the city origins, its history, degree to which its urban layout has been preserved, legibility of the urban model, and guidelines concerning its protection and restoration.

The discussed methodology was prepared for the research on historic towns of medieval origin in Poland, or more precisely in Lesser Poland, but can successfully be used in research on towns and cities in other countries, since it is universal.

This article will discuss its implementation as exemplified during the research on the history of the spatial development of the medieval town of Skawina. That town offers a fascinating opportunity for research on the history of urban planning. Its origins date back to the medieval period. It was established in the 14th century as a crucial element in the defensive perimeter of Poland, created then by King Kazimierz Wielki. The town was surrounded with defensive walls and had a castle. Neither of those elements has survived until today, but the urban layout of chartered Skawina, laid out based on the 9-square model using the 'large cable' unit (a.k.a. Krakow cable), has remained practically unchanged. It should be added that the history of spatial development of Skawina during the medieval period had not been thoroughly analysed before the described research was carried out. An additional argument in favour of commencing such studies is the fact that heavy industry developed in the town since the mid-20th century, which caused its rapid growth but also blurred the unique history of this royal town in the general, not merely local, awareness.

Need for research and protection

Historic towns are important elements of a cultural landscape, as they reflect all aspects of the life of a community that created them and has dwelled in them. Therefore, they are inextricably linked to the history of civilisation i.e. the history of human life. Here it was decided to quote the two, in the Author's opinion, key international documents which address the issue of protecting historic towns and cultural urban landscape.

The first of those is the International Charter on the Conservation of Historic Towns, published by the ICOMOS in 1987, which in a way supplemented the regulations of the International Charter for the Conservation and Restoration of Monuments and Sites from 1964, known as the Venice Charter [4]. The Charter from 1987 redefined the principles, goals, methods and measures necessary "to preserve the character of historic towns, to promote the harmonious existence of individuals and communities, and aim to preserve those properties, however modest in scale, that constitute the heritage of mankind" [5]. It also recalled what is involved in protecting a historic city by referring to e.g. the UNESCO Recommendation concerning "the safeguarding of historic or traditional areas and their role in contemporary life", signed in Nairobi in 1976 [14], saying that "the protection of historic towns is understood as activities necessary to their safeguarding, conservation and restoration, as well as their harmonious development and adaptation to the needs of contemporary life" [5].

Attention was drawn to the need for consistent policy of protection of historic towns and the policy of economic and social development, and their relation to spatial, urban and regional planning, which has repeatedly been emphasized by researchers analysing the issue of protection and proper management of historic towns [1, 7, 8, 9, 10, 16].

The second, and at the same time the most relevant, international document addressing the issue of protection of historic towns is the UNESCO Recommendation on the Historic Urban Landscape, signed in Paris in 2011, which was an update of the guidelines concerning historic towns included in the aforementioned Recommendation concerning the Safeguarding and Contemporary Role of Historic Areas from 1976. The Recommendation from 2011 states that "historic urban areas are among the most abundant and most diverse manifestations of /../ cultural heritage, shaped by generations and constituting a key testimony to humankind's endeavours and aspirations through space and time". It was also observed that the so called "urban heritage is for humanity a social, cultural and economic asset defined by a historic layering of values that have been produced by successive and existing cultures and an accumulation of traditions and experiences, recognised as such in their diversity". Authors of the Recommendation stressed that nowadays "rapid and frequently uncontrolled development is transforming urban areas and their settings, which may cause /../ deterioration of urban heritage". Therefore, it is essential to "support the protection of cultural /../ heritage" e.g. by putting "emphasis on the integration of historic urban area conservation, management and planning strategies into local development processes and urban planning" [15]. The analysed document also highlights the relation between the protection of historic towns and the principles of stable and sustainable development which "provides for the preservation of existing resources and active protection of urban heritage and its sustainable management", which is a prerequisite for its future development.

In answer to the above quoted recommendations and other international documents (International Charter on the Conservation of Historic Towns – ICOMOS) emphasising the necessity of protecting, and consequently documenting historic towns, their history, tradition and tangible and intangible values, the aforementioned research methodology was prepared.

Research methodology

In response to the current situation related to the condition of the cultural landscape in historic towns and contemporary problems of their protection, the already mentioned research methodology was prepared, called the historical spatial development research methodology. It consists of five stages, each of which is based on concrete research methods described below.

The first stage involves the so called "desk study" that should be conducted in selected archives, both in the area where the analysed town is located, and abroad. The aim of the research is to obtain necessary historic materials related to the origins and the spatial development of the town, which would allow for accurate estimation of the stages of its development and the original spatial structure. Those materials include historic written and printed records, as well as iconographic and cartographic materials referring to the past of a given town.

The second stage concerns the existing condition of the cultural landscape in a selected town. It is field research involving mainly the inventory of the area of the chartered town, with regard to its preserved elements such as e.g. the market square, building development blocks, settlement plots, as well as architectonic heritage. The photographic documentation of the existing state of the town is also collected during field research.

The third stage uses aerial archaeology in order to analyse the urban layout of a town. In general, aerial archaeology involves observing the surface of the earth from the air in order to discover and document any types of settlement structures (defined and organic) within the researched area. Therefore, specialist aerial photographs of an urban layout are taken at that stage of research.

The fourth stage that uses analysing and logical construction involves confronting research results obtained during the earlier stages; mainly comparing archive plans and aerial photos, as well as analysing them to discover changes occurring in the urban layout of an analysed town and its monuments.

The final, fifth stage of research is based on synthesis and serves to identify the cultural values and indispensable actions that have to be taken to protect the analysed town. Thanks to the information acquired at the earlier stages it is possible to identify the most valuable, existing elements and properties of the cultural landscape of the town and to recommend the restoration of those parts that require it. It also allows for working out suitable directions in the town protection which will slow down its degradation without impeding its development.

All in all, it can be stated that the described methodology consisting of the above described stages that require employing specific research methods allows for drawing conclusions combined with hypotheses concerning the shape and the functional – spatial structure of the analysed towns in the past, as well as their current values in the context of protecting the cultural landscape and their contemporary development.

Results and Discussion

The above methodology was verified in the course of research on over twenty medieval towns in Poland, which does not rule out its usefulness in research in other historic towns, also those abroad.

So far, the research with the use of the discussed methodology was carried out for such medieval historic towns in Poland as: Ciężkowice, Grybów, Krościenko nad Dunajcem, Lanckorona, Muszyna, Myślenice, Nowy Targ, Piwniczna, Proszowice, Skawina, Słomniki, Tylicz (Miastko), Tymbark, Uście Solne, w Dębowiec, Jaśliska, Osiek Jasielski, Pilzno, Tyczyn and Żmigród Nowy.

The usefulness of the methodology will be presented in more detail on the example of the town of Skawina. The town is located around 20 km from Krakow, the former capital of Poland. It was founded in 1364 as a royal town [3]. Almost immediately after the town had been founded, its regular urban layout was established, the parish church and town walls were erected, and a little later – the castle [6, 11, 17]. The monarch's involvement in the rapid development and, primarily, the defensiveness of Skawina was dictated by his desire to include the town in the defensive system of Poland at the time, which was created by King Kazimierz Wielki himself. The system was based on chains of fortified towns and castles located along the state borders [11, 18]. As mentioned before, the research in Skawina resulted from the need for an extensive study of the history of the town's spatial development and assessing its cultural value because of it uncontrolled development which poses a threat to its heritage. Results of the study are critical for the restoration of the town. They also support the current conservation policy realised by the Voivodeship Monument Protection Office, and the planning policy created by the local authorities.

During the first stage of the research in Skawina, carried out according to the approved methodology, the so called "desk study" was conducted. The purpose of the study was to collect vital archive documents (written, printed, iconographic and cartographic) related to the town's history, and on their basis to determine the key stages in the development of the town, as well as the most important objects and spaces recorded in sources.

The aforementioned study was carried out in the units of the National Archive, in the archive of the

Fig. 1. Skawina on the First Military Photograph from the years 1779-1783 – "Galizien und Lodomerien - First Military Survey"). Org. [in:] Austrian State Archive, Kriegsarchiv in Vienna.

Fig. 2. Skawina on the Second Military Photograph from the years 1861-1864 – "Galicia and Bukovina - Second military survey of the Habsburg Empire". Org. [in:] Austrian State Archive, Kriegsarchiv in Vienna.
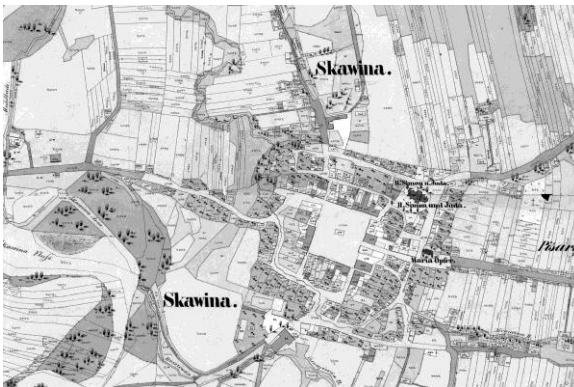

Fig. 3. Skawina on the Galician cadastral plan from 1845. Org. [in:] National Archive in Krakow, sign. 29/280/0/9.1/3457.

Fig. 4. Market square in Skawina at the beginning of the 20th c. View from the south-west towards the fragment of the northern and eastern frontage. Photo from Archive KHAUiSzP WA PK.

Voivodeship Monument Protection Office in Krakow, in the Archive of the Chair of History of Architecture, Urban Studies and Art at the Faculty of Architecture, Cracow University of Technology and the Austrian State Archive – in the Kriegsarchiv branch in Vienna. The research yielded substantial amount of material in the form of archive documents, historic maps (e.g. Austrian maps: the First Military Photograph from the years 1779–1783 – "Galizien und Lodomerien – First Military Survey"), the Second Military Photograph from the years 1861–1864 – "Galicia and Bukovina – Second Military Survey of the Habsburg Empire", and the cadaster of Galician towns from 1845), as well as archive iconography presenting old views of the town and its most valuable monuments. The above-mentioned studies allowed for initially determining the stages in the architectonic and urban-planning development of the town.

The second stage of research involved the field research carried out in Skawina, which primarily included the chartered urban layout. The inventory of the cultural heritage of Skawina carried out in this way, with the photographic documentation of the current state, allowed for stating that a considerable number of culturally valuable spaces and structures have survived within the analysed area until the present. Among the most important are: the medieval urban layout, the parish church of St. Simon and Jude with the churchyard, the filial church of the Visitation, the synagogue, the 19th-century town hall, the railway station complex, the building of the former "Sokół" Gymnastic Association, the historic tenement houses surrounding the market square, relics of wooden buildings, relics of industrial buildings from the end of the 19th and the beginning of the 20th century, as well as numerous historic roadside shrines.

During the third stage of the research the method of "aerial archeology" was used. Professional aerial photographs were taken, which allowed to carry out multifaceted analyses of the urban layout of the town. The contemporary orthophotomap clearly shows the urban structure of Skawina, formed at the time of its foundation, with the centrally located market square surrounded by settlement blocks and visible relics of their division into settlement plots.

The fourth stage involved comparing the research results obtained during the earlier stages. The archival plans (First Military Photograph from the years 1779–1783 – "Galizien und Lodomerien – First Military Survey", Second Military Photograph from the years 1861–1864 – "Galicia and Bukovina – Second military survey of the Habsburg Empire" and the Galician cadastre of the town from 1845) on which Skawina had been marked were compared with modern-day aerial photos. It allowed for identifying transformations in the urban tissue and

Fig. 5. Market square in Skawina nowadays. View of the fragment of the market square and the western frontage. Photo by D. Kuśnierz-Krupa.

Fig.6. Skawina on a contemporary aerial photo – orthophotomap. Photo by W. Gorgolewski, 2017.

Fig.7. Aerial photo of the urban layout of Skawina. View from the south. Photo by W. Gorgolewski, 2017.

its elements such as the market square, settlement blocks, the communications system or plots on which the culturally significant objects were located.

The final stage of research according to the proposed methodology involved assessing the cultural values of the town, which, as has been confirmed by the results of earlier stages, are very high. Skawina, founded around the 14th century, was given a regular, defined urban layout that has remained discernible until today and was only slightly altered in the past. The considerable extent to which the urban layout of the chartered town has been preserved, and the related communications system, also influence the legibility of the urban model according to which Skawina was founded. It was the so called 9-block model in which a rectangular market square was located in the centre of the layout, surrounded by eight single building development blocks divided into settlement plots. Relics of the original division have been preserved till today in the diagonal block, in the south-east corner of the market square.

The results of the research carried out in keeping with the approved metodology have led to the conclusion that Skawina, as a historic town, has maintained its high values until today. Those values should be under absolute conservation protection, first of all by means of inscribing the urban layout into the monument register. The historic heritage of the town and its condition ought to be constantly monitored and verified, and subsequently restored.

Conclusion

In the conclusion to this article, it should be emphasised that its aim was, on the one hand, to present the original research methodology prepared in order to protect historic towns, to document and popularise them, and on the other, to draw attention to the issue of protecting historic towns at the time of far-reaching spatial transformations related to their development. The methodology is an original combination of selected research methods such as "desk studies", field studies, "aerial archaeology" or the method of analysis and logical construction, and their suitable application at particular stages of the research. It allows for distinguishing individual stages of urban development, determining the state of preservation of the chartered town layout, legibility of the model used to lay out the town, as well as indicating measures indispensable for its protection and restoration. Research results obtained thanks to implementing the discussed methodology can be used both in the current conservation policy and the planning process. They verify the frequently outdated scientific findings and are created on the basis of knowledge obtained from archive sources, which is compared to the current state of urban structure.

The Author hopes that the methodology she has prepared will be more frequently applied both in Poland and abroad since, as has been demonstrated, it allows for pinpointing the most significant existing elements and values of the urban cultural landscape, with a recommendation for the restoration of those parts that require it. It also helps in a working out appropriate directions in its protection, thus slowing down the degradation of the cultural heritage in the town, which forms "the basis for collective identity and a factor that might enhance the sense of belonging by integrating various communities – local, national, religious and ethnic – therefore activities geared at preserving it and popularizing knowledge about it can be identified with contributing to the common good" [2].

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Kopsavilkums. Raksta mērķis ir iepazīstināt ar pētījumu metodoloģiju, kas tika sagatavota par vēsturisko pilsētu telpisko attīstību un tās saglabāšanas iespējām. Metodika, ko autors izmantojis pētot Polijas viduslaiku pilsētas, ir universāla un piemērojama arī pētījumos, kas veikti ārpus Polijas. Pētījumam ietver vēsturiskās apbūves funkcionālo teritoriju apsekošanu-tirgus laukums, baznīcas laukums utt. Fotofiksācijās tiek apkopoti arī lauka pētījumi. Izmantota arheoloģija, lai analizētu pilsētplānojumu, noņemot virsējo uzslāņojumu. Iegūto pētījumu rezultātu apstrāde un salīdzināšana ar arhīvu plāniem un aerofotogrāfijām, analizējot tos, lai noteiktu izmaiņas vēsturiskajā pilsētplānojumā. Visbeidzot, tiek ietverts novērtējums vēsturiskās pilsētas aizsardzībai. Apspriestā metodika ļauj izdarīt secinājumus kopā ar hipotēzēm par pētāmās pilsētas funkcionāli telpisko struktūru, kā arī tās pašreizējām vērtībām kultūrainavas aizsardzībā. Nepieciešamība sagatavot pētījuma metodoloģiju radās no pašreizējās situācijas vēsturiskajās Polijas pilsētās, kuras ne vienmēr ir pienācīgi aizsargātas, un apbūves vēsturiskie pētījumi bieži ir nepietiekami. Vēsturisko pilsētu aizsardzības nepieciešamība ir norādīta arī starptautiskajos dokumentos, ko sagatavojušas ICOMOS un UNESCO, piemēram, Starptautiskā harta par ICOMOS vēsturisko pilsētu saglabāšanu no 1987. gada un UNESCO ieteikumi par senajām pilsētām no 2011. gada.

The Development of the Catholic Cathedral Building-type at Bishoprics' Towns on the Baltic Sea Southern Coast during the 13th – 14th Centuries

Silvija Ozola, *Riga Technical University*

Abstract. The oldest Catholic cathedral is the five-nave Archbasilica of St. John in Lateran erected in Rome, but the Lateran Palace (Latin: Palatium Apostolicum Lateranense) was given as a present to Bishop (Latin: episcopus) of Rome for his residence (from 4th until 14th cent.). The perimeter building set up the structural complex of L-shaped layout where the Lateran Castle and the Archbasilica were included. In Western Europe largest cities were also archbishoprics' centres, in which neighbourhood Catholic church-states, or bishoprics were founded. Local conditions and relationships between the ruler and inhabitants determined the development of Christianity centres. Its main structural objects included in the fortified building complex were the Catholic cathedral which altarpiece (Latin: presbyterium) by the main altar was turned toward the east facing the rising sun, headquarters of the Canonical Chapter (German: Domkapitel) and Bishop's strong fortified residence resembled a lower tower, or a palace separated from the town, or built outside the town. In the late 12th century, bishoprics began to establish on the Baltic Sea southern coast at subjugated lands of the Balts and the Baltic Finns. At bishoprics' centres Bishops' fortified yards (German: der Bischofshof) were formed. A housing combined with a sacral structure was included in the perimeter building around the spacious court and integrated into the unified defensive system of the structural complex. In Riga, the Germans established centres of secular and spiritual power, as well as the main military economic base for the Baltics' expansion. The political and economic dualism was created. The representation of civil authority became the third alternative force. Each of centres characterized by its own structural elements. The main cult building for city inhabitants was the church of citizen's parish. Research problem: the development of the Catholic cathedral building-type in bishoprics' towns on the southern bank of the Baltic Sea during the 13th – 14th centuries has been studied insufficiently. Research topicality: the impact of cathedral building complexes on formation of medieval urban structures on the Baltic Sea south coastal lands during the 13th – 14th centuries. Research goal: analysis of the structure and layout of Catholic cathedrals in Livonia and the Prussians' lands to determine common and diverse features. Research novelty: evolution of the layout and structure of Catholic cathedrals on lands inhabited by the Baltic ethnic groups have been analysed in regional and European context. Results: study formation of the Catholic cathedrals' layout and structure on the Baltic Sea south coastal lands during the 13th – 14th centuries. Main methods: inspection of cathedrals in nature, analysis of archive documents, projects, cartographic materials.

Keywords: Bishopric centre, Bishop's residence, Catholic cathedral building-type, fortified urban structures, fortified structural complex of L-shaped plan, the State of the Teutonic Order

Introduction

In Rome, on the Palatine Hill's (Latin: *Mons Palatinus*, *Collis Palatinus*) southwest side where it slopes down towards the *Circus Maximus*, the reputed dwelling-place *Casa Romuli* of the legendary founder, the first king of Rome *Romulus* (traditional dates 771–717 BC) was situated. Probably, the term *Palatin* was derived from the name of ancient Italian deity *Pales*.

Since the 9th century, palaces began to built in the royal sense: initally, they were wooden buildings, but later – stone and brick structures. The German name *Stadtschloss* marks the impressive residence of majesty, but terms *Palast* and *Schloss* used for a great first class secular building often overlaps. In languages of many nations the word *Palast* became excellent housing's (Latin: *palatium* – "palace") synonymous and also was involved with diningrooms (German: *Speisesaal*). In cloisters, the space associated with *palatium* was emphasized.

The term "palace" (German: *der Palast*, Spanish: *palacio*, Italian: *palazzo*, Franch: *palais*, Polish: *pałac*, Dutch: *paleis*, Catalan: *palau*, Swedish: *palats*) marks a representative medieval building, or a fortified housing in the town, but the term "castle" in German (*Begriffe Schloss* and *Palast*) and other languages is used differently: the word *Palas* makes out the castle's housing block, but the word *Pfalz* means the royal, or imperial palace. The word *Pfalzgrafen*, also *Paladin* is applied for a short-term inhabited building used for meetings, guests' welcome and service.

In Riga, Bishop's residence was a lower tower for habitation performed protection functions, or an adjacent structure, called *palas*, into the perimeter building of Riga Bishop's first yard. A building site for a new fortified-complex of Riga Bishop's second yard was chosen next to local people's settlement.
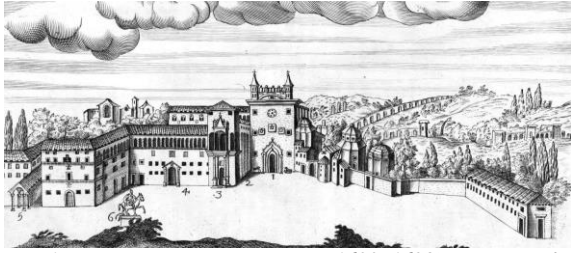
Fig. 1. Giovanni Giustino Ciampini (1633–1698). Drawing of a medieval fortified L-shape structural complex included of the Lateran Palace and the Lateran basilica: 1 – Lateran Basilica, 2 – Council Hall, 3 – Balcony of Boniface VIII, 4 – Lateran Palace, 5 – Holy Stairs, 6 – Statue of Marcus Aurelius. 1693. [online 13.01.2018, https://upload.wikimedia.org/ wikipedia/commons/0/00/De_sacris_aedificiis_a_Costantino_ Magno_constructis_synopsis_historica_pag._17_Tab._V.jpg
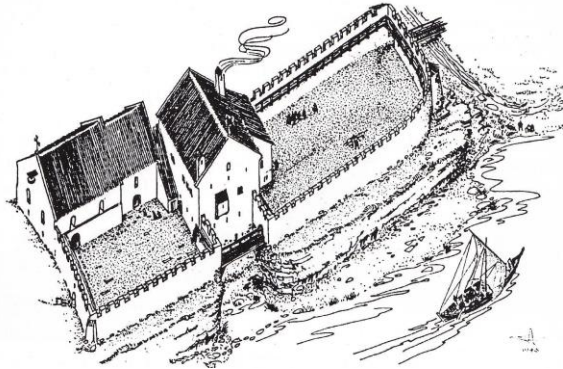

Fig. 2. Architect Gunārs Alfrēds Jansons (1928–2013). Building complex of Üxküll Church (1184) and Castle (1185) in the 13th century. 1993. [18, 40].
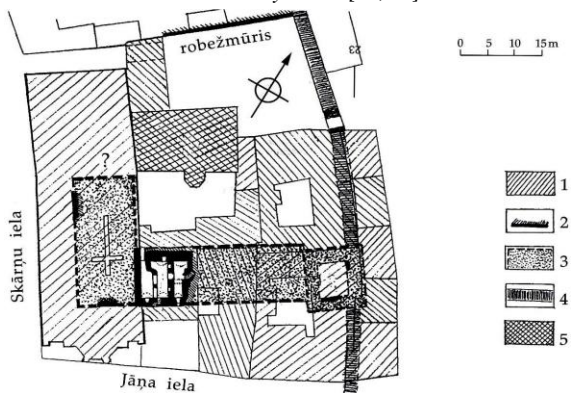

Fig. 3. Archaeologist, Dr. habil. hist., Professor Andris Caune. Reconstruction of Riga Bishop's first yard (1201–1234) planning: 1 – current buildings, 2 – identified Bishop's residence wall fragments, 3 – reconstructed layout of Bishop's residence buildings, 4 – defence wall of Riga, 5 – building in whose cellar excavations carried out in 1992. 1999 [10, 225].

Fig. 4. Panorama of Dorpat. 1553 skat. 13.02.2019 [https://upload.wikimedia.org/wikipedia/commons/2/27/Tartu_ 1553.jpg]

Two urban structures related to the Riga Cathedral (Latvian: *Rīgas Doms*) which became the Riga Archiepiscopatus's (Latin: *archiepiscopatus provincia Rigensis*; 1255–1562) main building formed the most important Christianity centre in Livonia and mutual correlation between the Canonical Chapter and Bishop's residence. In Dorpat (Estonian: *Tartu*, Latin: *Tarbatum*, Russian: *Дерпт*, *Юрьев* since 1893), Haapsalu, Marienwerder (Polish: *Kwidzyn*), Frauenburg (Polish: *Frombork*) and other fortified Christianity centres, building could have been placed along the perimeter of Bishop's yard. The planning and structure of fortified dwellings of priests and secular representatives were different. The chatolic cathedral building-type evolved under the influence of local conditions.

Previous researches on cathedrals and sacral buildings of Bishoprics' centers in Livonia: the book "*Tartu Toome Hill*" (1968) by historian Aili Suur (1933–2002) was published in three languages, but the issue "*Tartu toomhärrad 1224–1558*" (1998) by Tõnis Lukas was dedicated to the Dorpat Cathedral. Description about Haapsalu Bishop's Castle and fortification plans by the Castle Cathedral are included in the book by Estonian art scientist Professor Dr. phil. Armin Tuulse (1907–1977) "*Die Burgen in Estland und Lettland*" [52]. *Ülla Paras published the book (2003) about* Haapsalu Bishop's Castle Cathedral – the largest single-nave building in the Nordic and Baltic countries. Historian of churches Karl Ludwig Tetsch (1708–1771) wrote the history of Courland churches "Kurländische Kirchen Geschichte" (1767–1770) [50] where five churches have been mentioned in Hasenpoth (Asenputten, Hasenputten, Latvian: Aizpute) [55, 44] – each of them had a specific function. Information about St. John's the Evangelist Church [55, 49] served needs of the Courland Canonical Chapter (German: Domkapitel), historian of churches, Priest Johann August Theodor Kallmeyer (1809–1859) included in the book "Beiträge zur Geschichte der Kirchen und Prediger Kurlands" dedicated to Lutheran churches and parishs, and survey "Die evangelischen Kirchen und Prediger Kurlands" (1890) [24]. Thanks to young merchant Theodor Tide (Latvian: Teodors Tide) who came from Goldingen (Latvian: Kuldīga) to Hasenpoth where at the current 9 Atmodas Street opened a shop of photo supplies, became the only person of Hasenpoth – publisher of typographically multiplied postcards, nowadays we can look into the past and see St. John the Evangelist Church in the late 19th century. The oldest post stamps on Hasenpoth postcards are from 1899. M. Jakobson and S. Freidlin from Libau (now Liepāja) also published postcards with sights of Hasenpoth by World War I. Postcards with sights of Aizpute after
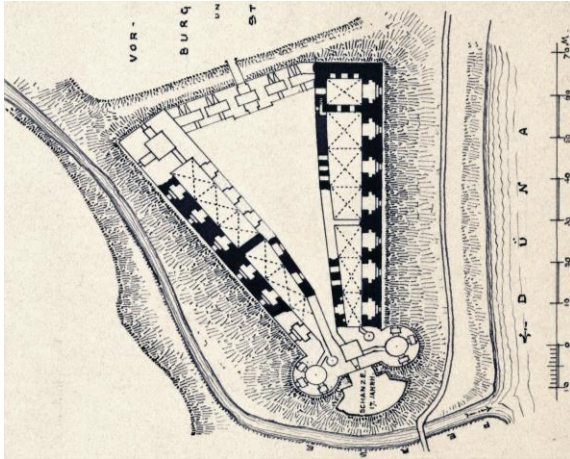
Fig. 5. The triangular layout of Castrum Kukonois created by two volumes placed in a narrow angle [Academic Library of the University of Latvia, Library of Misins].

Fig. 6. The ruined Haapsalu Cathedral. 1782 [Academic Library of the University of Latvia, Library of Misins].
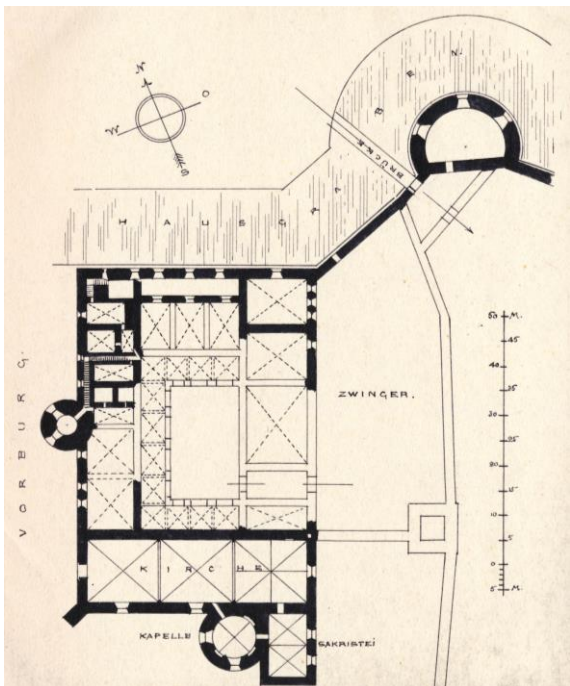

Fig. 7. Reconstruction of the Haapsalu Castle plan: 1 – church, 2 – refectory (dining-room), 3 – kitchen, 4 – dormitory (bedroom), 5 – gallery, 6 – residential rooms, 7 – church sacristy, 8 – new sacristy, 9 – tower, 10 – a special room for Christening, 11 –tower for observation. [Academic Library of the University of Latvia, Library of Misins,] [online 19.06.2017, http://kirikud.muinas.ee/?page=2&subpage=212&id=213&pilt=947]

World War I were issued by Fredrich Rosenstein's bookshop in Aizpute, but photographer's name is not known. Possibly, it was Katrīna Celmiņa owned a photo workshop at the current 16 Kalvenes Street during the 1920s and in the early 1930s. At the current 12 Atmodas Street, but later 18 Atmodas Street, Kārlis Ernstsons, but most of all, the person from Riga Krišjānis Vīburs (Fotobrom) has taken sights of Aizpute during the 1930s [44, *2*]. Old photos of St. John the Evangelist Church in Aizpute can be seen in the edition "*Latvijas evaņģēliskas luteriskas baznīcas. Mārtiņa Lutera Mazā katķisma un Augsburgas ticības apliecības 400 gadu atcerei*" ("Evangelical Lutheran Churches of Latvia. Certificates of Martin Luther's Small Catechism and Augsburg Confession for 400 Years of Remembrance"; 1929/1930) issued during the Latvia Republic period by the Church Central Administration [27]. The history of Aizpute and its churches was published in the edition "*Latvijas pilsētas valsts 20 gados*" ("Cities of Latvia during 20 Years of the State"; 1938) dedicated to Latvia anniversary [29, *328–329*]. Architect Rita Zandberga (1929–1993) wrote "*Aizputes arhitektoniski pilsētbūvnieciskās struktūras attīstības vēsture*" ("History of Aizpute Urban Structure Development"; 1980) [56], but architect Irēna Bākule (1945–2013) carried out research of Aizpute in nature (1990) [2] and prepared the regeneration proposal (1990, 2006) [3]. To create a culture-historical skech on this city the first post-war teacher at Aizpute, researcher of local history, folklore specialist, publicist Mirdza Birzniece (b. 1926) published the essay of Aizpute urban history in the edition "*Aizpute. Ceļvedis pa pilsētu un tās apkārtni*" ("Aizpute. Guidebook along the Town and its Neighbourhood"; 1996) [6, *17*] and in the booklet "*Aizpute*" (2004) [5, *75–77, 180*] where is a small description of St. John the Evangelist Church. However, architecture has not been analysed. The professional achievement of Ambassador Extraordinary and Plenipotentiary of Latvia in Israel Ivars Silārs (b. 1938) and engineer, photographer Varis Sants (b. 1964) jointly created the album "*Aizpute. Pagātne un tagadne*" ("Aizpute. The Past and Present*"*; 2014) with the sights of churches before World War II and in the 21st century [44, *28–31*].

In the book "*Latvijas mākslas vēsture*" ("History of Latvian Art"; 2004) [8] Dr. art. Laila Bremša, Dr. art. Aija Braslina, Mg. art. Dainis Bruģis, Dr. art. Stella Pelše, Mg. art. Inta Pujāte provided a survey of sacral architecture and art in Latvia. Historian, inspector of culture monuments to be protected Vitolds Mašnovskis (b. 1942) describes cultural and art values of St. John's Church in Aizpute [31, *28–32*], as well as churches of *Gross-Roop* (Latvian: *Liel-Straupe*) and *Ronneburg* (Latvian: *Rauna*). Architect Agrita Tipāne in doctoral thesis "*Kurzemes un Zemgales dievnamu*
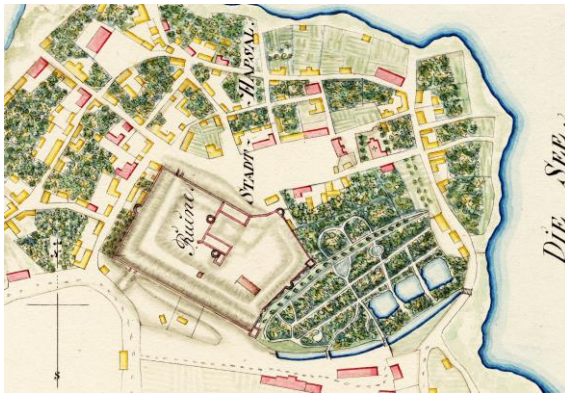
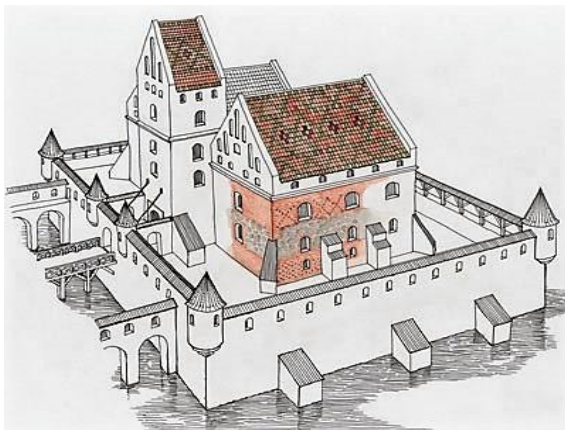*Fig. 8. Igaunijas guberņas revidents Carl Faehlmann. Plan of the double-block Haapsalu Castle [30, 267].*

Fig. 9. Architect Bronius Kruminis (1928–2000).
Reconstruction project of the double-block Trakai Island Castle (not realized). 1962 [Atstatomi Trakų pilies centriniai rūmai. Courtesy Vilnius County Archives. F2 50-14/384, 1. fol. 4; Baliulis A., Mikulionis S., Miškinis S. (1991) Trakų miestas ir pilys [The city and castles of Trakai]. Vilnius: Mokslas, pp. 251, fig. 176; online 19.02.2019, http://www.lietuvospilys.lt/images/2002-liublin-fig-1.jpg].
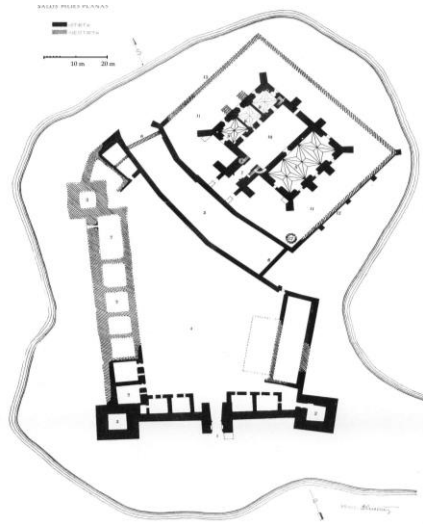
Fig. 10. Dr. Gintautas Rackevičius, drawing by V. Abramauskas. A sketch project of Vytautas residence in the Trakai Island Castle at the beginning of the 15th century. Plan of the double-block Trakai Island Castle.

[Vytauto Didžiojo kultūros muziejaus metraštis. Kaunas, 1941, t. 1, lent. XIV; online 16.02.2019, http://old.aruodai.lt/upload/20061223203915traku011.jpg].

arhitektūra" ("Architecture of Churches in Courland and Semigallia"; 2009, scientific advisor Dr. hab. arch., Professor Jānis Krastiņš) described St. John's Church in Aizpute very imprecisely and carelessly: "The castle church was situated in the south-west corner of the castle" [51, *105*]. Archaeologist, Dr. hab. hist., Professor Andris Caune (b. 1937) and Dr. hist. Ieva Ose in the encyclopaedia "*Latvijas viduslaiku mūra baznīcas. 12. gs. beigas – 16. gs. sākums*" ("Medieval Stone Churches of Latvia. The late 12th century – the early 16th century") analyse St. John's Church in Aizpute in a great detail. Mg. arch. Silvija Ozola in the publication "Sacral Building in Towns of the Bishopric of Courland" (2015) [39] emphasizes that two kinds of medieval urban structures can be distinguished in the Bishopric centre, depending on Bishop and Courland Canonical Chapter's activity. Specialist of the Archeology and History Department of the State Inspection for Heritage Protection, historian, Edgars Plētiens has studied the *Gross-Roop* Castle and the town of *Roop* (Latvian: *Straupe*) [41] which German name *Roop* is the Brasla River name originated from of the Livs language word *Ropa*, or *Raupe*, as well as published his study on small towns in Livonia [40].

Previous researches on the cathedrals' building-type development in lands of the Prussians: builder of Danzig City (Polish: *Gdańsk*) Bartel Ranisch (also *Bartłomiej*; 1648–1701) in the work "*Beschreibung aller Kirchen-Gebäude der Stadt Dantzig*" (1695) [43] has studied architecture of churches in Danzig. Architect from Prussia Conrad Steinbrecht (1849–1923) dedicated the "*Die Baukunst des Deutschen Ritterordens in Preußen*" (1885) [46] to building art in Prussia. Carl Wünsch analysed the East Prussian landscape, history, buildings, also the Königsberg Cathedral, and artworks in his book "*Ostpreussen*" (1960) [55]. Bishop Jan Wladyslaw Obląk in the publication "*Katedra w Fromborku*" (1969) [36] characterized the Frombok Cathedral, but Teresa Mroczko analysed Gothic architecture of Kulma land in the article "*Architektura gotycka na ziemi chełmińskiej*" (1980) [34]. Art historian, Professor Dr. hab. Christofer Herrmann (b. 1962) has specialized in the research of medieval architecture in the Prussian lands and dedicated the edition "*Mittelalterliche Architektur im Preussenland: Untersuchungen zur Frage der Kunstlandschaft und -geographie*" (2007) [17] to the history and architecture of castles and abbey churches. Teresa Czerniewicz-Umer, Jerzy Majewski and Małgorzata Omilanowska included the overview of Polish urban architecture and history and the information on cathedrals in Prussian lands in the book "Eyewitness travel Poland" (2012) [13]. Art historian Dr. Liliana

Kranz-Domasłowska (b. 1954) in the publication "Double cities in the Teutonic State on the example of Toruń" (2013) [26] analysed cathedrals' planning and structure of Prussian double cities in the 13th century. She dedicated to the Marienwerder Cathedrale editions (Liliana Krantz-Domasłowska (1999) *Katedra w Kwidzynie*. Toruń: Wydawnictwo UMK; Liliana Krantz-Domasłowska, Jerzy Domasłowski (1982) *Katedra i zamek w Kwidzynie*. Warszawa-Poznań-Toruń: Państwowe Wydawnictwo Naukowe).

The main subject of the paper: development of catholic cathedral building-type in bishoprics' towns on the Baltic Sea southern coast during the 13th – 14th centuries. Research problem: on lands of the southern coast of the Baltic Sea, subjugated by the Holy Roman Emperor, initially, churches were included in the perimeter building of bishoprics' centres in the same way as the Archbasilica of St. John the Baptist Cathedral in Lateran. The status of churches increased, and they obtained the name cathedral, that still does not change the typology of the building. Later, in structural complexes of bishoprics' centers the Catholic cathedral building-type developed. The impact of cathedral building complexes on the origins of Livonian and Prussian urban environment and building formation has been studied insufficiently. Self-isolation within the framework of one branch promotes assumption of inaccuracies and mistakes in the research of cult buildings by Latvian historians, art scientists, architects. Research novelty: analysis of the 13th – 14th centuries planning and spatial structure of cathedrals in bishoprics' centers on Livonia and the Prussians' lands are carry out in the regional and European context. Goal of the research: analysis of Catholic cathedrals' historical planning and construction in bishoprics' urban centres of territorial structures on Livonia and the Prussians' lands subjugated by the Riga Archbishopric to define common and different characteristics and to determine the significance of cathedrals as architectural dominances in spatial composition of towns. Main methods applied: analysis of archive documents, projects of urban planning, cartographic and graphic materials, photofixations, studies of published literature and inspection of cathedrals in nature and its impact on the urban environment.

The perimeter building of courtyards in the Baltics' oldest bishopric centers

In Europe during the 11th – 12th centuries, most of inhabitants were the Christians. The Holy Roman Empire started by the mid- 12th century to spread Christianity at the Balts' and the Baltic Finns' lands on the southern coast of the Baltic Sea. Churches, monasteries, cities were founded for colonization, and Christianity centres were made. The Germans arriving in the foreign land of the Lower Daugava met the Livs not united in a common state.

Priest Meinhart (Latin: *Meynardus, Meinnardus*, middle upper German: *Meynhart*; around 1130/1140–1196) from Segeberg Augustinian Abbey also took part in preaching the Christian faith on the Lower Daugava. In the solitary *Üxküll* Village (Latvian: *Ikšķile*, Liiv: *ikš (ükš)* + *kila* or one + village) populated by the Livs since the 11th century a small St. Mary's Church (1184) by a square planning hall for praying and choir was built on a dolomite rock of the Daugava River right bank. The building's façade faced the village. During archaeological researches (1967–1973), archaeologist, Dr. habil. hist., Professor Ēvalds Mugurēvičs (b. 1931) discovered that the first church next to *Üxküll* Bishop's residence was a wooden building on foundations of loaded stones [48, *341*]. In summer of 1185, close to the church's eastern façade an almost square planning two-room building – *palatium* was erected [4, *16–17*]. A separate yard for every building was made by a protective wall created into an unified defensive system a fortified structural complex of the L-shaped plan [11, *214*] equally like the Archbasilica of St. John the Baptist Cathedral in Lateran on the Caelian Hill. The Archbasilica connected with the Council Hall was perpendicular tightly attached to the Lateran Palace (Fig. 1). *Üxküll* Bishop's residence included in the L-shaped perimeter building had a yard facing the Daugava waterway and creating a cover (Fig. 2). Archaeologist, Dr. habil. hist., Professor Jānis Graudonis (1913–2005) found (1972) that the church included in the defensive wall was part of Bishop's structural complex. Cistercian monk Theodericus of Buxthoeven (also *Thidericus*; around 1150–1219) – half-sister's son of the Livonian Crusades organizer Archbishop of Bremen Hartwig II of Uthlede, arrived from *Bexhövede* Village. The *Üxküll* Bishopric (Latin: *Episcopatus Ixcolanensis*; 1186–1201) was founded under the subjugation of the Bremen Archbishopric. On 1 October 1188, Meinhart became Bishop of *Üxküll*, but St. Mary's Church gave the status of *Üxküll* Bishop's Cathedral. Priests came to *Üxküll* Village and created the Canonical Chapter approved by the *Regula Sancti Augustini*.

At the Livs' village *Holme* (English: Island, Latvian: *Sala*) opposite the Dole upper end Meinhart and Theodericus chose a place for the other centre where Priest Daniel built wooden St. Martin's Church for the parish. At the Lower Daugava vicinity the Germans under the guidance of stonemason from Gotland built in the late 12th century the first stone buildings for warehouses and merchants' settlement. *Castrum Kirchholm* (1186–1187) was erected. In the 13th century, *Holme* began to call as *Kirchholm* (Church-island), or *Alt-Kirchholm* (Old Church-island). Pope confirmed several castles

in Archbishop's of Riga ownership, and since 1255, *Kirchholm* fortifications appeared a new name – *castrum Kercholme* [12, *442*]. *Kirchholm* since the 17th century began to call as Martin's Island (Latvian: *Mārtiņsala*). In the *Üxküll* Bishopric two building complexes were made as separate urban structures – Bishop's yard in *Üxküll* Village included an architecturally simple St. Mary's Cathedral made of stone, but on the Church-island the Canonical Chapter's yard included wooden St. Martin's Church built for the parish.

On 28 March 1199, Pope (1198–1216) Innocentius III consecrated Theodericus's brother Albrecht of Buxthoeven (1165–1229) as the third Bishop of *Üxküll*. In the bull on 5 October 1199, he invited the Christians of Saxony and Westphalia to fight against the pagan Livs. Already in the following year, 23 ships arrived in the Lower Daugava. On ships, there were Bishop Albrecht and knights who after severe battles captured the Livs' leader. In a falsehood way they managed that on the right bank of the Daugava a place (*locum*) for the German settlement next to the Livs' village was allocated. Natural obstacles – waters and marshy surroundings determined its formation on gently sloping peninsula between the Daugava and the Rīdziņa River. However, the port in the Lower Rīdziņa extension at the local inhabitants' village had crucial significance. Innocentius III supported Theodericus's proposal of April 1200 to preach Christian faith in the Livs' land (Latvian: *Līvzeme*) and forbid merchants to visit the Semigallian Port. Riga at the beginning of two waterways near estuaries of the Daugava and the Lielupe River obtained the monopoly rights significant for trade.

In the northeast of the Germans' settlement on the Rīdziņa's coast the third strong fortified *domus episcopi* (bishop's yard, curia, castle) on the Livs' land in 1201 was built [16, *369*]. The Riga Bishopric (*diecese Rigensi, Rigensi ecclesia*; 1201–1255) was founded, and Albrecht (Latin: *Adalbertus Canonicus Rigensis*) became Bishop of Riga [11, *248*]. His brother, Dean of Convent (1202–1209) Engelbert of Buxthoeven from *Neumünster* Augustinian Abbey (1127) managed the Canonical Chapter. The first Riga Bishop's yard (1201–1215) separated from the town by cult building included into the unified defensive system was created. Initially, it seems the perimeter building consisted of two freestanding houses – a big residential (?) tower and cult building which side façade faced the town. The first Riga Bishop's St. Mary Cathedral (*ecclesia beate Marie*) in 1206 was mentioned. Later, Bishop's palace (Latin: *palacium nostrum lapideum*), probably, destroyed by big fire on 4 March 1215, joined both buildings [12, *392*]. The Canonical Chapter's house situated in one building, or in its appendage (*monasterium*) [9, *248*]. On Kalēju Street side,

a vacant square to Riga City's defensive wall was reserved. A fortified building complex of the L-shaped plan was built for the most important Christianity center in Livonia (Fig. 3).

In 1202, the Semigallians attacked *Üxküll* Village. The Germans left the Church-island, moved a market to the peninsula at the Rīdziņa Port and took over its lower. Implementing territorial and administrative changes, in new-founded administrative centres the presence of military forces – monks-knights was planned. Regulations defined knights' duties and lifestyle in the monastery. Bishop of Riga Albrecht along with Theodericus, using acquaintance in the Bremen Archbishopric, in 1202 founded Knights Brotherhood of Christ in Livonia (German: *Schwertbrüder*, Latin: *Fratres militiæ Christi Livoniae*; 1202–1237), or the Livonian Brothers of the Sword in order to involve monk-knights in military expeditions. During the fourth Crusade (1202–1204), the first Master of the Livonian Brothers of the Sword (1202–1209) Winno of Rohrbach (Latin: *Vinnenus*, *Wenno*, *Wynno*) next to Riga Bishop's yard built *domus Wittenstein* of dolomite, or St. Georgi (*sente Uriân*; 1204, destroyed in 1297) mentioned in the Livonian Chronicle of Henry (Latin: *Heinrici Cronicon Lyvoniae*). In the yard's south part, the cult building (*domus*, *capella*, *eclesia fr. milice*), or St. Georgi Church was erected between 1204 and 1209. In the chronicle this church is mentioned three times without indicating the precise place [9, *234*]. The Riga Bishopric center contained two proximal urban structures – the yard of the Livonian Brothers of the Sword and the first Riga Bishop's yard separated by a wall in the east part. On the west side the perimeter building complex of L-shaped plan was deached by the wall of *domus Wittenstein*. On the northeast side the spacious St. George's yard located. Riga City's defensive wall was erected on the north side. The first Bishop's yard was included into the unified defensive system of Riga. It is possible, that initially both yards were separated only by the common boundary-wall [11, *296*].

The first Riga Bishop's Cathedral burned down on 4 March 1215, when at night fire began in the city. "The city's first part burned, that is, built first and encircled by the first wall, from the Church of St. Mary burned along with big bells to Bishop's appartament house with proximal houses and to Knights Brotherhood's Church" (Latvian: "*Dega pilsētas pirmā daļa, tas ir, vispirms uzceltā, ko apņēma pirmais mūris, no Svētās Marijas baznīcas , kas nodega kopā ar lielajiem zvaniem, līdz bīskapa mājai ar blakus esošajām mājām un līdz ordeņa brāļu baznīcai*"; 16, XVIII-6). "The Convent dwelled in the church built within the first city. After this church and city burning, they began to

build the Church of St. Mary outside the city wall near the Daugava and live there." According to the text by the Livonian Chronicle of Henry, historians concluded that there have been two cathedrales – one in the oldest part of the town and the other one later – on the coast of the Daugava where the second Riga Cathedral located nowadays [9, *235*]. During archaeological surveillance (1988–1989) in Jāņa Street 6 – 18, under the basement floors of existing houses not only found remnants of older stone houses, but also some testimony of a former wooden building.

Instead the first Bishop's yard in 1235 obtained by Dominicans a monastery was made, but instead the ruined cult building which was very important for the city founded in 1201 St. John's Church was built. It for the first time was mentioned in 1297 [25]. It could be the early dating of this building. The church was extended around 1330 [45, *98*]. On the basement under the altarpiece of St. John's Church, can be seen fragments of walls made of roughly trimmed big dolomite blocks which layout does not correspond to the plan of St. John's Church. Masonry pattern with brick and stone insertion and cohesive substance enable us to recognise stone origin of Riga [45, *99*]. At the side of Skārņu Street, close to a short choir part of St. John's Church a spacious hall-type congregation's room was made of red bricks. A steep red-tiled ridged roof covered the church decorated by a small shed (roof) [45, *100*]. Strict urban building regulations determined the church's north-south orientation. In the façade along Skārņu Street, one can notice a breach. Builders made smooth and emotionally reluctant external walls complied with aesthetic impressions about monastery church's simple architecture and coincided with ideological principles expressed by Dominicans – avoid external luxury [45, *101*]. In the article "*Svētā Jāņa Evaņģēliski luteriskā baznīca*" ("St. John the Evangelical Lutheran Church"; 2007) [45, *99*] art scientist Dr. hab. art., Professor Ojārs Spārītis describes the plan of St. John's Church created in the place of the first Bishop's yard where formely located the first cult building erected by Bishop of Riga.

In summer of 1205, the Germans continued to subject the Daugava waterway. Bishop's of Riga vassal Daniel already in 1201 had feud – Dievukalns (Goods' Hill) on the right bank. In 1205, the Livs' ancient town burnt down, and next year Daniel at the Lower Rumbiņa began to build *Alt-Lennewarden* (also *Lenneworde*, *Lenewarde*, *Lenewarte*) fortress. On hill's plateau northern edge a defensive wall made of dolomite was installed [37, *74*]. The tall building of residence by a closed inner courtyard and a tower of quadrangular layout situated at the end of the cape, and a castle-front in the west of it. Defensive walls covered the large yard [12, *291–295*].

At the end of 1207, Bishop of Riga Albrecht along with the Livonian Brothers of the Sword divided the land of *Thoreida* (Latvian: *Turaida*): on the right bank of the Gauja River, Bishop founded the Bishopric of Livonia (Latin: *Episcopatus Livoniensis*, 1207–1255). In summer of 1211, influential church leader, the founder of town-shield Lippstadt Bernhard of Lippe (also Bernard II, or Lord of Lippe) from a noble family arrived with a large crusader troops in Livonia. On the Estonians' land Ridala (Estonian: *Ridala*, Latin: *Rotalia*), the Leal Bishopric (Latin: *Episcopatus Lealensis*), or the Bishopric of Estonia (Latin: *Episcopatus Estiensis vai episcopatus de Hestia*; 1211–1224), was founded. Immediately after Theodericus was ordained as Bishop of Leal, his brother Albrecht, who was the de facto head of the Germans armed expansion in the Baltic lands, appointed Bernhard as Abbot (1211–1217) of the Cistercian monastery in Dunamünde (Latvian: *Daugavgrīva*) located at the mouth of the Daugava. Bernhard led the forces of *Thoreida's* defenders against the invasion of the well-organized the Estonians' troops and ordered to block Estonian ships' movement through the wooden log dam across the Gauja. The Estonians' attack on water was repelled and the episcopal administration retained its authority over these territories. In 1212, Bernhard took part in the siege of Satesele Castle and restored peace with the Livs. There was a major uprising of the Baltic peoples against the hegemony of German colonists and feudal lords. The Livs initiated the Autin uprising later joined by the Autins' Latgals. Under the command of Bernhard the army participated in the massacre of wooden castle's defenders. As a result, the peace treaty with the Livs was extended. Fortifications of Fredeland (1214) on the Livs' hillfort by steep hillsides were built. Defensive wall surrounded hillfort's plateau by a perimeter formed the fortified complex of an extended layout. On the courtyard's west side, Bishop's fortified residence (1214), or *palatium*, was included in the wall's trace. The main entrance was in the north of courtyard. The complex of the second largest Christians' center outside Riga in 1239 was mentioned by the name of *Thoreida*. Typically building of medieval castles in countries under German influence was a tall flighting-tower Bergfried which was not designed for permanent habitation. However, this was the characteristic difference between the freestanding Bergfried – a tall slender tower with little internal room, few vaults and windows and the freestanding central tower-castle Dungeon (French: *donjon* Latin: *dominionus*; Russian: *донжон*) located in the most protectable and hardest accessible place of the fortified area. Living quarters of the castle and the Bergfried separated by an adjacent building *palatium* combined functions of habitation and

defence. In Bishop's yard of *Thoreida*, a cylindrical Bergfrid was built, but later a small south front-castle was created. The complex of *Thoreida* was studied by Professor Jānis Graudonis [14, *59–111*] and Honorary Doctor of the Latvian Academy of Sciences, architect Gunārs Alfrēds Jansons (1928–2013) [19; 20 *112–146*]. The Brothers of the Sword got the lands on the left bank of the Gauja which became a borderline.

Bishop of Riga Albrecht in 1215 began to build the second Bishop's yard (1215–1234) surrounded by a defensive wall and separated from Riga Canonical Chapter's building complex included the Riga Cathedral and the monastery. It is possible, that defensive walls of the Canonical Chapter's yard and Bishop's yard alongside the Daugava were built simultaneously with Riga enlargement. In Riga defensive wall's track the side-wall of a long-extended residence by two towers, or *palatium*, and the Chapel of Apostle Bartolomey was included. The second Riga Bishop's yard perimeter building complex of L-shaped plan by probably had stone houses – horse stables, reminded the L-shaped layout of perimeter building complex created by Bishop's of Rome residence on the Caelian Hill. Walls facing against the city were not so massive and high [12, *395*]. The first and the second Bishop's yards were located on the strong fortified city's outer boundary line. Riga became an important trade and crafts city on waterway and earth road crossings and the Teutonic Order's main military economic base, but later – the Riga Archbishopric Centre made of two urban structures on flat relief, or fortified yards adjoined close by Riga defensive wall.

Two urban structures of the Bishopric centers

Bernhard of Lippe on 21 September 1217 took an active part against Estonian forces in the historically significant St. Matthew's Day Battle at Fellin (from 1919 Estonian: *Viljandi*). German knights and their subordinate soldiers, in cooperation with the baptized Livs and units of the baptized Latgalians (about 3000 people), fought against the Estonians' defending united army (about 6000 people). As a result of the battle, the Estonians recognized the power of German invaders and agreed to re-adopt the Catholic faith and swear allegiance to Pope.

In spring of 1218, the successful conquest of Bernhard of Lippe, Bishop of Riga Albrecht and Bishop of Leal Theodoric went to the Landtag in Schleswig. There they actually persuaded the Danish king (1202–1241) Valdemar II to set off with an aggressive campaign against the Estonians in order to subordinate and further economic colonization. Waldemar agreed to a campaign against the Estonians and gathered a powerful army of volunteers. Bernhard's son Otto of Lippe who at that time (1216–1227) was Bishop of Utrecht, at the end of 1218 was consecrated to Bishop of Selia. Bernhard also participated in the consecration of his second son Gerhard II of Lippe (Latin: *Gerardus*; 1190–1258) as Archbishop of Bremen whom also conformed to Bishop of Riga. Archbishop of Bremen Gerhard II at the age of 29 also proclaimed himself Bishop of Hamburg which in 1224 was confirmed by Pope Honorius II.

The road to *Saaremaa* (Danish: *Øsel*; English (historically): *Osel*; Finnish: *Saarenmaa*; Swedish and German: *Öse*) Island led along the hillfort of Leal (Estonian: *Lihula*) where in 1215 Estonian fortifications were destroyed. On Ridala inhabitants' hillfort the Swedes in 1220 began to build the Leal Fortress (1220–1238) which the Brothers of the Sword allocated Albrecht's brother, Abbot of Bremen St. Paul's Benedictine Monastery (German: St.-Paul-Kloster; 1050) Hermann of Buxthoeven (1163–1248) who on 10 April 1220 became Bishop of Leal. Bernhard participated in the Estonian lands' second redistribution between the Livonian Brothers of the Sword, Bishop of Riga and Bishop of Leal who once again approved rules of the first division in 1216. The Brothers of the Sword in cooperation with Bishop of Leal established the Leal Bishopric's center. A yard was formed by defensive walls conformed to relief. Buildings were built to yards' inner side and Bishop's residence (1220–1238) was erected. Towers also were included in the unified defensive system. An isolated courtyard seperated by a protective wall and residential blocks was formed, and two functionally different zones was created. The first church in Leal was built in the 13th century at the main building's southern wing. The castle settlement and Cistercian monastery (probably destroyed in 1570) were established in the fortress's vicinity. The Leal Castle of stone (*Stenberg*) was built after the agreement of 1238 with Bishop and the Teutonic Order [1, *315*].

On 1 October 1228, Bishop of Riga Albrecht linked up the Leal Bishopric with the Wiek Vogtei and the conquered *Saaremaa* Island and created the autonomous Ösel-Wiek Bishopric (Estonian: *Saare-Lääne piiskopkond*, *Saare-Lääne Diocese*, German: *Bistum Ösel-Wiek*, Latin: *Ecclesia Osiliensis*; 1228–1560). Pope's policy implementer, legate (1224–1251) Wilhelm of Modena (Latin: *Guillielmum/Guilielmus Mutinensis*) built a church in the Ösel-Wiek Bishopric and strictly defined boundaries of the diocese which was legally established on 10 September 1234. The assigned Bishop of Ösel-Wiek (1234–1260) Heinrich I moved his residence from Leal to the coast of the Pärnu Bay where a port in the Pärnu River estuary in 1242 mentioned for the first time. He made Old-Pärnu (German: *Alt-Pernau*, Estonian: *Vana-Pärnu*; 1251) at the mouth of the Pärnu River's right affluent

Perona (now Sauga), built residence and the cathedral (1251). The Lithuanians in 1263 destroyed Old-Pärnu [50, *134*].

In spring of 1223, Bernhard of Lippe along with crusaders returned from German lands to Livonia and organized a war against the Estonians, which did not want to accept the German feudal power and the dominance of the Catholic elite. Bernhard on 15 August took Fellin where the Livonian Brothers of the Sword in 1224 started on the land of Sakala to build stone castle [1, *313*] instead of destroyed Estonian wooden fortifications by the Navest River. The residence by layout adapted to hillfort's relief was included in the united defensive system of a fortified complex.

The Livonian Brothers of the Sword in 1223–1224 destroyed the biggest Estonians' wooden fortress *Tarbatae*. The Dorpat Bishopric (German: *Bistum Dorpat*; 1224–1558) was founded, but on a strategically significant hill at the Emajegi (Estonian: *Emajõgi*, *ema* – mother, *jõgi* – river) River the fortified centre *Castrum Tarbatae* (1224–1279) was established. *Palatium* was included in the perimeter building of Bishop's yard of an irregular layout. Bishop of Riga Albrecht's brother, Abbot (until 1219) of Bremen St. Paul's Abbey, Bishop of Leal Hermann of Buxthoeven (1163–1248) in 1224 obtained secular power. On separate area of the Cathedral Hill (Estonian: *Toomemägi*) freestanding St. Peter and Paul's Cathedral as a basilica began to build, but a hall-type building was created: the nave and the altarpiece were built already in 1299. On the Cathedral Hill's highest spot behind Bishop's fortified yard and the castle-front separated from urban building by a stone safety-wall, the Canonical Chapter's residence and the Dorpat Cathedral (Estonian: *Tartu toomkirik*; German: *Dorpater Domkirche*; 1224–1279) were completed in the late 15th century. On a hill above the city, the layout of the stronghold is poorly recognized and very hypothetical. It probably consisted of the upper castle and the west fortified outer bailey separated from it by a moat. The upper castle was equipped with a cylindrical main tower, standing next to the eastern wing of the castle probably in a mixed brick and stone structure. The outer bailey was reinforced with at least four towers and gate towers. The entire complex was connected to the city's defensive walls. Bishop's fortified residence separated from city building by the defensive wall and the cathedral formed the center of Dorpat by two urban structures arranged side by side. On the western façade of the Dorpat Cathedral two massive, tall twin towers what German churches began to get in the 11th–12th centuries became the architectonic dominant of the Bishopric's centre where both urban structures formed a building complex in the Cathedral Hill's north part (Fig. 4).

Double-block fortresses of secular and spiritual power centers

The Daugava waterway contributed development of Latgalian countries, but in the early 13th century the situation rapidly changed. German merchants no longer wanted to accept the local inhabitants' brokerage in commercial relations, therefore a successful struggle for the Daugava waterway's control began. Bishop of Riga Albrecht along with the Livonian Brothers of the Sword to control the Daugava waterway and to repel the Lithuanians' invasions took over wooden fortifications on Latgalian hillfort, built from dolomite two two-storey blocks mutually placed in a narrow angle (Fig. 5), to create one of the first Riga Bishop's residences an irregular layout *Castrum Kukonois* (also *Kocanois*, Latvian: *Koknese*; 1209) by four towers on the cape at the estuary of the Pērse River in the Daugava following the outline of destroyed fortress of triangular planning. The Canonical Chapter hall, chapel, dwellings and wooden gallery opening to the courtyard located on the upper floor. A castle-front surrounded by defensive wall consistent of plateau relief left behind the residence. Pope (1254–1261) Alexander IV in 1255 confirmed that the Kokenhusen Fortress as the base for the conquest of the Daugava waters belonged to Archbishop of Riga. On 13 July 1277, Archbishop of Riga (1273–1284) Johanness I of Lune awarded the castle settlement by the Riga Law (German: *Rigisches Recht*) and determined town's borders, mentioning that defensive wall (destroyed in the 1680s to build new fortifications) for Kokenhusen had been built. Both residential blocks were included in the unified defensive system created by protective walls. The fortress since 14 July 1397 belonged to Archbishop of Riga who transformed his residence.

In 1260, the Cours, Semigalian, Latgalian and Prussian riots started. During the 1260s, Bishop chosed for the Ösel-Wiek Bishopric's new centre Haapsalu on the coast of the Baltic Sea. On the Cathedral Hill protected by water obstacles Bishop began to build a double-block structural complex (until 1279). Fortified Bishop's residence directed towards the Market Place and the Canonical Chapter's house was included into the track of defensive walls. In the single nave Bishop's Castle Cathedral (1260) (Fig. 6) not incorporated in the united defensive system (Fig. 7, 8) the throne, the official chair of the Bishop situated and the Chapter of the Bishopric worked. The inner walls were covered with paintings, the floor consisting of the gravestones of clergymen and distinguished noblemen. A unique round baptismal chapel was built during the second half of the 14th century. The western ends of the Haapsalu Castle's two parallel blocks (Fig. 8) connected by buildings (Fig. 7) creating structure of a rectangular layout around the courtyard surrounded by cloisters (15th cent.).
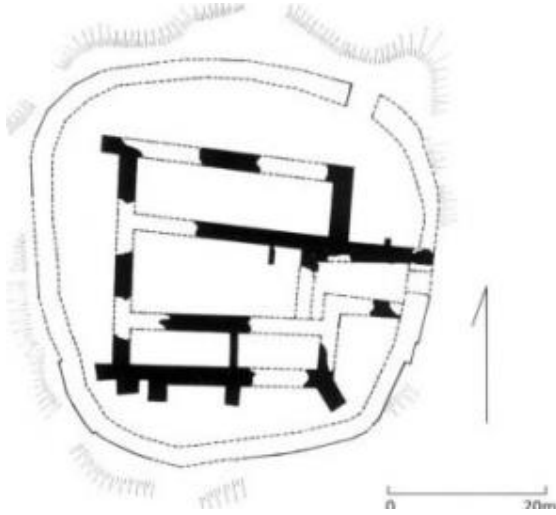
Fig. 11. Plan of the double-block
Łowicz Castle [15, 208].

Fig. 12. Plan of the double-block
Borysławice Castle [15, 114].

Fig. 13. Plan of the compact
double-block Liw Castle [15, 200].

Fig. 14. Architect, restorer, art historian Tatjana Vītola
(1920–2007). Reconstruction of the 17th century plan of the
Ronneburg Fortress. 1999 [54, 250].

Fig. 15. Architect Karl Rudolf Hermann Seuberlich
(1878–1938). Plan of the triple-block
Ronneburg Castle [52, 208.].

Fig. 16. German-Baltic artist Wilhelm Siegfried Stavenhagen
(1814–1881). The Ronneburg Fortress and church. 1866
[online 23.02.2019, https://upload.wikimedia.org/
wikipedia/lv/0/00/Rauna_1866.JPG]

The castle-front situated in the west of the courtyard, and a 29 m tall tower (13th cent.) for the neighbourhood observation protected the main entrance. This tower during the 15th century increased by 9 m and the bell was placed. On St. Nicolas Cathedral's south side the Christen Chapel and sacristy (Fig. 7) was built (15th cent.) next to the altarpiece. The first written record of the church is the charter of Haapsalu where Bishop Hermann I, the founder of the town wrote: "...we, the ones having established the cathedral in Haapsalu and having provided our canons with the appropriate dwellings and income, determined a certain site to be a town, where everybody who has chosen it as their place of living together with us, could gather and find shelter there; and if needed would be able to defend the church with all the means at their disposal."

In the Lithuanian State also a double-block fortress was built. In one of the largest Lithuanian State's centres Trakai, three castles were built at different time during the 14th century. The oldest one was the wooden castle of Old Trakai (Lithuanian: *Senieji Trakai*) surrounded by a stone and brick defensive wall [53, *260*]. This castle lost its meaning when Lithuanian Grand Duke Kęstutis (1297–1382) on the peninsula between Galvė Lake and Luka Lake built Trakai Island Castle (Lithuanian: *Trakų salos pilis*) (Fig. 9) – two parallel residential blocks linked by a defensive wall and a built-in high gate tower (Fig. 10). In the fortress of a two-division layout, a deep ditch separated residence from the castle-front. Lithuanian historian, Dr. Algirdas Antanas *Baliulis (b. 1936)*, Lithuanian architect Stanislovas Mikulionis (1935–1992) and Antanas Miškinis (1905–1983) have developed a hypothesis that the beginning of building of the Island Castle was the first half of the 14th century. They presumed that in the Island it was initially built in castrum, transi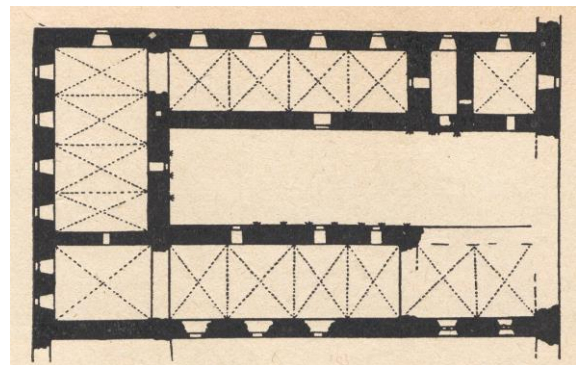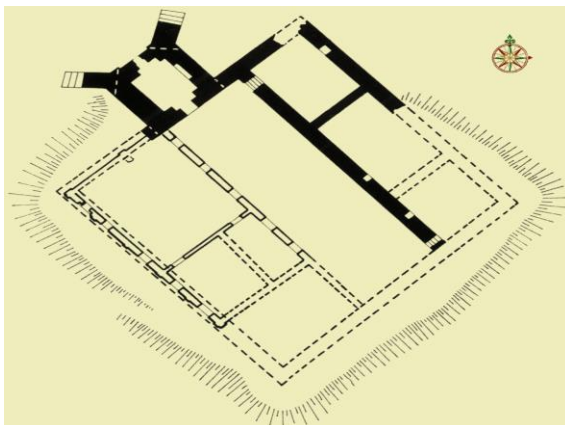tional to castle, style containing Romanesque features. In archaeologist Birutė Lisauskaitė's opinion, the construction of the Trakai Island Castle began in the second half of the 14th century. Archaeologist Albinas Kuncevičius (b. 1957) assigns the Trakai Island Castle to the second period of building brick and stone castles in the Grand Duchy of Lithuania, the beginning of the 15th century [Dr. Gintautas Rackevičius "Old new facts about the late-gotic exterior of the Grand Ducal residence in the Trakai Island Castle" (2002)].

In Poland, on a strategically significant island of the Bzura River Archbishop of Gniezno (1342–1374) Jarosław of Bogoria and Skotniki (Polish: *Jarosław Bogoria Skotnicki*) built the *Łowicz* Castle (Polish: *zamek w Łowiczu*; around 1355) made of brick, which since the 13th century was an Archiepiscopal manor evolved into its main residence. The castle was extended at the end of the

14th century. A second building block was erected on the courtyard's opposite south side. A compact double-block volume of parallel blocks surrounded by the defensive wall (Fig. 11). One block was meant for flats, but the second one was used for household needs. It had the form of a small courtyard surrounded by a wall, and a building stood along its northern side. A gate tower by an entrance gate was built in the east part of the rectangular courtyard [15, *208*] provided the fortress' constant defence. A chapel was placed on the tower's upper floor. The whole complex was additionally surrounded by an oval wall and a moat. On the island of the Rgilewka (Polish: *Rgilówka*) River, politicial and religious leader, Archbishop of Gniezno (1423–1436) Wojciech Jastrzębiec built the double-block *Borysławice* Castle (Polish: *Borysławice Zamkowe*; around 1423) surrounded by the defensive wall. A tower by the entrance gate located between two parallel residential blocks (Fig. 12) created a rectangular courtyard [15, *114*]. At the hill's top on the left bank of the Liwiec River knights for defensive needs built a compact double-block Liw Castle (Polish: *Zamek w Liwie*; 1429) consisted of two parallel residential blocks and a tower by the entrance gate. Later, one block knocked down (Fig. 13) to make a courtyard [15, *200*].

Triple-block fortresses of bishopric centers

In Courland, which had not been subjugated to the knights' power yet, the Riga Bishopric achieved *Dondangen* (*Donedange*, Latvian: *Dundaga*) district, and on September 1234, the Bishopric of Courland was founded de jure. Around 1235, candidates began to divide the land, but the Cours take part in forays through Zhemaitia. The Semigallian and Zhemaitian troops led by the Grand Duke Vikintas (Zhemaitian: *Vīkints*, Lithuanian: *Vykintas*; ?–around 1253) on 22 September 1236 in the Battle of Saule defeated severely the Brothers of the Sword. After the heavy defeat, knights of the Livonian Brothers of the Sword added to the Teutonic Order had already taken in 1235 over properties and knights of the Dobrin Brothers of the Sword. By the support of Pope Gregorius IX on 12 May 1237 a new autonomous structural unit of the Teutonic Order – the Brotherhood of the German House of Saint Mary in Jerusalem in Livonia (Latin: *Fratres de Domo Sanctae Mariae Theutonicorum Jerusalemitana per Livoniam*) formed for subjugation of the Baltic tribes. Regulations of the Teutonic Order's statutes on religious life and course of the war were binding [48, *420*]. The Teutonic Order's Master (German: *Deutschmeister des Deutschen Ordens*, 1219–1230, *Landmeister von Preußen des Deutschen Ordens* 1229–1239) Hermann Balk, Bishop of Breslau
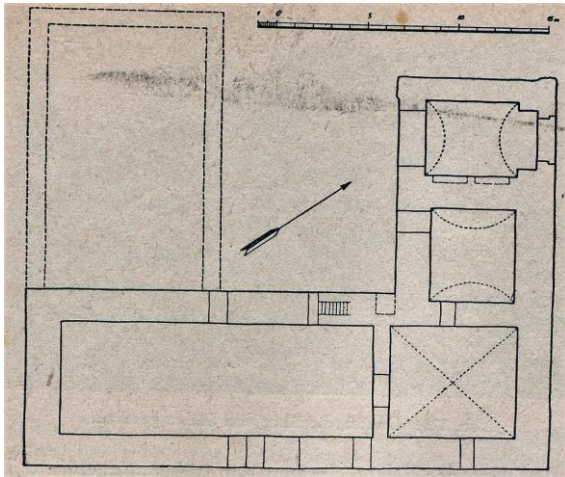
Fig. 17. The L-shape plan of Lemsal Castle formed by two first-volumes [52, 201].
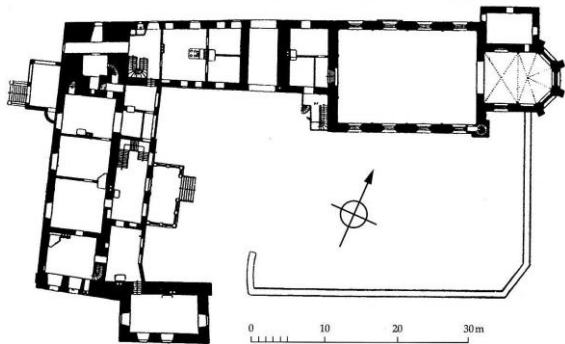
Fig. 18. Architect Wilhelm Ludwig Nikolai Bockslaff (1858–1945). The first floor plan of Riga Archbishop Vassal's Gross-Roop Castle building complex with included church. 1909 [12, 285].
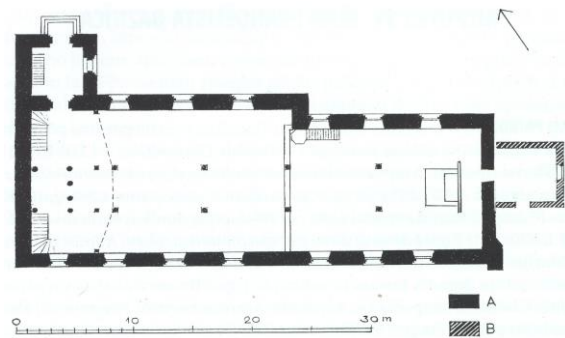
Fig. 19. Architect Elfrīda Pluka. Plan of St. John the Evangelist's Church (around 1290) in Hasenpot: A – walls of the Middle Ages, B – sacristy built in 1860. 1951 [11, 74].
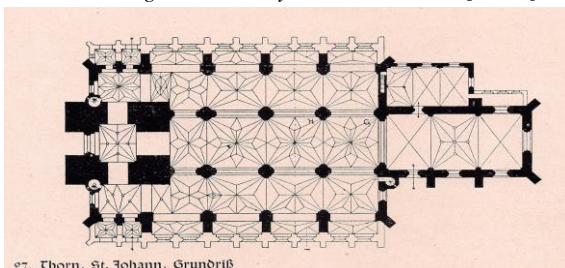
Fig. 20. Plan of the Cathedral of St. John the Baptist and St. John the Evangelist in the Old Town of Thorn [online 19.06.2017,: http://fotopolska.eu/foto/316/316027.jpg].

Thomas I (?–1268) and Duke of Silesia (1201–1238), High Duke of Poland (1232–1238) Henry the Bearded signed an agreement for establishment of new cities [21, *102, 101*] in the *State* of the Teutonic *Order* (Latin: *Civitas Ordinis Theutonici*, German: *Staat des Deutschen Ordens*; 1230–1525). Taking over tenures of the Livonian Brothers of the Sword, the Livonian State (1237–1561) was founded, including in it the Selonian and Samogitian lands, the biggest part of Estonian lands, the southeast part of Latgalia and two thirds of Courland [49, *96–97*]. Hermann Balk was appointed its Grand Master. Luebeck (German: *Lübeck*) located on the coast of the Baltic Sea and Hamburg located on the coast of the North Sea in 1241 signed a trading agreement which can be considered as the beginning for the German Hansa (Latin: *Hansa Teutonica*, German: *Deutsche Hanse*) those centre was established in Visby. German merchants from Luebeck needed new support places near big waterways and river estuaries. They in journeys included the southern coast of the Baltic Sea, took over the trade and built settlements at the most important destinations and interspaces, also in Riga implemented building and administration according to the German sample.

The impact of the Teutonic Order increase in Courland where on 19 April 1242 allowed the building of a fortress, or a town on "the most convenient spot" at the Venta (*Wynda*, *Winda*) River. On a strategically convenient place by the ford in the Venta southwards the Cours' Hillfort, Livonian Master (1242–1245) Dietrich of Grüningen decided to build the fortress for surveillance of the Prussian–Riga earth-road and the Venta waterway. In 1243, the Prussians started their first revolt [33, *98*]. Vice Master (1240–1241, 1248–1253) Andreas of Felben on 1 October 1243 signed an agreement with bishops of Riga, Dorpat and Osel-Wiek and founded the Confederation of Livonia (Latin: *Terra Mariana*; 1243–1561) [49, *105*]. A wooden fortress for the administration and military centre at the Venta was built in 1244, and the second stone fortresses construction period (1237–1400) in Livonia was related to activities of the Teutonic Order which from 1244 till 1251 worked out a new version of regulation (German: *Ordensregel*).

In 1245, the Riga Canonical Chapter received *Dondangen* district owned Bishop of Riga (1229–1253) Nikolaus of Nauen (Latin: *Nicolaus de Nauen*, *Nicolaus Canonicus Rigensis*), but the Curonians rose in rebellion. On a flat relief peninsula surrounded by the *Pāce* River and Mill Pond, the building of an elongated square layout three-block *Dondangen* Castle of stone built close to the fortified settlement *Kalnadārzs* (Mountain garden) began until 1290 [12, *165*]. The middle volume was

the first erected. An excavated ditch in front of it made difficulties to access the peninsula. Later, two parallel shorter side-volumes facing towards peninsula's banks created the U-shaped plan. A defensive wall connected ends of blocks created a closed courtyard. In the fortress got crossing the castle-front included together with the residence in the unified defensive system. Riga Canonical Chapter its fortress and lands belonged to him in 1434 sold to the Bishopric of Courland.

The Archbishop's of Riga residence and major center of power located from the 14th to the 16th century on the left bank of the Rauna River at the estuary in the Gauja near the Latgalian *Tanīskalns* on the borderland of the Confederation of Livonia. Along the great trade route leading from the Gauja Valley to Pskov and Novgorod the first Archbishop of Riga (1253–1273) Albert III (*Albert Suerbeer*, Latin: *Adalbertus Westphalus (Saurbier)*) of Cologne around 1262 built the largest and also the safest one castle of the Riga Archbishopric. On a top of the high hill by steep slopes a fortified Ronneburg Castle (*Rownenborgh*, German: *Schloß Ronneburg*, Latvian: *Rauna*; 1262, 1273–1284) made of stone (Fig. 14) was Archbishop's seat each year from 29 September to 7 February. Open two-story galleries surrounded the yard of the triple-block Ronneburg Castle which had a rectangular U-shaped layout made in the 17th century (Fig. 15): at the southern block's end there was the chapel and the Canonical Chapter Hall which walls decorated by portraits of bishops and archbishops of Riga. In the west block diningrooms (German: *Remter*, Latin: *refectorium*) were placed. Archbishop of Riga (1509–1524) Jasper Linde (Latin: *Gaspar Lindius*, *Casparus Linde*) built a tower "Tall Caspar" of square layout to the end of the north block of bedrooms (Latin: *dormitorium*) and made a large-scale reconstruction of the castle, as well as ordered to create towers and fortification ramps of the fortress. The residence had three castle-fronts surrounded by defensive walls included five cylindrical towers. In the north castle-front, there were stables, cattle-sheds, buildings for household. Water barriers formed the fortifird building complex incorporated into the walls' track and the united defensive system [12, *381, 383–384*]. The Livonian War from 1558 to 1583 did not touch the Ronneburg Castle, but after the Riga Archbishopric liquidation its political significance lost. Ronneburg Town (14th–18th cent.) next to the fortress (Fig. 16) existed until the Great Northern War (1700–1721) [28, *22*].

At a fortress of Marienburg (Polish: *Malbork*) on 27 April 1276 named after the Teutonic Order's patroness St. Mary around 1290, mutually linked four blocks of an even height were grouped around a square-shaped inner courtyard created the fortress of square layout [33, *108*]. It reminded a monastery by cloisters and was named by Estonian art historian, internationally renowned architect of fortress architecture, the first Estonian art Professor at the University of Tartu Armin Tuulse (until 1936 Armin Neumann; 1907–1977) in the Latin phrase *domus conventuales*, but in the book published in 1942 it was called as the convent-house (German: *Konventhaus*) [38, *130*].

Bishopric centers' perimeter building complexes of the L-shaped plan

The Lemsal (Latvian: *Limbaži*) Castle belonged Archbishop of Riga, consisted of two volumes (Fig. 17) created building of L-shaped layout, but later – three volumes arranged around the inner courtyard created the castle of U-shaped plan [12, *301–302*]. A square planning tower located at the castle's north corner. Between both volumes, the tower by the main entrance gate was into the defensive wall provided defense. Above them – a tall tower of square layout covered by a four-sided roof. The ringwall included the fortress separated from the castle-front by the ditch. The castle and castle-front obtained an autonomous defensive system.

The Peace Treaty of Christburg was signed [33, *101*], and the Prussians in 1245 finished revolts. Grandmaster made a decision on territorial division of the Prussians' land, began to establish administrative structures and erected wooden fortifications of an irregular layout instead former Prussian buildings. During the second half of the 13th century, building of castles expanded. Authorised by Grandmaster of the Teutonic Order in Livonia (1251–1254) Eberhard of Sayn (Latin: *Everhardus Seyn*) turned to the land conquests separated Prussia from Livonia. During two months' time in 1253, a stone castle of Memelburg (*castrum Memele*, *castrum inter Mimelam et Dangam*, *castrum Mimelburch*, *borch to Mimelborgh*) was built on an island on the Dange (Lithuanian: *Dane*, *Danija*, *Akmena*) River. In Memel (now *Klaipėda*), Bishop of Courland and the Teutonic Order on 8 February 1253 dealed with each other the new-built Memel Castle. In a document was mentioned that in Memel Courland Bishop's cathedral and residence had to be built. The Memel St. John's the Evangelist Church (German: *St. Johanniskirche*, *St. Johannis evangelische Stadtkirche*) was erected. On 19 April 1260, Pope Alexander IV confirmed that the Bishopric of Courland still did not have the Canonical Chapter. Bishop of Courland (1263–1299) Edmund of Werde mentioned in a document of 1263 that Goldingen should be Bishop's of Courland home. The Teutonic Order regulation dated from 1264 pointed that castle-region's all brothers of the Order together – brothers-knights, priests and servants called the

convent [48, *418–420*] had to live in monasteries and had to give the monks' promises of poverty, chastity and obedience. They had promise to fight against pagans. The Curonian riots had stopped, and on January of 1290, Bishop Edmund founded Courland Canonical Chapter. In the document, issued on 7 February 1290, Bishop presented half of the Memel St. John's the Evangelist Church to the new Canonical Chapter [47, *13*]. On the opposite left bank of the Dange, the settlement made by the Market Place obtained an unofficial name "*Neu Dortmund*" ("New Dortmund").

In Courland the resistance of the population was overcome and two centers were established in the Bishopric of Courland. Under the Archbishopric of Riga fortified building complexes for bishopric centers were built, and a church was included in the perimetral building around the courtyard. Pilten in the Bishopric of Courland was chosen for Bishop's residence placement on the right bank of the Venta River near the Vinda Port. Wooden castle of the Bishopric's political, economic and cultural centre on the peninsula in Pilten got under the Teutonic Order's control and was replaced by stone castle (before 1309) of a regular layout. Prof. Ēvalds Mugurēvičs's research "*Piltenes pils 14. – 16. gadsimtā un arheoloģiskās liecības par tās tiltu*" /"The Piltene Castle during the 14th – 16th centuries and Archaeological Evidences about its Bridge"/ [35, *164–184*] has been published in the collection of articles "Research on Courland and Semigallian Castles". Hasenpot in the Bishopric of Courland was chosen for Courland Canonical Chapter's placement on the right bank of the border-river Tebra. On the peninsula, the high Bleida Hill populated by the Curonians was the centre of Bandava castle-region. In Courland the resistance of the population was overcome and a fortified building complex for the Canonical Chapter was created [2; 3]. Around 1290, in the southwest part of hill's plateau St. John's the Evangelist Church (crashed down several times and again restored in 1733, 1860, 1887 and 1908) (Fig. 18) was built [28, *45*]. Information on Hasenpot and Pilten strongholds has been included in the encyclopaedia "*Latvijas viduslaiku pilis, IV.*

Latvijas 12. gadsimta beigu – 17. gadsimta vācu piļu leksikons" /"Lexicon of German Castles in Latvia, IV. In the late 12th – the 17th century"/ compiled by Professor Andris Caune and Ieva Ose, but about the churches – in the encyclopaedia "*Latvijas viduslaiku mūra baznīcas. 12. gs. beigas – 16. gs. sākums*" /"Medieval Stone Churches in Latvia. In the late 12th – the early 16th century"/ [11].
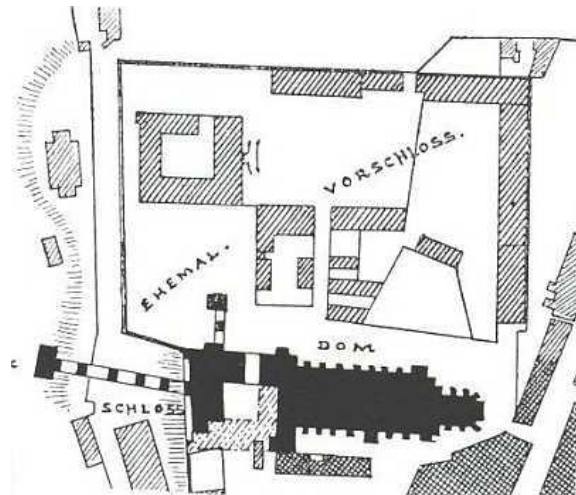
Fig. 21. Plan of the fortified Marienwerder building complex with the first and the second Bishop's residences and the Marienwerder Cathedral. Marienwerder building complex [online 07.04.2015, http://zamki.pl/?idzamku=kwidzyn].
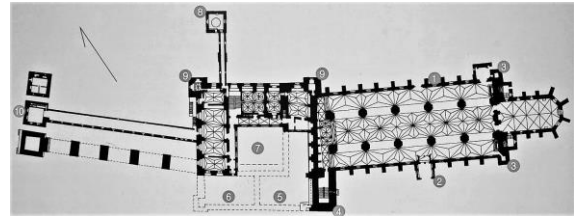
Fig. 22. Reconstruction of the plan of the second stone fortress for Bishop's residence and the Marienwerder Cathedral around 1360 [23].
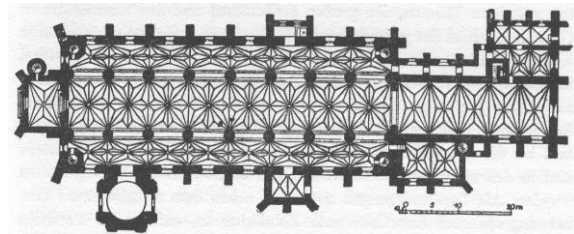
Fig. 23. Plan of the Frauenburg Cathedral [55, 45].

Fig. 24. German lithographer and artist Heinrich Wilhelm Teichgräber (1809–1848). The Frauenburg Cathedral. 1839 [online 16.02.2019, https://upload.wikimedia.org/wikipedia/commons/9/9c/Dom_zu _Frauenburg_Teichgr%C3%A4ber.jpg].

In autumn of 1206 and winter of 1207, Priest Daniel arrived in Idumei to preach the Christian faith. Near the Brasla River he created yard, but the first wooden church (1206, burned down in 1211) in *Raupe* (Latvian: *Straupe*) was built on the *Baukalns* [16, *X: 15, XV: 2*]. On the left bank of the Brasla Archbishop's of Riga vassals won the property. In the 13th century Vassal Fabian of Rosen built a fortified residence close to the road (*hellewech*) from Riga to Dorpat. In the southeast, the hydraulic pond system of the Brasla tributary blocked the access to the *Gross-Roop* Castle (before 1310) surrounded by water obstacles. Knights *Wolmar* and *Henneke* during 1350 got the land had been hatched by their father Otto and a fortified residence called the Rosen House (*husz tho Rosen*). In 1374, *Wolmar* from Rosen family became Governor of the city and also the *Gross-Roop* Castle that during lots of centuries due to rebuilding got a complicated planning around the courtyard surrounded on the west and north sides by buildings created the perimeter building complex of L-shaped plan, but on the south and east sides – by the defensive wall. In the west of the brick castle, the large outside yard surrounded by a wall was adjoined to the town. Two almost perpendicular buildings (15th cent. (?)) were added to the castle dominant – a four-storey tower-castle of square layout, which, possibly, was the oldest building. In the castle's west structures, there were residential rooms, but the castle's main gate located in the north building. St. Anna's (?) Church (15th cent. (?)) of three-nave and four-bay, erected at the end of the perimetral building and used by the citizens' parish, was included in the unified defensive system (Fig. 19), therefore an elongated altarpiece by a polygonal closing is not precisely orientated eastwards. The church had two entrances created into the northern and western walls. There have also been two vicaries. The church owned a large garden, building plots and houses in the town of *Roop*.

The structural complexes of Bishopric centers in the Prussians' lands

On lands populated by the Prussians monk Christian (*Christian von Lekno*; around 1180–1245) from the Oliva Monastery in 1222, became Bishop and by Pope (1216–1227) Honorius III's support founded the Bishopric of Culm (*Kulmerland*, German: *Bistum Kulm*; 1245–1566/1577). At time of construction of the Marienburg Castle, the regular planning Old Town of Thorn created in two building stages [22, *97*] became the capital city of the *State* of the Teutonic *Order*. Thorn composed of three parts: the Old Town in the west, the New Town in the east and the Castle in the southeast. The Old Town of Thorn was formed around the Old Town Market Place. Major buildings there include the Old Town Hall, Church of

the Assumption of the Blessed Virgin Mary and the Cathedral Basilica of St. John the Baptist and St. John the Evangelist (Polish: *Bazylika katedralna Świętych Jana Chrzciciela i Jana Ewangelisty w Toruniu*; 1236–15th cent.) (Fig. 20) which construction in the first decades of the 14th century commenced. Three naves were built, but later, the former church was knocked down. The new building's appearance is unknown, but it is assumed, that the middle-nave was built, the western façade was extended, partly walls and pillars were erected, the altarpiece was made and next to it – a square planning tower. In 1351, fire partly destroyed the cathedral, which during the third building period was renewed: one nave was extended, on the west side a new tower and the north nave, as well as side chapels were built. A hall-type building during the fourth building period was created. The increased volume obtained a modern look. From 1475 till 1480 chapels were built on the south side. The tower collapsed, and a massive tower during the 1480s was built instead of it. The height of the nave increased, and the stellar vaults were made.

The Teutonic Order's knights built a fortress (1233) of stone instead of the Prussian wooden fortress on a precipice by the Liw's River estuary, and the settlement created at the foothill. The garrison town Marienwerder (Polish: *Kwidzyn*; the City Law in 1233), named after the Holy Mary, was founded. In the west of the church, the second stone fortress (1242–1250) was built for Bishop's residence. The Pamede, or Pomesania (German: *Bistum Pomesanien*, Polish: *Diecezja pomezańska*; actually from 1249 (1259)–1527) Bishopric was founded, and in capital city Marienwerder for more than a century there were simultaneously two stone fortresses (Fig. 21). The cathedral was built (1264–1284) instead of the church close next to strongly fortified Bishop's residence, and in several building stages a structural complex was made, to separate Bishop's residence and a castle-front from the town. In 1285, the Canonical Chapter was established and the first church for citizan's parish obtained the status of the cathedral. Around 1325, St. John's the Evangelist's Cathedral (Polish: *katedra św. Jana Ewangelisty*; 1284–the 2nd half of the14th cent.) of brick (Fig. 22) was started on a steep hill. The building's five-nave hall (86 m long and 25 m wide) by side-naves of 14,5 m high adjoined the west end close to the square planning fortress (1322–1347) with the courtyard, strengthening the defence of the Capitular Castle. Stellar vaults covered the cathedral's 21 m high middle-nave and two-storey altarpiece (around 1335/1340) in the apse. The Mariewerder Cathedral (German: *Domkirche von Marienwerder*; 1343–1384), used also for citizan's parish, performed defensive functions, therefore in the east end, two massive octagonal planning stair towers were built on the sanctuary. In the southwest corner at the

interconnection with the fortress, a belfry for the neighbourhood observation was erected, but in the late 15th century, the top part for was made, increasing the height up to 59 m [15, *191*]. The Marienwerder Cathedral's tower, built next to it, quite possible, before reconstruction was used for observation. The well tower was built on the northeast side of the fortress.

One of the four bishoprics in the Prussian's lands was the Archdiocese of Warmia (Latin: *Archidioecesis Varmiensis*, German: *Bistum Ermland*; 1250–1512), founded in 1243. Warmia for the first time mentioned in 1249, but from 1262 till 1299, there appeared the term "*Ermelandt*". Tenure of Bishop and the Canonical Chapter stretched from the Vistula Lagoon far away into the inland and as a wedge pushed in between the lands ruled by the Teutonic Order, separating the old tribal regions. Instead of the Prussian settlement *Brusbergue* on the side of the Vistula Lagoon the Teutonic Order founded Bishop's residence (1250–1340) Braunsberg (Polish: *Braniewo*), which the Prussians destroyed in 1261. Dwellers from Luebeck in 1273 arrived in a new place restored Braunsberg by the Paslenka (Polish: *Pasłęka*) River, and Bishop of Warmia (1278–1300) Henryk I Fleming (*Heinrich/Henricus I Fleming*) started to make the Old Town fortified with a ditch and defensive wall. In 1278, Braunsberg became the capital city of the Bishopric of Warmia, Bishop made (1278–1284) a fortified residence included in Bishop's yard and a square planning tower (13th cent.) with a gate for entrance into the yard. In the northwest of the yard development of building started. Henryk I Fleming in 1284 awarded the Luebeck Law. Since 1466, Braunsberg was incorporated in the Teutonic Order's State.

In 1280, Bishop of Warmia Henryk I Fleming his residence moved to fishermen settlement, where a castle (*castrum*) (1278–1284) [15, *150*] was built and the Canonical Chapter's house was placed. In Frauenburg (Polish: *Frombork*), the capital city of Warmia (Ermland), the Town Hall was built at the marketplace. On the Cathedral Hill (Polish: *Wzgórza Katedralnego*) was built the first and main bishopric's wooden church, which in 1288 obtained the status of the cathedral (Latin: *Ecclesia Warmiensis*). Bishop of Ermland Eberhard of Neisse (1250–1326) awarded Frauenburg the Luebeck Law, which already had lot of Hansa cities. On the Cathedral Hill, Bishop of Warmia (1329–1334) Henryk II Wogenap in 1329 started to erect from the east westwards a freestanding three-nave Archcathedral Basilica of the Assumption of the Blessed Virgin Mary and Saint Andrew (Polish: *bazylika archikatedralna Wniebowzięcia Najświętszej Maryi Panny i Św. Andrzeja Apostoła*; 1329–1388) of 97 m long rectangular layout (Fig. 23) [55, *79*]. Cathedral meant also for defence functions. The middle-nave of the prayer's hall was

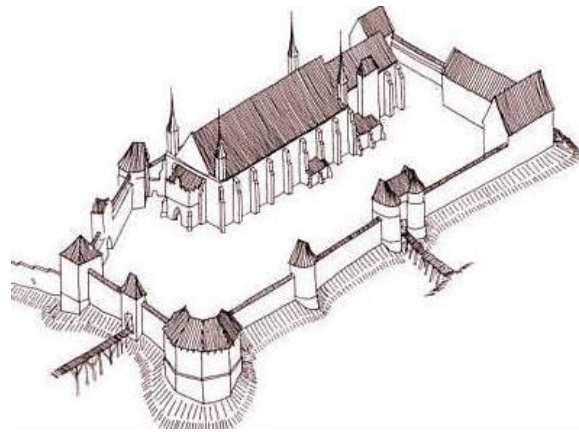Fig. 25. Professor Dr. hab. Tadeusz Zagrodzki (around 1911–2007). The reconstruction plan of the Frauenburg Cathedral's ensemble. 2002 [online 19.06.2017, http://zamki.res.pl/frombork.htm].

Fig. 26. Plan of Frauenburg [online 16.02.2019, http://wolneforumgdansk.pl/files/plan_113.jpg]
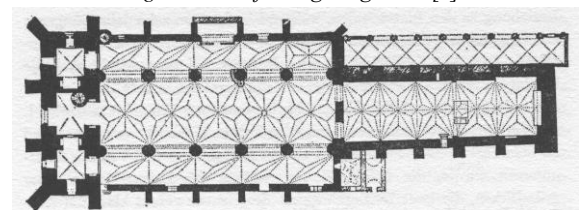

Fig. 27. Plan of Königsberg. 1581 [7].

Fig. 28. Plan of the Königsberg Cathedral (1333–1380). Around 1830 [55, 42].

divided into eight bays, and an altar for each canon was placed in a separate compartment. Octagonal pillars, arranged in two lines, supported the stellar vaults and separated the middle-nave from side-passages. On the main axis of the middle-nave the richly decorated chancel, consecrated in 1342, was placed. In cathedral's corners, stair towers of octagonal layout were higher and covered by steep roofs, in order to save proportions and join the inner part of the building with defence porches. The little belfry on the ridge of the gabled roof was joined together with the building's massive volume, which reminded of the Cistercians' Monastery building (Fig. 24). Richly decorated portal on the cathedral's west façade between the porch (anteroom) and middle-nave was especially beautiful. A very widely spread element in Rhineland during the 12th – 13th centuries was the arcade, which also decorated the cathedral's façade. In the north of the wall by the porch extra semicircle stairs were added and enabled access to the organ swell-box. In 1388, Bishop of Warmia (1373–1401) Henryk III Sorbom completed building of the cathedral, which was connected in two places with building structures, arranged around the perimeter (Fig. 25). In the south and west of them, a big yard surrounded by cloisters located. Bishop's residence (around 1350) and the Canonical Chapter's house were included in the building complex placed in the east part of the Cathedral Hill (Fig. 26) [13, *278*]. Defensive walls were built in the 1430s [42, *5*]. The Belfry (Polish: *wieża Radziejowskiego*; mid-14th cent.), Copernicus Tower (Polish: *wieża Kopernikowska*; 14th cent.) and octagonal bastion with the Big Tower (1448) included in the northwest part, but the West Gate (Polish: *Brama zachodnia*) was erected on the wall's west side. The Holy Spirit Hospital and St. Anna's Chapel (Polish: *szpital Św. Ducha i kaplica św. Anny*; late 15th cent.) also were included in the fortified ensemble of the cathedral (Polish: *zespół katedralny: Katedra Wniebowzięcia NMP i św Andrzeja Apostoła, Pałac biskupów warmińskich, Kanonie, Obwarowania obronne*).

In Sembia, where in the early 9th century the Prussians major centre had sprung up on a strategically and geographically convenient place at the Pregel River estuary in the Baltic Sea, Sembian wooden fortifications *Twangste* (Prussian: *tvinksta* – "a pond made by a sluice") on a high hill were destroyed. The Königsberg (Prussian: *Kunnegsgarbs*, Lithuanian: *Karaliaučius*, Polish: *Krolewiec*; from 1946 in Russian: *Калининград*) Castle for the waterway's surveillance were built on the left bank of the Pregel River, but on the fortifications' southern side, St. Nicolay's (*Niclas*) Church (1264, destroyed in 1828) was erected. Pope's legate William of Modena in 1243 founded the Samland Bishopric (*Bistum Samland*; actually in 1252–1525) on the Sambians' land. At estuary of the river (Russian: *Приморская*) on the coast of the Baltic Sea the *Schönewick* Castle for Bishop's residence (till 1525) was built until 1266. On its neighbourhood a village was formed in 1266. Bishop of Samland (1295–1318) Siegfried of Reinstein founded Wiskiauten (*Vyschuzin*, Russian: *Моховое*, Lithuanian: *Viskiautai*). On 14 September 1305, Fischhousen was awarded the City Law, but its name *Castrum Vischhusen* obtained in 1326. On 13 September 1333, the cathedral (German: *Königsberger Dom*; 1333–1380) in Königsberg (Fig. 27) began to built, but around 1440, the three-naves Königsberg Cathedral began to be rebuilt. Twin towers crowned with spikes (destroyed by fire in 1544) highlighted the western façade of the cathedral which had a deep altarpece (Fig. 28). Prayer's hall covered by star vaults was made under one roof.

Conclusions

1. Traditions of Christianity centers' formation rooted in the remote past when the City of David in the site of domestic inhabitants' settlement was set up outside the modern city walls of Jerusalem. Establishing bishoprics in Lvonia and the subordinate Prussians' lands bishops chose a place for their residence and the cathedral near settlements of domestic inhabitants: bishoprics' centers were set up in the hillforts where at the highest point the couryard of irregular layout was created. Newly erected buildings involved in the perimeter building so that palace and bishop's cathedral also perform a defence function. The layout of the perimeter building complex by the bishop's palace, the Canonical Chapter's hall and the cathedral resembled the main cult building complex on the Caelian Hill in Rome where the Archbasilica and the Bishop's residence were included in the perimeter building formed a fortified, confined courtyard. The Chapter's hall clinged to the Archbasilica of St. John in Lateran formed a link with the perpendicularly oriented bishop's residence, thus creating a fortified building complex of the L-shaped layout. The first Riga Bishop's St. Mary Cathedral destroyed by fire in 1215 was probably involved in the perimeter building of the first Riga Bishop's yard and located in a place where Dominicans later built St. John's Church. In the mid-13th century, the fortified building of bishoprics' centers was created under the influence of traditions of the Teutonic Order fortification building.

2. In Livonia and the subordinate Prussians' lands, the planning of bishoprics' centers in the 13th and 14th centuries was influenced by buildings provided Bishop's and the Canonical Chapter's needs, as well as individuality of relief and natural

conditions. Complexes were built on the highest place of relief, as well as on flat relief. Different solutions for protection were chosen for each case. Initially, the building complex of the bishopric's center was formed by a fortified courtyard involved structures in the perimeter building. Later, two urban structures were developed: one for Bishop and the other for the Canonical Chapter. Separate dwellings were built by Bishop and the Canonical Chapter, and each of the urban structures had a different function. In Riga after the devastating fire of 1215, which destroyed the first Riga Bishop's St. Mary Cathedral, Bishop of Riga chose a building site on flat relief for the second Bishop's yard near domestic settlement. The sacral building complex consisted of two urban structures – the second Bishop's yard of the L-shaped layout and the cathedral complex with monastery. In Dorpat, the building complex of two urban structures was created at the top of the hill: a freestanding cathedral was built closely Bishop's yard of the irregularly layout.

3. In the bishopric's center of Haapsalu, the compact double-block fortress was made up of two parallel volumes – each of them was designed for their own function, but one urban structure developed. Sometimes two ends of parallel volumes were joined by a protective wall to create a closed yard. In one of the volumes a cathedral was built, or used for another purpose. In such fortified,

closed building volume a tower building for protection was incorporated, so it was not necessary to place the fortress in a difficult of access place. Another time in the perimeter building two volumes were included one after the other, or the bishop's residence was perpendicular to the cathedral to create the building volume of the L-shaped layout.

4. A double-block fortress complemented by a third volume created a three-block fortress: placing two volumes perpendicular to each other got the fortress of L-shaped layout, but supplementing with the third body placed parallel to one of volumes, a compact U-shaped triple-block building volume was created. A freestanding sacral building was built nearby. Transforming (opening) a compact triple-block fortress of the U-shaped layout and placing next a cult building as a continuation of the perimeter building the fortress got the L-shaped layout.

5. In the 13th century, bishoprics were established on the Baltic Sea southern coast at subjugated lands inhabited by the Cours and the Prussians. The local inhabitants fought back, therefore, each of the bishopric's urban structures intended to Bishop and the Canonical Chapter was placed separately – each in their own village. In the perimeter building of Christianity centers on Livonia, a church building-type developed, but in the perimeter building of bishoprics's centers on Prussians' lands a cathedral building-type developed.

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Kopsavilkums. Daugavas labajā krastā, Ikšķiles (*Üxküll*) ciemā priesteris Meinards (*Meinhart*, ap 1130/1140–1196) sāka līviem sludināt kristietību, uzcēla nelielu Sv. Marijas baznīcu (1184) un austrumpusē 1185. gada vasarā cieši klāt uzbūvēja kvadrātveida plānojuma divtelpu ēku – palasu. Pie katras celtnes izveidoja atsevišķu sētu un radīja L-veida plānojuma nocietinātas apbūves kompleksu kopējā aizsardzības sistēmā. Dibināja Ikšķiles bīskapiju (*Episcopatus Ixcolanensis*; 1186–1201), un 1188. g. 1. oktobrī kļuva par Ikšķiles bīskapu, bet Sv. Marijas baznīca ieguva katedrāles statusu. Priesteri izveidoja Domkapitulu (vācu: *Domkapitel*), un Doles augšgalam iepretī uz Salas (*Holme*) līvu ciemā izvēlējās vietu otram centram, kur draudzei uzcēla Sv. Mārtiņa baznīcu. Bīskapijā vienu apbūves kompleksu radīja bīskapam, bet otru – Domkapitulam.

Pussalā starp Daugavu un Rīdziņu, kur bija vietējo iedzīvotāju ciems un osta, vācieši ierīkoja apmetni un tās ziemeļaustrumu stūrī Bīskaps Alberts (*Albrecht von Buxthoeven*; 1165–1229) izveidoja Rīgas bīskapa pirmo sētu (1201–1215), kuras apbūvi, šķiet, sākotnēji veidoja divas brīvstāvošas celtnes – baznīca un liels dzīvojamais (?) tornis. Abas celtnes vēlāk saistīja palass un radīja L-veida plānojuma perimetra apbūves nocietinātu kompleksu, kas atgādināja Romas bīskapa mājvietu Romā, kur kādreizējai Laterānu dzimtas pilij (latīņu: *Palatium Apostolicum Lateranense*) perpendikulāri uzcēla piecjomu Sv. Jāņa Kristītāja (latīņu: *Archibasilica Sanctissimi Salvatoris*; 324, pēc 430 pārbūvēta) baziliku, kuru plaša zāle saistīja ar pili un izveidoja L-veida plānojuma perimetra apbūvi. Jaundibinātajos pārvaldes centros paredzēja militāra spēka – mūku-bruņinieku klātbūtni, tādēļ blakus Rīgas bīskapa sētai dibināja Kristus bruņinieku brālība Livonijā (vācu: *Schwertbrüder*, latīņu: *Fratres militiæ Christi Livoniae*; 1202–1237) jeb Livonijas Zobenbrāļu ordenis uzcēla *domus Wittenstein* jeb *St. Georgi* (1204, nopostīta 1297) sētu, un dienviddaļā – *St. Georgi* baznīcu (starp 1204 un 1209). Bīskapa pirmo sētu 1235. gadā ieguva dominikāņi un izveidoja klosteri. Vietā, kur uguns 1215. g. 4. martā nopostīja dievnamu, kas, iespējams, bija Rīgas bīskapa pirmā katedrāle. Vēlāk uzceltai Sv. Jāņa baznīcai (minēta 1297. g.) zem altārdaļas tika saglabāti no dolomīta mūrēti sienu fragmenti.

Igauņu pilskalnā pie Emajegi upes zobenbrāļi uzbūvēja neregulāra plānojuma *Castrum Tarbatae* (1224–1279). Bīskapa sētas perimetra apbūvē iekļāva palasu. Katedrāles kalnā (igauņu: *Toomemägi*) blakus bīskapa sētai uzcelta Domkapitula mītne un Sv. Pētera un Pāvila katedrāle (igauņu: *Tartu toomkirik*; vācu: *Dorpater Domkirche*; 1224–1279) radīja Tērbatas bīskapijas centram divu pilsētbūvniecisku struktūru veidotu apbūves kompleksu. Baltijas jūras krastā uz ūdensšķēršļu aizsargātā Haapsalu Katedrāles kalna izveidoja aizsargmūra ietvertu divu paralēlu korpusu apbūves kompleksu (līdz 1279). Mūra trasē ietvēra bīskapa rezidences sienu, pavērstu pret pilsētu. Otrā būvapjomā izveidoja vienjoma katedrāli, kuru kopējā aizsargsistēmā neiesaistīja. Abu korpusu rietumgalus savienoja būves un radīja taisnstūra plānojuma celtni ap krustejas (15. gs.) ietvertu iekšpagalmu. Tornī (13. gs.) apkārtnes novērošanai 15. gadsimtā ierīkoja zvanu. Vienā no Lietuvas lielākajiem centriem Traķos lielkņazs Kęstutis (1297–1382) uz pussalas starp ezeriem uzcēla cietoksni (lietuviešu: *Trakų salos pilis*), kura abus paralēlos dzīvojamos korpusus savienoja aizsargmūris ar tajā iebūvētu augstu vārtu torni. Divdalījuma plānojuma nocietinājumā rezidenci no priekšpils šķīra dziļš grāvis. Polijā arhibīskapi savām nocietinātajām mītnēm būvēja divus paralēlus dzīvojamos korpusus, starp kuriem uzcelts tornis ar ieejas vārtiem izveidoja taisnstūra iekšpagalmu. Radīja kompakta plānojuma cietokšņus.

Kursā 1234. g. septembrī juridiski nodibināja Kursas bīskapiju (*episcopatus* or *diocesis Curoniensis*; 1234–1583). Rīgas Domkapituls 1245. gadā ieguva Dundagas novadu un uz pussalas blakus vietējo iedzīvotāju nocietinātajai apmetnei Kalnadārzs sāka būvēt četrstūra plānojuma trīskorpusu Dundagas cietoksni (līdz 1290). Priekšpili un mūra rezidenci iekļāva kopējā aizsargsistēmā. Raunas upes kreisajā krastā Rīgas arhibīskaps uzcēla uz paugura taisnstūra plānojuma trīskorpusu Raunas cietoksni (1262, 1273–1284), pie kura bija baznīca, bet arhibīskapa Limbažu rezidences būvapjomu veidoja četrstūra plānojuma tornis un trīs, bet vēlāk – četri korpusi ap iekšpagalmu. Rezidencei un priekšpilij bija autonoma aizsargsistēma. Baznīcu uzcēla pilsētā. Kursas bīskapa rezidencei izraudzījās Pilteni, bet Domkapitulam – kuršu pilsnovada Bandavas centru Aizputi (*Asenputten*, *Hasenputten*) robežupes Tebras labajā krastā, kur uz pussalas kuršu

apdzīvotā pakalna dienvidrietumu malā ap 1290. gadu uzcēla Sv. Jāņa Evaņģēlista baznīcu un Kursas Domkapitula mītni. Radīja L-veida plānojuma apbūvi. Straupē pie Braslas upes bīskapa vasaļi uzcēla ūdensšķēršļu apņemtu Lielstraupes (*Gross-Roop*) pili (pirms 1310), kurai dienvidaustrumos pieeju aizšķērsoja dīķu sistēma – Braslas pietekas uzstādinājums, kam pāri gāja Rīgas–Tērbatas ceļš. Mūra ietvertam ārējam pagalmam uz rietumiem no pils piekļāvās pilsētiņa (*stat to Rope*). Iekšpagalmu rietumu un ziemeļu malā ietvēra korpusi, bet dienvidu un austrumu malā – mūris. Četrstūra plānojuma četrstāvu torņpilij piebūvēja divus gandrīz perpendikulārus korpusus (15. gs. (?)) un radīja L-veida plānojumu: rietumkorpusā bija dzīvojamās telpas, bet ziemeļkorpusā izbūvēja pils galvenos vārtus un galā uzcēla kopējā aizsargsistēmā iekļautu Straupes baznīcu (15. gs. (?)), kuru izmantoja pilsētnieku draudze.

Prūšu zemēs Olivas klostera mūks Kristians (*Christian von Lekno*; ap 1180–1245) 1222. gadā dibināja Kulmas bīskapiju (*Kulmerland*, vācu: *Bistum Kulm*; 1245–1566/1577) un kļuva par bīskapu. Pamediešu celtā *Kwedis* cietokšņa (11. gs**.**) vietā ordeņbrāļi uz stāvkrasta pie Livas (*Liwa*) ietekas Vistulas labā krasta pietekā Nogatā uzcēla mūra cietoksni (1233) un baznīcu. Kalna pakājē izveidoja apmetni un dibināja Sv. Marijas vārdā nosauktu pilsētu Marienverderu (vācu: *Marienwerder*, poļu: *Kwidzyn*; pilsētas tiesības 1233). Baznīcas rietumpusē uzcēla otru mūra cietoksni (1242–1250) bīskapa rezidencei (1243–1525). Dibināja Pomezānijas bīskapiju (vācu: *Bistum Pomesanien*, poļu: *Diecezja pomezańska*; faktiski no 1249 (1259)–1527), un galvaspilsētā Marienverderā baznīcas vietā cieši klāt nocietinātai bīskapa rezidencei piebūvēja jaunu dievnamu (1264–1284), iesaistītu celtņu kompleksā, kas rezidenci un priekšpili nošķīra no pilsētas apbūves. Dibināja Domkapitulu (1285), un pilsētnieku draudzes pirmā baznīca 1285. gadā ieguva katedrāles statusu. Bīskapam un pilsētnieku draudzei ap 1325. gadu sāka stāvajā kalnā no ķieģeļiem būvēt piecjomu zāles tipa Sv. Jāņa Evaņģēlista katedrāli (poļu: *katedra św. Jana Ewangelisty*; 1284–14. gs. II puse), kuras rietumgalu piekļāva kvadrātveida plānojuma cietoksnim (1322–1347), lai stiprinātu Domkapitula mītnes aizsardzību. Perimetra apbūvē iekļautā Marienverderas katedrāle (vācu: *Domkirche von Marienwerder*; 1343–1384) veica aizsardzības funkcijas. Tornas katedrāli (poļu: *Bazylika katedralna Świętych Jana Chrzciciela i Jana Ewangelisty w Toruniu*; 1236–15. gs.) sāka būvēt 14. gs. pirmajās desmitgadēs, bet 1351. gadā baziliku daļēji iznīcināja ugunsgrēks. Celtni atjaunoja: paplašināja vienu laidumu, rietumpusē uzbūvēja sānu kapelas un torni, kas sabruka. Tā vietā 1480. gados uzcēla masīvu torni, bet ziemeļpusē izveidoja jomu. Palielinātajā būvapjomā radīja zāles tipa celtni. Varmijas bīskaps (1278–1300) *Henryk I* (*Henricus I Fleming*) 1274. gadā sāka Braunsbergā veidot ar grāvi un aizsargmūri nocietinātu Vecpilsētu, kur bīskapa sētā ierīkoja rezidenci (1278–1284), un uz ziemeļrietumiem attīstīja apbūvi. Bīskaps *Henryk I* Domkapitulam nocietinātu rezidenci (*castrum*; 1278–1284) 1280. gadā uzbūvēja zvejnieku ciemā. Katedrāles kalnā (poļu: *Wzgórza Katedralnego*) no koka celtā pirmā un galvenā bīskapijas baznīca 1288. gadā ieguva katedrāles (latīņu: *Ecclesia Warmiensis*) statusu. Varmijas bīskaps (1329–1334) *Henryk II Wogenap* Katedrāles kalnā virzie 1329. gadā sāka būvēt brīvstāvošu trīsjomu taisnstūra plānojuma ķieģeļu baziliku (poļu: *bazylika archikatedralna Wniebowzięcia Najświętszej Maryi Panny i Św. Andrzeja Apostoła*; 1329–1388), paredzētu aizsardzības funkcijai. Varmijas bīskaps (1373–1401) *Henryk III Sorbom* 1388. gadā pabeidza celt katedrāli, un to divās vietās saistīja ar perimetra apbūvi. Dienvidu un rietumu pusē lielo pagalmu ietvēra krusteja. Sembu zemē 1243. gadā dibināja Sembijas (*Sambia*) bīskapiju (vācu: *Bistum Samland*; faktiski 1252–1525), kas nonāca Rīgas bīskapa pakļautībā. Baltijas jūras piekrastē bīskapa rezidencei uzcēla *Schönewick* pili (līdz 1266), un blakus izveidoja ciematu (1266). Samlandes bīskaps (1295–1318) *Siegfried von Reinstein* lagūnas ziemeļkrastā pie upes grīvas, kur atradās bīskapa rezidence (līdz 1525), dibināja *Wiskiauten* (*Vyschuzin*, krievu: *Моховое*, lietuviešu: *Viskiautai*), kurai 1305. g. 14. septembrī piešķīra pilsētas tiesības, bet Kēnigsbergā sāka celt Sv. Marijai un Sv. Adalbertam veltītu trīsjomu katedrāli (vācu: *der Thum*, *Königsberger Dom*; 1333–1380), neparedzot celtnei militāras funkcijas.

The Evolution of Cathedral Planning on the Baltic Sea Southern Coast during the 13th – 14th Centuries in Context of European Building Traditions

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Abstract. In Rome, Emperor Constantin I started to build the most ancient cathedral – the five-nave Archbasilica of St. John in Lateran, but the Lateran Palace was given as a present to Bishop of Rome for his residence. Perimeter building blocks set up the building complex. In Europe, during the 6th–9th centuries numerous rulers proclaimed Christianity as the only religion in the country. The Church strengthened its impact on the society and governmental administration. In Rome, like in Jerusalem, a religious centre was created, but in the middle of the 8th century, a city-state Vatican was founded, and on one of hills, the Pope's residence was placed. Christians organized structures governed by Bishops and founded Catholic church-states – bishoprics.

In the late 12th century, subjugation of the lands populated by the Balts and the Finno-Ugric tribes began. Bishoprics and cult centres were founded, and residences for Bishops and Canonical Chapters were envisaged. The bishopric main building was the cathedral. In Europe during lots of centuries evolution of the cathedral building-type happened. In the Balts and Finno-Ugric lands cathedrals were affected by local building traditions. The origins of the Riga Cathedral (Latvian: *Rīgas Doms*) can be found in 1201–1202, when the bishopric centre from *Üxküll* was moved to the newly-founded Riga, where the Bishop's residence was built on a geopolitically and strategically convenient place. The most important centres to look for inspirations were Braunschweig, Westfalen, Köln, Lübeck, Ratzeburg, Bremen, Hamburg.

Research problem: interpretations of sacral building typology and terminology application cause difficulties in the research of historical building plans. Research topicality: evolution of the cathedral building-type and impact of cathedral building complexes on formation and planning of medieval urban structures during the 13th and 14th century. Goal of the research: analyse planning of historical structure in urban centres of bishoprics to determine significance of cathedrals as architectural dominances in spatial composition of towns. Research novelty: this research is based on Latvian historians and archaeologists' former studies. Nevertheless, opportunities provided by the analysis of urban planning and cartographic materials have been used, and created building due to local construction traditions has been assessed in the European context. Results: study of architecture, layout formation and structure of cathedrals on the southern Baltic Seacoast lands during the 13th and 14th centuries. Main methods applied: this study is based on research and analysis of archive documents, projects and cartographic materials of urban planning, as well as study of published literature and inspection of buildings in nature.

Keywords: bishopric centre, cathedral building-type, city planning, the Riga Cathedral, urban structures

Introduction

In Rome, the military leader of the Roman Empire Marcus Vipsanius Agrippa (64/62BC–12BC) started to build (27 BC) a cylindrical "temple of all Gods" – the Pantheon covered by a 22 m high hemispherical cupola (diameter 43 m) of concrete constructions, which symbolized the heavenly vault. The inner room was illuminated through the wide opening (diameter 9 m) in the centre of the cupola. In 126, Roman Emperor (117–138) Publius Aelius Traianus Hadrianus rebuilt the Pantheon, and in 609, the temple became the Christian Church.

In Rome on one of hills, starting from 46, construction of majestic buildings begun. Under Roman Emperor (98–117) Marcus Ulpius Nerva Traianus's guidance, Apollodorus Damascenus (50/60–130) created for political, administrative and religious centre the symmetrical planning Forum Traiani (Italian: *Fordo di Traiano*; 112) (Fig. 1)

surrounded by the portico. In the complex of monumental buildings (107–113) the Temple of Trajan (Italian: *tempio del divo Traiano*) was placed on the longitudinal axis. The Trajan's Column (Italian: *Colonna Traiana*) in front of the temple was created between two library buildings – one for Latin, but the other for Greek documents. The huge Basilica Ulpia by the colonnade was placed perpendicularly. On the eastern side of the Forum Traiani, on the terrace of the hill's slope a five-storey trade complex from bricks and concrete – the Trajan Market (Latin: *Mercatus Traiani*; 100–112) separated from the forum by a high wall was built. Using Caracalla and Diocletian's therms as samples, in Rome instead of a big warehouse (Latin: *horrea piperataria*) the three-nave Basilica of Maxentius and Constantine (Latin: *Basilica Constantini, Basilica Maxentii*; 308–312) – the first

building covered with a vault was built. A huge statue of Roman Emperor (306–337) Constantinus I Magnus's was placed in the apse on the western side of basilica, but a veranda supported by four columns was erected on the southern side. In Trier, Constantinus I built the Basilica of Constantine (German: *Konstantinbasilika*; 310), where a heated Throne Hall by statues placed in niches of marble wall was suitable for meetings.

Constantinus I gave Roman Bishop the Lateran Palace (Latin: *Palatium Apostolicum Lateranense*) as a gift, so that Popes would have home. In 313, on the Caelian Hill construction of the most ancient Roman cathedral – the Cathedral of the Most Holy Saviour and of Saints John the Baptist, also the Archbasilica of St. John in Lateran (Latin: *Archibasilica Sanctissimi Salvatoris*; 324, rebuilt after 430), whose main relic was the "Holy Stairs", begun. The Archbasilica and the Bishop's residence were included in the perimeter building (Fig. 2). In Vatican (Latin: *Status Civitatis Vaticanæ*), the five-nave Papal Basilica of St. Peter (Latin: *Basilica Vaticana*, *Basilica Sancti Petri*; 324/326–349) with a perpendicular volume to the longitudinal axis or the transept was built instead of the Circus of Nero (Fig. 3). In the hall, in front of the semi-circular apse the altar was erected. It situated just opposite the main entrance at the eastern end, to which the atrium with a fountain adjoined. The entrance in the atrium took along wide stairs and through the triumph arch (Fig. 4). Basilicas built by Constantinus I and his descendants became predecessors of cathedrals.

Bishop of Jerusalem (312–335) *Macarius I* encouraged Constantinus I to knock down the Venus Temple in Jerusalem, and Romans uncovered ancient Jewish burials. The anteroom and burial chamber – a grave with a stone bed for the body (Latin: *arkosolium*) was acknowledged as Jesus's burial site. According to directions, given by Constantinus I's mother Flavia Iulia Helena Augusta (around 250–330), architects Zenobius and Eustace built the Church of the Holy Sepulchre (Latin: *ecclesia Sancti Sepulchri*, German: *Grabeskirche*, *Kirche des Heiligen Grabes*, Russian: *Воздви́жение Честно́го и Животворя́щего Креста́ Госпо́дня*; 325/326–335, destroyed in 1009) on possible authentic site of Christ's punishment outside defensive walls of Jerusalem. In the central part of this church, also called the Church of the Resurrection, or the Church of the *Anastasis* (German: *Auferstehungskirche*), high walls by stone of the Anastasis Rotundas (Italian: *rotonda*, Latin: *rotundus*, German: *Rotunde mit Ädikula*, *Arkadenkranz mit Kuppel*) supported the cupola (Fig. 5). The belfry was built (around 330) next to the five-nave basilica. On 14 September 335, the Church of the Resurrection was solemnly consecrated.
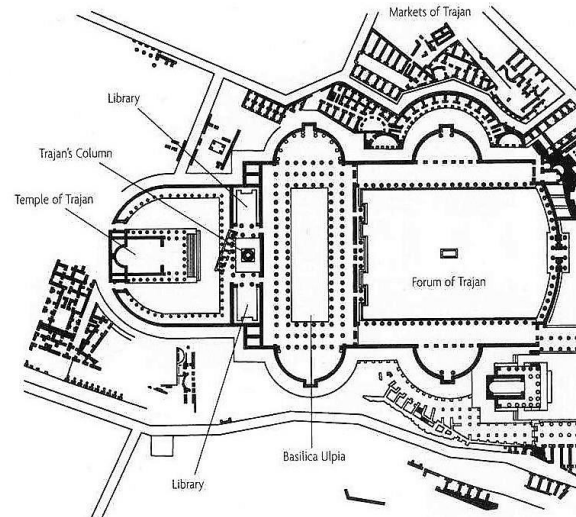
Fig. 1. Rome. The plan with the great Forum of Trajan, 1st century CE [online 19.06.2017, https://upload. wikimedia.org/wikipedia/commons/0/00/Trajan_forum.jpg].
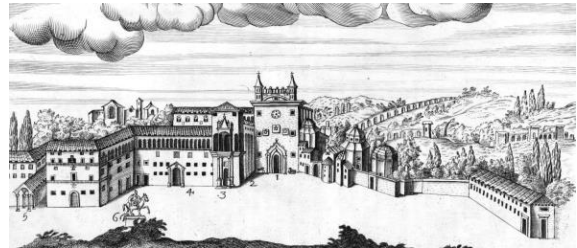
Fig. 2. Giovanni Giustino Ciampini (1633–1698). The drawing of a medieval fortified L-shaped structural complex on the Caelian Hill in Rome: 1 – the Archbasilica of St. John in Lateran, 2 – the Council Hall, 3 – the Balcony of Boniface VIII, 4 – the Lateran Palace, 5 – the Holy Stairs (scala sancta), 6 – the Statue of Marcus Aurelius. 1693. [online 13.01.2018, https://upload.wikimedia.org/wikipedia/commons/0/00/De_sacr is_aedificiis_a_Costantino_Magno_constructis_synopsis_ historica_pag._17_Tab._V.jpg].
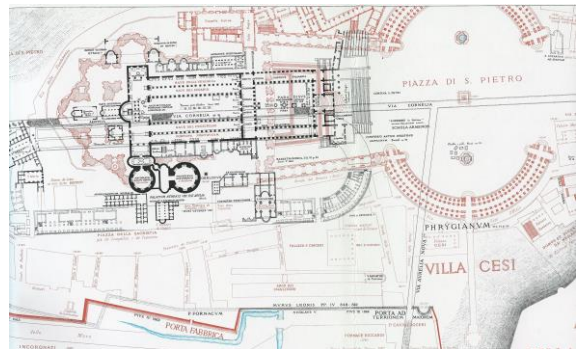
Fig. 3. Archaeologist, Professor at the University of Rome, Rodolfo Lanciani (1845–1929). Plan of St. Peter's Basilica built instead of the Circus of Nero. 2006 [24].

During the 4th century, Christians created worship places to place the altar. The building of elongated layout by a rectangular hall complied with impression about the temple, therefore large-size public buildings – basilicas built by Romans for court sessions, meetings and trade were adapted to cult needs. The main room was divided lengthwise into three or five naves (French: *nef*, Latin: *navis*) with the help of columns or pillars. Windows at the top of walls of the higher and wider middle nave
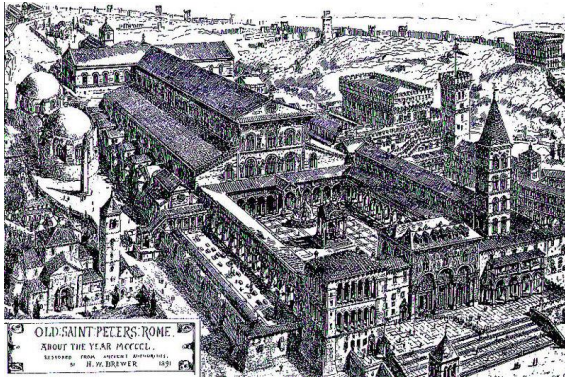
Fig. 4. Henry William Brewer (1836–1903), Old St. Peter's Basilica as it was thought to have looked around 1450. 1891 [online 19.06.2017, http://mentalfloss.com/sites/ default/legacy/wp-content/uploads/2009/04/ospb.jpg].
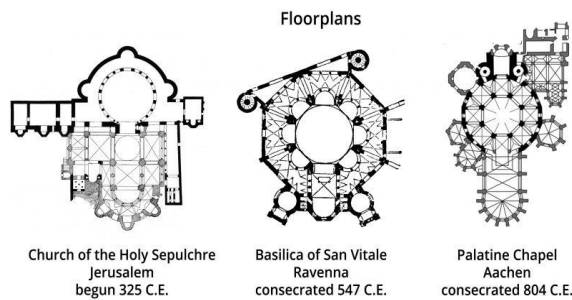
Fig. 5. Floorplans of the Church of the Holy Sepulchre (Jerusalem; begun 325, consecrated July 15, 1149), the Basilica of San Vitale (Ravenna; consecrated 547), the Palatine Chapel (Aachen; consecrated 804) [http://smarthistory.org/wp-content/uploads/2016/09/floorplans.jpg].

Fig. 6. Artist Hans Bornemann (1410–1475). The portrait of Anskar, Archbishop of Hamburg, on the painted panel of the Hamburg Dome. 1457. St. Ansgar's painting can be seen now in Hamburg St. Peter's Church. [online 24.01.2018, https://upload.wikimedia.org/wikipedia/commons/0/07/Bornem ann%2C_Hans_-_Ansgar.jpg].

illuminated the worship room. Unlikely the pagans, Christians did not consider the temple as God's home, but rather than a gathering place for believers. A spatial solution appropriate for the function initially was not related to the symbolism. Only one semi-circular planning niche or apse created in the eastern part of the worship room was just opposite the main entrance in the western part of the building, where in front of the entrance a closed anteroom separated with a wall or narthex was meant for the people who were not allowed to enter the worship room. Initially the layout of sacral buildings was simple, and it consisted of two big zones: the presbyterium, where the sacred ritual takes place, and the worship hall. In front of the main entrance in church's stairs were built. Christians changed architecture of basilicas according to the ritual and created symbolism for religion. Hereafter in the Roman Empire, there were public buildings – basilicas, and sacral buildings – basilicas with the atrium [52, *34*]. Initially, Roman emperors did not allow Christians to build basilicas in the city: they were built outside the city, thus the name "outside the walls" was obtained. Pope (352–366) Liberius built the three-nave Basilica di Santa Maria Maggiore (*St. Mary Major*, Italian: *Basilica di S. Maria Maggiore*; founded in 356) [43, *216*], but Western Roman Emperor (393–423) Flavius Honorius Augustus financed building of the Papal Basilica of St. Paul outside the Walls (Italian: *Basilica Papale di San Paolo fuori le Mura*; around 370). The basilica was considered as a privileged building. Miraculous icons and Saints' relics placed in it, lionized by pilgrims who worshipped Jesus Christ and His mother the Virgin Mary. In Roman Catholic Church, there is distinction between *Basilica majoris* and *Basilica minoris*, which are honorary titles awarded by Roman Pope. All four *Basilica majoris* situated in Rome. They obtained the honorary title and privileges. In Vatican, in the Papal Basilica of St. Peter there is the first Pope (33–67) St. Peter's grave. The Archbasilica of St. John in Lateran is the World's and Roman cathedral, in the Basilica di Santa Maria Maggiore there is the relic of the Bethlehem's Manger, but in the Papal Basilica of St. Paul outside the Walls there is St. Paul's grave. *Basilicas minoris* were located in different cities. Instead of the Christian martyrs' burial site Archbishop of Milan (374–397) St. Ambrose built a three-nave basilica by three apses, but without the transept. The worship room of the Basilica of Sant'Ambrogio (Italian: *Basilica di Sant'Ambrogio*, official name: *Basilica romana minore collegiata abbaziale prepositurale di Sant'Ambrogio*; 379–386) was covered by two crossed half-circumferential vaults, creating cross-vaults.

It was considered, that baptism symbolized beginning of a new life and person's inclusion in the believers' community. Running water was important in the Baptism ritual, although water in a pool was also appropriate. In Italy, a special room for Baptism – the octagonal (number 8 symbolizes rebirth) planning Baptistery of Neon (Italian: *Battistero Neoniano*; 400–450) became as a sample for lots of buildings. One of the main relics for Christians is the Holy Cross, to which, according to the Christian Doctrine, Jesus Christ was crucified. In Ravenna, an early cross-cupola building of bricks – the Mausoleum of Galla Placidia (Italian: *Mausoleo di Galla Placidia*; 425) crested with a cubical tower was built for the oratory, chapel or baptistery orientated north-southwards, whose layout reminded of a Latin cross. Quite possibly, it was related to the narthex of the Basilica of San Vitale (527–547) [52, *36*]. In 547, Patricius of the Roman Empire Theoderic the Great (454–526) consecrated an octagonal planning temple for the martyr *Saint Vitalis* [43, *174*]. Gallery included the central room covered by a cupola (diameter 16 m) supported with 8 pillars, but an elongated apse was made for the altar. Basilica of San Vitale (Fig. 5) obtained a special status in Christianity.

During the Charles the Great's reign, simple construction volumes were created, without overloading the surface with components. The central part of the Aachen Cathedral was made of the octagonal planning Palatine Chapel (Fig. 5) covered by a cupola. The eastern part of the chapel consecrated by Pope (795–816) Leo III in honour of the Virgin Mary was closed with the apse, but in the western part in front of the entrance, there was the atrium, and on each side of the monumental narthex a cylindrical staircase tower was built. The belfry was erected in the 14th century [43, *43*].

During the first centuries of Christianity, in the early basilicas the bishop's throne or cathedra (Latin: *Cathedra*, Greek: *Kathedra* – "desk") was placed deep in the apse. In the basilica with the cathedra (German: *Kathedralkirche*, *Kirche der Kathedra*, Latin: *ecclesia cathedralis*), as well as in the cathedral (German: *Kathedrale* or *Dome*) the Holy Court, philosophical contemplations took place and political issues were discussed, but the metropolitan governed the metropolis symbolically, archbishop – the archdioceses, but bishop – the bishopric. Until the 14th century, the cathedral was used for religious and social activities.

In different regions of Western Europe, various trends existed in cathedral building: in France, the School of Burgundy, Provence, Aquitaine and other schools, but in German lands – Schools of Saxony and Rhein, where construction volumes of cathedrals were massive and simple. Diverse architectonic forms and elements reflected local building traditions and artistic taste. Byzantine impact on cathedral building was felt in the Adriatic Sea coastal cities. In Burgundy, where the Roman Catholic Church had a special influence, during the economic and cultural upswing an abbey was created in Cluny (also Cluni), which became as a sample in church building during the 9th–11th centuries. In the south and south-west part of France as Provence, Aquitaine and somewhere else the link with the Mediterranean coastal lands, Italy and Byzantium was preserved and own architectural traditions and constructive techniques were created. Hall-type buildings (German: *Hallenkirchen*) with one or three naves, applying lancet arches, vault constructions and cupolas for the ceiling, were built, but façades were abundantly decorated. The cathedral architecture of the northern part of France was simple – cylindrical vaults were used for the middle-nave covering, but cross vaults for the side-naves.

In Bremen at the Market Square next to merchants' guilds and city seniors' houses, the Town Hall and the Roland's Statue, the first Bishop of Bremen (787–789) Willehad built from wood the Bremen Cathedral, dedicated to St. Peter (German: *Bremer St. Petri Dom*; 789), but the Saxons burnt down this building. Bishop built the cathedral (805), where in the middle-nave of the worship hall and the side-naves was made with the choir. In Hamburg, instead of the burnt wooden church Benedictine monk Ansgar (*Saint Ansgar*; 801–865) built from stone Saint Mary's Cathedral (German: *Hamburger Dom*, *Alter Mariendom*) (Fig. 6) with a tower in order to provide observation, protection, sacral ritual and entrance functions. Christians founded the Roman Catholic Archdiocese of Hamburg (Latin: *Archidioecesis Hamburgensis*, German: *Erzbistum Hamburg*; 831) and Ansgar became the archbishop in 831. Hamburg was conquered (845–848) by the Danes, and building was burnt down. In 847, in the alliance with Bremen the Archdiocese of Hamburg-Bremen (Latin: *Episcopatus Bremensis*, German: *Erzbistum Bremen*) was founded, and Ansgar, whose residence due to the Polish attack was moved to Bremen, in 848 became the first archbishop [41, *109–110*]. In 1041, the Bremen Cathedral, dedicated to St. Peter, and a part of the library was destroyed by fire. Hamburg-Bremen Archbishop (1043–1072) Adalbert I (*Adalbert von Bremen*) started construction of a new cathedral and invited Adam from Bremen to write the chronicle "History of Bishops from Hamburg Churches" (*Gesta Hammaburgensis ecclesiae pontificum*; between 1072 and 1076) [30, *73*]. In 1060,

in the Kingdom of Denmark the Diocese of Lund (Swedish: *Lunds stift*) was founded and the Christianity Centre was opened. Bishops were Germans, who maintained a close link with the Hamburg-Bremen Archbishopric.

After the victory in Palermo, Italian architect Buscheto (Bushetto) started to build a five-nave basilica in Pisa – the Pisa Cathedral (Italian: *Duomo di Pisa*, *Duomo di Santa Maria Assunta*; 1063–1118) (Fig. 7). Basilicas in Florence and Pisa had colonnades and flat ceiling, but crypts and side-naves were covered by vaults. In the intersection place of the equal coverings of the middle-nave and side-nave a stone cupola was erected (1090–1383), creating the feeling of spaciousness inside of the large mosque. In the middle part of the main façade, a round rose window symbolized the Fortune Wheel, Sun, Christ or the Virgin Mary compared with a rose without any thorns [52, *40, 46*]. Architect Rainaldo completed the Pisa Cathedral by richly decorated external walls, using stylistically different Byzantine, Islamic and Lombardian elements. In 118, Pope (118–119) Gelasius II consecrated it. The cathedral became the principal building in the ensemble, which included also the belfry (1174–1372) and Baptistery (Italian: *Battistero di Pisa*; 1153–1265/1278) built by Diotosalvi (also Deotislavi).

Previous researches on cathedrals in Western Europe: drawings of medieval cathedrals' façades, plans and sections have been collated in the edition "*Kirchliche Baukunst des Abendlandes*" [9], prepared by art historian Georg Gottfried Julius Dehio (1850–1932) and Gustav von Bezold (1887–1901). "*Heinrici Chronicon*" (1993) [16] tells us about events in the Lund Cathedral (Swedish: *Lunda domkyrka*; 1080–1145), dedicated to Saint Lawrence. The architectural assessment of the world's most outstanding buildings can be found in the book "*Мировая архитектура*" (2012) [52] by Russian writer, art historian Pyotr Gnedich (Russian: *Петр Петрович Гнедич*; 1855–1925). Hungarian architect, academic Máté Major (1904–1986) has been analysed architecture of ancient buildings of Roman Empire and Middle East in the book "*Geschichte der Architektur. Die Architektur der Urgemeinschaften und Sklavenhaltergesellschaften*" (1957) [26]. In the 1st volume of the edition "*Geschichte der Architektur*" (1984) [27] this information has been supplemented by the description about the first Christian buildings in Jerusalem – the Church of the Anastasis and Basilica of the Nativity (Latin: *Basilica Nativitatis*). The 2nd volume is dedicated to architecture of the most ancient cathedrals and churches in Europe. The abundantly illustrated book of history of architecture is "*Historia architektury w Zarysie*" (1959) [5] by Polish architect Tadeusz Andrej
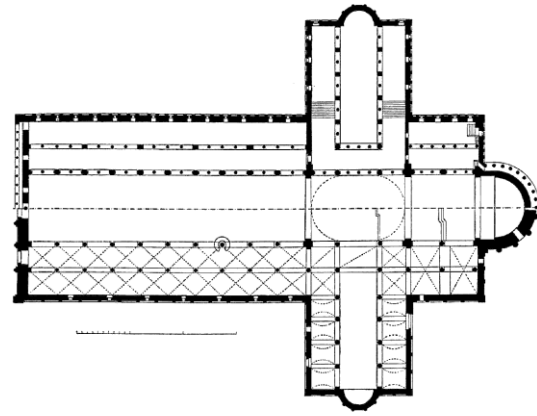
Fig. 7. Art historian Georg Dehio (1850–1932), Gustav von Bezold (1887–1901). Plan of the Pisa Cathedral (1063–1118) [9].

Fig. 8. Overwiev of the Lunda Cathedral (1080–1145) [online 19.06.2017, https://upload.wikimedia. org/wikipedia/commons/thumb/4/4f/Lunds_domkyrka%E2%80 %93flygbild_06_september_2014.jpg/800px-Lunds_domkyrka%E2%80%93flygbild_06september2014.jpg].
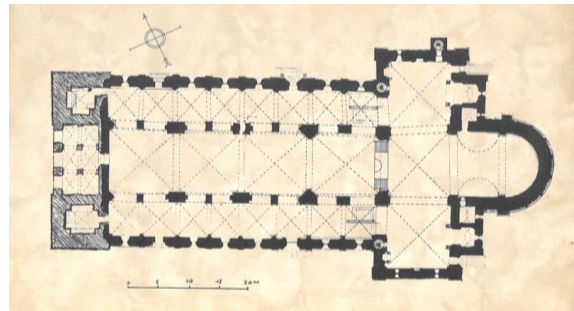
Fig. 9. Plan of the Lunda Cathedral [online 19.06.2017, https://larsgahrnskriver.files. wordpress.com/2011/05/bild4.jpg].

Broniewski (1894–1976). There are 799 pictures with precise information on their authors, and descriptions about medieval cathedrals in Europe have been collated. Dr. Hubert Kürth and Dipl.-Ing. Aribert Kutschmar in the book "*Baustilfibel*" (1976) [23] illustrated by drawings and photos have dedicated two chapters to medieval cathedrals – "*Die Baukunst der Romanik*" and "*Die Baukunst der Gotik*". In the book "*История градостроительного искусства*" (1984) [55] Professor Dr. art. Tatiana Savarenskaya (Russian:

Татьяна Фёдоровна Саваренская; 1923–2003) analysed the most ancient cathedral placement in urban environment. Architecture of cathedrals has been analysed in the book *"История архитектуры"* (1984) [53] by historian of architecture and urban construction Nikolai Gulyanitsky (Russian: *Никола́й Феодо́сьевич Гуляни́цкий*; 1927–1995) and in joint-work *"Античное искусство: Очерки"* [54] (1988) by Nina Dmitrieva (Russian: *Нина Александровна Дмитриева*) and Ludmila Akimova (Russian: *Людмила Ивановна Акимова*), as well as in two volumes of *"Очерки по истории архитектуры"* (2003) [48, 49] by Nikolai Brunov (Russian: *Николай Иванович Брунов*). Latvian art scientist Skaidrīte Cielava (1920–2005) prepared an educational, dedicated to art processes in the world, – series of books *"Vispārīgā mākslas vēsture"* /General History of Art/ [8], where in the 2nd volume architecture of medieval cathedrals has been analysed. Italian architect, historian of architecture, one of the founders and presidents of the Italian Urban History Association (Italian: *Presidente dell' Associazione italiana di storia urbana*) Guido Vittorio Zucconi (b. 1950) provides information on the Florence Cathedral in the book *"Firenze guida all'architettura"* (2007) [47]. History and descriptions of the world's architecture about medieval cathedrals in Europe have been collated in the edition "A Global History of Architecture" (2007) by Professor (1991) Dr. Francis D. K. Ching (b. 1943) and architecture historian Professor Dr. Mark M. Jarzombek (b. 1954) (the edition *"Всемирная история архитектуры"* (2011) [56] is the translation into Russian). The book "Cathedrals and Churches of Europe" (2015) [43] by Rolf Toman, Alan Bednorz and Barbara Borngässer is informatively rich and illustrated.

Previous researches on the Riga Cathedral: in the late 18th century, artist Johann Christoph Brotze (1742–1823) started to depict urban building for the sake of research. In the 1st volume of the edition *"Zīmējumi un apraksti"* /Drawings and Descriptions/ (1992), fragments of plans by the Riga Cathedral placement [4, *84–85*], descriptions, containing information of the building [4, *43–78*] have been included. Riga sights, where the Riga Cathedral can be seen [4, *43, 48, 62, 63, 65, 66, 67, 68, 70, 73, 74, 75, 76, 78*], have been collated.

At the end of the 19th century, the complex approach to building's restauration quickly contributed to the detailed study of the Riga Cathedral. At that time careful study of this object, including the prospection method and archaeological excavations, became one of the most essential work methods for new pleiad of art and architecture historians, which introduced studies of Latvian art history on a professional level. As the

most famous building researchers could be mentioned architect Wilhelm Bockslaff (1858–1945) and architect Wilhelm Johann Carl Neumann (1849–1919) who published the first essay about art history *"Grundriss einer Geschichte der bildenden Kunste in Liv-, Est- und Kurland vom Ende des 12. bis zum Ausgang des 18. Jahrhunderts"* (1887) [32], in which medieval buildings and cities have been described, but, having become the builder of the Riga Cathedral, he implemented reconstruction of the building. As the manager of the Riga Cathedral renovation, he published the *"Der Dom zu St. Marien in Riga"* (1912) [31]. Architect of Pärnu City, building art lecturer of Tarbatu University Architecture Faculty Reinhold Ludwig Ernst Guleke (1834–1927) has depicted the Riga Cathedral especially broadly in photos, drawings of details and surveys in the collection *"Alt-Livland"* (1896) [33, *194*]. Old photo of the Riga Cathedral can be seen in the edition of the Church Central Administration, issued during the Latvia Republic period, *"Latvijas evaņģēliskas luteriskas baznīcas. Mārtiņa Lutera Mazā katķisma un Augsburgas ticības apliecības 400 gadu atcerei"* / Evangelical Lutheran Churches of Latvia. Certificates of Martin Luther's Small Catechism and Augsburg Confession for 400 Years of Remembrance/ (1929/1930) [25]. An old picture with the Riga Cathedral placement in the urban environment has been published in the edition History of Latvia (2009) [39, *189*] by diplomat, historian, Latvia University Philology Doctor of Roman languages, Professor Dr. phil. Arnolds Spekke (1887–1972). Artists' work related to Riga have been included in the album *"Senā Rīga gleznās, zīmējumos un gravūrās"* /Old Riga in Paintings, Drawings and Engravings/ (1937) [37], but Professor Dr. Hans Schröder compiled in the *"Riga im Wandel der Zeiten"* (1942) [36]. Culture historian Jānis Straubergs (1886–1952) has collated pictures, descriptions, also about the Riga Cathedral, maps about the Old Riga in six notebooks *"Rīgas vēsture"* /History of Riga/ (1937) and in the book *"Vecā Rīga"* /Old Riga/ (1951) [42, *73–77*]. The history of Riga and its old churches has been published in the edition dedicated to Latvia anniversary *"Latvijas pilsētas valsts 20 gados"* / Cities of Latvia during 20 Years of the State / (1938) [40].

The capacity of the empirical thought has a limit, beyond which the vicious circle of never-ending interpretations starts, therefore, it is essential to emphasize the initial research stage and work methods related to it. A researcher of buildings on the initial stage in his work has the closest contact with the research object, which is accurately documented and studied, fixes the evolution of building forms and interconnection with constructions and materials and generates primary

information which is further applied by theoreticians. Historian of architecture, candidate of art sciences Yuri Vasilyev (Jurijs Vasiļjevs; 1928–1993) did not theoretically try previous cognitions, but hypotheses and assumptions tested in nature. Lacking the written resources, the source of information became the object itself. It was the advantage of researcher in comparison with a theoretical analysis [10, *173*]. Yuri Vasilyev introduced the methodology of architecture research, which during the 1950s was a novelty in Latvia. The main essence was awareness of the carefully written and iconographical material together with a detailed study in nature [10, *167*].

The Latvia SSR Academy of Sciences and The State Committee for Building and Architecture of the Latvian SSR of the Council of Ministers issued an album dedicated to Riga architectural monuments (1956). Authors are Latvia SSR meritorious architect, Chairman of Latvia SSR Council of Ministers Architecture Department, Vice Chairman of Latvia SSR National Building Affairs Committee Ēvalds Ādolfs Kišē (1899–1974), who in 1930 started studies at Moscow Architecture Institute, worked as an architect in the urban building design trust department in Moscow, and Leons Plauciņš (1903–1993) [19]. In 1960, a volume of the Tartu University scientific articles collection was issued as art historian, pedagogue, Professor Dr. art. Voldemar Vaga's (1899–1999) monography about the spatial form issues of Estonian and Latvian medieval churches – development of basilica and hall-type buildings in Livonia, emphasising the significance of St. Mary's Church, also the Riga Cathedral (Latin: *Domus Dei*, Latvian – "*Dieva nams*") in development of cult architecture in Estonia [50]. After the Riga Cathedral restauration (1962) a special booklet "*Rīgas Doms*" /The Cathedral of Riga/ (1966) [35] illustrated by pictures of the renovated building was published. During the Soviet time, the first research, which was not worse than the scientific level of the pre-war period, was the work by architect Yuri Vasilyev, who an important part of his working life dedicated to the complex of Riga St. Mary's Cathedral. He also devoted a book to Riga architectural monuments (1971), in which the information on the Riga Cathedral was included [51, *24*]. Vasilyev had a good knowledge on the history of Riga Cathedral's restoration. He considered that the incomplete basic information could create further misunderstandings and mistakes, so the description of the restoration was included in the publication (1975) about Latvian building monuments' research history [44]. Due to different reasons, the research was not published till 1985. Prof. Voldemar Vaga's conclusions about the Riga Cathedral Basilica as the original one and only

volume solution were contradicted. Already in the late 1960s, knowing the bad technical condition of cloisters' small capitals, he in cooperation with Ieva Miķelsone and Margarita Zarenkova carried out a survey of these details. In 1975, a similar work with participation of Vita Rinkeviča and Vladimirs Neilands was organized. Sketches and notes about the Riga Cathedral shows on serious absorption, but in archives written records are missing. Drawings are shown, that Vasilyev cooperated with researcher of medieval architecture, engineer builder Gunārs Erdmanis (1927–1990) and also used a graphical analysis of planning and proportions of building forms [10, *171–172*]. Further activities in the research of the Riga Cathedral linked to the 1980s, when extensive repairs were going on. During that time, the need to prepare materials for several publications and the album about the Riga Cathedral ordered to look for answers again in the same objects [1]. Information on the Riga Cathedral art values has collated in the book "The Riga Dom Cathedral stained glass" (1997) [38].

Cathedral, church and chapel are typologically different sacral buildings. In the Middle Ages, each of them had its own function, spatial structure and location in the urban environment. In Dr. arch. Jānis Zilgalvis's essay "*Latvijas arhitektūras īsa vēsture*" /Concise History of Latvia Architecture/ (1993, see p. 15) [45], as well as Professor Dr. habil. arch. Jānis Krastiņš, Professor Dr. habil. arch. Ivars Strautmanis (1932–2017), Riga City Chief Architect Jānis Dripe's (b. 1953) joint work "*Latvijas arhitektūra no senatnes līdz mūsdienām*" / Latvia Architecture from Ancient Times till Nowadays / (1998, see p. 29 of the 1st chapter of "*Latvijas arhitektūra no senatnes līdz mūsdienām*" / Latvia Building Art during the Course of Ancient Centuries/, written by Krastiņš) [21], the Riga Bishop's cathedral or the Dome is incorrectly called as church, which is another and from the cathedral a different type of sacral building.

Dr. arch. hon. causa Andrejs Holcmanis (1920–2009) in his book "*Vecrīga – pilsētbūvniecisks ansamblis*" /Old Riga – an Urban Ensemble/ (1992) described the layout of ancient settlements and building from the urban point of view, summarized the history of the Old Town of Riga, emphasizing the special significance of the Riga Cathedral [18, *93–98*] in the medieval urban planning and building. However, in the essay of Riga history published in the encyclopaedia "*Latvijas pilsētas*" /Cities of Latvia/ (1999) [17], the Riga Bishop's Cathedral has not been mentioned at all. Art scientist Dr. art. Elita Grosmane has collated information on Bishop Albreht's (German: *Albrecht von Buxthoeven*, Latin: *Adalbertus Canonicus Rigensis*; 1165–1229) intention and

cathedral construction in Riga (2000) [11] and architectural and art values of the Riga Cathedral [14], but Prof. Krastiņš and Prof. Strautmanis, working together, in the guidebook "*Lielais Rīgas arhitektūras ceļvedis*" /The Great Guidebook of Riga Architecture/ (2002) [22] introduce their readers with the most important medieval buildings in Riga, whereas the description of the Bishop's Cathedral confirms formal attitude: the altar part of the church plan, put in for illustration, is turned towards the west. Prof. Krastiņš describes architecture of the Riga Bishop's Cathedral in the book "*Rīgas arhitektūras stili*" /Styles of Riga Architecture/ (2005) [20, *40–45*]. In the book "*Latvijas mākslas vēsture*" / History of Latvian Art / (2004) [3] Dr. art. Laila Bremša, Dr. art. Aija Brasliņa, Mg. art. Dainis Bruģis, Dr. art. Stella Pelše, Mg. art. Inta Pujāte provide a survey of Latvian sacral architecture and art. Professor Dr. hist. Ilgvars Misāns and Asoc. Prof. Andris Šnē of Latvia University History and Philosophy Faculty have prepared materials for seminars in Medieval History of Western Europe "*Klosteris, pils un pilsēta*" /Abbey, Castle and City/ (2004) [29]. Historian, inspector of culture monuments to be protected Vitolds Mašnovskis (b. 1942) describes cultural and art values of the Riga Cathedral [28, *258–283*]. Archaeologist, Professor Dr. habil. hist. Andris Caune (b. 1937) and Dr. hist. Ieva Ose in the encyclopaedia "*Latvijas viduslaiku mūra baznīcas. 12. gs. beigas – 16. gs. sākums*" /Medieval Stone Churches of Latvia. The late 12th cent. – the early 16th cent./ (2010) [7] analyse the Riga Cathedral in a great detail.

In 2006, a sketch design was prepared for the Riga Cathedral restoration – restoration plan, in which the information on further Riga Cathedral application, building history, art values, exterior and interior, building constructions, engineering and technical communications were included. The long-term chairperson of the Restorers' Society Dace Čoldere and Jānis Zilgalvis in collective monography "*Rīgas dievnami. Arhitektūra un māksla*" / Churches of Riga. Architecture and Art / (2007) in the research on the Riga Cathedral [46] have published unique pictures of the Riga Cathedral in the second half of the 18th century, sections and plans of monastery's Chapter Hall (13th cent.) made in 1932 by architects Ādolfs Vilmanis (1904–1991) and Jānis Līcītis (1908–1981), the Riga Cathedral in Augusts Vegers's engraving published in the "*Rigascher Almanach für 1877*", and a photo of monastery's yard after the reconstruction in the early 20th century from V. Kamals's collection. Unfortunately, authors of the exciting research are not consequent in terminology application and they write about the building – St. Mary Dome Church (cathedral) (Latvian: "*Sv. Marijas jeb Doma baznīca (katedrāle)*") [46, *65*]. The issue of the authorship and influence area of the construction plastic arts' samples has obtained new outlines in Elita Grosmane's studies [12, 13]. Art historian Dr. art. Agnese Bergholde-Volfa (b. 1980) has studied building plastic arts of the Riga Cathedral [2]. She is also not consistent when using the terms. She calls the Riga Cathedral as church. In the context of construction of monasteries in Europe, Assist. Prof. Mg. arch. Silvija Ozola has analysed two urban structures of the Riga Archdiocese Centre's planning [34, *76–77*].

Research problem – mistakes and insufficiencies emerge in medieval architecture studies, if methods of graphical analysis are absolutized and significance of the archaeological research is not appreciated, but self-isolation within the framework of one branch, without listening and applying opportunities of cooperation with specialists of other close branches, using an autonomous research method closed within one branch, and analysing the object only from the archaeologist, architect's positions, the base for a confusing and even false information is created. Cathedral, church and chapel are typologically different sacral buildings, whereas lots of researchers in Latvia change arbitrarily the status of buildings: the Bishop's Cathedral, including also the Riga Cathedral, are called as the church. Research novelty: analysis the bishoprics' cathedrals planning and structure in the context of regional and European building traditions, as well as the Riga Cathedral, which affected the 13th–14th century Riga urban development and formation of cult centres, subjugated to the Riga Archbishopric. The goal of the research: analyse evolution of the cathedral planning, common and different characteristics of cathedral layout and spatial structures, as well as the Riga Cathedral role in formation of environment of cult centres. Main methods applied: photo fixations, cartographic and graphic materials have been used for the analysis of cathedrals and urban centres.

Development of the cathedral building-type in the German lands in the 11th–13th centuries

During the 11th–12th centuries, two tendencies characterized the complex and controversial development of Western Europe: national self-determination efforts, due to whose impact feudalism flourished, and conservative processes, which delayed the national development for a long time. Tectonic thinking fitted in organically in the creative synthesis of both opposite systems. In cities, cathedrals took the leading position and in the 13th century replaced monastery churches [30].

The peculiarity of cathedrals was not determined by varied building materials, or geographically climatic conditions, but rather by the socially political development of the country, culture-historical, artistic and building traditions.

One of the "Emperor's cathedrals" (German: *Kaiserdom*) in the Holy Roman Empire was the Speyer Cathedral (Latin: *Domus sanctae Mariae Spirae*, German: *Speyerer Dom, Kaiser- und Mariendom zu Speyer*; reconstructed in 1030), which was rebuilt. The solution of the cathedral's western construction volume could have depended on the practical and liturgical function meant for that (staircase tower or functional westwork). The westwork and transept was made, but a tower was built for the choir on each side, and in 1040 the crypt (Latin: *crypta*) was built under the altar. The main nave covered with flat wooden ceiling was closed with a semi-circular apse, which was rectangular from the outside. One of the biggest Christians' cathedral, which was also politically important and symbolized the Emperor's power, was consecrated in 1061 [43, *22*], but later it was extended. Building was finished in 1106. In Mainz, instead of the church destroyed in fire in 1081, construction of the three-nave basilica with columns – the Mainz Cathedral or St. Martin's Cathedral (German: *Mainzer Dom*, Der Hohe Dom zu Mainz or, officially, *Der Hohe Dom zu Mainz*; 1100 and 1137) was started. Saint Martin of Tours (Latin: *Sanctus Martinus Turonensis*; 316 or 336–397) and St. Stephan (*Stephanus*) became its patrons. The old *Abschluss des Ostbaus* was replaced with a large apse with a narrow arch (German: *Blendarkaden*) gallery (German: *Zwerggalerie*) – elements which were used for the first time for the Speyer Cathedral, but the second time for the eastern apse of the Mainz Cathedral. It seems that five niches in the gable (German: *Giebel*) arranged in the growing order on the right and left were borrowed from the Speyer Cathedral. It is possible that the square planning prismatic tower built by Willigis-Bardo (around 940–1011) was replaced with the octagonal cupola, and the idea was borrowed from the Speyer Cathedral to make the crypt (German: *eine dreischiffige Hallenkrypta*) under the three-nave hall of the new eastern choir, whose construction was not continued. The middle tower on the eastern side was essentially rebuilt several times. The eastern transept (German: *Querschiff*) round the brick tower was raised and extended. A tower of staircase was built on each side of the apse [43, *26*]. Two big portals took to passages on the right and on the left from the apse, above which there were two floors, where the application of rooms has not been found out yet: possibly, the sacristy and archive, accessible only form the chancel, and storerooms were on the lower floor, but upstairs there might have been the chapel. The emperor's death in 1106 marked a significant turning-point in construction: the building was completed in a hurry and incompletely. It is considered, that unfinished transept and portals were made during 1125–1130. Cross vaults were used for covering in Worms St. Peter's Dom (German: *Wormser Dom, Dom St. Peter zu Worms*; 1130–1181). Two span lengths in side-naves complied with each covering span length in the main nave. This system was especially common in German cathedral architecture. Building façades had monumental simplicity, which expressed the spatial composition of the building. The arch motive dominated in the modest décor [53, *78*]. Emperor built three grand cathedrals – the Cathedral of Speyer, Mainz and Worms.

During the second Crusade (1147–1149), knights rebuilt the Christians' most sacred place the Church of Resurrection. Towards the cardo maximus was turned the façade with the entrance gate, in front of which in the early 12th century the atrium of stones was made (Fig. 5), and on its western side the Lord's Brother St. Jakov's Orthodox Church (Russian: *церковь святого Иакова, брата Господня*; 1009–1055), built for the first bishop in Jerusalem. The Chapel of St. Mary Magdalene (Russian: *греко-православная часовня святой Марии Магдалины*; 1009–1055) made in relation to its baptistery. Construction of the belfry (arch. Maitre Jourdain; 1160–1180) was completed in 1172, but later its height was decreased for two floors. In the main temple of the Church of Resurrection Catholicum (Russian: *Кафоликон*, German: *Katholikon*; 1160–1170) or Eastern Orthodox Patriarchate of Jerusalem (Russian: *кафедральный храм для Патриархов Иерусалимской Православной Церкви*), the Anastasis Rotonda covered the sanctuary divided into two parts. On eastern side of the Coptic Chapel (Russian: *Кувуклия, Коптская капелла*) in external Angel's Chapel (Russian: *придел Ангела*) a low pilaster with a built-in stone – the Angel Altar, placed above the Golgotha cliff rock, that had supported the Holy Cross. In the wall of Rotonda three altars are built – one is facing the south, the other – the north. The altar of the Chapel of the Syrians or Jacobite Chapel (Russian: *придел православных сирийцев (Сиро-Яковитской Церкви) или придел Никодима*) built in the back of the 11 m high west-side external wall of the former Constantine Basilica is turned towards the east. According to street layout, four entrances with eight doors were made opposite each other. The renovated Church of Resurrection was solemnly consecrated on the 50th anniversary of Jerusalem conquest, 15 July 1149.

In Scandinavia the only archbishopric – the Archdiocese of Lund was founded, where a basilica

of stone with wooden ceiling – the Lund Cathedral dedicated to Saint Lawrence (Fig. 8, 9) was built. The main entrance in the western façade was surrounded by twin towers. The altar of crypt was consecrated in 1123, but the main altar of the cathedral – on 1 September 1145. Sweden fell into Lunda's influence, and in the early 12th century, the metropolis was founded, where bishops of Denmark and northern countries were consecrated. In the 12th century, in the Kingdom of Sweden six bishoprics and the centre of archbishopric in Uppsala (1164) were created. In 1234, the Lunda Cathedral was destroyed by fire [16, 7].

The cathedral type further development was affected by four cathedrals built by Duke Heinrich der Löwe (around 1129–1195). On 11 August 1154, on the highest spot of the Old City of Ratzeburg in the north part of the island the first Bishop of Ratzeburg (1154–1178) Evermod laid the foundation-stone for the Ratzeburg Cathedral (German: *Dom von Ratzeburg*) (Fig. 10), which altar part was built by 1160, but in 1220 the entrance was made in the south side. In the second half of the 13th century, in the Bishopric of Ratzeburg (German: *Bistum Ratzeburg*) the cloister and Canonical Chapter's building were built for Premonstratensians. On the west side of the Ratzeburg Cathedral instead of the initially envisaged two-tower façade the construction volume is closed by the middle tower built around 1251, with side outbuildings on the height of the middle nave. Having returned from the Holy Land, Duke laid the foundation-stone for the Brunswick Cathedral (German: *Braunschweiger Dom*; 1173–1226) in 1173, but although during 1182–1185 he was evicted to England. Under the choir, the crypt for the three-apse cathedral was built. In the west part of the Brunswick Dome the middle room of the three-part planning construction volume was made as a narrow corridor. On 29 December 1226, the building was consecrated as the collegiate church, which became a sample for the Bremen Cathedral, dedicated to St. Peter (German: *Bremer St. Petri Dom*, *Bremer Dom*) (Fig. 11), and the church of Segeberg Augustinian Monastery (German: *Augustinerkloster Segeberg*; 1134) [11, *59–60*]. Three-nave basilica (Fig. 12) of the Lübeck Cathedral (German: *Lübecker Dom*; 1173–1230), founded by Duke in 1173, was built until 1247. In the Lübeck Cathedral's interior, the bay between the towers opens towers the longitude in its whole height. In 1241, Lübeck (on the Baltic Seacoast) and Hamburg (on North Sea coast) signed the trade agreement, which can be considered as the beginning of the Hanseatic League (Latin: *Hansa Teutonica*, German: *Deutsche Hanse*). In Gotland, where the Visby Cathedral (Swedish: *Visby domkyrka*, *Visby S:ta Maria domkyrka*; 1225) (Fig. 13) was built, after 1241 Germans established a significant centre.
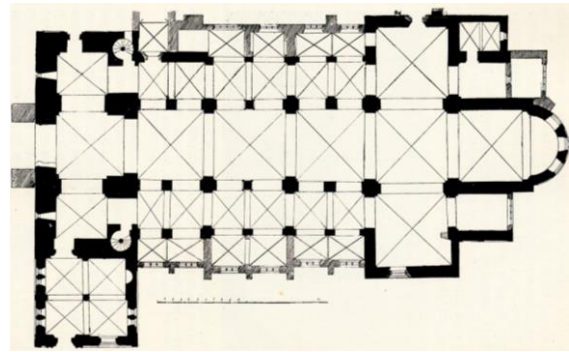
Fig. 10. Plan of the Ratzeburg Cathedral. Around 1880 [Grundriß des Domes vor dem Umbau online 07.06.2017, http://www.ratzeburgerdom.de/images/gross/haupt_46.jpg]
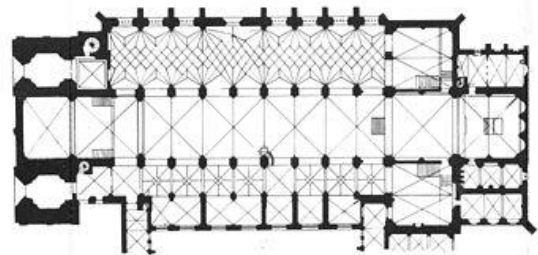
Fig. 11. Plan of the Bremen Cathedral before its restauration in 1888 – 1901. On the south side the monastery building was destroyed by fire in 1912. 1888. [online 19.06.2017, https://upload.wikimedia.org/wikipedia/commons/thumb/0/02/BremenDomGrundriss.jpg/360px-BremenDomGrundriss.jpg]
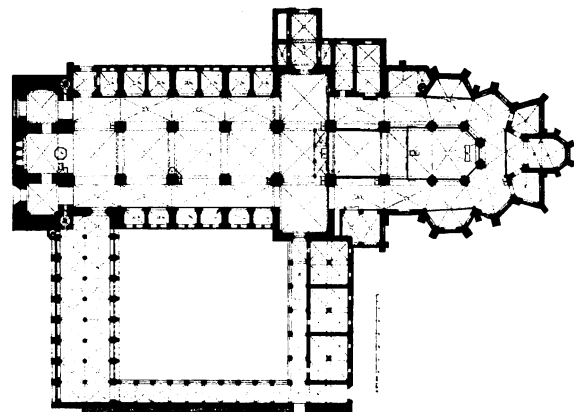
Fig. 12. Plan of the Lübeck Cathedral with the circular passage around the chancel, built later. 1878. [Plan des Lübecker Doms vor 1878. online 19.06.2017, http://upload.wikimedia.org/wikipedia/commons/thumb/7/77/GrundrissDom.png/220px-GrundrissDom.png]
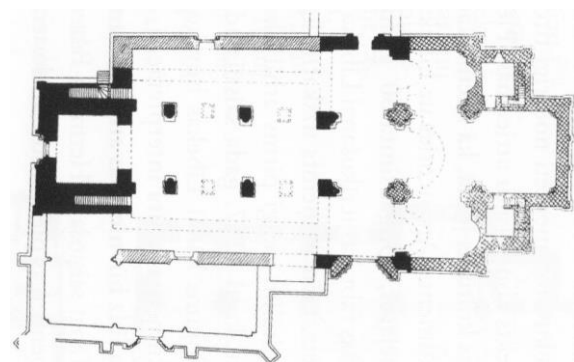
Fig. 13. Plan of the Visby Cathedral [2, 75].

Riga Bishop's Cathedral erecting under the impact of German building traditions

Bishop of Riga Albrecht spent his youth in the Bremen Cathedral, which often highlighted as one of the second Riga Cathedral's (Fig. 14) pre-sample. This time coincided with the upswing period of the Archdiocese of Hamburg-Bremen, introduction of the expansion policy in the Baltics and active building of the Ratzeburg Cathedral, which was the first north-German three-nave basilica of bricks with the choir's square, transept and apses. On the Baltic Sea eastern coast, Bishop Albrecht created one of the biggest centres of Christian faith extension Western branch, and before laying the foundation-stone of the second Riga Cathedral. He arrived in the religious life centre Magdeburg, where for the first time the new choir for the German church was built according to the French Gothic sample, but the place in front of the cathedral (sometimes called "new marketplace", *Neuer Markt*) was occupied by the imperial palace (*Kaiserpfalz*), destroyed in fire of 1207.

Construction of the Riga Bishopric's Cathedral could have been affected by Segeberg Augustinian Monastery St. Mary's church (1156) and one of the biggest pillar basilicas the Lübeck Cathedral. In the newly founded Bishopric of Riga, it was not possible to implement quickly the large-size pillar basilica with the choir square and apse, transept with two apses in the eastern side, three-nave room for the congregation. Supposedly, applying local dolomite ashlars, building outside the city's walls on the bank of the Daugava begun after St. Jacob's Day on 25 July 1211, when the place was consecrated.

In 1220, the Riga Cathedral altar part and transept were finished. The cathedral was not made any more like the basilica with narrow side-naves, but as a hall-type building on one level, covered with vaults. Strategically the most important turning point in creation of Riga Bishop's Cathedral, probably, was related to the transition, implemented in the building process during 1220s. The rapidly spread modern material in the Baltic Seacoast building practice – red brick, to whose aesthetic qualities representative significance was awarded in the early phase of building, emphasising the contrast between the basic red of clay and the white chalk joints, plastered over and whitewashed elements of the wall décor. The change of building material happened without changing the planning of the pillar three-nave basilica. Simultaneously, construction of the monastery's eastern block was started. Functionally important cube-type choir with the apse for the liturgical ceremonial process and the transept with apses at the back had already been built to the cathedral, which was necessary for the mission work and baptism. Building was continued in the transept and the west end of the north side-nave, and the

13. JAHRH. 14. JAHRH. 15. JAHRH. 16. JAHRH. NEUZEIT.
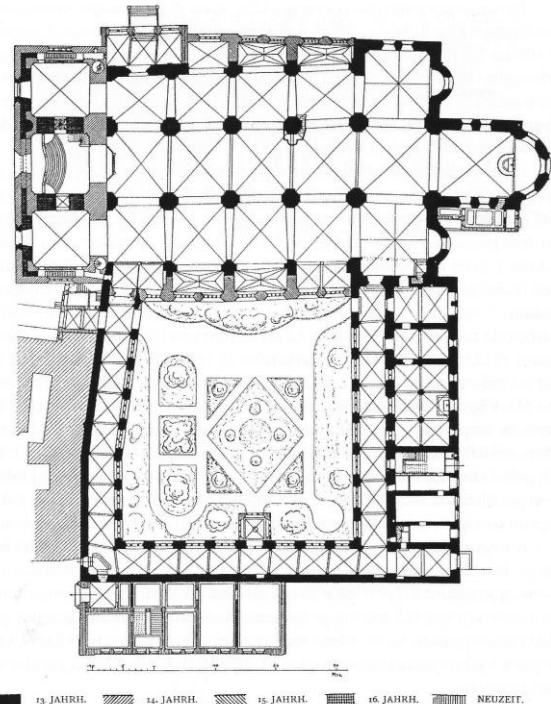
Fig. 14. Architect Johann Wilhelm Carl Neumann (1849–1919). Plan of Riga Bishop's second Cathedral and monastery. 1912 [6, 253].
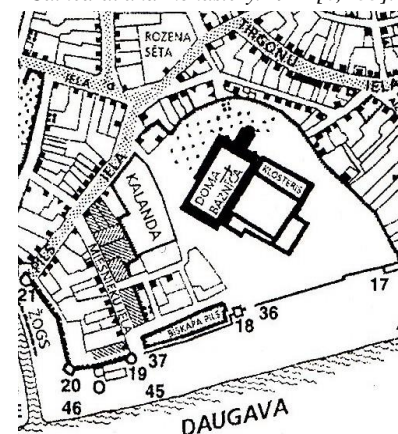
Fig. 15. Culture historian Jānis Straubergs (1886–1952). Planning of Riga Bishop's second yard around 1500 [41, 154–155].
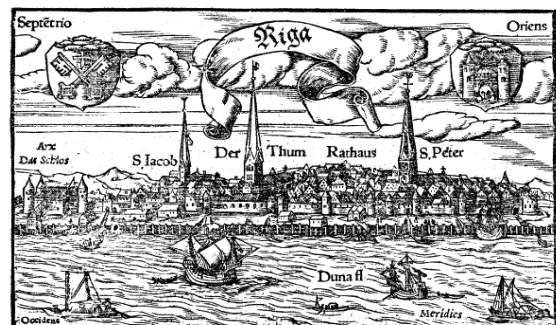
Fig. 16. Riga Bishop's second Cathedral crowned by a high spire in the drawing of panorama of Riga before 1547 [4, 43] submitted to Sebastianam Minsteri for publishing by the office secretary of Riga Town Council, poet, chronicler Hans Johann Hasentöter (also Hasentödter, around 1517–1586) [30].

massive cross-type poles on both sides of the middle-nave justified the preparation. Monastery rooms were not less important, especially the Chapter Hall. Partial construction of the cloister eastern building and the south building can be related to the first building period, which was necessary for monastery's household life [14, *8–9*]. The Latin cross planning of the Riga Cathedral, which confirms the initial basilic intention of the building, has a square choir and apse of a semicircle form, the eastern transept and a massive construction volume on the west side. The four bays of the congregation's room, whose planning is close to a square form, create outlines typical to a hall-type building. Massive pillars of a cross-type planning mark borders between the middle nave and side naves. Buildings of the abbey are placed on the south side of the cathedral at the end wall of the transept, but the square yard is surrounded by three cloister blocks. Presumably, on the west façade of the Riga Cathedral there was the initial entrance with a semicircle covering. Nevertheless, the portal of the main entrance has been made on the north side. The preseason for these changes is not known, but it could be related to the desire to make the church more accessible to the newly-founded city, to which the north façade of the Riga Cathedral was turned. The equivalence of all three bays' size is an important feature to the Riga Dome's representable entrance. The middle room was been made as a full-fledged bay, similarly to the Lübeck Cathedral and the Ratzeburg Cathedral. The layout of the Riga Cathedral and monastery buildings was traditional (Fig. 15): the cathedral with the tower, crowned by a slender, tall spire (Fig. 16), was situated in the north, but monastery buildings – in the south [7, *33*].

The Lübeck Cathedral was rebuilt (1266–1335): side-naves were raised up to height of the middle-nave and a circular passage was made around the chancel [43, *50*]. Bishop (1317–1341) Heinrich II Bochholt created eastern choirs and extended the building: the massive rectangular cross-section buttresses outlined the border in the oldest part and columns – in the newest part. In the second half of the 13th century, the middle-nave was made in the Riga Cathedral building. Around 1300, rooms were completed. In the 14th–15th centuries, the congregation room was extended, breaking out side-walls and building chapels. There was an intention to extend the cathedral towards Jauniela side, rebuilding the altar part testified by massive foundations, found in excavations in 1986, dating back to the 15th century. Monastery rooms, sacristy and Chapter Hall were built in the early Gothic forms. In the west wing, the irregular shape of the cloister confirms shortening of the congregation room during the course of building. Different materials and building techniques can be noticed in massive tower's brick design decorated by niches and arcades. It is likely that stone parts of the tower were raised simultaneously with the basilica's middle-nave building [18, *94–96*]. The Riga Cathedral was restored several times – in the late 19th century, during the 1960s (arch. Edgars Georgs Slavietis (1905–1985), Vilis Druģis (1912–1990)), in 1982–1984 (arch. Juris Galviņš).

Around 1400, Riga had become an important trade and crafts city on waterways and road crossings, the centre of the Teutonic Order and the Riga Archbishopric. Close by Riga defensive wall fortified yards were created, but in the central part of the city the monastery complex was placed, in which the Riga Cathedral was included. The planning of the Riga Archbishopric Centre made by two urban structures adjoined the defensive wall of Riga. The Riga Bishop's second yard's perimeter construction included the sacral building and reminded of the solution for Roman Bishop's residence on the Caelian Hill in Rome, but in the centre of Riga Canonical Chapter's yard the Riga Cathedral building complex consists of the cathedral and the monastery.

Conclusions

1. Assessing in the European context, a common feature for the Riga Cathedral, which became the main building in the Riga Archbishopric, in whose subjugation seven bishoprics got, was the ability to organize urban environment in an architecturally active way. A distinctive feature was the structural construction of the Christianity centre – mutual correlation between the Canonical Chapter and Bishop's residence – two urban building structures, related to the cathedral. Functional solutions of urban building development have been developed in building plans of bishoprics' capital cities, but the aesthetic and artistic quality of building was affected by the cathedral building-type further development.

2. The building complex of Riga Cathedral, monastery and Riga Bishop's second yard influenced formation of the street network and square placement in the city, as well as erection of gates in Riga City's defensive wall.

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Kopsavilkums. Romas imperators Konstantīns I 313. gadā sāka Romā celt senāko katedrāli – piecjomu Sv. Jāņa Kristītāja katedrāli (latīņu: *Archibasilica Sanctissimi Salvatoris*; 324, pēc 430 pārbūvēta), bet Laterāna pili (latīņu: *Palatium Apostolicum Lateranense*) uzdāvināja Romas bīskapam mājvietai. Izveidoja L-veida perimetra apbūves kompleksu. Kristieši 4. gadsimtā radīja lūgšanu vietas, kur novietoja altāri. Priekšstatam par templi atbilda iegarena celtne ar taisnstūra zāli, tādēļ kulta vajadzībām pielāgoja tiesu sēdēm, sapulcēm un tirdzniecībai romiešu celtās liela izmēra sabiedriskās ēkas – garena plānojuma bazilikas, kur ar kolonnu vai stabu rindām gareniski dalīja telpu trīs vai piecos jomos (franču: *nef*, latīņu: *navis*). Vidusjomu veidoja augstāku un platāku, un sienu augšdaļā ierīkoti logi izgaismoja telpu. Atšķirībā no pagāniem kristieši neuzskatīja templi par Dieva mājokli, bet gan par ticīgo pulcēšanās vietu ar funkcijai atbilstošu telpisko risinājumu, kuru sākotnēji ar simboliku nesaistīja: zāles austrumdaļā altārim izveidoja vienu vienīgu pusapļa plānojuma nišu jeb apsīdu, kas atradās tieši pretī galvenajai ieejai celtnes rietumdaļā, kur pirms ieejas ar sienu nodalīja slēgtu priekštelpu – narteksu, paredzētu personām, kurām liedza ieiet lūgšanu telpā. Sakrālo celtņu plānojums sākotnēji bija vienkāršs, un to veidoja divas lielas zonas: altārdaļa garīgajam rituālam un draudzes telpa. Pirms galvenās ieejas baznīcā izbūvēja kāpnes. Kristieši atbilstoši rituālam izmainīja baziliku arhitektūru un radīja reliģijai simboliku. Romas impērijā turpmāk pastāvēja sabiedriskas celtnes – bazilikas, un sakrālas celtnes – bazilikas ar ātriju. Eiropā daudzi valdnieki 6.–9. gs. pasludināja kristietību par valsts reliģiju. Baznīca nostiprināja savu ietekmi sabiedrībā un valsts pārvaldē. Romā tāpat kā Jeruzalemē izveidoja reliģisku centru, un uz viena no pakalniem 8. gs. vidū izveidoja pilsētu-valsti – Vatikānu (latīņu: *Status Civitatis Vaticanæ*), kur izvietoja pāvesta rezidenci. Kristieši radīja bīskapu pārvaldītas teritoriāli organizatoriskas struktūras un dibināja katoļu baznīcvalstis – bīskapijas, kur galvenais dievnams bija katedrāle. Baltijas jūras dienvidu piekrastē 12. gs. nogalē sāka pakļaut baltu un somu-ugru apdzīvotās teritorijas un dibināt bīskapijas. Bīskapiju centros paredzēja mājvietu bīskapam un Domkaputulam, bet bīskapu troņa novietošanai cēla katedrāles, kas kristietības centrā kļuva par apbūves galveno dominanti. Daudzu gadsimtu gaitā Eiropā izveidoja katedrāles būvtipu, kura attīstību baltu un somu-ugru zemēs ietekmēja vietējās būvniecības tradīcijas. Rīgas Doma pirmsākumi meklējami 1201.–1202. gadā, kad bīskapijas centru no Ikšķiles pārcēla uz jaundibināto Rīgu, kur ģeopolitiski un stratēģiski izdevīgajā vietā uzbūvēja bīskapa rezidenci.

The identity of military heritage areas of the coast of Kurzeme

Natalija Ņitavska, Monta Siliņa, *Latvia University of Life Sciences and Technologies*

Abstract. The coastal landscape of Kurzeme in Latvia is connected with the USSR border and military objects, established in the Soviet Union period that nowadays on losing their function are still on the coast and influence the landscape both physically and visually. These objects can be evaluated in different ways – both different and unfamiliar elements for the coastal landscape, as well as the potential of new landscape development. The research of the factors affecting the coastal development is a key to success for future coastal planning and management, as it helps to identify negative and positive landscape transformation processes, as well as their reflection on the identity of the coastal landscape. In order to understand the role of the military heritage of the coast of Kurzeme in the overall identity of the coastal landscape of Kurzeme, a survey of military areas was carried out by analyzing the physical and visual accessibility of the landscape, identifying the type of the landscape, existing elements, their materials and colour gamma, the current usage and state in common, as well as the emotional side of the landscape – feelings, impressions, atmosphere (sense of place). The information obtained in the survey helped to compile a biography of each of the military area landscapes, also based on the cultural and historical research of each landscape. The comparison of different landscape biographies of the military heritage of the coast of Kurzeme gives a perspective of their inclusion in the common identity of the coastal landscape of Kurzeme and reveals the potential for the development of these landscapes.

Key words: Kurzeme, coast, military areas, landscape biography, landscape identity

Introduction

The Baltic Sea is one of the integral parts of the Latvian national identity; therefore, these landscapes are our world-wide business card with all bigger and smaller cities, protected areas and coastlines, which are in the process of continuous development. In the sustainable development strategy of Latvia, the coast is recognized as one of the values of Latvia, and the diverse and multifunctional development of the coastline is emphasized as a goal, where one of the roles is also for the special and unique coastal landscapes [13]. Factors affecting coastal development directly or indirectly affect the identity of the coastal landscape. The research of the factors affecting the coastal development is a key to success for future coastal planning and management, as it helps to identify negative and positive landscape transformation processes as well as their reflection on the identity of the coastal landscape.

Coastal landscapes are easily subjected to degrading effects of human activity. The initial value of a landscape depends directly on land usage intensity [16]. Human activities on the coast were affected by historical, political and social aspects. For a long time, the Soviet Army was stationed along the coast, which changed the status of this area and restricted economic activity.

The development of each single city and settlement directly or indirectly affected changes of the identity of the coastal landscape. As a result of human activity, relief, river beds, building and vegetation changed [8; 9; 10].

1. Kolka Naval Radiocommunication Station
2. Mazirbe border guard post
3. Lielirbes krasts border guard
4. Radio decoration scrap
5. Irbenes radio antenna, Irbene armenian town "Zvaigznīte"
6. Staldzene Projection Set
7. Cirpstenes zenith rocket brigade
8. Sea observation and communication service in Pavilosta
9. Ziemupe: Zenith rocket base
10. Pape Lighthouse

Fig. 1. The location of surveyed objects [on googlemap].

Characterization of the historical landscape and a research of the landscape development make it possible to overlook the trajectory of the past and to conclude what decisions and actions can lead to certain consequences in a particular landscape, which would be a good basis for future planning. Archaeological research, the research of historical archival material, the research of folklore and other

testimonies are also used for the landscape characterization on forming together the scope of interdisciplinary research [11]. New concepts have been highlighted in recent landscape studies such as landscape biography and landscape of the place, landscape reading and development continuity [24].

The aim of the study is to analyse the situation in military sites in general at the coastal stage without dividing the situation in each area. The general picture of the situation gives an understanding of the common trends in these areas. The transformation of these military territories changes the coastal identity in general.

Materials and Methods

In order to achieve the goal of paper – understanding and analysing the situation in the military areas of the coast, are carried out detail research and inventory of each object, but this inventory data presentation is not the purpose of this article.

Objects

10 coastal military areas of Kurzeme were surveyed in the course of the research:
1. The Naval Radio Communication Station of Kolka
2. The border guard post of Mazirbe
3. The Coast Guard of Lielirbe
4. The radio engineering in Lūžņa
5. The radio antenna of Irbene, the army camp of Irbene "Zvaigznīte"
6. The floodlight troop of Staldzene
7. The zenith missile brigade of Cirpstene
8. The Marine Observation and Communication Service in Pāvilosta
9. Ziemupe: Zenith rocket base
10. The lighthouse of Pape

There are two places in Mazirbe under the same name – the same base and tower / projector dormitories at the sea. The survey of the objects was made in the August 2014.

Methods

The landscape biography of the coastal military areas of Kurzeme consists of two parts of the research: a theoretical research (*landscape biography*) and survey of objects and the obtained data (*landscape spatial structure*).

The task of the theoretical research is to acquire historical stages of the development of the coastal region of Kurzeme and facts, which changed the landscape identity both in general and in relation to individual sites. The research has been selected from 1939 to the present day – this is precisely this period that is full with the events and the beginning of the creation of Soviet military areas on the coast of Kurzeme. Various sources of information – historical books and archive materials, articles and publications, graphical and visual materials for a particular period have been used in this part of the research. The results of the theoretical research are summarized in the scheme and a brief description of each stage of development is drawn out, highlighting the main events since 1939 to the present day (Figure 2).

The method of survey of the spatial structure of the landscape consists of three parts – arrangements and information gathering; the survey of the object; gathering and analyzing of the data obtained.

*Arrangements made before
the survey of the object*

„The Passport of the Object" and „Assessment Matrix" was prepared for each object before the survey of the object. The passport of the object identifies the data for the period of surveyed object being created, the excellent objects in the complex, the property rights, information about the planned usage, the location on the map, as well as the linking with adjacent objects. The task of the assessment matrix is to get information from what can be captured with the sight and the feeling of exploring the surrounding area of the object. The assessment matrix is divided into five sections. For each section, criteria and sub-criteria are identified. Inventory matrix summarizes general information: date of the survey, name and location of the place. In addition, a common map is developed, which lists all ten objects of the survey, more detailed maps of the locations of the object, and a developed route, when and in which objects the research will be carried out. The matrix includes the following evaluation criteria: physical and visual accessibility, landscape type, existing landscape elements, elemental materials and colour gamma, existing usage of the area and condition in general. In addition the inventory matrix included also subjective factors such as the emotional side of the landscape – feelings, impressions, and the atmosphere.

The survey of the object – the completion of the assessment matrix and the recording of the object in photographs was made for each of ten landscapes on-site facility. In addition, a layout of the area is outlined, showing the most characteristic points, features. During the survey the pre-planned scheme is complemented with the visual accessibility criteria – view types. The matrix sections and criteria are completed in sequence – since it is designed simultaneously taking a photo of the subject.

The collection and analysis of the obtained data. Individual data processing, collection and evaluation of special features of each object are performed after the survey of all objects. After the analysis performed, the objects are compared with each other; the common and distinctive features are sought.
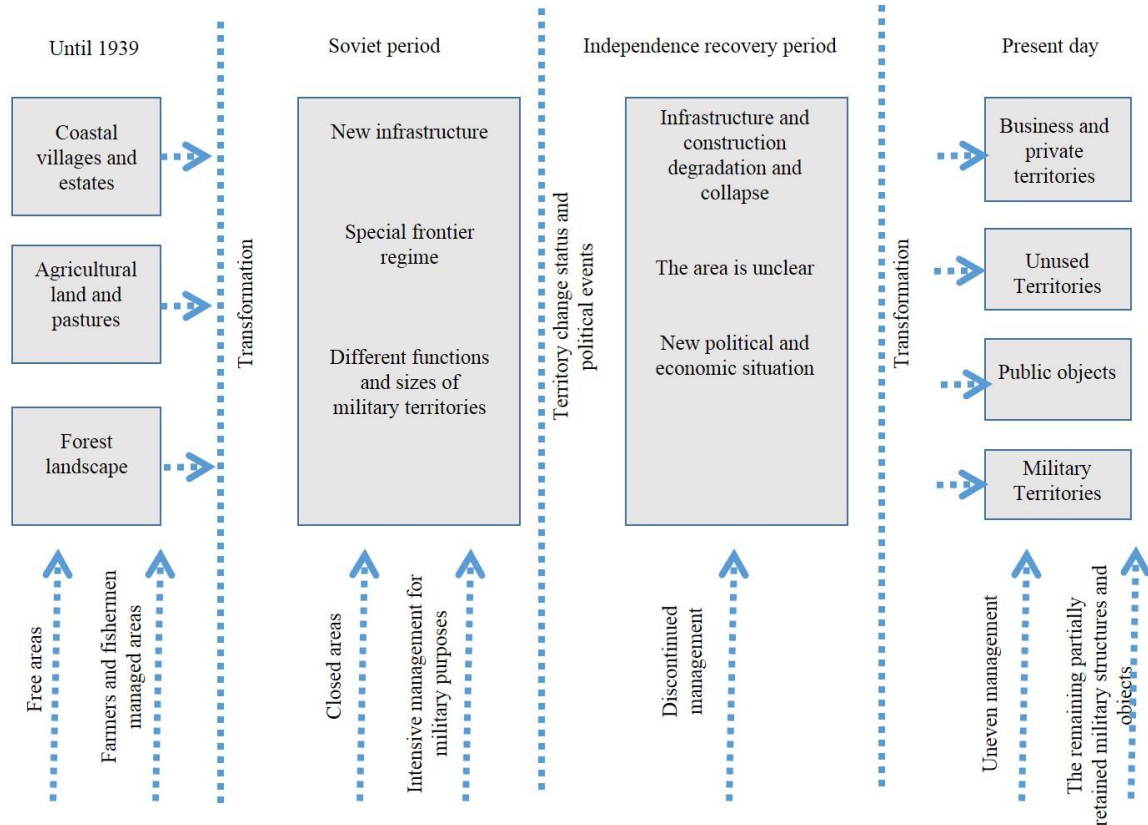
Fig. 2. The biography of the military landscapes of the coast of Kurzeme. Created by the authors.

Results and Discussion

Landscape biography

In order to understand and consistently "to draw" the landscape biography of military areas of Kurzeme, there is a study on the development of a common coastal area of Kurzeme, divided into four periods – the period of freedom of Latvia, the Soviet period, the period of independence restoration, present days. Separate facts indicate common development trends along the entire coast of Kurzeme, and part of the facts apply directly to military areas, but all of this is evident as the landscape biography in common (Figure 2).

The biography of military landscapes of the coast of Kurzeme

The period of freedom of Latvia. In 1939, the situation in the coastal landscape was as follows: active fishing, which was also considered as a traditional type of management on the coast; economic and trade relations with foreign countries were developed. There are both lighthouses and harbours in the coast, as well as developed shipbuilding, the boom of naval and active economic activity. The landscape is formed like a mosaic-shaped structural landscape, with small farms, villages, harbours, forests interchanging – in general, creating a steady landscape development.

The Soviet period in the Baltic Sea coastal areas in Latvia was marked by drastic changes, as these territories became the external border of the USSR. The largest cities of the West coast of the Baltic Sea, Liepaja and Ventspils, became the bases of the Soviet navy [7]. A special frontier regime was created on the coast of the Baltic Sea, where border guard units, items, tank farms, aviation polygons, warplanes, weapons and ammunition depots, military intelligence objects, and so on were concentrated [12]. In order for placing of these objects and the living of the army resources and territories were necessary. This led to the displacement of local people from their native places of residence, the adaptation of several cultural and historical objects for military needs, and the proclamation of the coast as a restricted movement zone. The boundary status of the landscape radically changed the cultural and historical development of this place, both the historically developed way of life and the rhythm, as well as the way of management. The development of the coastal area was no longer possible as before, as it was strictly limited in this period.

Along with these processes in the coast, the Latvian rural landscape was also affected by the land reform, which began already in 1940. Its task was to set nationalization of land, or the creation of a state land fund, reducing existing farms to 20–30 hectares, declaring the land to be state property [23; 4].

Along with this set of processes, collectivization took place in Latvia. Since 1946 collective farms had been established in Latvia as a socialist model farm. Collective farms unified land, equipment and animals previously owned by farmers and deprived in the period of land nationalization. The economic development of collective farms varied, which contributed to the migration of people from the less developed rural areas to the cities. Between 1940 and 1985, the rural population in Latvia decreased from 65 % to 30 %. After collectivization the number of estates in the territory of Latvia decreased from 89.8 % (in 1948) to 3.5 % (in 1950) [23; 4].

This period, characterized by forcible industrialization, the collectivization of agriculture, also caused the migration of citizens from other Soviet republics, changing the ethnic composition of Latvia. The development goals of the new government affected the existing structure of the building, there were changes in the sphere of urban development, standardized architectural solutions entered [5; 6]. Later in 1959, the construction of new industrial enterprises began. The number of military industrial complexes increased in Latvia, but issues of environmental protection issues were considered relatively small [23; 4].

Starting with 1956, the First Secretary of the Soviet Party, N. Hruschev, condemned I. Stalin's totalitarian regime and began partial liberalization, which was reflected in many areas of life. This period was characterized by the improvement of cultural and social life. During the migration, newcomers in many places lived in barracks, so in the 1960s, mass construction of residential houses started in accordance with standard projects. The housing stock increased twice from 1960 to 1985, but all the needs of the population were not satisfied [23; 4].

The enormous changes of *the Soviet period* planned and later realized by the government, brought great changes in the cultural landscape of Latvia. Today, researchers are still returning to the study of this issue, surveying different landscapes in Latvia, their former appearance till the arrival of Soviet power by cartographic materials and effects, which are also reflected in the contemporary landscape. The group of authors studied the changes in the cultural landscape during the Soviet period and its effects today. As a result, it was found that several elements of the landscape have been lost –

most often estates, small fragments of the landscape that formed the mosaic-shaped landscape structure. There is still the question about the preservation and usage of the impress left in the Soviet period or the return to traditional landscapes. The authors conclude that it is necessary to adopt the modern landscape as the current cultural landscape and, as far as possible, to maintain traditional management where state support is needed [1; 2].

The period of independence restoration. After the restoration of independence of Latvia in 1990, the Soviet military forces left their bases. Several thousand hectares of vast areas in the coastal areas were abandoned without inhabitants, but with rocket bunkers, submarine ports, descent cultural and historical monuments that previously served for the needs of the army, soldiers' barracks and other structures. Often these areas were contaminated [14]. Upon the departure of the Soviet military forces, military areas often came under the management of local governments. There was not enough money to manage and protect them, so they were most often plundered [3]. Some of these areas were denationalised or privatized.

In the early 1990s, collective farms were transformed into share societies or were liquidated [23]. Areas of collective farms and the army remained ownerless legally, which contributed to the degradation of these territories, vandalism, destruction of nature and cultural and historical objects and violation of laws, because new legislation had not been ready yet to protect these areas. During this period, the most frequent violations on the coast were car-damaged dunes and illegal construction in the protection area. Despite the fact that Soviet legislation banned construction on the dunes, local governments considered these laws to be out of date [15]. In general, these times of change had changed the policy of urban development, as the form of new private property and market came into force in both urban and rural buildings [6].

The former border of Eastern and Western Europe also gained value with the great biodiversity of these areas, which was facilitated by the limited availability of this area. After the fall of the Berlin Wall, the idea was to create a Green Belt project that still works nowadays. The Baltic Green Belt project works under this project, which was implemented by 15 national and non-governmental organizations from the five eastern and southern coastal states of the Baltic Sea as well as the International Union for Conservation of Nature in Belgium and the Coalition Clean Baltic in Sweden. The purpose of this project is to preserve, to use and to develop the natural and cultural heritage along the coast of the Baltic Sea; to establish an international cooperation platform for organizations

of nature conservation and sustainable coastal development; to demonstrate good examples in tourism, field of ecological agriculture, and public involvement in regional planning [21; 22]. Another project that took place in the 1990s was co-funded project of the European Union INTERREG IIIB – Sustainable Reintegration of Post-soviet Military residential territories as a Challenge and Opportunity for Regional Development – ReMiDo. Territories were evaluated within the framework of the project, certain development trends were determined, the experience of other countries were evaluated, action plans have been developed at the state and local government level, some pilot projects have been implemented [14].

Present days. Upon the departure of the Soviet Army, there are many territories with obscure status and disorderly surroundings. Former military areas in the coast are contaminated and dangerous. This is not only the pollution of groundwater and soil, but also unexploded ammunition that is in the ground. Currently, the Ministry of Defence, the Ministry of the Environment, local governments and the National Armed Forces (NAF) are responsible for cleaning up these territories.

Currently, there are more than 100 000 hectares of such areas in Latvia, which is the seventh part of the territory of Latvia. About 80,000 units of marine ammunition are located in the Baltic Sea, including in territorial waters of Latvia. Since 2003, the State Agency of Property Protection has been operating, which also carries out and organizes environmental protection measures also in military protection objects. Planned exploration of these areas was made together with the NAF, while the implementation of protection and clean-up measures is delayed by the need for large financial investments [20].

More and more tourists are interested in military heritage. And many specialists consider this area as a unique and competitive tourism destination with their target audience. Several objects have already been surveyed nowadays and recommendations for the sustainable management and usage of military heritage in tourism have been given – Natura 2000, which is a network of protected areas created for conservation of natural diversity of the European Union, as well as in other protected areas.

Often military buildings of the period of Tsarist and military building of the period of the World War I were was used for the USSR military bases. There is also created a database of these military heritage objects and a map of military heritage tourism objects. The recommendations are compiled and prepared in the "Guidelines for the Usage of Military Objects", which includes information on the database from various states [17; 18; 19].

Spatial structure of the military landscape of the coast of Kurzeme

Summarizing the results obtained after the survey of military heritage objects, common trends were indicated. For example, the existing type of land usage, which is closely related to the set of landscape biographies, is very different, but still 36% of the territory has not been used yet (Figure 3). Former military territories are also used as public objects (14 %), for various types of economic activities (14 %), for science (7 %), for living (7 %), and part of the objects were also used for the needs of the army (14 %). So, there is generally a positive tendency to use these territories instead of leaving them abandoned.

The objects are characterized by three types of the landscape: forest landscape, forest and marine landscape, marine landscape. Only the coniferous forest – pine forest – is the only one to be found in all these objects of the forest landscapes. The type of forest landscape is located at the objects of Lūžna and Pāvilosta. The objects in Kolka, Staldzene and Mazirbe are surrounded by a forest on the one side, but on the other side by the sea landscape. The marine landscape occurs in the object of Pape, which is surrounded by a zone of bent-grass, osier dune and sandy beach.

The concurrent attention was paid to the existing contours of the forest landscape around the object aroused as a result of human activity, by installing and constructing military-type areas. There were two distinct groups – expressive / rigid and partially readable / almost invisible landscape contours. Strong / rigid landscapes are characterized by straight pine forest areas, where the existing overgrowth, which seeks to re-integrate the transformed area, is very minimal. The contours of such character are found in objects in Staldzenē, Pāvilosta, as well as in Mazirbe. The infrastructure of existing road, other human-made elements, object management are some of the reasons why nature does not "take over" the free territory. Partially readable / almost invisible landscapes are characterized by the fact that the outline of the forest
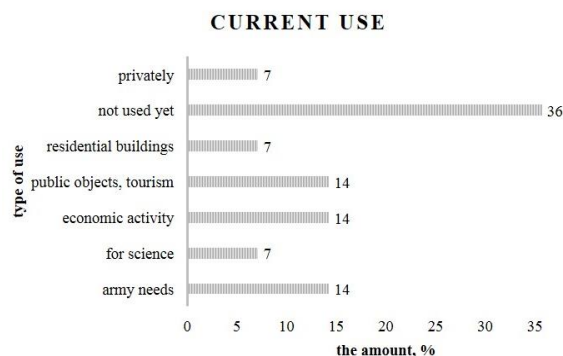
CURRENT USE

*Fig. 3. The current way of usage of military objects.
Created by the authors.*

is readable, but the young pine forest stands and their clusters began to form a natural border of the forest. It is typical in Kolka and Lūžņa. The criteria of physical accessibility are divided into two sub criteria – the populated area and outside the populated area. In objects located besides or in the populated areas there have been found both gravel pavement (Lūžņa) and asphalt pavement (Kolka, Staldzene, Pāvilosta). In objects such as the Lighthouse of Pape and the Tower and the projector building of Mazirbe that are located outside the populated area the only gravel pavement infrastructure is provided. Objects are outside of populated areas, which can be reached by concrete slab or gravel pavement. The concrete slab pavement is in Irbene and Cirpstene. Although the object is not immediately visible, the pavement makes it clear that you are travelling to the area of the military heritage. The existence of roads and parking places provides physical accessibility to objects, which is an important factor in their further development. It should be noted that all the objects have supply roads and half of them have the parking lot either.

In turn the visual accessibility is different, and it is closely related to the location of the object and the type of the surrounding landscape.

Covered / partially obscured object view

These objects are located more inland, but there are exceptions. Narrow, distant, partially covered / obscured views are found in such objects:

▪ The border guard post of Mazirbe – base,
▪ The Coast Guard of Lielirbe,
▪ The radio antenna of Irbene, the army camp of Irbene "Zvaigznīte",
▪ The zenith missile brigade of Cirpstene
▪ Ziemupe: Zenith rocket base.

All the objects are surrounded by a forest landscape. Four objects are covered by a pine forest, but Mazirbe is characterized by a mixed pine-deciduous tree forest. This group is characterized by landscapes with pronounced and rugged forest contours. They are characteristic for all objects, especially for the territory of Ziemupe and Irbene. Although views of these objects are covered, wide and open view lines are opened up on entering the area. Military objects are often stationed away from highways, which are strategically important for maintaining the safety of objects, and therefore 40% of objects are still not visible and 30% are only partially visible. The open landscape (30%) is more related to the type of the landscape and the size of the objects (Figure 4).

Landscape biography can often be read only from preserved elements of the landscape, which are witnesses of past events and feature not only the former nature of the landscape, but also the spatial
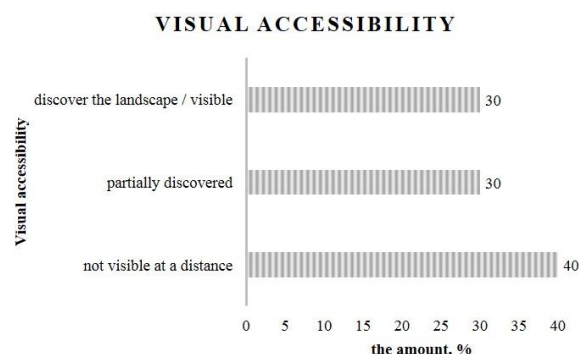
Fig. 4. The visual accessibility of military objects of Kurzeme Created by the authors.
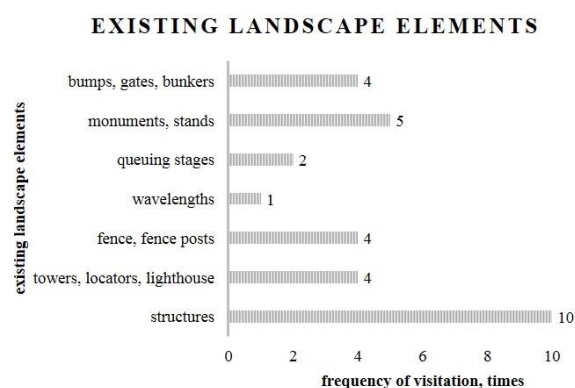
Fig. 5. Existing landscape objects in military objects of Kurzeme. Created by the authors.
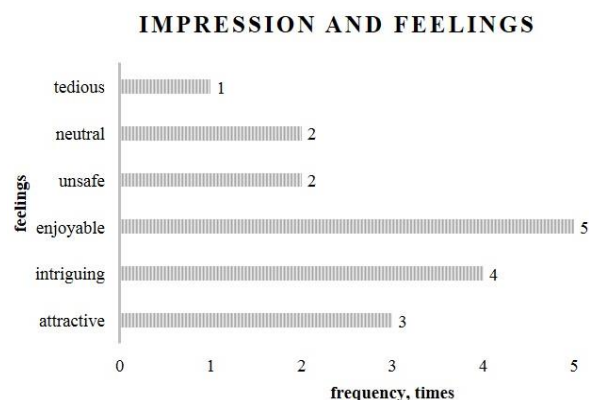
Fig. 6. The assessment of emotions and feelings of military objects of Kurzeme. Created by the authors.

structure that could change in time, both under the influence of a human being and the natural environment – by overgrowing the open space, by constructing the new infrastructure, or the decomposition and dismantling of individual objects.

Military territories are rich not only with elements of military heritage, but also with elements related to the previous functions of the landscape, for example, Lielirbe was once a manor, and part of its buildings remained unchanged along with military structures.

In the course of the research, on surveying the territory landscape elements of the military nature

were mainly characterized – such as buildings, towers, locators, lighthouses, fences, fence posts, waves, square plantations, monuments, stands, embankments, protective walls, bunkers (Figure 5).

In addition to the visual assessment of the landscape, there was also an emotional assessment of the landscape, which is an integral part of landscape identity. It should be noted that thanks to / due to the magic of the coastal nature, even the ruined objects did not leave a bad impression, as the presence of the coastal nature softened the emotional background. The emotions were rated on the following scale: attractive, intriguing, enjoyable, unsafe, neutral, tedious (Figure 6). Sometimes emotions were partite and therefore there were marked several positions from the scoring scale. Summarizing the results, emotional assessment is given by how often one or another item was marked

Conclusions

Areas of the military heritage of the coast of Kurzeme are an integral part of the entire landscape identity of the coast of Kurzeme – these are areas with a rich landscape biography, which has changed over the last 80 years due to political and natural conditions, very active and cardinal. Separate areas of the military heritage of the coast of Kurzeme have a distinct initial function of the landscape – they were both manor territories, settlements and fishermen's villages, and forest landscapes, and meadows and pastures. As the political situation has changed, such different landscapes have come down in a similar situation – the function of landscape usage, spatial structure and management has changed, and the link with the local population has disappeared as it was restricted territory. The future usage, transformation and management of the landscape in the Soviet period are different from the traditional usage of the coast of Kurzeme and the management of the landscape, which left irreversible changes in the landscape identity. After the abandonment of the Soviet Army, areas remained unclear and unmanaged, where, in turn, on vandalism and deliberate extermination of military objects natural factors caused, which continued the changes in the landscape identity, partly reducing the radical changes of the Soviet period. Today, after surveying the objects, it can be safely declared that these areas have a great potential for development, involving these areas into the tourism, which has been already active in other European countries today. The development of tourism could be facilitated by the existing satisfactory infrastructure – roads and car parks, there are still a number of preserved military objects and the attractiveness of the natural landscape in common and delightful emotions provided by the elements of coastal nature, which are an integral part of these areas of the military heritage of the coast of Kurzeme. The visual accessibility of the landscape, which is associated with both the different location of the objects and the different landscape structure and the different landscape types, provides a variety of landscapes that are more likely to hold the tourists' interest.

It should be noted that the identity of the coastal landscape of Kurzeme now should be strengthened and more existing opportunities should be exploited, as well as the emotional connection of people with the coastal landscape should be strengthen, where tourism development could be one of the tools of preservation and development of landscape identity nowadays.

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Kopsavilkums. Kurzemes piekrastes ainava Latvijā ir saistīta ar Padomju laikā šeit izveidoto PSRS robežu un militāriem objektiem, kas zaudējot savu funkciju, mūsdienās vēl joprojām atrodas piekrastē un ietekmē ainavu gan fiziski, gan vizuāli. Šos objektus var vērtēt dažādi – gan ka atšķirīgus un svešus piekrastes ainavai elementus, gan kā jaunu ainavas attīstības potenciālu. Piekrastes attīstības ietekmējošo faktoru izpēte ir veiksmes atslēga turpmākai piekrastes plānošanai un pārvaldībai, jo palīdz izzināt negatīvus un pozitīvus ainavas transformācijas procesus, kā arī to atspoguļojumu uz piekrastes ainavas identitāti. Lai izprastu Kurzemes piekrastes militāra mantojuma lomu kopējā Kurzemes piekrastes ainavas identitātē, ir veikta militāro teritoriju apsekošana analizējot ainavas fizisko un vizuālo pieejamību, nosakot ainavas tipu, esošus elementus, to materiālus un krāsu gammu, esošo izmantošanas veidu un stāvokli kopumā, kā arī ainavas emocionālo pusi – izjūtas, iespaidus, atmosfēru (*sence of place*). Apsekojumā iegūtā informācija palīdzēja sastādīt katras militārās teritorijas ainavas biogrāfiju, kuras pamatā ir arī katras ainavas kultūrvēsturiskā izpēte. Salīdzinot dažādas Kurzemes piekrastes militārā mantojuma ainavu biogrāfijās, ir sniegts priekšstats par to iekļaušanos kopēja Kurzemes piekrastes ainavas identitātē un atklājas šo ainavu attīstības potenciāls.

The transformation of the cultural landscape of Latvian rehabilitation gardens and parks

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Abstract. The research on the impact of the healing power of the natural base on the human health in Latvia has begun in the 15th century. For several centuries to the present day, it has been proved that the exposure link between the natural contribution during rehabilitation of the patient and the duration of the recovery of the patient only in the inside of the in-patient care health facility makes a dramatic difference. The patient's visual linking with the landscape space creates positive emotions that have a healing effect, demonstrating positive changes in the equalization of the blood circulation, cholesterol, and psycho-emotional level in the body. Most gardens and parks provide aesthetic enjoyment but the rehabilitative sensory and therapy gardens are designed to functionally stimulate the human senses (vision, touch, smell, taste, and hearing). The rehabilitation garden or the park is a place that promotes physical, mental health, and well-being, and it should be designed near medical institutions where the moments of psycho-emotional feelings of the patient and his relatives are the most delicate.
Keywords: rehabilitation, healing, psycho-emotional level, landscape space

Introduction

In the early 19th century, the start of development of parks in Latvia is related to the location of springs and the possibilities of using the natural base in the process of the medical treatment of patients. The study compares not only the impact of the expression of the natural base and the underground natural resources on the development of balneology but also the political and economic situation in the country [2]. The two world wars, the change of political power and the fluctuations of economic policy also affected the transformation of the landscape space of the parks and gardens of the sanatoriums. In the 60s–70s of the 20th century, an intensive building of rehabilitation centers started in Latvia, which brought an exaggerated scale and infrastructure load in the scenically fragile and picturesque cultural and historical environment.

The study of the healing landscape space is related to the environmental science, mathematics, philosophy, art, psychology, promoting knowledge of the impact of the environment on the human being and the impact of the human being on the outdoor space, which in general forms the so-called environmental psychology. Its understanding is needed by architects, landscape architects, and spatial planners. In the world, there is a growing interest in studying the relationship between the human and the environment, which proves that the functional and the compositional structure of the outdoor and indoor spaces solved at a highly professional level strengthens the psycho-emotional stability of people.

Most gardens and parks provide aesthetic enjoyment, but the rehabilitative sensory and therapy gardens are designed to functionally stimulate the human senses (vision, touch, smell, taste, and hearing). The task of gardens is to improve the health and well-being of people, to promote faster recovery through contact with nature. Recreation and treatment at a site rich in natural healing resources shorten the time of medical rehabilitation and recovery of the human body. The development of health care gardens in the 21st century in Latvia is gradually growing and they have become functionally important outdoor spaces that provide patients with therapeutic benefits. In practice, there are various health gardens featuring attractive landscapes. Some of them lack essential landscape elements of rehabilitation and several important parameters that optimize safety and rehabilitation. Poorly designed care gardens can cause a psycho-emotional harm to patients, which is unacceptable in the medical environment. The summarized visual aesthetic, ecological, and social criteria of medical gardens and parks can be used by industry professionals – architects and landscape architects.

Research methodology

The therapy or the rehabilitation garden is an outdoor space designed to improve the physical and mental health of people, to develop feelings and senses for young children, the elderly, hospital patients, visitors, and the staff. In the late 20th century,

the planning of the rehabilitative landscape started in the world, which is connected with the summarizing of interdisciplinary researches (architects, landscape architects, therapists, doctors, psychologists, psychotherapists, sociologists, etc.). The development of rehabilitation gardens and parks in Latvia began in the late 19th century. Many historic rehabilitation gardens and parks of Latvia are a cultural and historical heritage that has also brought about a change in the structure of populated areas due to the development of spas. Climate, attractive surroundings, and proximity to the sea were important at the balneological resorts. The construction of summer cottages and well-houses formed a new language of the architectural form design. During the Russian province times under the order of the imperial government in 1884, the health resorts in the Baltic States – Ķemeri, Baldone, and Druskininkai acquired significance.

In Latvia, the early 20th century as the interwar period is characterized by the spread of tuberculosis, which was caused by inadequate food and living conditions. In the 20s–30s of the 20th century, under the influence of land reform, the sanatoriums Krimulda, Īle, Tērvete were built in alienated manor centers. New sanatoriums were built in Ķemeri, Tērvete, Ogre, Cēsis, Inciems, near Lake Rāzna [10].

The aim of the research is to make a scientifically sound assessment of the aesthetic, ecological, and functional quality of rehabilitation gardens and parks, taking into account the regional features of the areas and the specificity of the natural base.

The research assignments touch two main criteria:

- *to provide an overview of the history of the development of rehabilitation centers in Latvia in the planning of gardens and parks;*
- *to determine the types of Latvian medicinal gardens and their compositional structure.*

The applied research methods: the comparative method – the scientific literature on sanatorium parks and healing gardens of Latvia from 1739 up to the present day has been compiled and analyzed. The current situation of the landscapes of Latvian rehabilitation gardens and parks, their spatial structure, and the diversity of small land plots, natural environmental processes, space and time scales, visual dynamics of landscapes, and their interrelationship research in local, rehabilitation garden, and park areas are compared. Not only the geometric characteristics of the elements of landscape structure but also the ecological and functional significance of individual elements is important for the ecological planning of the landscape.

Macroecologically, the spatial research method is based on the assessment of the application of the spatial diversity and ecological solutions in landscape planning:

- the ecological functions (biologically high-quality landscape spaces);

- the visual and aesthetic quality (attractive landscapes of the natural base by estimating sight lines
  and points);
- the quality of the cultural and historical environment (historical sights, the historical land use);
- the role of recreation and tourism (relaxation, education, cognition, and rehabilitation);
- the resources and the functional role of the area (settlements, forest landscape, agricultural landscape, etc.).

Along with the medicine boom in monasteries at the world scale, folk medicine also developed in Latvia. In 1220, in Riga, the first St. George's Hospital, "pharmacy booths" selling herbal preparations, various spices, and alcoholic beverages are opened. In the 14th century, in Riga, and a little later in towns of the Latvian province, the first pharmacies appeared with pharmacy gardens, where medicinal plants were grown for health purposes [7]. The folk medicine, springs were divided into three groups:

- *eye springs,* where the sick washed their eyes. According to the chemical composition, the water of these springs was solid and thick, saturated with *gypsum*;
- *holy springs,* for the healing of bone pain and skin diseases, where the sulfur springs helped. For good healing success, people donated pieces of money throwing them into the water of the holy springs (historical coins were found in the springs of Bārbele, Baldone, Ķemeri, and Pēterupe);
- *the devil's eyes,* spring waters which left a bad impact on people according to patients' observations [17].

The development of Latvian historical health resorts in the late 20th century was determined by the climate and the hydromineral factors, being the basis for the effect of climate therapy on human health.

Each of the sanatoriums in Latvia is located in different regions with different climate impacts, which are subordinate to the effects of the elements of the natural base:

- the assessment of the landscape space of the seaside resorts (Liepāja, Jaunķemeri, Vaivari);
- the context of the relief, forest landscape of the resort (Īle, Tērvete, Rāzna, Krimulda);
- the context of the river or lake landscape space (Baldone, Rāzna, Baltezers).

Latvian rehabilitation gardens and parks are classified into two groups according to their historical origins:

Group 1 – gardens and parks established in historic open-air places (Baldone, Ķemeri, Bārbele);

Group 2 – gardens and parks passed down from manors after the agrarian land reform in 1922 (Krimulda, Rāzna, Īle, Baldone, Ziedoņi, Tērvete (until 1932), as the adaptation of the historical site to
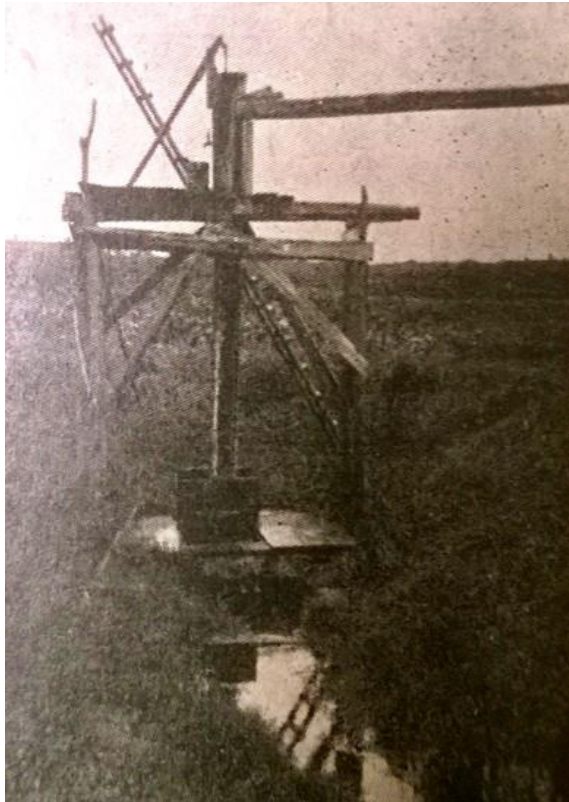
Fig. 1. Bārbele Sulfur Spring in the early 20th century.

Fig. 2. Bārbele Sulfur Spring. Photo by the authors, 2017.

rehabilitation contributed to more rapid initiation of therapeutic treatment of patients.

One of Latvian oldest healing sulfur springs is Bārbele. In the historical materials mentioned since 1739 when by the order of Duke Ernst Johann von Biron, the land around the hydrogen sulfide deposit was bought and a sulfuric bath healing facility was built. Bārbele Sulfur Spring was studied, and soldiers of various diseases were healed there (Fig. 1, 2). In the 19th century, the concentration of hydrogen sulfide in the spring fell and the Bārbele sulfur spring resorts and later Ķemeri gained more popularity [5]. A park was planted, and a dance floor was opened near the spring. During World War II, the Bārbele

health resort was destroyed. Currently, only the spring has survived.

When compared, it is evident that the three oldest Latvian health resorts – Bārbele, Baldone, and Ķemeri are united by the sites of the hydrogen sulfide springs but the difference is in the climatic conditions. In the Ķemeri health resort, the air has a higher degree of humidity than that in Baldone or Bārbele, as it is adjacent to the bogs and the sea. In turn, there are no bogs near Bārbele and Baldone and both spas are surrounded by a picturesque park with a forest landscape. Latvian health resorts, located in natural subterranean areas (forests, bogs, proximity to the sea) gradually began to be formed as landscaped areas. In 1818, H. G. von Korff in Baldone near the Ķekaviņa River, created a health resort park with paths, the compositional structure of which is subordinate to the picturesque line of the river bank. The central dominant of the park is the parade courtyard with a building (Fig. 3).

The trees in the park are planted in separate groups, forming a certain compositional and dendrological characteristics for the purposes of coloring, branching, sunlight (oaks, linden trees, maple trees, ash trees, black oaks, etc.). The landscaped space around the springs of Baldone was emotionally amplified by a church with a sacred grove and a stacked stone fence (16th / 17th century). On the left bank of the Ķekaviņa River, the second part of the historic sanatorium park is located.

The spatial plan of the sanatorium included seven blocks of the health resort. One of them is the bathhouse or the so-called "White Castle" (1890) around (Fig. 7) which rare species of trees and shrubs were planted: larches, spruces, cedar pines, Manchurian cork trees, silver firs, red oaks, as well as a pond and a canal were excavated that have overgrown with time. The total area of the park is 2.7 ha and it merges with the adjacent forest. The coniferous forest started behind the health resort. Each of the blocks of the health resort was subordinate to a different landscape space (Fig. 5, 6, 8).

In the engraving of the late 18th century, the landscape of the well-house of Baldone was drawn, where in 1795 above the sulfur spring outlet, a pavilion with a domed roof was built, and to the left of it - a health resort where sulfur water was used for both drinking and procedures (Fig. 4). From a small historic sulfide mineral water spring (the 15th century), in the 30s of the 20th century Baldone Spa had developed into a picturesque site with a park and several well-houses, occupying an area of about 6 ha. The building of a settlement with a street network gradually began in rings around it. In the early 20th century, the health resort of Baldone was treated as a balneotherapy and mud-bathing facility with pine needles, salt, and carbonic acid baths. The spring gave about 86000 liters of water a day, which was enough to make 500 sulfur water baths. In the spring of 1927,
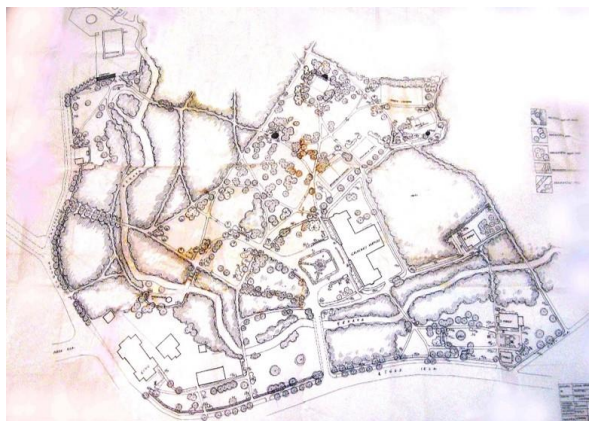
Fig. 3. Plan of the park of sanatorium "Baldone"
(H. G. Korff, 1818). Archive of Baldone Municipality Council.

Fig. 4. The landscape of the well-house in Baldone, the late 18th century [8].

the first part of the building of the healing mud bath was ready and put into operation, but the second one – in 1928 [17]. In the 20s of the 20th century, a bathhouse with baths was built, also adding the largest open swimming pool in Latvia with a bath and a mud treatment block (architect Artūrs Krūmiņš, 1939). The park planted by Baron von Korff in the late 19th century with walking paths, squares, and bridges in the 20s–30s of the 20th century was supplemented by romantic stone sculpture works at the outlet sites of the sulfur springs. The works of art, whispering of the spring water, and the picturesque park psycho-emotionally empowered the patients.

Baldone Health Resort was developed until the mid-19th century, where people were treated with hydrogen sulfide baths and mud applications. Hydrogen sulfide baths were prepared in combination with the conifer extract, cooking salt, and carbon dioxide. Carbon dioxide baths were used to treat cardiovascular diseases. The picturesque park along the banks of the Ķekaviņa River with bridges, well-kept in the early 19th century had great importance in the healing process. The growth of the health resort was reduced in 1877 by the railway line to Ķemeri opened in 1877. The rebirth of Baldone Health Resort began in the mid-20th century, regaining its historic glory by receiving large funding for the expansion of the sanatorium. Unfortunately, the ill-conceived scale of the new volume of the building, along with the historical cultural space, disrupted its peace and balance. In 1838, a chapel was built in Ķemeri, which is located 6 km from the sea between lakes and bogs, rich in springs and containing sulfur waters used in folk healing (Fig. 10).

In Ķemeri, the first bathhouse with a bath section was built, which until 1880 was the oldest building in Ķemeri. An Orthodox wooden church was built in the park area, as well as promenades, and recreation sites were created. The wooden bathhouse built in the late 19th century was combined in 1924 with the mud healing complex designed by architect E. Štālbergs (1883-1958). In 1838, with the permission of Tsar Nicholas I, on the state land the first state healing sulfuric spring bathing facility with 32 seats was built [6]. The resort was popular not only among the locals but also in the Russian Empire, therefore in 1912 a railway line "Ķemeri- Moscow" was opened. The five-story sanatorium building with roof terraces and a tower opened in 1936 was the culmination of the boom of the health resort (architect E. Laube) (Fig.14).

The beautiful building effectively located in the park embodies an image of a castle called the "White Ship", which is "stuck" in the forest landscape. Regular plantations were located around the building, which further merged with the picturesque Ķemeri Park, which consisted of a network of winding paths, pavilions, rotundas, bridges, and artificially created canals connected with the Vēršupīte River flowing through the park. The park was arranged in 1851–1861 under the guidance of the gardener M. Wagner (Fig. 11, 12, 13, 15). The beginnings of folk medicine in Latvia gave rise to the development of natural healing (springs, mud, pine needle extracts, carbon dioxides, bog climate, etc.). Healing sites or areas were the beginning of the development of certain building infrastructure.

The area of Ķemeri Spa is characterized by several landscape spaces – the forest, the park with tree groups, alleys, lines of trees and fields, watercourses, and buildings. The natural base, which consists of a forest, the Vēršupīte River, its branch and floodplains, makes 9.03 ha or 34.9% of the park area. In turn, the well-kept park with fields, the pavilion pond with the canal and the ditch make up 14.07 ha or 54.5% of the park area. Buildings with hardcover areas - 0.99 ha or 3.8% of the park area [16].

The central part of Ķemeri Park along the banks of the Vēršupīte River was created in 1851–1861. It is a cultivated park with a path system of the park and 13 bridges (Fig. 16). The forest massifs and Ķemeri Hotel Garden (*parterre*) stretch in the north and east of Ķemeri Park but in the south, a park with several fields is open. North of the pavilion pond, a field is located at the lowest point, created in the 1920s–1930s, occupying 0.2 ha or 0.8 % of the whole park. Historically, there has been a tanning place. The park is rich in centuries-old oaks, elms, linden trees, maples, pines, and fir trees.

Fig. 5. The fountain "Vāverīte" (the squirrel) of the sanatorium park in Baldone, the sulfur spring, sculptor Voldemārs Jākobsons, 1938. Photo by the authors, 2018.

Fig. 6. The fountain "Ķirzaciņa"(the lizard) of the sanatorium park in Baldone, the sulfur spring, sculptor Voldemārs Jākobsons, 1938. Photo by the authors, 2018.

Fig .7. The sanatorium building in Baldone.

Fig. 8. The sanatorium park in Baldone. Photo by the authors.
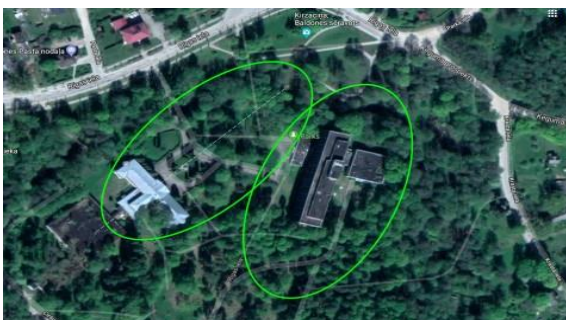
*Fig. 9. Baldone Resort Park.
Created by the authors, 2018.*

The expressiveness of the park's landscape space is enriched by individual volumes that enhance the emotional perception – the Orthodox wooden church (1893), monuments to the doctors (1861), and those who died in both wars. In the southeastern part – a wooden bath building (the late 19th century), which is combined with a mud healing complex (architect Ernests Štālbergs, 1924). In the 20s–30s, the park was expanded towards Lake Sloka, reaching a total length of 15 km of walkways. By straightening and deepening the Vēršupīte River, the hydrological conditions of the surrounding area changed, therefore the drainage of forests and bogs began to emerge in the Ķemeri area, resulting in a significant decrease in the rate of water flow in the Vēršupīte River. Geologists emphasize that the drainage of sulfur water springs has occurred as a result of these drainage works. Even in the postwar years, the intention was to continue draining the area around Ķemeri on an even larger scale, which would have led to drying up of the sulfur springs and the loss of the status of Ķemeri Health Resort. In the north and east of Ķemeri Park, there is a vast forest area that goes further to the Raganu bog. The biologically high-quality Ķemeri National Park in the 80s of the 20th century was founded to preserve and protect the processes of formation of mineral water and curative mud, which are important for the preservation of the spa values and the historical evidence of rehabilitation [10].

The development site of the historical medical resorts in Latvia was determined by the climatic (bioclimate), landscape, and hydromineral (hydro minerals and curative mud) factors. Bioclimate determines the impact of climate on human health, which can be both positive (used in climate therapy) and negative. Bioclimatic parameters, unlike meteorological parameters, have a complex effect on the human body.

Liepāja has been known as a bathing and healing site with sulfur springs since the 18th century and since 1810 as a resort. The *Merbi* private facility with cold and warm seawater baths started operating in 1834. After 1860, the boom of the city of Liepāja was due to *the creation of the dune greenery, which protected the city from traveling sand and turned the coast into a gorgeous park*. After centuries of fear of the seashore sand attack around 1867, the creation of a park with trees around the buildings was started. Opposite Peldu Street, in 1870, Jūrmala Pavilion was built and a fountain was created. The architecturally spatial solution of Kūrmājas Prospectus was completed by the architect's M. P. Bertschy (1840-1911) designed well-house with a restaurant and an area with parterre plantings surrounded by a metal fence, as well as creating a concert garden with 500 spectator seats. *"Nicholas Swimming Pool"* was built close to the dune belt, thus protecting the resting area from the

Fig. 10. The well-house plantations in the early 20th century
NKMP archive.

Fig.11. Flower beds near the well-house the 30s of the 20th
century. Materials of Ķemeri Museum.

Fig. 12. Ķemeri Concert Hall, the early 20th century. NKMP
archive.

Fig. 13. A pavilion with a spring, the   early 20th century.
NKMP archive.

sea wind (1902, architect Paul Max Bertschy) [20]. In 1925, healing mud was discovered in Lake Liepāja and in the 20s–30s, mud baths, compresses, sulfur, and carbon dioxide bath divisions were opened. In 1895, Liepāja City Council took a decision to establish a park between Peldu Street and Krasta Street. The plantations were created according to the project developed by Georg Kuphaldt, the director of Riga Gardens and Parks. During World War I, the city was affected by the outbreak of dysentery epidemic, which led to felling of many trees and shrubs in the southwestern part of the treatment facility area in order to set up tents for patients. There were several tennis courts in the greenery of the seaside park in Liepāja and a sports ground in the south of the park. From 1908, an Art Nouveau fountain started running [9]. The city gardener A. Leimanis made the reconstruction of Jūrmala Park in 1930, forming lines of trees and in the north and middle of the park -alleys, planted the Crimean linden alley, lawns with tree and shrub groups at Jūrmala Street.

Liepāja Seaside Park was the largest in Latvia – it stretched 3 km along the Liepāja beach (now it occupies 70 ha). It was planned that the park would be even bigger - it would stretch from South Pier to Thunder Canal (Fig. 18). There were sports grounds in the park (Fig. 17) with greenery, around 20 different varieties of linden trees (*Tilia*), 23 varieties of maples (*Acer*), willows (*Salix*), birch trees (*Betula*), coniferous trees, as well as exotic trees and shrubs – beeches (*Fagus silvatica*), red-leaved (purple) beeches (Fagus Sylvatica purpurea Latifolia), the Manchurian walnut tree *(Juglas mandshurica)*, larches (*Larix*), yews (*Taxus baccata*), the black pine (*Pinus nigra*), the cork or velvet tree (*Quercus suber*) (not survived), the tomato shrub, etc..

In total, 130 different tree and shrub varieties grew in the park. The park was the hardest destroyed in the 50s and 60s of the 20th century, there were 113 varieties of trees and shrubs left behind. 32 local and 139 imported tree species were found in the inventory carried out in 2000.

After the change of the groundwater level after World War II, the water level in the pond dropped, the land of the sanatorium area was rapidly bogged, which could be related to the construction of the adjacent Ezerkrasts locality, which changed the groundwater levels of Liepāja. It is known that the bed of the ancient pond was lined with round stones. The inconspicuous development of the drainage systems, the location of dense buildings, the creation of new underground communications routes, etc., is the reason for the depletion of the subterranean depths, which, in turn, reduces the quality of the spa.
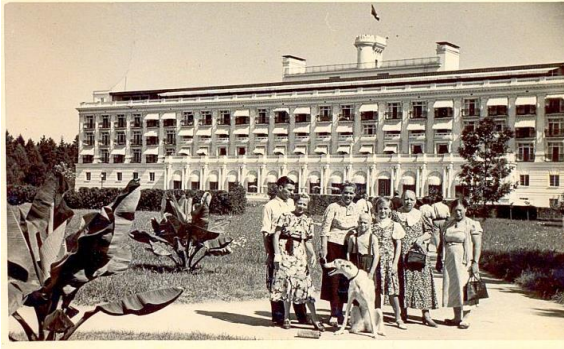
Fig. 14. Ķemeri Sanatorium in the 30s of the 20th century. Churn groups on the lawn. NJKP archive.

Fig. 15. Walls with climbing plants near the stage, the early the 20th century. NJKP archive.

Fig. 16. The plan of Ķemeri Spa with the historical well-house park, 1938. Ķemeri Museum.

The value of a rehabilitative environment is determined not only by materials measurable but also by the values of the aesthetic quality. A comprehensively rich application of aesthetic and functional principles in the development of the concept of the outdoor space of rehabilitation centers promotes the harmonious development of the rehabilitation process among patients.

Gardens and parks contribute to the social interaction that improves the immune system, promotes positive mood, and faster recovery. For centuries, health care facilities were hidden behind high walls and fences, which had a significant impact on the perception of patients. Within strictly defined boundaries, a "sick" and healthy society was separated, not only physically but also psychologically.

The landscaped space and human communication is only possible if it has favorable conditions - the landscape space is easily accessible to patients, families, and the staff. The modern rehabilitative landscape includes high-quality and safe walking paths, easy-to-move rest benches, chairs or loungers.

Psychological perceptions stimulate the patients' perception of the daily rhythm, as well as provide harmonious sense of balance.

If the expressiveness of the landscape space is able to address people emotionally, then it develops as a rehabilitating environment and it is able to generate positive energy that heals the psycho-emotional state of a person. The research proves that in the modern technological society the quality of an emotionally strong architectural and spatial linkage of the construction volumes of the outer space and rehabilitation center is lacking, which, in turn, transfers pulse to the continuation of the medical rehabilitation process [3]. A compositionally balanced structure of gardens and parks develops the world of human feelings in versatile manners and makes them more responsive to what is happening around them. R. Jūrmalietis, a researcher of the Environmental Research Center of the University of Liepāja, describes the landscape as a combination of space with the abiotic, biotic, and social conditions that are physically and psychologically interacting with a group of individuals or individuals within the space, influencing the processes of its life and consciousness [12]. Each landscape space offers the most unexplored and undervalued tools for improving and harmonizing human health, as there is a mutual dialogue that must contain:

▪ understanding of the functional structure of the environment;
▪ the assessment of the visual and aesthetic values of the environment;
▪ understanding of the cultural, historical, and environmental values.

These values in the life of each individual come together with experience of distress and the "intrinsic" value. Coloring in the landscape effectively acts on emotions and imagination. Medical research has shown that being in a green environment, body temperature and pulse are reduced, breathing is smoothed, people become quieter or more relaxed, the blood pressure is lowered, and it is much easier to deal with anxiety. Fragmentation of the urban environment, traffic noise, missing green plantations are tiring and stressful. In view of the above, new areas outside the urban space are being sought for the establishment of rehabilitation centers where not only the architectural

Fig. 17. A fragment of the map of Liepāja. The swimming area, the 20s of the 20th century. Source: The National Library of Latvia, Cartography Department of the National Library of Latvia, Plan fon Libau. 1931.

Fig.18. Liepāja Seaside Park the 30s of the 20th century. Lost Latvia.

Fig.19. The well-house "Nicholas Swimming Pool" in Liepāja, 1870. Liepāja Museum.

landscape of the rehabilitation centers is important but also the surrounding or the nearby and accessible landscapes. This is especially true of the sight lines that need to be cultivated and preserved in the landscape at the height of both standing and seated people. The same applies to the sight points from the interior.

The research of the aesthetic and functional environment is based on the whole system – the theoretical regularities, practical environmental and interpersonal relations, the mutual expressions of the aesthetics, culture, and art. Human health aspects are seen as one whole. This refers to the level of the human social communication, emotional balance, mental development, and the informative accumulation of the cognition, the acceptance of the spiritual world, the level of physical preparedness, and the level of the personality growth. The design of the landscape space of rehabilitation centers most directly affects the patient's feelings, improves people's communication abilities and attitudes towards each other. In the recovery process, rehabilitation centers must provide *multifunctional garden spaces* that allow each individual to find the most suitable one.

If the expressiveness of the landscape space is able to address a person emotionally, then it develops as a rehabilitating environment and it is capable of generating positive energy that heals the psycho-emotional state of a person. The research shows that the developed society of the modern technology lacks the quality of a harmonious linkage of an emotionally strong outdoor space and the building volume, in turn, transfers pulse to the continuation of the process of the medical rehabilitation.

In the 90s of the 20th century, Latvia experienced a crisis of sanatoriums and health resorts. Many of them were closed, rebuilt, and adapted to other functions (Baldone, 1992, Ķemeri, 1994) [14]. In the 20th –21st century, the economic and political situation in Latvia contributed to the crisis of health resorts, as health resorts could be enjoyed abroad. The public demanded high-quality aesthetic services here and now but failed to implement it for economic reasons. The so-called "scissors" of the economic policy were emerging that destroyed the highly developed cultural and historical heritage. This applies both to the preservation of the

architectural and historical values of buildings and to the areas of historic parks.

More and more people's health in the 21st century becomes dependent on the lifestyle of the society or on the basis of inactivity and chronic psychological tension as it is not enough time to restore physical and emotional forces [19]. It contributes to heart attacks, cardiovascular, diabetic, depressive, schizophrenic diseases, atherosclerosis, and infectious diseases, which are largely related to people's wrong lifestyle, exhaustion, and fatigue [1]. Like any work of art, the healing garden, as a value contains an "open field" for further productive research of reality. People tend to embrace and explore issues from all sides – like how a person experiences nature in his/her body. You cannot ask in the rehabilitation garden where nature ends and where the man starts. In order for the rehabilitating landscape to address the patient, it is necessary to pay attention to the perception of each individual and its determining factors. It is important to consider not only the patient's age group and the direction of treatment but also to make a comprehensive, harmonious landscape space in the planning of a modern rehabilitative environment.

The rehabilitation and sense garden of the 21st century is an endless dialog between the man and nature that invites you to participate and explore, the plans have simplicity of lines that promote relaxation and concentration of patients [4]. After the 50s of the 20th century, there was a downturn of the significance of ecology in the planning processes, which could be explained by the rapid growth of industry and the boom of forestry. In the 21st century, ecological planning of landscapes is gradually gaining new momentum, creating a new approach to the spatial planning through solutions for sustainable landscaping and calling for a balance between the economic interests of the man today and the preservation of natural and cultural, and historical values for the future [15]. At present, the regulatory enactments of the Republic of Latvia do not require the observance of the principles of the ecological planning and the application of the ecological plan for the development of areas but their use in planning landscapes would be only a benefit to Latvian nature.

In rehabilitation gardens and parks, river banks, lakes, bays, canals or ponds form wet areas of varying degrees and they are of particular value to wildlife and wetland plants.

Landscape ecology in the rehabilitative landscape space is expected to have perspective growth and various challenges for a sustainable landscape design. While developing ecological plans for rehabilitation centers, attention should be paid to reducing the consumption of natural resources, while developing sites with high added value, created by a person with his or her knowledge and professionalism. This is especially true of rehabilitation, thematic activities of healing, and environmental guides in rehabilitating landscapes. Innovative ideas in rehabilitation gardens and parks provide greater financial returns, as well as vary the uses of the scenic park space, attracting groups of visitors of different ages. One of these is the roof garden, which is added to the ecological buildings. As a positive benefit in building roof gardens, the emotionally rich panoramic views are noteworthy to mention that are not perceived at the street level. An eco-planning strategy can help improve biodiversity in rehabilitation gardens and parks, respecting the connections between nature areas to prevent landscape fragmentation with hedges, watercourses, park edges, roads, etc., and to improve the ecological integrity of the area. Focusing on the possibility of free movement of species, the landscape permeability, and animal diversity would improve. In some cases, these zones are also joined by small-scale agricultural, forestry, and also coastal ecosystems, which, as adjacent landscapes, complement the small rehabilitation garden or the park.

The surrounding enclosing nature parks, restricted areas, Natura 2000 areas, and other biologically valuable landscapes are important (the rehabilitation center "Tērvete", Rāzna, Krimulda, Līgatne) [13; 16]. An example of how the aesthetic quality of the landscape today is valued in the material terms is found in the practice of real estate taxation, where the price of land is determined by a set of criteria.

Conclusions

A professionally designed rehabilitation garden contributes to the recovery of a person's psycho-emotional balance. The result of high-quality medicinal gardens is provided by the use of the most suitable plants for the local climatic conditions, as well as a functionally and compositionally structured layout. Recreation and treatment at a site rich in natural healing resources shortens the time of medical rehabilitation and the recovery of the human body, which is also a financially important factor. For people with sensory disabilities and intellectual disabilities, the specificity of the healing gardens must be created not only in the easy-to-understand language of the compositional symbols but also in their visual and aesthetic message of the psycho-emotional ease of perception and laconism.

The use of wide glazing in the construction volumes of rehabilitation centers creates a visually unified outdoor and indoor connection, which is

a good criterion for promoting a positive emotional state of the patient.

With the development of modern buildings alongside the natural depths of the historic spas, the geomorphological structure of the earth's layers must be carefully examined. Without evaluating the findings of the engineering research, a serious change or complete disappearance of the historical chemical composition of healing springs is possible. Over the last hundred years, as the country has changed its political and economic situation, the compositional image of the gardens and parks of the medical centers is changing, which is influenced by the understanding of the size of the new building and the location of the infrastructure in the landscape space.

As the state funding for the maintenance of the historic sanatoriums and the spas decreases and they are closed down, the testimony of the cultural and historical heritage disappears during the boom period of health resorts in Latvia. The site preserves the richness of the natural depths but its historical use and the context with the park disappear. Parks and gardens are re-planned and transformed from an intensive rehabilitation to a recreational landscape space.

The technological possibilities of the 21st century give high comfort to the process of an intensive medical treatment in rehabilitation centers. Technologies are also applicable to modernized ventilation, recuperation, and conditioning systems that provide high-quality indoor air exchange and patient satisfaction. The comfort offered by technologies indirectly affects the patient by promoting inactivity and indifference. Out of this observation, the newly created physical therapy gardens established in the early 21st century are welcome that promote activities in the "green" outdoor space. The above problem is also exacerbated by the western medical institutions as the rehabilitation gardens are gradually disappearing and parking lots are being replaced instead.

Many of today's patient rehabilitation centers rely more on intensive therapeutic treatment, failing to devote even a small part of the rehabilitation time to movement activities and the "green" outdoor space.

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Kopsavilkums. Pētījumi par dabas pamatnes dziedniecisko īpatnību ietekmi uz cilvēka veselību Latvijā ir aizsākušies 15.gs. Vairāku gadsimtu garumā līdz mūsdienām ir pierādīts, ka iedarbības saite starp dabas devumu pacienta rehabilitācijas laikā un pacientu atveseļošanās ilgumu tikai stacionāru iekštelpās veselības iestādē, veido krasu atšķirību. Pacienta vizuālā sasaiste ar ainavtelpu veido pozitīvas emocijas, kam ir

dziedinošs efekts, pētījumos pierādot pozitīvas izmaiņas asinsrites, holesterīna un psihoemocionalitātes līmeņa izlīdzināšanai organismā. Vairums dārzi un parki sniedz estētisku baudījumu, bet rehabilitējošie sajūtu un terapijas dārzi tiek veidoti tā, lai funkcionāli darbinātu cilvēku maņas (redzi, tausti, smaržu, garšu un dzirdi). Rehabilitācijas dārzs vai parks ir vieta, kas veicina fizisko, garīgo veselību un labklājību, un tie ir ierīkojami pie ārstniecības iestādēm, kur pacienta un tā tuvinieku psihoemocionālo sajūtu mirkļi ir vistrauslākie.

Profesionāli veidots rehabilitācijas dārzs veicina cilvēka psihoemocionālā līdzsvara atgūšanu. Kvalitatīvu ārstniecības dārzu rezultātu nodrošina vietējiem klimatiskajiem apstākļiem piemērotāko augu izmantošana, kā arī funkcionāli kompozicionāls sakārtots plānojums. Atpūta un ārstēšanās dabas dziednicības resursiem bagātā vietā saīsina medicīniskās rehabilitācijas un atjaunošanās laiku cilvēka organismam, kas arī finansiāli ir svarīgs faktors. Cilvēkiem ar sensoro funkciju un intelektuālās attīstības traucējumiem ārstniecisko dārzu specifika veidojama ne tikai viegli saprotamā kompozicionālā simbolu valodā, bet arī to vizuāli estētiskais vēstījums ietver psihoemocionāli vieglu uztveramību un lakonismu.

Rehabilitācijas centru būvapjomos pielietojot plašus stiklojumus, tiek veidota vizuāli vienota ārtelpas un iekštelpas sasaiste, kas ir labs kritērijs, lai veicinātu pozitīvu pacienta emocionālo stāvokli. Mūsdienu jaunajai apbūvei attīstoties līdzās vēsturisko kūrvietu dabas dziļēm, ir rūpīgi jāpārliecinās par ģeomorfoloģisko zemes slāņu uzbūvi. Neievērtējot inženiertehnisko pētījumu slēdzienus, ir iespējama nopietna vēsturiski dziednicisko avotāju ķīmiskā sastāva izmaiņas vai pilnīga izzušana.

Pēdējo simts gados, mainoties valstī politiski ekonomiskai situācijai, mainās ārstniecisko centru dārzu un parku kompozicionālais koptēls, ko ietekmē jaunās apbūves mēroga izpratne un infrastruktūras novietojums ainavtelpā. Samazinoties valsts finansējumam vēsturisko sanatoriju un kūrvietu uzturēšanai, un tās slēdzot, izzūd kultūrvēsturiskā mantojuma liecība par kurortoloģijas uzplaukuma laiku Latvijā. Vieta saglabā dabas dziļu bagātību, bet vēsturiskais to pielietojums un konteksts ar parku izzūd. Parki un dārzi tiek pārplānoti un veidojas to transformācija no intensīvas rehabilitācijas uz rekreatīvu ainavtelpu.

21. gadsimta tehnoloģiskās iespējas dod augstu komfortu intensīvam ārstnieciskajam procesam rehabilitācijas centros. Tehnoloģijas ir attiecināmas arī uz modernizētām vēdināšanas, rekuperācijas un kondicionēšanas sistēmām, kas nodrošina kvalitatīvu gaisa apmaiņu telpās un apmierina pacientus. Komforts, ko piedāvā tehnoloģijas, netieši ietekmē pacientu, veicinot mazkustīgumu un vienaldzību. Izejot no šī apsvēruma, ir apsveicami 21. gadsimta sākumā jaunizveidotie fiziskās terapijas dārzi, kas veicina aktivitātes "zaļajā" ārtelpā. Minētā problēma ir saasinājusies arī rietumvalstu medicīnas iestādēm, jo rehabilitācijas dārzi pamazām izzūd un to vietā tiek iekārtotas autostāvvietas.

Liela daļa mūsdienu pacientu rehabilitācijas centros uzticas vairāk intensīvai ārstnieciskai terapijai, neveltot pat nelielu daļu no rehabilitācijas laika kustību aktivitātēm un "zaļajai " ārtelpai. Daļēji tas liecina par rehabilitācijas centru teritorijas zemu estētiskās kvalitātes līmeni un nespēju piesaistīt pacientus. Ainavu ekoloģijai rehabilitācijas ainavtelpā ir sagaidāma perspektīva izaugsme un dažādi izaicinājumi ilgtspējīgas ainavas veidošanā. Izstrādājot ekoloģiskos plānus rehabilitācijas centriem, uzmanība jāvērš uz dabas resursu patēriņa samazināšanu, turpretī attīstot objektus ar augstu pievienoto vērtību, kuru veido cilvēks ar savām zināšanām un profesionalitāti. It īpaši tas attiecināms uz rehabilitācijas, dziednicības tematiskajām aktivitātēm un vides gidiem rehabilitējošās ainavās. Inovatīvas idejas rehabilitācijas dārzos un parkos sniedz lielāku finansiālo atdevi, kā arī dažādo ainaviskās parku telpas izmantošanas iespējas, piesaistot dažāda vecuma apmeklētāju grupas. Viena no rehabilitācijas formām ir jumta dārzs, kas pieder pie ekoloģiskām būvēm. Kā pozitīvs ieguvums jumta dārzu izveidē ir atzīmējami emocijām bagāti panorāmas skati, kas ielas līmenī nav nojaušami.

Ar ekoloģiskās plānošanas stratēģiju ir iespējams rehabilitācijas dārzos un parkos uzlabot bioloģisko daudzveidību – ievērojot savienojumus starp dabas teritorijām, lai novērstu ainavas sadrumstalotību ar dzīvžogiem, ūdenstecēm, parku malām, ceļiem utt. un uzlabotu teritorijas ekoloģisko vienotību. Pievēršot uzmanību sugu brīvai pārvietošanās iespējai, uzlabotos ainavas caurlaidība un dzīvnieku daudzveidība. Dažos gadījumos šīm zonām pievienojas arī nelielu platību lauksaimniecības, mežsaimniecības un arī jūras piekrastes ekosistēmas, kas kā blakus esošas ainavas papildina nelielo rehabilitācijas dārzu vai parku. Piemērs tam, kā ainavas estētiskā kvalitāte mūsdienās tiek novērtēta materiālā izteiksmē, rodams nekustamo īpašumu taksācijas praksē, kur zemes cenu nosaka noteiktu kritēriju skala.

The role of woody plants in the formation of figurative and symbolic structure of memorial parks

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Abstract. The article presents the results of the research of the role of plants in the formation of the figurative and symbolic structure of the war memorial parks. It is determined that tree plants can play a role of the the indirect means of expressing the ideological load during different periods of the year. Some species of deciduous shrubs play this role only in autumn due to the red colour of not only fruits but also of foliage, in particular, the *Viburnum opulus* L., which is common in the war memorial parks in Kyiv, which emphasizes their ideological load due to the fruit and leaves in autumn colouring, as well as the symbolic meaning of this plant for Ukrainians. In winter, the plant act as the means of expressing the ideological load of the war memorial parks due to the shape and colour of the crown, branches, fruits (*Rhus typhina* L., *Cornus mas 'Sibirica'*, *Viburnum opulus* L., *Sorbus aucuparia 'Pendula'*). Based on the results of an expert assessment of Kyiv memorial parks, the peculiarities of the use of woody plants in the formation of figurative and symbolic structure of the war memorial parks of Kyiv are revealed and a structural scheme is developed according to the semiotic levels of perception as per Barabanov (2002). It is discovered that using of plants is most widely represented in parks, which is based on the sign level of perception (collective unconscious) caused by the peculiarities of perception and interpretation of the lines, form and colour of the plant. In particular, within the researched parks, it was revealed that both the positive and the negative effects of the shape, size, colour and texture of the plants influence the perception of the memorial architectural components. When using symbols in the formation of figurative and symbolic structure of the park using plants two approaches to the formation of plant composition are revealed. The first is based on the use of symbolical for Ukrainian species of plants (*Viburnum opulus* L., *Sorbus aucuparia* L.), while plant groups are mono-species independent components of the composition. In the second approach, the matching of plants is based on the symbolic meaning of their morphological characteristics. In this case, the plants are located next to the memorial architectural objects as secondary components to enhance emotional influence and increase the information characteristics of the memorial. This approach to the use of plants for the formation of figurative and symbolic structure of the park is based on the symbolic level of semiotic units of perception, according to Barabanov (2002), which is determined by the sociocultural context that is formed within a certain social, historical period and territory.

Keywords: symbolism of plants, park composition

Introduction

Park landscape, as part of the subject-spatial urban environment, inextricably linked to its functional and figurative-information system and along with architecture is the means of information that was laid down during its formation, is actualized during perception and affects consciousness [8]. This creates a "tangible landscape" (the concept as per Lynch [17]) - a tangible environment that affects interpersonal communication, focuses attention on its importance for human comfort and is expressed in sounds, aromas that can both promote and interfere with communication.

The simplicity of the means of information communication, in particular the using of the simplest elements that organize the architectural form and influence the person emotions is the important characteristic of understanding and correct interpretation of information [8]. Le Corbusier [15] emphasized namely the importance of the elementary forming elements of architectural forms and the need to study their influence on the perception of man. Thus, the concept of informativity of the urban environment relates both to direct means of information [17], and to the system of symbols, figurative meaning, signs [15; 26; 2; 13], which form a certain semiotic structure. The symbolic and sign system is characterized by special forms in the park landscape, and it is due to the biological nature of its components and the continuity of the development of the park three-dimensional composition. The regular transformation processes of the landscape components complicate the process of designing the figurative and symbolic structure of the park, and its research. In this context, it is important to mention about the research of Yilmaz, Özgüner & Mumcu, [27], where authors point out the possibility of studying the landscape aesthetics in terms of formal and symbiotic aesthetics and consider the aesthetic assessment of the parks and greenspaces as a process oriented towards perception, both in form and with a symbol – two variables of the general assessment.

These studies are of great importance in the study of memorial parks that provide a connection to the past generations by means of the sign, symbolic and semantic system, which shows itself first of all in the planning structure, monumental decoration and general composition. The most semiotic approach to the formation of the figurative meaning of park landscape, as well as the demonstration of "collective consciousness" is observed in the memorial parks of war themes, the content component of which is based on the sign, figurative and symbolic level of perception. In particular, Oleksiichenko et al. [18] in the research of war memorial parks, point out the direct and indirect means of expressing the ideological load of the park, which can both contribute into correct interpretation of the information and symbolic meanings laid down during park formation, and level them.

The form of the direct means of expression directly reflects the intended figurative meaning, the idea of the object, and the indirect means of expression indicate the ideological content and can increase the meaning of direct means. Indirect means act on the basis of allegories embedded in their artistic image (the abstract concepts, their representation through the close associations, concrete images and objects), symbols (images of the maximum degree of generalization and expressing an idea or a original peculiarity of a certain event or phenomenon). These means are aimed at activating relevant associations from visitors (concepts that appear when referring to another one, a subjective image of an objective connection between objects and phenomena) and, thus, "are being read" while observing [18]. In the context of the using of allegories and the system of symbols, it is worth noting that the basis for their perception and understanding is "collective memory", which is formed mainly in the result of sociogenesis. In particular, Jankovic [13] notes that the architectural form of a man-made memorial object is a materialization of collective memory. At the same time, plants in the memorial parks usually act as indirect means of expressing the ideological load due to symbolism and associative perception of forms and colours. When choosing a tree or shrub for the dominant of plant composition – take into account the symbolic meaning of plants traditionally formed in some society, for example of genera *Quercus* L., *Cedrus* Trew., *Platanus* L. – symbols of power and strength; *Populus alba 'Pyramidalis', Populus nigra* var. *italica* Münchh. – trees of eternal memory [18].

Along with the symbolic meaning of plants the morphological characteristics, which are aimed at activating of associative perception, are of great importance as well. In particular, trees and shrubs that have a weeping crown, as well as plants with dark foliage, are used to emphasize the sense of sorrow and mourning. In addition, the "tree height" and "height of vegetation" are important characteristics of landscapes influencing human perception [9, 21, 16]. Galev, Gurkova & Galev [7] emphasize the importance of plants for the perception of memorials mentioning the integrity of the perception of the monument and the surrounding plants.

An important aspect of studying the park landscape as a figurative and symbolic structure is the analysis of aesthetic preferences of visitors, in particular the influence of plantings on the aesthetic quality of landscapes. In this context, the research of Hofmann et al. [11] should be noted, where the features of the landscape that affect the high aesthetic assessment of professionals ("planners") and visitors were discovered. In particular, the high level of artificiality and contrast (high and low) levels of closure and prospects were good predictors of the aesthetic advantages of non-specialists.

According to the research Fuller et al. [6] it was revealed that biodiversity increases the aesthetic quality of green spaces and, although usually not considered intentionally positively associated with the aesthetic preferences of the landscape [16; 14; 4]. However, other authors [25; 10] noted differences in the perception of species diversity between experts and non-professionals.

The value and features of the plants composition within park areas were studied by Polar & Akay [20], who identified the relationship between the visual quality of park landscapes and: the color of the composition of plants (harmony among foliage, flowers and stems of individual plants); the form (the outline) of the composition of plants (harmony among trees, shrubs and flowers with their forms); a variety of plants. In addition, the authors found that the absence of shrubs negatively affects the aesthetic assessment of the landscape [20]. Despite the great impact of seasonal dynamics of plants on the image of the landscape [27], studies that draw attention to the volatility of plants during the growing season in terms of formal and symbolic aesthetics and perceptions are limited. In this context the research of Thorpert & Nielsen [23] should be noted, who studied the relationship between the species diversity of plants communities, its colors and positive evaluation of the landscape and found that the most positive assessment of landscapes were noted in summer and autumn, and the lowest - in winter. It should be highlighted that the research was carried out directly in the environment, rather than using a photo that is also rarely encountered in the context of attracting respondents.

So, along with the fact that the plant is a subsidiary element of landscape expression of ideological load object, they are considered to be a

particularly powerful factor in the perception of visual quality landscape that is highlighted by a number of researchers [16; 23; 20;7; 27]. Such circumstances make it expedient to analyze the peculiarities of the use of plantations in the context of the informational and cognitive approach to studying the aesthetics of the park environment, as well as their influence on the formation of the figurative and symbolic structure of the memorial park.

The purpose of the research is to analyze the role of tree plantations in shaping the figurative and symbolic structure of the environment of memorial parks, as well as their influence on the aesthetic perception of park landscapes.

Materials and methods

The methodological basis for the study is the interactionist paradigm [19], in which the aesthetic qualities of objects and patterns of perception are determined by the survey of respondents in combination with an expert assessment. The expert assessment included an analysis of the compositional integrity and significance of plants in shaping the figurative and symbolic structure of the memorial parks in Kyiv. The purpose of involving respondents was to identify the features of the perception of plants and their impact on the formation of general-landscape emotional image of the landscapes by the parks visitors.

The research is based on Thorpert & Nielsen [23], Dupont et al. 2014 [5], Hofmann et al. [11] Shelby & Harris [22], however, has significant differences, in particular, a comparative analysis of the peculiarities of the perception of the park environment landscapes using different methods of conducting research, as well as allowing respondents to independently determine the factors influencing their assessment, instead of using semantic differential scales.

Characteristics of research objects

The research was conducted within the framework of Kyiv war memorial parks (3 objects) during 2012–2018, namely: Slava Park, Peremoha Park and Pechersk Landscape Park. Parks are located in different parts of the city (Fig. 1), created in the second half of the twentieth century and devoted to the events of the Second World War. The main differences between the researched parks include a significant difference in the area of the territories, the correlation of functional zones, as well as the planning and compositional construction of the three-dimensional structure of the park environment.

The materials for the research were the results of a comprehensive assessment of the territory of the Kyiv war memorial parks, including the use of field and analytical methods. The analysis of the cultural and historical significance of the experimental object was carried out by the monographic method, the town-planning characteristic – the cartographic method.

Expert evaluation is based on the principles of the environmental perception of the landscape, as well as the concepts of experimental psychology Holovey & Hornova [12], which corresponds to the provisions of the system approach and coincides with the general trends in modern scientific research.

Investigation of peculiarities of park landscapes perception by respondents

To study the aesthetic qualities of the park environment, as well as to reveal the peculiarities of the perception of plants and their influence on the formation of a landscape of the nature of landscapes by visitors of parks among the memorial parks of Kyiv, the territory of the Slava Park was chosen as the research object with an area of 19.4 hectares located in the central part of the city. The park is the object of nature reserve fund of Ukraine as a park-monument of landscape art of local significance. Within the park, there are 24 locations for the assessment of landscapes (Fig. 1), which are presented in 46 photos. Locations and photos were selected in accordance with generally accepted methods of conducting such studies (Daniel & Boster [3]), in particular those used in Hofmann et al. [11], Polat & Akay [20], and more. The study involved 25 participants aged 22-25 years – 7 men and 18 women from different regions of Ukraine.

Photographing and order of the research

Since the study involves identifying features of the perception of park landscapes during the growing season. In particular, photographing of park landscapes was carried out during August 2017 (to illustrate the summer features of the park environment) and in October 2017 (to illustrate the autumn features of the park environment) in the sunny weather from 1 pm to 4 pm, including the human factor in photographs. For photography, a semi-professional digital camera with a resolution of 20.1 million pixels. Photos are printed in 10×15 format (matte finish).

Surveys and results analysis

Describing the methods for determining the aesthetic preferences of respondents, it is advisable to note two approaches. The basis of the first is a comparative analysis of the aesthetic assessment of the landscape, obtained as a result of the survey of the respondents and parameters of the components of the landscape.

In this case, the parameterization of the components is carried out by experts in accordance with the purpose of the study, and photographs are used as models (including panoramic [20]).
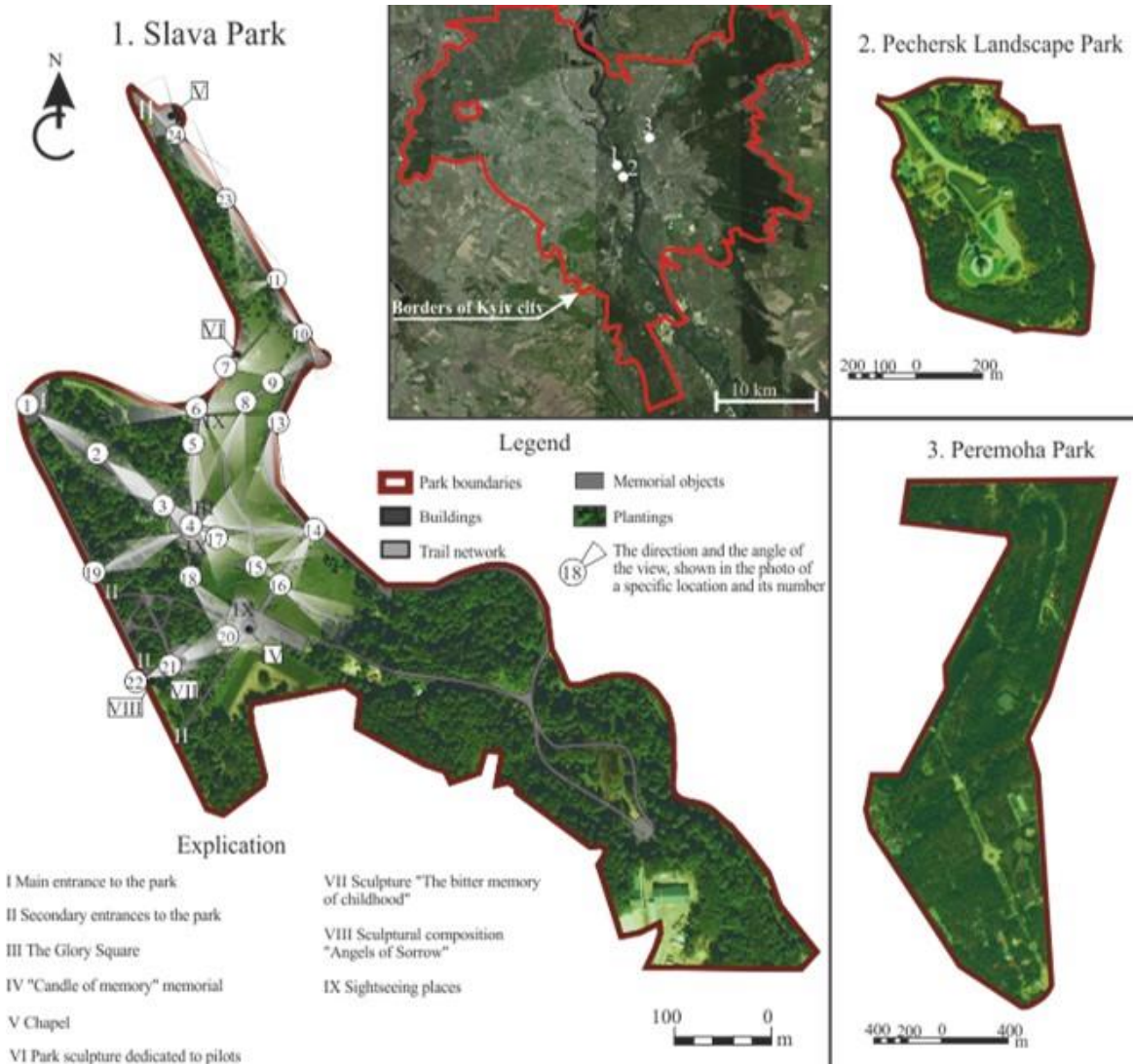
Fig. 1. The location of war memorial parks in Kyiv. The locations scheme in the Slava park, which were used to evaluate the aesthetic appeal of the park and the angles of view that are reflected in the photographs.

The second is based on the use of the semantic differential [11].

In the course of the study, both of the above methods were applied, however, the parameters of the park environment components were not carried out by experts to perform the tasks. Instead, the respondents were offered to independently substantiate the signs of the landscape, which are positive and increase their aesthetics or reduce it and can be defined as negative. The signs could include both the material components of the landscape and the associative notions and feelings that should be noted in the appropriate column opposite the photo number (substitution method) after evaluating a particular landscape on a 10-point scale, where 10 is the highest score. The expediency of the free choice of respondents for positive and negative signs of the park environment is conditioned by the need to determine the "readability" of the information structure of the park environment of the research

object, as well as determining the role of plantations in shaping the overall landscape of the respondents' emotional reactions. The methodology used by Osychenko [19] to determine the aesthetic preferences of the urban environment was taken as a basis.

Research results

Expert assessment of composition structure of research objects and peculiarities of plants using in the formation of their figurative and symbolic structure

The first stage of the study was a complex analysis of researched objects based on an expert assessment, during which 123 species, 62 cultivars of woody plants were represented in the researched parks. The significant number of introduced plants among the park greenery were found, which are represented by species (106) and their cultivars (14). Along with the importance of the impact of species

diversity on landscape aesthetic (Polar & Akay [20]), the plant assortment does not make clear understanding of the compositional integrity of the object, as well as their role in creation of figurative and symbolic structure. Thus, the study of these aspects was done within the territory of Kyiv memorial parks.

The compositional structure of the Pechersk Landscape Park, especially within the territory of National Museum of the history of Ukraine in the Second World War, is harmonious as there are no components of the park space that disturb its integrity. Architectural elements and the elements of trail network (avenues, squares) are dominant, and plantings are subjected to them and highlight their compositional and ideological significance. Although the plant species diversity of the memorial complex is rather poor, however, the used species and cultivars of woody plants express the themes of the object. For example, small groups of *Picea pungens 'Glauca', Picea pungens* Engelm., in combination with *Juniperus sabina* L. are harmoniously located along the main alley and around the square; along the slope of the alley to "Roads of Life", a line of plantings from *Viburnum opulus* L. is growing, as well as around the bowl "Eternal Flame".

Other plant groups of the park are located behind the memorial on the slopes, without closing the views and emphasizing on the park theme, and also with no contradiction. However, the drawback is the monotony of plant composition and seasonality of its changes during the flower exhibitions in the park.

For parks with compositional unity it is expedient to include the Slava Park, the composition center of which is a monument of Glory. It is a 27–meter obelisk on the grave of an unknown soldier in the center of the Glory Square. From the entrance to the monument there is a wide alley, framed on both sides by the *Carpinus betulus* L. hedge. Along the Heroes' Alley there are 34 burial grounds of soldiers of different ranks. The Holodomor Victims Memorial is equally dominant in the park composition. The memorial includes three main parts: the "Candle of Memory", the Hall of Memory and the "Black Boards" Alley, with the names of the settlements affected by the Holodomor of 1932–1933. The planning structure of the park is determined by the compositional dominants, which emphasize its memorial purpose.

The park plants are represented mainly by deciduous woody groves from *Aesculus hippocastanum* L., *Acer platanoides* L., *Tilia cordata* Mill. etc., especially in the lower part of the park, and regular style compositions of coniferous plants and bosquets from *Carpinus betulus* L. The latter have an important composite value in forming the figurative and symbolic structure of the

park, because they perform a number of functions aimed at emphasizing the ideological and historical significance of memorial architectural components, namely: formation of the view for the obelisk of Glory; visual isolation of the Heroes' Alley from the rest of the park area is to focus attention on the information content; creation of a closed space along the central alley of the park to increase the emotional influence of the obelisk of Glory at the exit to the Glory Square, which opens a view of the city.

The Guelder-rose Grove, which is planted in the zone of the Holodomor Victims Memorial Complex (locations 20, 21 in Fig. 1), and in the north-western part of the park along the walkway to the chapel (location 23, 24 in Fig. 1). There are other memorial plants grown by politicians in the park, such as *Picea pungens 'Glauca'* and *Sorbus aucuparia 'Pendula'*. There are *Fagus sylvatica 'Pendula', Salix caprea 'Pendula', Betula pendula 'Youngii', Berberis thunbergii 'Atropurpurea', Prunus cerasifera subsp. pissardii* (CarriŠre) Dost l, *Sorbus intermedia* (Ehrh.) Pers., *Viburnum opulus* L. in the so-called arboretum zone and the Guelder-rose Grove zone (laying in 2005), which can act as a means of expressing ideological load due to the crown form, leaf colour, but the inconsistency of their composition and unsuccessful placement within the park negatively affects their perception.

The compositional structure of Peremoha Park includes some controversial moments, they are due to the location of different thematic and function objects. Thus, in the entrance part of the park there is a monument to the Widowed Mother, and in the background of this objects there are attractions for children and other entertainment facilities. In this context, it is worthwhile to note the role of plants to isolating visual links between the contradictory components presented.

Continuing the analysis of plant role in the formation of composition, figurative and symbolic structure of Peremoha Park, it is important to mention thematic flowerbeds which are located along the main park alleyway leading to the Immortality Hill and near the monument "Women of War", which is located next to, as well as individual plants planted during the reconstruction in 2004.

Summarizing the analysis of composition, figurative and symbolic structure of Peremoha Park it is important to mention that along with the clearly inappropriate components of the park environment (entertainment attractions) also there are elements that express the war theme of the park but have an indirect relation to the victory in the Second World War, namely the Guelder-rose Alley to Heroes of Ukraine of the XXI century and the complex composition Border Guard's Alley. The role of woody plants in the formation of figurative and symbolic structure and expressing the park thematic,

consists in the visual isolation of contradictory to park themes and functions components.

Among the main means of emphasizing themes in the Peremoha Park at the expense of plants can be attributed: the formation of thematic flowerbeds using the symbols ornamentation of the appropriate colours - red, yellow, white; inclusion in the composition of greenery the appropriate crown form, the colour of leaves and inflorescences.

Thus, based on the analysis results as to peculiarities of woody plants using in the formation of figurative and symbolic structure of Kyiv war memorial parks 28 species and 33 cultivars of tree plants among the geenery which are growing on the research objects are proved. They could be use of the indirect means of expression ideological load and park theme due to morphological features of plants, namely the shape and colour of the crown, colouring of branchs, leaves, flowers and fruits, as well as their symbolic meaning.

Analysis of plants influence on the perception and understanding of park figurative and symbolic structure by respondents

As a result of the Kyiv memorial parks study, it was proved that the most species (25) and cultivars (21) of woody plants wich are used in role of indirect means of expression ideological load are growing in Slava Park. Thus, in the memorial part of the park on the main alley, therefore the formal shape of three-row hedge from *Carpinus betulus* L., the monumentality and ceremony of the composition is emphasized at the expense of formal planning style, as well as the use of such principles of composition organization as symmetry, magnitude, which are confirmed by the results of the questionnaire. In particular, the signs that the respondents mentioned in the photographs of landscapes, where the hedge from *Carpinus betulus* L. is present, are primarily sublimated: "magnificent", "solemnly", "bright", "magnitude" and "harmoniously". The mention of the hedge, as a positive feature in such landscapes by respondents, is 10-20% of their total number. In addition, it should be noted that there is a medium (0.449) correlation between the frequency of sublimed characteristics and the hedge of mentioning respondents as a positive feature of the landscape. Interesting in this context is the fact of same correlation (0.487) between the frequency of mention of the above sublimated characteristics and monuments that, according to Jankovic [13], are a demonstration of collective memory and are used as the main means of expression ideological load of the park and the formation of park information structure.

Therefore of the combination of the frequency of mention to the hedge and the monumental components of park environment, the correlation of these components with sublimated characteristics increases to a strong (0.721), which is a subtext of significant influence of the harmonious combination of plant and architectural components on the perception of figurative and symbolic structure of the park by respondents, as well as formation whole-landscape emotional reaction, which is expressed in the mention of sublimated characteristics in the questionnaire.

The important component of both the compositional and figurative-symbolic structure of the Slava Park is the Hero Cities Alley (location 19 in Fig. 1), formed by *Picea pungens 'Glauca'*, which is often used on the memorial objects of tragic thematic, especially in the parks of the post-Soviet space, that are due to the pyramidal crown shape and blue-coloured needles. Analyzing the role of the alley in formation of figurative and symbolic structure of the park, it is advisable to pay attention to the peculiarities of its perception by respondents, among which 25 % noted the plants as positive elements that influenced their assessment of the summer landscape. In the autumn, the part of mention of *Picea pungens 'Glauca'*, as a positive feature of landscapes, increased to 40 % of the respondents. On the other hand, the influence of *Picea pungens 'Glauca'* on the formation of solemn mood of landscapes by the designers in this part of the park area was not found among the respondents - there is no correlation between the frequency of mentioning the positive role of plants and sublimed characteristics. The tree rows of *Sorbus aucuparia 'Pendula'* are important component of both the compositional and figurative-symbolic structure in the Slava Park, the shape of its crown emphasizes the tragic theme of the park. These tree rows are located across the slope at two levels of the park and are viewed from a large part of park territory. However, due to the small size of the plants compared with the scale of the park, they are perceived by respondents as components of the park environment, mainly in landscapes of 8 locations (see Fig. 1). Furthermore, the respondents' reaction to these trees is ambiguous, but most clearly reveled in the autumn period. In general, the tree rows of *Sorbus aucuparia 'Pendula'* is presented in four photographs and in all cases marked by respondents in both positive and negative contexts. In addition, the number of negative references to the *Sorbus aucuparia 'Pendula'* rows is greater, but a strong correlation (0.889) between the evaluation of the photos and the part of references to plants by respondents as a positive feature of the landscape was found. It is important to note that the part of references to plants in these landscapes in the summer is significantly reduced – in the context of a positive characteristic by 77.8 %, and a negative by 61.5 %.

Summarizing the analysis of the peculiarities of the respondents' perception of the landscapes of the Slava Park and the role of woody plants in the formation of the mood according to park theme, as well as the level of understanding of the symbolic content of the object, it is important to focus the attention in plants and plant groups that have a symbolic meaning, but cause of the miss of compositional integrity of their significance in the formation of figurative and symbolic structure is leveled, and the symbols are not "read" by visitors, in particular: Guelder-rose groves, planted in the zone of the Holodomor Victims Memorial Complex and in the north-western part of the park along the walkway to the chapel; memorable tree-planting by politicians - groups of *Picea pungens 'Glauca'* and *Sorbus aucuparia 'Pendula';* single trees of *Fraxinus excelsior 'Pendula'* and *Fagus sylvatica 'Pendula';* irregular groups from *Fagus sylvatica 'Pendula', Salix caprea 'Pendula', Betula pendula 'Youngii', Berberis thunbergii 'Atropurpurea', Prunus cerasifera* subsp. Pissardii (Carriðre) Dost l, *Sorbus intermedia* (Ehrh.) Pers., *Viburnum opulus* L. et al.

Discussion

Based on the expert assessment and the analysis of perception peculiarities of park landscapes by respondents, it is advisable to pay attention to the fact that the main principles of plant composition organization of the park environment is to emphasize the memorial elements due to crown form of the plants, less often - based on the perception of crown silhouette, as an indirect means of expressing the ideological load (for example, a weeping crown form for expressing the tragedy of the events, or a conical crown form for solemnity. In general, the main crown forms of tree plants, identified as indirect means of expressing the theme load of the park, include the follows:

▪ columnar crown shape – *Thuja occidentalis 'Columna', Quercus robur 'Fastigiata', Taxus baccata 'Fastigiata', Populus bolleana* Louche., *Populus nigra* var. *italica* Münchh. et al.;
▪ conical crown shape – *Picea pungens 'Glauca'* та ін.;
▪ rectangular crown shape – hendges from *Carpinus betulus* L., *Ligustrum vulgare* L. et al.;
▪ weeping crown shape – *Salix caprea 'Pendula', Fagus sylvatica 'Pendula', Betula pendula* Roth. та *Betula pendula 'Youngii', Fraxinus excelsior 'Pendula', Salix alba 'Pendula', Sorbus aucuparia 'Pendula', Ulmus carpinifolia 'Camperdownii'.*

As to analyzing the use of plants for expressing or highlighting the ideological load of memorial object, it is importance to noting that colour is perceived both as a sign and as a symbol. An example, the yellowish colour became a symbol of the Holodomor in Ukraine in 1932-1933 (it is also known as the Terror-Famine and Famine-Genocide in Ukraine), after the publication of Vasyl Barka novel "Yellow Prince", whose name is an allusion to the biblical horseman on a pale (pale-yellow) horse from Revelation 6:8. At the same time, the yellow colour, like red, is very active and can be used to emphasize attention as a means of highlighting the importance of events, which symbolizes a memorial object. An example of using of yellowish colours in a this context is the colour of branches of hedge from *Cornus alba 'Sibirica'* in the winter (Fig. 2) near the Holodomor Victims Memorial in the Slava Park.

As to seasonal dynamics of plants, it is important to mention that tree plants can using as indirect means of expressing the ideological load during different periods of the year. Some species of deciduous bushes only in the autumn act this role cause of the red colour of fruits or foliage. Thus, *Viburnum opulus* L. (see Fig. 2), which emphasizes ideological load of memorial objects of fruits and leaves in the autumnal colour, as well as the symbolic meaning of the plant for Ukrainians, is widespread in war memorial parks. As noted above, the memorial groups and plantings have been created in some research parks, namely: Guelder-rose groves - in zones devoted to the Holodomor in Ukraine in 1932-1933 (Slava Park) (see Fig. 2); Guelder-rose Alley to Heroes of Ukraine of the XXI century (a small group of bushes in the Peremoha Park). Also, to the right of the entrance to the high relief composition "The Road of War", on the territory of the National Museum of the history of Ukraine in the Second World War, a rows of bushes from *Viburnum opulus* L. was created within the Pechersk Landscape Park. In addition, the good using of *Spiraea×vanhouttei* (Briot) Zabel in Pechersk Landscape Park on "The Road of the War" is proved, which acts as a protective border for visitors, and therefore the white blossom in the summer and reddish autumn leaves colour, emphasizes the theme of the object. Also the groups from *Spiraea japonica* L., *Euonymus europaeus* L., *Viburnum opulus* L., etc., act as accents in war memorial parks in the autumn. In winter, the plant act as the means of expression of the ideological loading in war memorial parks due to the shape and colour of the crown, branches, fruits: *Rhus typhina* L*., Cornus mas 'Sibirica', Thuja occidentalis 'Sunskit'* and others.

The composition of war memorial park in the post-Soviet space has a emphasizes solemn character in the post-Soviet space, which is caused by Cult of the War in the Soviet Union, and shows in the using of such principles of composition organization as formal style, symmetry, magnitude, and colours of the plants. Therefore, for the formation of accents
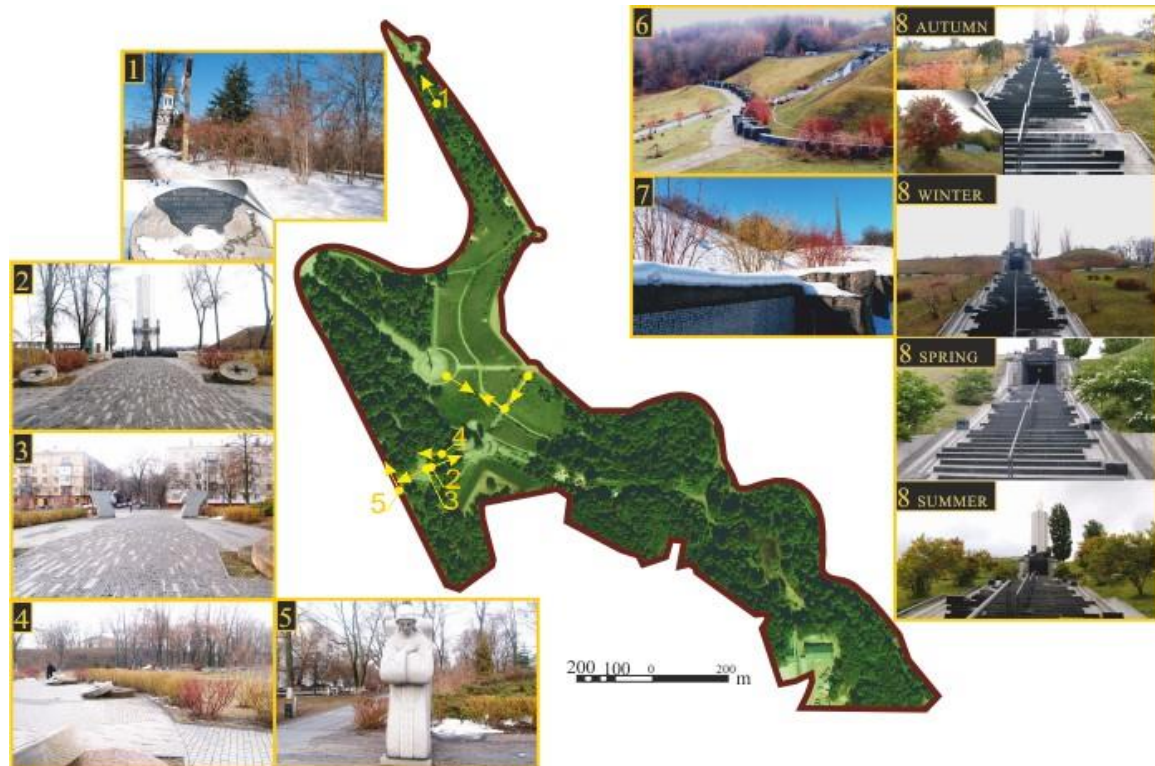
*Fig. 2. The peculiarities of the use of plants in the formation of figurative and symbolic structure
of the Holodomor Victims Memorial in the Slava Park.*

used to beautiful flowering bushes in particular with white inflorescences, which are blooming in the first half of May and the purple foliage plants, both trees and shrubs. It is important to mention that the valuable component of the of memorial parks three-dimensional composition, is coniferous plants, which, due to evergreen colouration and, usually strict forms of habitus, can act as indirect means of expressing the ideological load throughout the year. For example, the main plantings in the territory of the National Museum of the history of Ukraine in the Second World War (within the Pechersk Landscape Park) are groups from *Picea pungens 'Glauca', Picea pungens* Engelm., *Juniperus sabina* L., which, due to colour and shape, emphasize the severity of the park theme.

Thus, based on our research results, the peculiarities of the use of woody plants in the formation of figurative and symbolic structure of the war memorial parks of Kyiv were proved and a structural scheme was developed using the semiotic levels of perception of Barabanov [2] (Fig. 3).

Furthermore, the using of plants is the most widely represented in parks, which is based on the sign level of perception (collective unconscious), which is caused by the peculiarities of perception and interpretation of the lines, form and colour of the plant. In particular, within the research parks, both the positive and the negative effects of the shape, size, colour and texture of the plants on the perception of the memorial architectural components were proved (see Fig. 3).

The main negative characteristics of plants and their groups that negatively affect the compositional, informational, ideological and aesthetic meaning of the memorial architectural components of research parks are inconsistency of the composition of plants (background groups, frame plantings, solitaire trees, etc.) and the monument, inconsistency of their scale, closing the view of the monuments by plants.

The positive influence of plants on the formation of compositional, figurative and symbolic structure of the memorial parks of war themes, mainly consists in focusing of attention on memorial architectural objects, highliting their emotional influence and emphasizing the theme of the park through the composition harmonization, as well as the using of the symbolic meaning of plants. The compositional principles of plants using include the formation of view for the memorial, the visual isolation of memorial architectural objects from the rest of the park, highliting the architectural form by matching the shape, colour and texture of the crown of trees and bushes, creating a harmonious background from tree and shrub groups. The most harmonious combination of plants and memorial architectural components is in the Slava Park, which has the strongest influence on the formation of a whole-landscape emotional assessment of park landscapes, according to the park theme, which was confirmed by the results of the questionnaire of respondents.
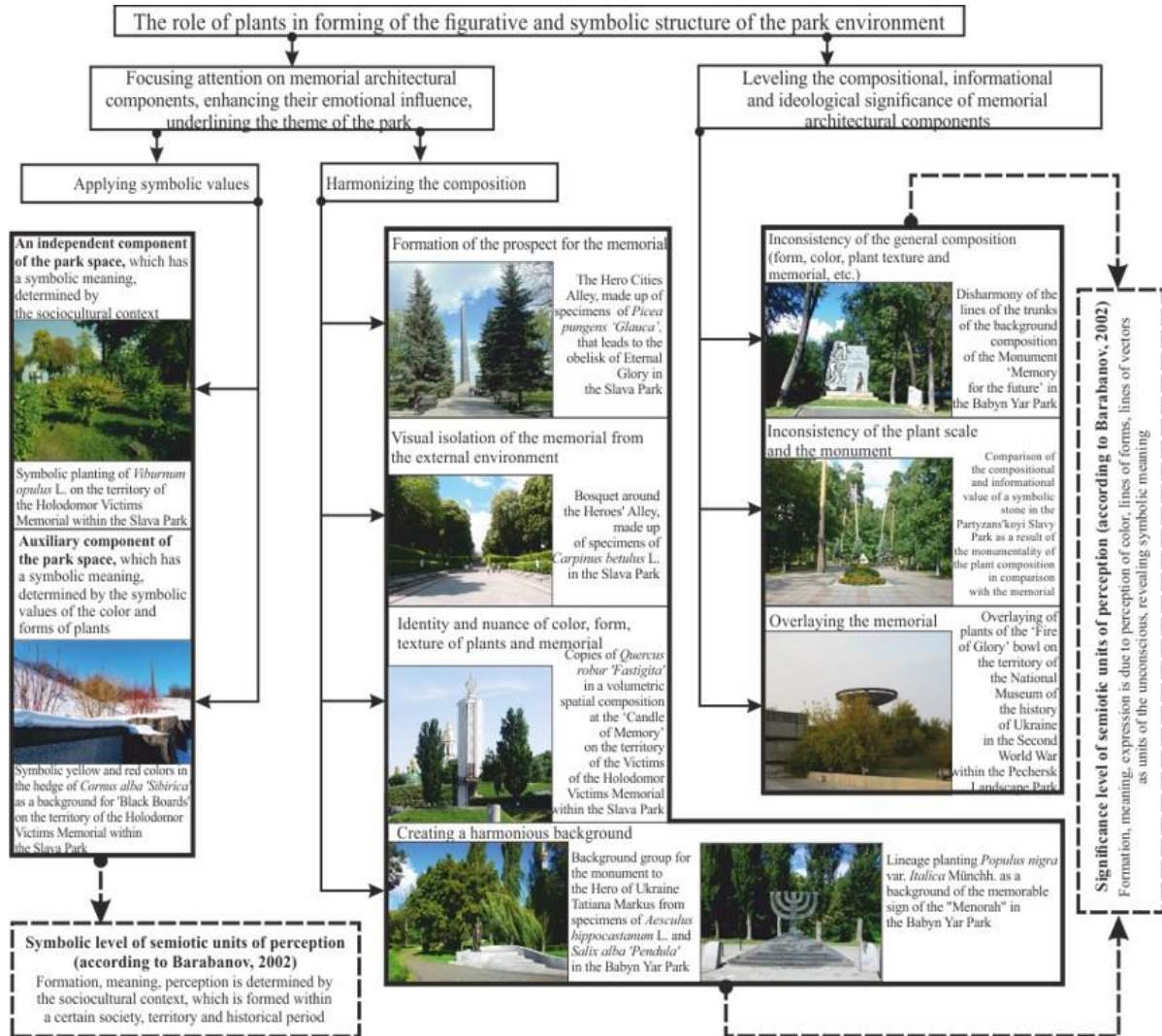
*Fig. 3. The peculiarities of plant perception in the formation of figurative
and symbolic structure of war memorial parks in Kyiv.*

When using symbols in the formation of figurative and symbolic structure of the park, by plants, two approaches to the formation of plant composition are revealed. The first is based on the use of symbolic species of plants for Ukrainians (*Viburnum opulus* L., *Sorbus aucuparia* L.), while plant groups are mono-species independent components of the composition. In the second approach, the matching of plants is based on the symbolic meaning of their morphological characteristics (the weeping and pyramidal form of the crown, the red and yellow colour of the leaves, inflorescences, fruits, branches). In this case, the plants are located next to the memorial architectural objects as secondary components to enhance emotional influence and increase the information characteristics of the memorial. This approach to the use of plants for the formation of figurative and symbolic structure of the park is based on the symbolic level of semiotic units of perception, according to Barabanov [2], which is determined by the sociocultural context that is

formed within a certain social, historical period and territory. Although the plants that have a certain symbolic meaning, which shows in different levels of semiotic units of perception is proved, the visitor perception of them is ambiguous.

Conclusions

Summarizing the research results of the interconnections between the plant composition and figurative and symbolic structure of the war memorial park, it is important to accent on the importance of harmonious combination of architectural components and plants for forming a definite emotional reaction of visitors. Since, according to results of the study, it was revealed that along with a large number of plant components within the Slava Park, which were formed in order to create a holistic figurative and symbolic structure of the park, most of them do not have a significant influence on the formation of the necessary emotional reaction from respondents, although affect

their aesthetic preferences. However, the influence of plants on figurative meaning of the landscape increases significantly when they are harmoniously combined with architectural components, which is confirmed by the results of the questionnaire.

The further work may be aimed at studying the influence of plants on the perception of memorial park landscapes and understanding of their informational and ideological context in the winter period of the year, under the predominance of colour and architectonics of the branches, due to the appearance of the trees and shrubs crowns. Another important aspect of further research is finding of the role of sociocultural influence on the perception of phytocompositions by respondents of different ages, social and ethnic groups.

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Kopsavilkums. Rakstā ir izklāstīti pētījumu rezultāti par augu lomu kara memoriālo parku figurālās un simboliskās struktūras veidošanā. Pētījums pierāda, ka kokaugi var būt kā simbolisks ideoloģiskās izpausmes veids atšķirīgos gadalaikos. Dažas lapu koku un krūmu sugas šo lomu spēlē rudenī ne tikai augļu sarkanās krāsas dēļ, bet ietverot arī lapotni, jo īpaši *Viburnum opulus L.*, kas ir izplatīts Kijevas kara memoriālajos parkos. Ziemā vainaga, zaru un augļu forma un krāsa *(Rhus typhina L., Cornus mas 'Sibirica, Viburnum opulus L., Sorbus)* veido kompozicionāli spēcīgu vizuālās izteiksmes valodu.

Pamatojoties uz Kijevas memoriālo parku ekspertu novērtējuma rezultātiem, tiek atklātas augu koksnes izmantošanas īpatnības Kijevas kara memoriālo parku figurālās un simboliskās struktūras veidošanā. Strukturālā shēma tiek pakārtota atbilstoši semantiskai uztverei, kā norādīts Barabanova pētījumā (2002). Tiek atklāts, ka augu izmantošana ir visizplatītākā parkos, kas balstās uz krāsas un formas uztveri, ko veido augu dendroloģiskās īpatnības. Pētītajos parkos tika atklāts, ka gan pozitīvā, gan negatīvā kompozicionālā "scenārija" izspēle uz augu formu, izmēru, krāsu un tekstūru ietekmē memoriālās arhitektūras komponentu uztveri. Izmantojot kokaugu simbolus parka struktūras veidošanā, atklājas divas pieejas augu sastāva veidošanai. Pirmais ir balstīts uz simbolisku Ukrainas augu sugu izmantošanu *(Viburnum opulus L., Sorbus aucuparia L.),* savukārt augu grupas ir vienas sugas kompozīcionālā sastāvdaļa. Otrajā pieejā augu dendroloģisko īpatnību izvēle balstās uz to morfoloģisko īpašību simbolisko nozīmi. Šajā gadījumā augi atrodas blakus piemiņas arhitektūras objektiem kā sekundārie komponenti, lai palielinātu emocionālo spēli un kāpinātu piemiņas zonas informāciju. Minētā pieeja augu izmantošanai parka figurālās un simboliskās struktūras veidošanā ir balstīta uz vizuālās uztveres līmeni, ko nosaka sociālkulturālais konteksts, kas veidojas noteiktā valsts vēsturiski politiskajā un sociālekonomiskajā laika posmā.

Magnetic Places
in Riga Soviet Residential Areas

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Abstract. This article focuses on magnetic places in Riga Soviet residential areas – locations which are differ from ordinary spaces due to their naturalness, possibility of restoration, perceived beauty and possibility to appropriate such places. This paper utilises two theoretical fields – the one of evolutionary aesthetics in dealing with such elements as prospects and refuges that is crucial for survival, but also phenomenology dealing with mental maps and subjective perception of space. The method in use is semi-structured interviews, since they provide a valuable in situ material for proving a theoretical thought. It can be concluded that the magnetic places that often are as much as 200 m far from the interviewees' homes are more attractive than the location outside their window. This finding is in stark contrast to Oscar Newman's Defensible Space Theory. There are also few recommendations for landscape architects included in this text: one of those is to not only invest more resources into the design of magnetic places, but carefully design the ordinary places. The latter should be done not only in order to avoid the arousal of no-go areas in a residential complex, but also because any ordinary space has a potential of becoming a place.
Keywords: space, place, magnetic place, evolutionary aesthetics, phenomenology

Introduction

Previous research of the author of this paper was focused on the question whether or not there is a metric system that underlies the preference of public spaces in urban settings. In many yards and streets of the Soviet housing areas in Riga, Latvia, which was the research field, it was possible to detect by the help of open-ended interviews the objects that formed the perceived borders of these spaces. Such objects were not only walls of the buildings but most importantly also trees, elevations, water features, benches. It became clear that the perceived size of the space together with reported presence of elements such as prospects and refuges corelates with liking or disliking this space [10; 11]. Prospect is a possibility to see into the landscape and gather more information than available at the moment, but refuge – an opportunity to hide. Both are crucial for survival [1; 7]. Yet, in few cases the interviewees did not have much to report and showed no interest on yards or streets they were asked about: neither in the context of size perception and liking, nor with regard to prospects and refuges. This phenomenon of being reserved even about the locations very close to the doors to their homes always happened when there was a strikingly beautiful area in the proximity of the housing ensemble. This area seemed to be able to make perception and also preference ranking of other spaces difficult. The strikingly beautiful locations tended to blend out other, "ordinary" spaces in the area from our conversations. Such locations are called magnetic places by the author of this paper. The existence of these seldom locations asserts that one of theories used in contemporary landscape architecture – Oscar Newman's Defensible Space Theory – which proposes that the locations near to one's home are the most dear to the inhabitants and thus defensible, might have some deficits [14]. The goal of this article is to characterise magnetic places and point to the possible implementation of this concept into landscape architecture.

One of the theoretical thoughts that can explain the liking of magnetic places themselves is evolutionary aesthetics. The magnetic spaces are natural locations and thus their liking can be easly associated with biophilia concept popular in the evolutionary aesthetics [19]. Also, prospect and refuge theory can shed a light on such a high preference. A good number of such elements corelates with human calculus of better survival options according to Prospect and Refuge Theory [1]. Besides that, such an environment is capable to restore the resources of direct attention needed in the everyday as Attention Restoration Theory promotes it [8]. Yet, opposed to ordinary yards and streets, the magnetic places are not measurable in meters. Their perceived borders are not visible as their impact exceeds beyond the site. On contrary, many magnetic places attract people from afar. This attraction makes the places magnetic. Hence, the field of their influence is called magnetic field.

Even though, the content of magnetic places can be explained in the language of evolutionary aesthetics, the perception of their borders needs a very different theoretical framework. Magnetic places are the locations that can be seen partly only. Their size is bound to subjective experience, their borders often lay beyond the site, their meaning is subjective, emotional. Magnetic places resamble the concept of a place elaborated by phenomenologists, who differentiate

between space and place. Space is more abstract than place. „What begins as undifferentiated space becomes place as we get to know it better and endow it with value" states Tuan [18]. "Place is a meaningful location", writes human geographer Tim Cresswell [3]. Also philosopher Edward S. Casey describes places similarly: "place as experienced by human beings, in contrast to space, whose abstractness discourages experiential explorations" [2]. Concept of place differs from the one of space by the level of experiencing it. "A person is more attached to place and he or she is to a very small degree attached to space" [2]. Casey argues that spaces that can be embodied have the potential of becoming places [2]. Casey also states that "/../ the body not only goes out to reach places; it also bears the traces of the places it has known." He terms these processes "Outgoing" and "Incoming" [2]. The interview material on some locations resembles the above mentioned quotes in a nutshell: these places are meaningful, worth experiencing, they possess a great deal of the degree of attachment, their traces are well embedded into residents' bodies and memory. Thus, the hypothesis of this paper is as follows: if there is a magnetic place in a Soviet Residential area it intensively attracts inhabitants who want to spend some leisure, but more importantly such space diminishes the apprehension and attachment to ordinary spaces.

Methods and Materials

The primary tool for inquiring data on magnetic spaces was open-ended interviews with the inhabitants of four Soviet time residential areas in Riga, Latvia: *Āgenskalna priedes*, *Ķengarags*, *Zolitūde*, *Ļeņina* (now *Brīvības*) *iela* 177. The route of the interviews was always prechosen. Also, the spaces that the conversations were about were established by the researcher in advance. They included both, locations next to the entrance of respondent's home such as a yard or street that can be seen out of the window as well as spaces that were as much as 500 m away from that entrance. The interviews were originally designed to assemble material on liking as well as size perception of spaces. Open ended interviews were selected as they provide the best possibility to comprehend spatial issues that have a good theoreticaly grounded understanding, but not empirical *in situ* based one [10; 6]. Yet, as a positive side-effect of a semi-structured conversation – such interviews bring along also unpredicted topics. So called magnetic places are one of them. Discourse analysis is applied to the interview material to detect the inhabitant's utterances on these particularly attractive locations in their areas.

For the purpose of this paper the main discourse the author is filtering out of the interviews –

avoidance to talk about the particular yard or street when asked and leaning towards speaking about the magnetic place instead. Such a change of the interview course signals that the interviewee is attracted by the magnetic field as mentally and subjectively they are in a magnetic place even though physically they are in a very different location – yard next to their home, for instance.

The next method applied once the magnetic place is established: evaluating it from the point of view of presence of prospects and refuges in it. Such a look to any location gives the researcher the understanding on why the place is being liked.

Furthermore, because as opposed to ordinary spaces the magnetic places have no objectively measurable borders, another approach is needed to understand their subjective amplitude. The magnetic places will be rendered from the point of view phenomenological place. This will show the subjective range of these locations. This step is essential in dealing with the material: it helps to understand why some spaces become places? Is it because they promise restoration? Or perhaps they are easier to appropriate?

Results and Discussion

By analysing the interview material, it was discovered that three out of four residential areas had at least one magnetic space in close proximity. In *Ķengarags* such a space is Daugava river promenade, in *Zolitūde* – an alley of trees on the outskirts of the residential area, in *Ļeņina iela* – former cementery *Lielie kapi* that serves as a park now. The only housing ensemble where no magnetic place was discovered was *Āgenskalna priedes*. It means that here residents did not have any particular place that they felt was so supreme that made thinking and talking about other locations redundant.

Not all three magnetic places have the same power of attraction, magnetic field in other words. *Daugavas* promenade in *Ķengarags* seemed to have a very persistent and intensive influence on how the inhabitants perceived and liked other locations in this housing ensemble. Also, *Lielie kapi* in *Ļenina iela* residential complex was mentioned quite often by the inhabitants as the actual place of spending time that out shadowed the yard of the estate. The utterances about the tree alley in the outskirts of *Zolitūde* can also be interpreted as descriptions of a magnetic place, but they are not as intensive as the previous two.

All three magnetic places can be visually characterised in multiple ways. For instance, they are natural locations, at least if the amount of water, animals, birds, trees or other plants in such spaces is compared to their presence in the yards and on the streets of the residential area in question. Accordingly, the built portion of magnetic places is

very small. There is perhaps a pedestrian road, a monument, an embankment in such a space. Another important aspect that can be applied generally to all three magnetic places, there are no large obstacles – walls or intensive streets – between the inhabitants home and a magnetic place. Besides that, the interviews register a distance that is no longer than 200 m between the home and the magnetic place. A look at two magnetic places bellow gives some more precise detail on this phenomenon.

Daugava river bank

One of them is a 25 m wide promenade that is situated along the elevated part of Daugava river bank. On one side it is bordered by the facades of residential area Kengarags houses and green intervals between them. Both, facades and green intervals are ca. 50 m long. The other side of the promenade is dotted by trees. Further, there is a slope between water and pathway. The river here is ca. 500 m wide. Yet, the sight can wander significantly further along it. Daugava is meandring slightly at this section (Figure 2).

From the view point of evolutionary aesthetics this landscape manifests quite a few prospects and refuges. The meandering river and also the steep slope is forming prospects: moving along the curbed path or down the slope provides a new perspective and thus information about the location. The water in its turn host many elements of refuge – one can hide in the water and observe the scene in such a way that gives an overview not possible from the promenade. The trees with low growing branches in this case are refuges, too. One can climb onto them and escape a danger. The abundance of all the mentioned elements is the one of the reasons why this scene is loved by the inhabitants. There are certainly more of prospects and refuges than in the neighbouring yards and streets (Figure 1).

The inhabitants demonstrated love and affection towards Daugava river promenade. A young adult Martins said that there was no other place like Daugava river promenade in the city. A retired woman Jevgenia proudly described the promenade as very "posh". Almost everyone interviewed in this area used positive superlatives to describe their relationship to Daugava river promenade. This affection or liking in other words can be explained by the above mentioned numbers of prospects and refuges [4].

Inhabitants also explained that this is the place where they relax, both their eyes and mind. They found it very peaceful here. A place to forget the everyday, they said. According to the Attention Restoration Theory, such a place renews the resources of the direct attention that are needed to function and make decisions.

Fig. 1. A view to Daugava river promenade in Ķengarags, Riga. Photo courtesy of Google Maps.

Fig. 2. A smaller transparent circular area represents the visual field seen from the banks of river when walking along the promenade (white arrow). Larger transparent circular field shows the amplitude of Daugava river on a mental map of a resident (white symbol of a female), which extends until their home. Photo courtesy of Google Maps and author.

However, evolutionary aesthetics cannot explain the perception of the size of Daugava river promenade. Of course, the space that can be seen from the promenade can be demarcated on the paper map (Figure 2). Yet, the borders of the very same space on the residents' mental maps to use Tuan's concept are much larger. Subjectively the Daugava river promenade extends as far as until the large *Maskavas iela*, which physically cannot be even seen from the promenade. Moreover, its meaning surpasses the meaning of a next-to-home-yard in such a way that the interviewees even avoid a conversation about the yard.

To demonstrate this point I will describe two interviewees that are symptomatic to the rest. For instance, 30 years old mother of a toddler Olga, was asked about the largest yard in the residential area that is seen outside her window. She refused to call it a yard and reffered to it as a place to jog. She also emphasized thad she felt her yard was everywhere in the area, where one could descend the bank of Daugava, sit down and think. Olga stressed that *Ķengarags* was a very beautiful residential area. Also, Alla whose residential block is situated on Maskavas street 200 m away from Daugava, when asked if she used her yard, replied without hesitating a moment with a no. She always went to Daugava river instead. These answers indicate that Daugava river banks are mentally the closest location used for

regeneration. Daugava river banks replace their yard. Figures show the extent of magnetic place for both quoted interviews.

From the point of view of phenomenology the Daugava river bank is endowed with a value to use Tuans expression [19]. According to the interviews it is beautiful, posh, enables thinking, is usable for walks, bike rides and jogging. Aesthetic and functional value of this environment is very distinct almost in every interview. These elements turn a space into place. The inhabitants not only enjoy but also appropriate the bank. Potentially this extraordinary significance of the promenade is the reason why the size of it much larger on the mental map than it is on the physical one. Even standing 200 m away from the bank inhabitants feel attracted to Daugava. This is truly magnetic place.

Lielie kapi

Another example is *Lielie kapi* near the housing ensemble in *Ļenina* (now *Brīvības*) *iela* 177. *Lieli kapi* is a cemetery. First burials took place at the end of the 18th century, but the last ones – ca. 60 years ago. The size of the cemetery is 22 ha. A rather busy *Senču iela* runs through it, deviding the space in two asymmetrically large parts. The larger one of ca. 17 ha is closer to the estate in question. Significant portions of the cemetery were destroyed during the Soviet times and it was turned into a park. Yet, some of the tombstones and memorial buildings are still present. The greenery is composed of large trees with high growing branches, there is also no underwood. Both of the factors potentiate far reaching visual fields. The cemetery paths are mostly designed as straight roads (Figure 4).

From the point of view of evolutionary aesthetcis, this green area possesses a large number of refuges as every memorial building on the sight serves as one. These small built structures can serve as a hiding place in case of danger. Also, there are multiple prospects, formed by the groups of trees. Walking behind those groups promises new pieces of information – a component necessary for survival. The presence of prospect and refuge elements theoretically explains the liking of *Lielie kapi* by the inhabitants (Figure 3). The presence of these elements in the residential area itself is much smaller.

Empirically the case of *Ļeņina iela* demonstrates very similar contents of quotes regarding the affection and liking of *Lielie kapi* as it was in case of Daugava river banks in Kengaraga. Men and women interviewed seem to appreciate *Lielie kapi* peacfulness and fresh air. They are also delighted by their ways to the park – Indranu iela – an aproximately 80 m long stretch of a side street bordered by two to three stories high historic residential houses.

Fig. 3. A view to Lielie kapi, Riga.
Photo courtesy of Google Maps.

Fig. 4. A smaller transparent circular area represents the visual field seen from entrance to the park. Larger transparent circular field shows the amplitude of Lielie kapi on a resident's mental map (white symbol of a female), which extends until their home. Photo courtesy of Google Maps and author.

The interviewees also mention couple of times that they use *Lielie kapi* to relax from the city noises. This relaxation from the overstimulated city life that is possible in the cementary can be explaind by ART – the place has a property of restoring direct attention.

Yet, also in this case evolutionary aesthetics cannot explain the size of *Lielie kapi* on the mental maps of the inhabitants. When 18 years old Rihards was asked standing in the yard of *Ļeņina iela* 177 estate about his favourite place in this residential complex, he answered it was the park. Meaning of course the *Lielie kapi* cementary which has been turned into the park. For him this green area was part of the residential area, even though technically they are separated by housing of a very different era and a distance of ca. 150 m. (Figure 4) Also 37 years old Rihards and 38 years old Markes gave a similar answer. Some other asked to name the place in the residential area where they would read a book, mentioned park, too.

From the phenomenological perspective quotes of the inhabitants on *Lielie kapi* show that this is the location that they appropriate more intensively that their yard. Some come here to walk a dog, some – to read a book, some – to relax. These are all the activities that they do no excercise in the yards or

streets next to their homes. In other words, the inhabitants demonstrated the expressions of joy over possibility to freely function and appropriate *Lielie kapi*. In Casey's words the places are experienced. *Lielie kapi* is the location that encourages experiential explorations, in contrast to spaces which due to being so abstract, avert any wish to explore them. Also, in the case of *Ļeņina iela* 177 ensemble, the residents being interviewed in the yard or on the street feel attracted to the *Lielie kapi* much more than they are to the yard that they can see outside of their window. This phenomenon makes *Lielie kapi* magnetic place.

Conslusion

The following characteristic signs of magnetic places have been discovered in this paper: they are natural locations with multitude of prospects and refuges – fact that permits to relax the direct attention. This argument is in line with most of the environmental psychology literature on the topic [8; 17; 5; 16; 12]. They are also locations that have a high subjective value because of their aesthetics beauty and appeal to appropriate them. This finding resembles the one done by many phenomenologists who argue that places opposed to spaces are endowed with subjective value and encourage explorations [2; 13; 18]. Also, magnetic places are

borderless in the sense that one cannot really see their borders.

Moreover, they are easy to reach and there are no obstacles like intensive traffic between ordinary spaces and magnetic places. Because of their high value the magnetic places attract inhabitants from locations that are as 200 m far away. Hence, they are called magnetic places and the range of their attraction – magnetic field. Thus, the hypothesis that a magnetic place outcompetes the perception and likability of ordinary space next to residents' homes is proved. This last conclusion is in strong disagreement with the very popular Defensible Space Theory [14; 15], which teaches us that the location closer to one's home are the most cherished ones.

Discovery of magnetic places in any residential area should signal to landscape architects dealing with it that investing larger resources into its reconstruction is meaningful, since the inhabitants are heavily attracted to them. It does not mean yet that ordinary spaces such as yards and streets should be neglected by landscapes architects and thus become a no-go-zones of the residential areas. For also spaces have a potential to become places [2].

The interviews were not designed to discover magnetic places specifically. Another project with specific questions is needed to address this issue.

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Kopsavilkums. Raksts pēta tā sauktās magnētiskās vietas lielmēroga dzīvojamajos rajonos Rīgā, kuras atšķiras no parastajām telpām ar īpaši lielu dabisku zonu klātbūtni, ar iespēju tajās rekonstruēt mentālās kapacitātes un apropriēt tās. Magnētiskajām vietām piemīt arī īpaši augsta uztvertā estētiskā vērtība. Raksts apskata magnētiskās vietas no divu teorētisko lauku viedokļa – evolucionārā estētika un fenomenoloģija. Pirmā izvērsti pēta skatu un slēpņu klātbūtni magnētiskajās vietās, tie ir ainavā atrodami elementi, kuri cilvēka sapratnei signalizē izdzīvošanas potenciālu. Savukārt no fenomenoloģijas viedokļa tekstā apskatīta magnētisko vietu subjektīvā un emocionālā vērtība.

Rakstā secināts, ka magnētiskās vietas respondentuprāt ir daudz pievilcīgākas, kā parastās telpas, t.i., tām ir liels magnētiskais lauks. Liela magnētiskā lauka fenomens ir vērojams pat gadījumos, kuros magnētiskās vietas atrodas pat 200 m atstatumā no respondentu dzīves vietas, bet parastās telpas – redzamas pa mājokļa logu. Magnētisko vietu eksistenci iespējams izskaidrot gan ar lielo skatu un slēpņu skaitu no evolucionārās estētikas viedokļa, gan no vietas teorijas (*place theory*) skatpunkta, kas populārs fenomenoloģijā. Taču magnētisko vietu fenomens ir pretstatā tam, ko postulē Oskara Ņūmena (*Oscar Newman*) *Aizsargātas telpas teorija (Defensible Space Theory),* kura paredz, ka visciešākā saistība iedzīvotājiem ir tieši ar telpām, kas atrodas vistuvāk mājvietai.

Raksts rekomendē ainavu arhitektiem veicināt resursu ieguldījumu magnētiskajās vietās. Tomēr ainavu arhitekti tiek aicināti, neaizmirst arī parastās telpas, jo katrai telpai piemīt potenciāls kļūt par vietu.

Landscape sociology as developing academic discipline

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Abstract. The common tendency in higher education is specialisation. Landscape has been subject of interest in sociology from its beginnings, and social aspects are one of mane characteristic parts of landscape. Even more – sociology is strong theoretical basis of landscape architecture. The research is made with aim to understand theoretical basis of landscape sociology as developing academic discipline. Methodology used in research is systematic literature review, which provides range of tools to identify connections in theory. Literature review was done to define landscape sociology as important academic discipline in higher education of landscape architecture. Landscape and sociology as academic disciplines have long history, but landscape sociology as separate discipline is still developing. It is important include landscape sociology in landscape architecture higher education.
Key words: landscape architecture, landscape sociology, specialisation

Introduction

Cultural anthropologists, historical geographers, landscape ecologists and environmental artists have contributed not only to the landscape architecture as academic discipline, but other disciplines as well. The European Political Strategy Centre has prepared information that shows tendencies in education. There are many challenges and goals to achieve; the most common in higher education is specialisation [10]. Landscape architecture is a multidisciplinary specialisation. Social aspect is an important part of landscape; it is of the same importance as the aspects of culture, nature, perception and aesthetics [25]. As scientists from various fields have confirmed, different society groups have direct connection with the landscape [11, 12, 23, 24].

Landscape, nature and environmental topics have been mentioned in sociology since its beginning. It is known that founders of the sociological field – Durkheim, Weber and Marx had all something to say about nature and society [15]. Landscape is developed and its construction has a social aspect. Especially nowadays when it becomes more and more important to make the surrounding environment in a way that it helps people to communicate and spend time outdoors. It must be created by considering both people and nature. Landscape architecture research as landscape itself is generally multi- or interdisciplinary and perhaps even trans-disciplinary [6]. Theoretical basis of landscape architecture comes from many disciplines. There are a few variations of defining the basis of landscape architecture research, one of them is this base being depicted as three overlapping value systems as shown in figure 2 [27]. From this point of view sociology is not just a part of landscape, but strong theoretical basis of theory and practice in landscape architecture.

Landscape architecture as academic discipline developed only in the early 20th century. All the theoretical and academical roots come from the USA as the first higher education programme in landscape architecture was established in Harvard University, USA in 1990. Later this education developed also in Europe, originating in Agricultural University of Norway [31].

The aim of this research is to understand the theoretical basis of landscape sociology as a developing academic discipline. Systematic literature review methodology is used in landscape architecture and social sciences as it provides a range of tools to identify the theoretical connection [21, 29].
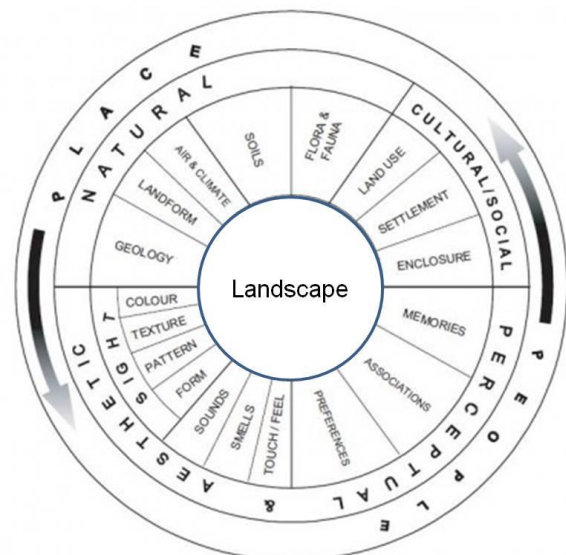

Fig. 1. What is landscape?
[Swanwick, C. Landscape Character Assessment.
Guidance for England and Scotland. Edinburgh:
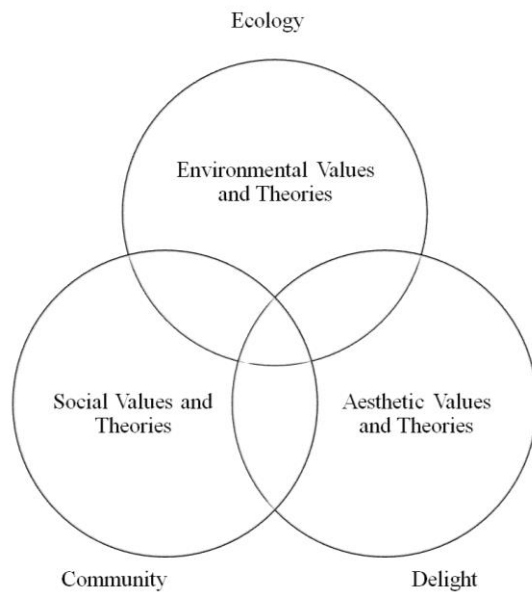*The Countryside Agency, John Dower House, 84 p].*

*Fig. 2. Overlapping fields of value and sources of theory in landscape architecture [**Thompson I. H**. Ecology, Community and Delight: Source of Value in Landscape Architecture. London: Spon Press, 2000, 216 p. ISBN-10: 9780419236108.].*

Materials and Methods

The research is based on the literature review with the aim to define landscape sociology as an academic discipline important in higher education of landscape architecture. As a part of the research, also a study on landscape architecture study programmes for the study year 2017/2018 was conducted. The tasks of the research are as follows:

- to define landscape sociology as the origin and development of an academic discipline;
- to define similarities and differences in academic fields related to landscape sociology;
- to find out if landscape sociology is included as a subject in higher education study programmes of landscape architecture;
- to find out if sociology is mentioned as part of some study subjects in higher education study programmes of landscape architecture.

Results and Discussion

Results are divided into two parts – landscape sociology development and related fields, and landscape sociology in higher education.

Landscape sociology development

The first part of the term "landscape sociology" is the *landscape* itself. It is a comprehensive research subject. "Landscape" was mentioned for the first time in literature in 1598 [16]. Currently the landscape definition from the European Landscape Convention is widely used, which defines it as area, as perceived by people or visitors, whose character is the result of the action and interaction of natural

and/or human factors [9]. Landscape research is done on wide range of different types [4].

If looking for the origins of landscape sociology, first, sociology development must be looked at. Sociology itself is the starting point of landscape sociology. *Sociology* is the science of human life in society. It explains both the functioning of different social structures (groups, communities, organizations) and the statistical groupings (e. g, gender, age, education, etc.), and the impact on the lives of individuals and society, as well as analysing, explaining and predicting changes in society. Sociology looks at the society as a system composed of different elements; it looks at the interaction of individuals among themselves and the surrounding social world. Sociology reveals the active role of the individual in explaining how it affects and transforms the surrounding social world and shows how social structures affect and form the individual [18].

Sociologists are interested in the experiences of individuals and how these experiences are shaped by interactions with society. Sociologists try to identify these general patterns by examining the behaviour of large groups of people living in the same society and landscape. Philosophers in the 18th century created basic principles, which can be used in explaining social life. 1780 is the year when the word "sociology" appeared for the first time. As an academic subject, development of sociology in Europe started in 1895. Sociology can be divided into three parts: Structural Functionalism, Conflict Theory, and Symbolic Interactionism [19].

The beginning of the 20th century is the time when sociology appeared in Latvia in the form of public, political research, social philosophy and social statistics. However, only in the 1960s sociology developed as a separate branch of science. Initially it had to be proven why sociology had to be separated from philosophy and sociology (besides, the first academics were graduates of philosophy and with philosophical education) [28].

Landscape architecture has long history of development, but the title – landscape architect was used for the first time in 1858. It was used by Frederick Law Olmsted, one of the designers of Central Park in New York City. Throughout the 20th century the title – landscape architect – was used more frequently as landscape architecture became an established profession. Landscape architecture became a profession as it was requiring specific training and degrees [7]. Landscape is a subject of interest in many different fields and as a result the definition of it also differs. From the sociological point of view this definition includes two characteristics of landscape: landscape as a material objective and subjective culturally

*Fig. 3. New York - mixed-use planning
[photo by the author, 2018].*

*Fig. 4. New York – mixed-use planning
[photo by the author, 2018].*

*Fig. 5. New York – mixed-use planning
[photo by the author, 2018].*

determined form of perception and evaluation of this material structure [1].

Landscape architecture cannot be defined completely as it changes depending on the context. Landscape architecture theory is based on field practice [13]. Depending on the context the topic of landscape architecture could be – urban design, site planning, storm water management, urban planning, restoration, parks and recreation planning, green infrastructure planning, private or residential master planning design, etc.

Landscape architecture has practical changes in the field with the aim to make living of people together better from different point of views. One of the current tendencies in landscape architecture is mixed-use planning. It is influenced by the tendency to make multi-use living space in different scale. Mixed-use planning is closely connected to city's walkability. Mixed-use planning is the one, which includes a variety of land uses together in one area. This kind of space is supposed to be more vibrant and socially-interactive [3]. New York City is already quite multifunctional in the scale of each building, but still there are many challenges. Because of these new tendencies in landscape architecture, stronger research practice in landscape sociology and growing interaction in landscape and sociology interaction are developing.

Landscape sociology as a separate field of research is not well known. Landscape sociology researches social theory, social ecological systems, resilience studies, rural sociology, complexity science, interdisciplinary, landscape policy and planning, anthropology and natural resource management [8].

Landscape sociology differs from sociology, because the landscape aspect involves interaction between society and environment. If sociology looks at society as a system composed of different elements, then landscape sociology looks further – how the society interacts with environment in some specific scale of landscape.

Landscape sociology includes different terms. From the social aspect, the idea that not only the residents of the exact place, but also its visitors and those who manage and develop the legislative frame of the landscape are of great importance. General legislation, exactly territorial planning documents, as well as development strategies are all parts of the legislative frame. The involved parties for each specific landscape site can vary – those can be municipalities, different municipality organisations, managers, government organisations. So far, the landscape sociology researchers have developed research capacities in social theory, social ecological systems, and resilience studies, rural sociology, complexity science, interdisciplinary, landscape policy and planning, anthropology and
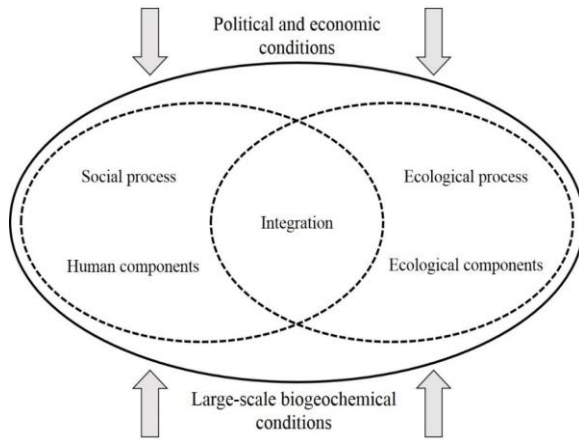
Fig. 6. Social-ecological system
[Virapongse, A., Brooks, S., Metcalf, C. E., Zedalise, M., Gosz J., Andrew, A., Alessa L. A social-ecological systems approach for environmental management. Journal of Environmental Management, 2016, Vol. 178, p. 83-91].

natural resource management [8]. Landscape sociology also makes research on a never-ending cycle – social aspects define landscape and landscape defines identity [26]. Social networks are linked to the space in which they occur [22].

Some other point of view to terms landscape and sociology is that landscape is the place, where social and ecological systems meet. Social and ecological systems are two dimensions, which cannot be separated. In simple terms it is clear, that nature affects people and people affect nature [5].

Figure 6 generally shows the interaction of these social and ecological systems. Socio-ecological system is complex and includes social processes, human components as one part, and ecological process and ecological components as another part. Among these two parts there are integration-management practices, adaption and resource use. The integration part is the part of landscape architect's daily life. The landscape architect works the same way as the socio-ecological system, where political and economic conditions as for example the project's budget and development plans are found on the one side and large-scale biogeochemical conditions, which are important in the process of making choices about plants, materials and functional planning of the place, on the other side [32].

It is also important to mention other related research fields, e.g. human ecology and environmental sociology. *Human ecology* is similar to landscape sociology. Human ecology is a study of the interaction of humans with their environments. The main topics of human ecology are genetic, physiological, and social adaptation to the environment and to environmental change, role of social, cultural, and psychological factors in the maintenance or disruption of ecosystems,

effects of population density on health, social organization, or environmental quality, new adaptive problems in urban environments, interrelations of technological and environmental changes [2, 17].

Environmental sociology formed in late 1970s. In a wider range it looks at the understanding of the relationship between the society and the environment. The most important task of environmental sociology in the 21st century is to discover the most effective mechanism of environmental reform, which will guide the society to more socially secure and environmentally friendly arrangement. [15].

TABLE 1

Terms and Their Comparison. *Created by the author.*

Term	First mentioned/ defined	Definition from	Research topics
Landscape	1598	The landscape is a part of the land, as perceived by local people or visitors, which evolves through time as a result of being acted upon by natural forces and human beings.	Due to the holistic nature of this term, there is a wide range of landscape researches.
Landscape architecture	1858	Landscape architecture is a contextual discipline.	Urban design; Site planning; Storm water Management; Urban planning; Restoration; Parks and recreation planning; Green infrastructure planning; Private or residential master planning and design.
Sociology	1780	Sociology looks at society as a system composed of different elements, as well as looks at the interaction of individuals among themselves and the surrounding social world.	Experiences of individuals; How individual experiences are shaped by interactions with society; Identification of general patterns by examining the behaviour of large groups of people living in the same society, landscape.

Term	First mentioned/ defined	Definition from	Research topics
Landscape sociology	*Is not clear*	*Still in not defined.*	Social theory; Social ecological systems; Resilience studies; Rural sociology; Complexity science; Interdisciplinary; Landscape policy and planning; Anthropology; Natural resource management.
Human ecology	1972	Study of the interaction of humans with their environments.	Genetic, physiological, social adaptation to the environment; Role of social, cultural, and psychological factors in the maintenance or disruption of ecosystems; Effects of population density on health, social organization, or environmental quality; New adaptive problems in urban environments; interrelations of technological and environmental changes.
Environmental sociology	Late 1970s	Relationship between society and the environment.	Discover the most effective mechanism of environmental reform.

Landscape sociology in higher education

In most landscape architecture studies sociology is included in different subjects. After research on landscape architecture study programmes in different universities for the study year 2017/2018, it can be concluded that sociology as a topic is included in different subjects, but it is taught as a separate subject only in two universities – the Polytechnic University of Milan and Latvia University of Life Sciences and Technologies.

There are two universities, which have more research capacity in landscape sociology – Melbourne School of Land and Environment and the Polytechnic University of Milan. In these two higher education institutions landscape sociology is a separate academic discipline.

There is a landscape sociology group in Melbourne School of Land and Environment. The Landscape and Environmental Sociology group has developed research practice capacities in such fields as social ecological systems, rural sociology, landscape policy and planning, natural resource management. These group members are involved in teaching such subjects as Reshaping Environments, Social Research Methods, Sustainable Landscapes and Building Resilient Settlements [30].

Sociology of the Environment is taught in the Polytechnic University of Milan. The main topics of the course include dimension and consequences of the urban mobility, transformation of the urban settlements and housing issues, urban social research, etc. Using the analytical tools and the major theory of the urban sociology, the course focuses on the social dynamics of the contemporary society and the major transformation. Course students gain knowledge and understanding of social sciences, social change and the principal trends in contemporary post-industrial societies [20].

In study year 2016/2017, Latvia University of Life Sciences and Technologies, Programme of Landscape Architecture underwent changes and introduced new subjects and methods for the bachelor and master studies. One of the new subjects is landscape sociology, which is introduced with the goal to have specialised subjects necessary for landscape architects while keeping wide and multidisciplinary knowledge in the study field. Landscape Sociology has been introduced as a new subject in bachelor studies of landscape architecture in Latvia University of Life Sciences and Technologies [14].

Learning outcomes of this study subject are:
▪ knowledge: structure, functioning and development of society in relation to landscape;
▪ practical skills: to work with various sources of information, to discuss the developing trends in society, and to critically evaluate socio-economic processes in the context of landscape architecture;
▪ competence: students are able to deal with problem situations and make decisions using social knowledge in professional activities of a landscape architect by using the results of various research findings.

Conclusion

Landscape and sociology separately have long history from 16th and/to 18th century respectively. Landscape sociology is a new and developing branch of sociology. Still the boundaries of landscape sociology and its definition are not clear. The most important difference between sociology and landscape sociology is the scale of landscape, which is important for landscape sociology. Many other similar terms in sociology are dedicated to landscape questions. It can be concluded that landscape and sociology both are wide and holistic terms.

Nowadays higher education becomes more and more specialised; therefore it is important to include landscape sociology in higher education studies of landscape architecture. Also it is important study subject as sociology is one of mane theoretical basis in landscape architecture.

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Kopsavilkums. Kopējās tendences augstākajā izglītībā ir vērstas uz specializēšanos, tai skaitā arī Ainavu arhitektūras augstākajā izglītībā. Ainava ir bijusi kā intereses un izpētes objekts socioloģijā jau kopš tās pirmssākumiem. Un savukārt sociālais aspekts ir viens no raksturlielumiem ainavas izpētē un studijās. Sociālie aspekti ir tikpat nozīmīgi kā kultūra, daba, uztvere un estētika. Sociālie aspekti īpaši nozīmīgi kļūst mūsdienās, kad nepieciešams veidot apkārtējo vidi tādā veidā, ka tā veicina vēlmi cilvēkiem komunicēt un pavadīt laiku ārtelpā. Ārtelpu jāveido, ņemot vērā gan cilvēkus un to vēlmes, gan dabu un tās nepieciešamības. Socioloģija veido nozīmīgu teorētisko bāzi ainavu arhitektūras zinātnes nozarē un tās akadēmiskās disciplīnas attīstībā. Pētījums veikts ar mērķi izprast teorētisko bāzi ainavu socioloģijai kā akadēmiskajai disciplīnai, kas vēl tikai attīstās. Pētījumā izmantotā metodoloģija ietver sistemātisku literatūras izpēti, kas sniedz dažādus rīkus sasaistes definēšanai teorijā. Literatūras izpēte veikta ar mērķi definēt ainavu socioloģiju kā svarīgu akadēmisko disciplīnu augstākajā izglītībā ainavu arhitektūrā. Ainavu un sociālās zinātnes kā akadēmiskās disciplīnas ir ar senu attīstības vēsturi, attiecīgi no 16. un 18. gadsimta. Ainavu socioloģija savukārt ir jauns sociololoģijas atzars, kas vēl attīstās. Pašlaik vēljoprojām nav viennozīmīgi skaidras robežas un definīcija ainavu socioloģijas jēdzienam. Nozīmīgākā atšķirība strap socioloģiju un ainavu socioloģiju ir ainavas mērogs, kas ir nozīmīgs ainavu socioloģijai. Ņemot vērā, ka mūsdienās augstākā izglītība paliek aizvien specializētāka, ir nozīmīgi iekļaut ainavu socioloģiju ainavu arhitektūras augstākajā izglītībā.

The Baltic countries towards
the goals of waste framework directive

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Abstract. Social acceptance of littering behaviour has changed in the recent decades, with rapidly increasing public awareness about the human health and biodiversity impacts that can result from waste-mismanagement. Littering has an important impact on landscape and overall environment. It is of vital importance to assess existing littering sources and to try to limit them at their source. During recent years European Union (EU) has significantly strengthened the waste management requirements. In terms of newer Member States it meant – inventory of the existing system, closure and recultivation of the sub-standard landfills, development of new infrastructure, using best available technologies and, of course implementation and development of separate waste collection system. In order to ensure higher quality recycling, requirements to sorted waste collection become higher. The authors see one of the solutions – implementation of the deposit refund system (DRS), especially taking into account that both plastic beverage bottles as well as bottle caps have been identified within top 10 single use plastic found in the marine litter. The research is based on the benchmarking and statistical data analysis. As the result of the research, the authors propose implementation of DRS as a solution both to Latvian waste management issues and as a tool to improve landscape from the environmental aspects.
Key words: deposit refund system, waste management, waste recycling

Introduction

Good waste management is a building block of the circular economy and helps prevent waste from having a negative impact on the environment and health. Social acceptance of littering behaviour has changed in the recent decades, with rapidly increasing public awareness about the human health and biodiversity impacts that can result from waste-mismanagement [27]. Proper implementation of the EU's waste legislation will speed up the transition to a circular economy. There are essentially two varieties of legislation used to reduce waste in the environment. These include "command and control" measures, and market-based economic instruments [22].

Legal obligations on the management of municipal waste (waste from households and similar waste) are laid down in the Waste Framework Directive [9]. The Directive includes two recycling and recovery targets to be achieved by 2020: 50% preparing for re-use and recycling of certain waste materials from households and other origins similar to households, and 70 % preparing for re-use, recycling and other recovery of construction and demolition waste. Although, the Directive has been adopted 10 years ago, providing 2 years for Member States for transposition, the analysis of municipal waste recycling ratios shows that many Member States still have this target as a very challenging issue.

From the table 1 it may be seen that 5 member states have the recycling rate above 50 % and 9 member states are in a so called risk-free zone of above 42%, meaning that these countries most probably will be able to achieve 2020 target. Still 14 member states are at risk of non-achieving the targets, which may result in considerably high penalties [7].

Although, it has to be noted, that the authors critically evaluate the data provided by Eurostat, taking into account that the data is calculated using one out of four calculation methods. As soon as the Member states will unify the calculation methods, the figures are about to change. It is important to point out, that Latvia is already using the calculation method that will be used in the future. In addition, Latvia's figure might improve in case Eurostat will count in the "recovery" of waste within biological reactor. In this case the recycling figure will be 62 %. The authors would like to point out that the high recycling ratios by Lithuania and Slovenia for instance are mostly due to implementation of incineration with energy recovery. In 2016, Europeans generated on average 480 kg of municipal waste per person, 46 % of which was recycled or composted, while a quarter was landfilled [10]. Taking into account that in May 2018 European commission adopted amendments to the Waste package directives, new and ambitious targets on waste treatment are set in front of the member states. In addition, European Commission published a Proposal for a Directive on the reduction of the impact of certain plastic products on the environment. Single Use Plastic items represent about half of all marine litter items found on European beaches by counts. The 10 most found SUP items represent 86 % of all SUP items (constituting thus 43 % of all marine litter items found on European beaches by count).

Beverage bottles that are single-use plastic products are one of the most found marine litter items on the beaches in the Union. This is due to ineffective separate collection systems and low participation in those systems by the consumers. It is necessary to

TABLE 1
Municipal waste recycling rates, 2017 [10]

Country	Recycling rate (%)	Country	Recycling rate (%)
Germany	67.6	Bulgaria	36.2
Austria	57.6	Hungary	35
Slovenia	57.8	Czech Republic	34.1
Netherlands	54.2	Poland	33.8
Belgium	53.7	Spain	33.5
Luxembourg	48.3	Portugal	30.9
Lithuania	48.1	Slovakia	29.8
Sweden	46.8	Estonia	28.1
Denmark	46.3	Latvia	25.2
EU 28	45.3	Croatia	23.5
Italy	45.1	Greece	17.2
United Kingdom	44.3	Cyprus	16.1
France	42.9	Romania	13.9
Finland	42.0	Malta	6.4

promote more efficient separate collection systems and therefore, a minimum separate collection target should be established for beverage bottles that are single-use plastic products. Member States should be able to achieve that minimum target by setting separate collection targets for beverage bottles that are single-use plastic products in the framework of the extended producer responsibility schemes or by establishing deposit refund schemes or by any other measure that they find appropriate. This will have a direct, positive impact on the collection rate, the quality of the collected material and the quality of the recyclates, offering opportunities for the recycling business and the market for the recyclate. The Directive requires Member States to achieve a minimum separate collection target for single- use plastic beverage bottles. The latest wording of the article foresees that Member States shall take the necessary measures to collect separately for recycling: a) no later than by 2025 75 % of single-use PET bottles placed on the market and b) no later than by 2030 90 % of single-use PET bottles placed on the market. Thus, European Commission is setting ambitious targets, leading Member states to deposit-refund system, as it has been discussed that efficient sorted waste collection system could reach approximately 75 % of separate collection for PET material. According to Eunomia [5], DRS can ensure 95 % reduction in littering of beverage containers, which could positively impact the SUP restriction into the landscapes and marine environment. As beverage containers are often consumed on the go (and are significantly larger than frequently-littered items such as cigarette butts or chewing gum), it is estimated that, generally, they account for approximately 40 % of litter by volume. The deposit attached to beverage containers gives them a financial value, so consumers

will be less likely to litter them. When beverage containers are littered, other citizens will be motivated to pick them up so that they can claim the refund. As such, it is estimated that a well-designed DRS could reduce the littering of beverage containers by 95 %, meaning the volume of all litter would reduce by a third [6].

Materials and Methods

This study is focused on the assessment of European and in particular Baltic countries in terms of municipal waste recycling, further focusing on packaging waste. Taking into account the latest developments of the legislative proposals by the European Commission, the authors see the DRS as one option to ensure the achievement of the ambitious targets set for the Member states to achieve. The research is based on statistical data analysis and benchmarking. Taking into consideration that Latvia has still not implemented the DRS, it is of vital importance to evaluate the experience of neighbouring countries in order to develop the most appropriate model, taking into account best experiences from the countries, which already have DRS in place.

Results and Discussion

As the problem of marine litter has steadily grown worse, there has been renewed interest in deposit-return for the recovery of single-use beverage containers. These systems see customers pay a small deposit when they purchase a can or bottle, which they get back when they return the container to a collection point for recycling [25]. In deposit-refund systems, consumers pay a deposit when purchasing products and receive refunds when returning used products. Deposit-refund systems are introduced to increase the return rates, partly achieved by paying consumers incentives to return their used products to appropriate places [21]. According to Linderhof, *et.al.* [19] and Walls [29], deposit-refund schemes are basically a combination of two instruments: a tax on the purchase of a certain product, and a subsidy on the separate collection of the same product in its after-use stage. They can be efficient policy instruments to encourage reuse and recycling.

DRS – a tool to decrease the environmental life cycle impact of beverage packaging and to increase its resource efficiency

When assessing DRS, it has to be emphasised, that in the European Union currently there are 9 member states which have DRS in place, the newer countries to introduce the system are Lithuania in 2016, Italy in 2017 a range of countries, including Latvia are currently at the evaluation or implementation stage. Table 2 reveals summary in DRSs across EU. According to Reloop [25] and Lavee [18] deposit return systems are a proven tool to collect high quantities of empty beverage containers for reuse and

TABLE 2

Implementation of DRS in EU. *Created by the authors*

Country (MS since)	Mandatory DRS	Country (MS since)	DRS
Belgium (1958)	Yes (2002)	Slovakia (2004)	*Under evaluation*
Croatia (2013)	Yes (2005)	United Kingdom (1973)	*Under evaluation*
Denmark (1973)	Yes (2002)	Austria (1995)	N/a
Estonia (2004)	Yes (2005)	Bulgaria (2007)	N/a
Finland (1995)	Yes (1996; 2008)	Cyprus (2004)	N/a
Germany (1958)	Yes (2003)	France (1958)	N/a
Lithuania (2004)	Yes (2016)	Greece (1981)	N/a
Netherlands (1958)	Yes (1993; 2006)	Hungary (2004)	N/a
Finland (1995)	Yes (1996; 2008)	Luxembourg (1958)	N/a
Sweden (1995)	Yes (1984; 1994)	Malta (2004)	N/a
Czech Republic (2004)	*Under evaluation*	Poland (2004)	N/a
Ireland (1973)	*Under evaluation*	Portugal (1986)	N/a
Italy (1958)	*Under evaluation*	Romania (2007)	N/a
Latvia (2004)	*Under evaluation*	Slovenia (2004)	N/a

high-quality recycling and are vital to achieving circular economy. Over 130 million people in the EU alone live in countries with deposit-systems. It's also used in most Canadian provinces, 10 US states, and large portions of Australia. The latest jurisdiction to implement a container deposit program was New South Wales in 2017. A range of studies have performed the assessment of economic aspects of depositrefund system [4, *20*], in addition, there are also studies performing analysis of impact from packaging deposit-refund system on consumers and producers [17].

Both the strategy on the prevention and recycling of waste [1, 8, 30] and the strategy on the sustainable use of natural resources aim for a reduction of the European economy's environmental impact and an increase of its resource efficiency. Within this, DRS aim at increasing the proportion of empty packaging returned by consumers to take-back/collection points. This helps to increase the reuse of packaging products and the recycling of packaging material. It also provides inhabitants with a tangible incentive to participate in waste prevention processes [14, 28].

Community law leaves it to each Member State to choose between a deposit and return system, on the one hand, and a global packaging-collection system on the other, or to opt for a combination of the two systems depending on the type of product [7].

As clearly demonstrated in Figure 1 countries, which have a mandatory deposit system, have achieved significantly higher recycling rates than member states without such a system in place. Still, it is quite complicated to compare EU member state achievements as DRS exist on reusable containers, one-way containers, metal cans, etc. Moreover the DRS in the Member states distinguish by being voluntary or mandatory, for example, as stated by Hassi, Pietkäinen [16], in Finland the return rate of drink containers increased by 15 % between 2008 and 2009 in connection with the introduction of a mandatory DRS. The percentage of returned plastic bottles in 2009 was 89 %, for aluminium cans 92 % and for glass bottles – 98 % [3]. The very significant increase in the actual number of cans returned whilst the return rate remains relatively steady reflects the change in consumption patterns from refillable glass bottles to one-way cans. Refillable glass bottles are returned at an even higher rate than one-way packaging. In 2014, the rate was 97 %, and in 2015 it was 98 %. It is noted that Finland's significant shift from refillable to one-way beverage packaging over the last ten years or so has been attributed to the structure of the packaging tax, which stimulated the use of refillable packaging over one-way packaging until amended in 2004 and again in 2008 [23].

Latest plastics recycling data (see Fig. 1) shows that the Member states have results varying from almost 75% to 25% recycling. It is important to stress, that for example Lithuanian figures can be explained by the fact that prior 2016 Lithuania had implemented sorted waste collection and with the implementation of DRS the recycling ratios have improved significantly. On the other hand, the case of Estonia shows that only relying on DRS with weak initial development of sorted waste collection is not facilitating to reach 2025 target.

It has to be stressed that, despite the fact that the amount of deposit on one-way packaging in European Union member states applying a mandatory deposit system varies from 0.04 EUR in Estonia (in 2005) and now Croatia having the lowest fee of 0.07 EUR to 0.40 EUR in Finland and Denmark, when broadening the analysis worldwide, the refund figures are close, varying from 0.03 EUR in some states of the USA to 0.27 EUR in Canada. Economical incentive definitely stimulates return rate escalation, thus additional research is planned by the author in the future to examine the savings of the inhabitants at the expense of waste collection costs. The countries with mandatory deposit systems show an average 82.42 %
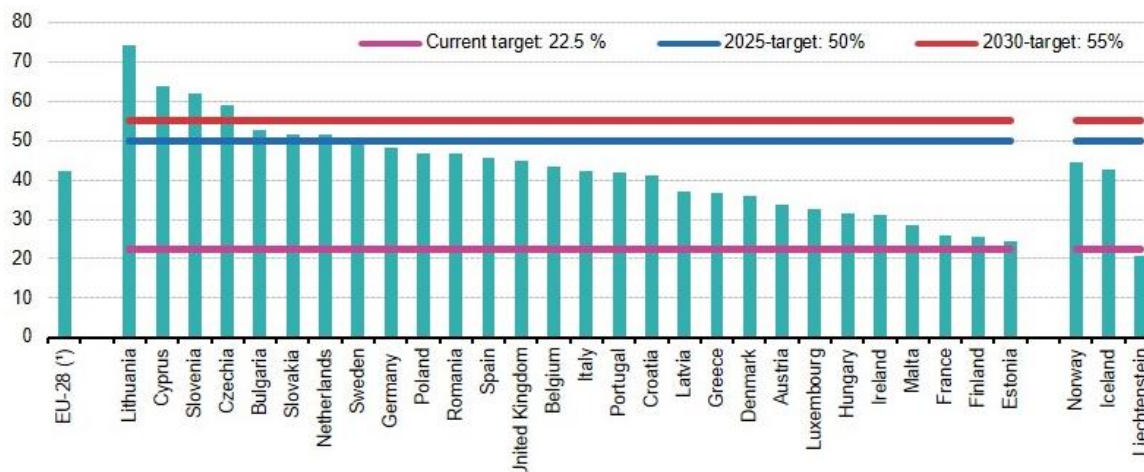
Fig. 1. Recycling rate for plastic packaging in 2016 in EU [10].

return rate, which is a very high and challenging achievement. The member states without mandatory DRS cannot impress the statistics with such return rate figures [2; 25; 26].

Some countries (including Latvia) struggle for decades to implement DRS due to the unwillingness of retailers to participate in the scheme and due to waste management companies which state that they would be deprived of part of their profit and argue that current waste management system with waste containers for separate waste collection (paper/cardboard, glass, PET bottles) would become ineffective. Of course, this is clearly founded on economics, as for example a waste management company, collecting sorted waste can have a revenue of approx. 20 EUR/t for glass and at the same time almost 250 EUR/t for PET material [24; 15]. Nonetheless there are examples of successful deposit systems which exist together with sorted waste collection, for example – Germany, Austria, the Netherlands. Thus it is planned to perform a more in-depth analysis of trends and retrospective in sorted waste collection and DRS. Application of a complex solution can obviously bring better results in reaching recovery and recycling targets. One important aspect with the DRS – is the implementation costs. It has been proven that the implementation of the system at the earlier stage of waste management development often results more economically efficient and cheaper than at the later stages. According to Dace, *et.al.* [12] the costs of the deposit-refund system depend on the amount of packaging placed on the market. The amount of deposit packaging, in its turn, depends on the consumption of beverage drinks affected by GDP. Implementation of DRS brings benefits such as increase in the return rate, increase in recycling rate, and better quality of collected materials, less waste in the environment. Thus it does have high initial infrastructural investment costs and many countries do experience strong lobby from retailers, and from waste

management companies engaged in collection of sorted waste.

The introduction of mandatory DRSs nevertheless may be justified if the environmental/economic benefits clearly surpass their direct and indirect costs. There, however, are options for removing the trade barriers by harmonising the national DRSs [14]. In support of the abovementioned, there are examples of transboundary flow of one-way beverage cans among Germany, Denmark, Sweden, Norway and Finland. The problem here is that cans, purchased in Germany are not covered by the German or the Danish DRS [2, 4]. On the other hand there is an example of neighbouring countries – Latvia and Estonia, whereby when the latter implemented DRS, Latvian citizens from the cities and villages in Latvia closest to Estonia started bringing PET bottles to Estonian DRS, so Estonia had to protect their system in order to accept only packaging purchased in Estonia [11].

Table 3 provides a comparison of packaging recycling rates and deposit refund fee. The figures achieved are the result of the high return rate.

Benefits and drawbacks of deposit-refund system

When analysing the differences within the countries with and without deposit-refund system, the authors were able to get certain evidence from other countries that well-designed and well-run DRS can deliver an estimated increase of around 20% in the reported amount of beverage containers collected for recycling, and deliver a better quality of captured material (i.e., less contamination) than is currently estimated as happening in the countries without DRS for beverage packaging [13]. Experience from other countries/states with a DRS shows that they often improve the quality of material collected, as containers are generally cleaner and there is less contamination with non-target materials. Another benefit of the DRS is directly linked with landscape, as it has impact on the littering issues and a range of

TABLE 3

Packaging recycling rates within deposit-refund system. *Created by the authors.*

Country	DRS	Deposit fee, Eur per packaging	Recycling rate, %
Germany	Aluminium, glass, plastic	0.25	98.5
Norway	Aluminium, glass, plastic	0.13-0.33	95
Netherlands	Large plastic bottles, beer bottles, plastic beer crates	0.25	95
Finland	Aluminium, glass, plastic	0.15-0.40	93
Denmark	Plastic, glass	0.13-0.40	89
Estonia	Aluminium, glass, plastic	0.10	90
Sweden	Plastic, aluminium	0.10-0.20	85
Lithuania	Aluminium, glass, plastic	0.10	

TABLE 4

Comparison of Lithuanian and Estonian DRS. *Created by the authors.*

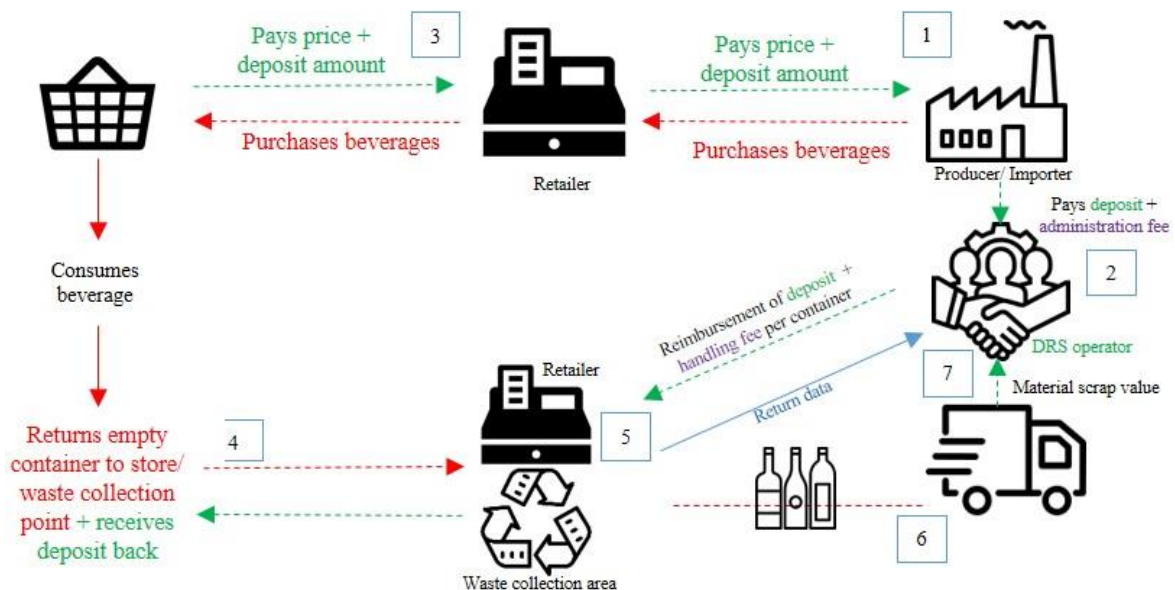| DRS	Estonia	Lithuania
Types of packaging	PET, glass, metal (>150ml<3l)	PET, glass, metal (>100ml<3l)
System operator	Non-profit company established by 4 associations of beverage producers and traders (25% each).	Non-profit company established by 3 associations of beverage producers and traders.
Remuneration paid by the DRS operator to the point of acceptance of the packaging	1) manually EUR 0.0105 per plastic packaging; EUR 0.00120 per glass packaging; 2) with a non-compression machine EUR 0.0215 per plastic packaging, EUR 0.0234 per glass packaging; 3) With a machine with compression EUR 0.0310 per plastic packing unit.	1) manually EUR 0.015 per packaging; 2) with a machine EUR 0.028 per unit (including unit handling fee of EUR 0.016, since the machines for receiving packaging do not belong to merchants).
Initial investments	(2005 prices) - EUR 15 million	(2016 prices) - EUR 30 million.
Financing for DRS	Revenues: 1) participation fees for beverage producers / traders; 2) unsolicited deposit; 3) profit from the sales of packaging for recycling/recovery. Expenses: 1) reward for merchants; 2) costs for preparing of packaging for recycling/recovery; 3) logistics costs; 4) cost of reverse vending machines.	

Fig. 2 Material and financial flow of potential Latvian DRS. Created by the authors, based on Reloop, 2018.

countries, which have DRS in place, including in particular Estonia and Lithuania prove that the littering decreases significantly.

Comparison of Estonian and Lithuanian DRSs

In Estonia, mandatory DRS for beverage packaging (deposit system for single-use and reusable packaging was launched in 2005) was developed prior to sorted waste collection system. At that time, the producer responsibility systems also were not yet developed in Estonia.

In Lithuania, mandatory DRS for beverage packaging (deposit system for disposable packaging was launched in 2016) was developed when the country had already developed sorted waste collection system, had active producers' responsibility system companies, and a DRS for reusable glass packaging was already applied. Although the waste management

Deposit-refund schemes can be effective in redirecting waste streams from final disposal to reuse and recycling. The advantage of a deposit refund scheme is that it reduces the incentive for illegal dumping while it simultaneously stimulates reuse and recycling of products. In addition, it reduces the amount of waste [19]. The authors see DRS as a strong mechanism for significant decrease of environmental littering, thus bringing positive impact on landscape. Littering not only entails clean-up costs, but also has a negative impact on communities and businesses, moreover, an 80% reduction in litter is also assumed following implementation of the DRS. This is a conservative estimate based on a comparative review of the effect of DRSs on littering behaviour and on impact on the overall country landscape [6].

The DRS, even despite more complex implementation process, generally provides greater transparency and control over the operation of producer responsibility schemes and can be considered more cost-effective in the long term. It is highly debated, that the efficiency of beverage packaging DRS is doubtful, as it covers only a small part of the total packaging volume. However, this is an important contribution to the recycling targets of packaging waste. The authors see both systems (existing waste management and DRS) as complementary, not exclusive, because the types of packaging and materials not covered by the deposit system will be collected within sorted waste collection system. By application of the DRS, it is expected to have an indirect positive effect on the overall

companies did not support the application of the DRS, they were given the opportunity to participate in the implementation of the deposit system by providing the service - ensuring the acceptance of the deposit package from consumers. The authors see it essential that the DRS will not be developed against existing system on the contrary, it will be able to amend and improve the existing system and have efficient use of the infrastructure. Following table provides a detailed comparison of Latvia's neighbouring countries with DRS in place. When evaluation the systems, developed by the neighbouring countries, the authors see that it is of vital importance to understand not only the implementation stage of the system, but also to develop the comprehensive representation of the packaging flow and financial flow within the DRS.

Conclusions

environmental awareness of the society by raising awareness of waste sorting and sorted waste collection. With the operation of the DRS - by accepting the deposit packaging from the consumers it is possible to use the sorted waste collection areas in local governments. With this the waste management companies could become involved in the DRS.

While assessing all the positive examples of Lithuania and Estonia, as well as other EU countries with DRS in place, the authors foresee that performance indicators after one year of the introduction of the beverage packaging deposit system, could ensure that 80 % of the reusable beverage packaging sold is recovered; 60 % of the recovered disposable beverage packaging is recycled or recovered; reduced litter size of forests, roadside and roadside – 75 %; The cost of cleaning forests, roadside and roadside parking is reduced by 25 %.

Overall it may be concluded, that taking into account the ambitious targets set by the European Commission, the authors see that currently it is the best possible timing for the implementation of the DRS, as it has to be taken into consideration that the implementation costs will not decrease over time.

When tackling the topic of further recommendations, in the context of the new Directive on single use plastics, the authors would advise to introduce ban on certain types of packaging as well on all types of plastic bags. This will also be assessed in more details in the further papers, developed by the authors.

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Kopsavilkums. Tieši pēdējās desmitgadēs ir krasi mainījusies sabiedrības informētība par atkritumu nepareizas apsaimniekošanas ietekmi uz cilvēku veselību un bioloģisko daudzveidību. Piesārņojums rada būtisku kaitējumu ainavai un dabas videi. Ir svarīgi novērtēt esošos piesārņojuma avotus un censties tos ierobežot to rašanās avotā. Pēdējo gadu laikā Eiropas Savienība (ES) ir ievērojami nostiprinājusi atkritumu apsaimniekošanas prasības. Attiecībā uz jaunākajām dalībvalstīm tas nozīmē: pašreizējās sistēmas uzskaiti, standartiem neatbilstošu atkritumu poligonu slēgšanu un atjaunošanu, jaunas infrastruktūras izveidi, labāko pieejamo tehnoloģiju izmantošanu un, protams, dalītas atkritumu savākšanas sistēmas ieviešanu un attīstību. Pieaug prasības šķiroto atkritumu savākšanai. Raksta autori pamato vienu no risinājumiem – depozītu sistēmas ieviešanu. Pētījuma pamatā ir salīdzinošā novērtēšana un statistikas datu analīze. Pētījuma rezultātā autori ierosina depozīta sistēmas īstenošanu kā labvēlīgu risinājumu gan Latvijas atkritumu apsaimniekošanā, gan kā instrumentu ainavas uzlabošanai no dabas vides aspekta. Atslēgas vārdi: depozīta sistēma, atkritumu apsaimniekošana un pārvaldība.