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IMPROVEMENT OF THE URBAN GREEN MATRIX THROUGH URBAN REGULATION AND ARRANGEMENT OF UNDEVELOPED SPACES - CASE STUDY OF LAUSH SETTLEMENT IN BANJALUKA

Abstract

This paper aims to examine the state of undeveloped spaces in urban areas. The first part of the paper focuses on the state of the urban landscape's undeveloped spaces. To recognize their character and quality, the Narrative Spatial Analytics (NSA) method was proposed. It integrates three design research techniques which enable landscape designers to expand the scope of their research practice. The second part of the paper discusses a case study of neglected green space in the Laush settlement in Banjaluka, which could be incorporated into the Banjaluka green matrix. The phases of the solution concept for the arrangement of a new park and the elaboration details were analyzed, which completed the process of improving the Banjaluka green matrix.

Keywords: undeveloped city spaces, urban landscape, Narrative Spatial Analytics, urban design

UNAPREĐENJE ZELENE MATRICE GRADA PUTEM URBANE REGULACIJE I UREĐENJA NEIZGRAĐENIH PROSTORA - STUDIJA SLUČAJA NASELJA LAUŠ U BANJALUCI

Сажетак

Циљ овог рада је истраживање стања неизграђених простора у урбаним подручјима. У првом дијелу рада фокус је на стању неизграђених простора урбаног пејзажа. Да би се препознао карактер и квалитет неизграђеног простора предложена је метода Наративна просторна аналитика. Она интегрише три технике истраживања дизајна, које омогућавају дизајнерима пејзажа да прошире обим своје истраживачке праксе. У другом дијелу рада разматра се студија случаја запуштеног зеленог простора на подручју бањалучког насеља Лауш, које би се могло инкорпорирати у бањалучку зелену матрицу. Анализиране су фазе концептуализације рјешења за уређење новог парка и детаљи разраде, чиме је заокружен процес унапређења зелене матрице Бањалукe.

Кључне ријечи: неизграђени простори града, урбани пејзаж, наративна просторна аналитика, урбани дизајн

1. INTRODUCTION

Today's development and sustainability of cities are characterized by increasing construction. Characteristic of the entire world nowadays, intense urbanization has influenced the transformation of cities and changes in the quality of the environment, resulting in the degradation of the environment and life in cities. It has created extremely dehumanized urban systems, for people significantly move away from their primordial life space – nature [1].

The quality of city life can be significantly improved by appropriate changes in the way of using and arranging undeveloped urban spaces. These spaces include parks, green squares, coastal areas, protection complexes, and many other objects of landscape architecture, all of which have a social, ecological and aesthetic function. Parks provide opportunities for playing, recreation, social interaction, and personal and spiritual growth. They strengthen the sense of community and place of belonging [2]. Also, it appears that city parks are associated with improved physical and mental health, lower body mass index (BMI), reduced stress and anxiety, reduced disease, and even increased longevity [3-6]. People are said to have a predisposition to positively react to natural contents and environmental characteristics such as vegetation and water. Therefore, they consider urban environments much more stressful and less suitable for recovery from stress. The notion of the restorative power of contact with nature is widely supported and helps to explain people's tendency to be in the natural environment [7].

The value of urban greenery in shaping the city's image has been known for a long time. Parks, gardens and tree-lined avenues are valuable structural elements of urban form. The visual contribution of the green landscape is of high importance. Even a very limited number of landscape architecture objects significantly alleviates the environmental shortcomings of the completely built environment. Therefore, the green components of urban open spaces are key elements of urban design and planning. They significantly contribute to the cities' recognition, advantages and diversity, which further improves their competitiveness at regional and global levels and enables better development [8].

In light of this setting are the facts that „the floor area ratio must be analyzed carefully to reduce the negative effects in urban areas, and the introduction of nature into the urban environment, landscaping, parks and tree lines cannot be only a matter of artistic beautification of the city, but the task of arranging the living environment, whose 'technicality' and excessive construction can be dangerous for spiritual and mental health“ [9]. Therefore, the development of cities needs to be based on new humane principles of the planned building, in which people will be more in touch with nature.

This paper discusses the research process of planning and arranging undeveloped spaces in the urban area of Banjaluca. With efficient landscaping, spaces that are between previous use and still undecided new development can improve the green matrix system and contribute to preserving the identity of Banjaluca as a landscape city. Finally, the identity of the city should be respected. This city was formed thanks to its natural and cultural heritage. Banjaluca has been creating its recognizable identity for centuries. Therefore, this research intends to point out the scope of transformations of landscape structures in the context of the development flows of the city's urban matrix. As functional-ambient city units, green ecosystems with natural biological processes are areas of unique characteristics and elements of cultural and historical heritage. Their spatial form, manner and intensity of use in the city indicate how specific they are.

To achieve sustainable development of the green system in a city, which can satisfy ecological, social, economic and many other functions in various spheres of life, it is necessary to respect the needs of today's inhabitants, but also of future generations that will inherit the city and continue planning new development flows. Therefore, the transformation of urban spaces aims to meet these changing needs of their users in the dynamic life characteristic of the 21st century. The connection between society and space is the key cause-effect relationship that requires flexibility and transformability of space, but also its sustainability and resilience [8]. There is no doubt that the sustainable use and arrangement of space affect the city's development. Space is a public good, as well as a natural resource, so it should be used in a controlled way. In the end, there should be harmony between the built and natural environment.

The influential factors, which determined the new morphological phases of the spatial context of the urban greenery in Banjaluca, were analyzed in light of these changes. The research points to the state of the existing green spaces of the city, the possibilities of interpolation of new ones, as well as the tendencies of renewal and preservation of such vulnerable urban structures.

2. OBJECTIVE AND METHODS OF PAPER

This paper aims to point out the possibility of improving the quality of the environment and living conditions in the city by developing public green spaces. Appropriate changes in the way of using, designing and arranging green spaces contribute to this. One of the goals of sustainable urban development should be green matrix improvement. Accordingly, the intention is to point out the degree of transformation of green spaces in the context of the process of urban planning and development in Banjaluca.

Several methodological procedures focused on specific phases have been applied in this paper. The methodological apparatus of Narrative Spatial Analytics (NSA) is explained in the theoretical part of the paper. To bring new insights into the theory and practice of landscape architecture, the theoretical basis on which this methodological apparatus relies is specified. This part of the research is based on the method of critical content analysis by studying the available literature. A new method of designing research has been proposed. This was done through a set of narrative techniques, which originate in the field of architecture and all together form a research and design process that could provide a more comprehensive approach to landscape analysis. The scientific analysis results are presented and synthesized with valid arguments.

The applied part of this paper elaborates on the context analysis. Also, it gives a general overview of the green matrix system in Banjaluca, its development flows, spatial organization and structure. The 1975 Urban Plan of Banjaluca and the Draft of the 2020-2040 Urban Plan of Banjaluca served as the basic sources of data in determining the general setting of urban patterns of development and distribution of urban green spaces and landscape. Subsequently, the focus of the analysis was on the Banjaluca settlement of Laush. The results of the theoretical part of the research were applied to a specific case study - the conceptual urban solution of the new park in Laush. Field research and processing of collected data are determined through methods of structural, functional and causal analysis of relevant data from professional and scientific literature, including appropriate planning and program documentation. Field research using the in-situ method enabled space mapping. The phases of concept forming and the details of the elaboration of the urban solution were analyzed, which completed the entire process of designing a new park in Banjaluca. This way, it is possible to improve the existing urban patterns of development and distribution of green spaces in the process of urban planning.

3. THEORETICAL SETTINGS – NARRATIVE SPATIAL ANALYTICS

This part of the research aims to explain the used methodological apparatus of Narrative Spatial Analytics (NSA). The term Narrative Spatial Analytics (NSA) was defined by Pavle Stamenović and Đorđe Bulajić in their paper titled „Narrative Spatial Analytics (NSA) in urban landscape research and design“ [10]. Namely, the term represents a methodology designed through the joint work of master students of architecture in the joint curriculum between the elective course of Architecture of Territory (the Faculty of Architecture, University of Belgrade) and the elective studio of Green Spaces of the Urban Landscape (Faculty of Architecture, Civil Engineering and Geodesy, University of Banja Luka) during the winter semester of the 2019/2020 academic year. The focus of the semester was on observing the different spatial scales of the urban fabric of Banjaluca and its wider, peripheral territories, to connect the urban territory with the surrounding natural landscape. Taken as a whole, landscapes and the city's hinterlands as peripheral territories represent a significant and necessary spatial potential of the city. Therefore, the course raised the question of re-examining the importance, function and morphology of peripheral territories in the contemporary context of the city.

The NSA methodological apparatus proposes procedures derived from narrative planning theory [11, 12] and landscape design research [13] to bring new insights into the theory and practice of landscape architecture. These concepts are applied to landscape architecture to propose a new research-design method regarding the notion of 'scale' perceiving the landscape as a scale-continuum [10].

Landscape design research refers to the interpretation that landscape design is a means of acquiring knowledge of spatial composition via architectonic plan analysis [13]. Furthermore, this paper is a continuation of the contemporary narrative planning theory and the notion of narrative, which has a growing impact on urban planning and studies. As Lieven Ameel emphasizes: „The interest in urban narratives goes hand in hand with an increasing awareness that urban planning could (and in many countries legally should) take into account experiential, 'subjective' place-based information, shared in the stories people and communities tell of their place in the world“ [11]. Narrative planning theory

focuses on individual storytelling and, following Henri Lefebvre's interpretation, "it is implicitly founded on the thought that space is relative and intersubjective" [11]. This explains the idea that places are defined by the multitude of individual impressions, interests, and experiences, which are influenced by interpretations. As James Throgmorton suggests: „planning can be interpreted as a form of persuasive and constitutive storytelling about the future“ [12].

Stamenović and Bulajić [10] propose a set of narrative techniques (see Table 1), which originate in architecture and together form a research and design process which could provide a more holistic approach to landscape analysis. Instead of applying a conventional zoning methodology, the suggested one enables and unlocks the inherent physical layers of a given territory on a much deeper level. The recommended techniques explore deeper into the elusive layers of the urban landscape, thus making the research better grounded. Instead of a wide-ranging zoning process, which is a common planning technique, this iterative method enables a research and design procedure that simultaneously examines both the overall territory and the specific small-scale location.

Table 1. Narrative Spatial Analytics (NSA) techniques [10]

Technique	Deliverable	Refers to	Scale of view	Outcomes
Analytical mapping	Diagrammatic map	Context	Zoom out	Structure: layering the territory
Narrative drawing	Drawing	Context / Concept	Zoom in	Content: experiencing the life of the place
Architectural montage	Image	Concept	Zoom in / Zoom out	Form: representing the atmosphere and the character of the landscape

Analytical mapping is carried out through graphic work that exclusively contains elements and layers of particular interest for the research question, which is reducing of the amount of information from the geographical map. The analytical mapping process is continually repeated during the research and results in a series of diagrammatic analytical drawings and maps that allow new landscape readings. To produce analytical drawings, the essential characteristics of what the researcher sees must first be scanned, filtered and selected in order to focus only on specific elements and include informal layers of territory related to the narrative capacity of the landscape [10].

Narrative drawing captures a moment in a series of events which define the continuous process of a particular spatial scenario. It seeks to unite all the peculiarities of the characteristic space pattern: all the irregularities, built and unbuilt layers, traces of use and signs of life. The procedure is performed according to previously established criteria that relate to circumstances (context), needs (users) and intentions (architects). The techniques used for a narrative drawing are reduced to the simplest operations used by spatial designers – a line tool. It can be considered as taking samples of a certain territory, especially a characteristic feature of the space, with montage as a complementary technique. Narrative drawing rarely shows a top view - a plan, because it is crucial that this drawing contains spatial attributes and characteristics of both quantitative (analytical) and qualitative (narrative) procedures during the design research process [10].

In the NSA methodology, architectural montage is used as a tool that provides information on the physical characteristics of space, atmosphere, and merging of physical context and proposed spatial intervention. It is often applied in architectural design and research, and is presented here in landscape architecture. „Working on images through the technique of montage means bringing them to life, capable of producing new and different meanings“ [14]. The architectural montage consists of two narrative layers: (1) the corpus, the base - photographic representation of the place, and (2) the intervention – the layer developed through a various number of techniques and built into the corpus of an image, representing the suggested spatial intervention. We can distinguish two types of NSA montage: (1) orthophoto montage created using the aerial satellite imagery provided by the GIS and (2) perspective view montage created using photographs obtained in situ during the survey [10].

The synthesis of all these data and new knowledge was made to structure the spatial design concept of the selected spatial framework and develop the concept of intervention for design transformation.

The results were evaluated throughout the whole creative process, from in-situ field research to design solutions and applications (Fig. 1).

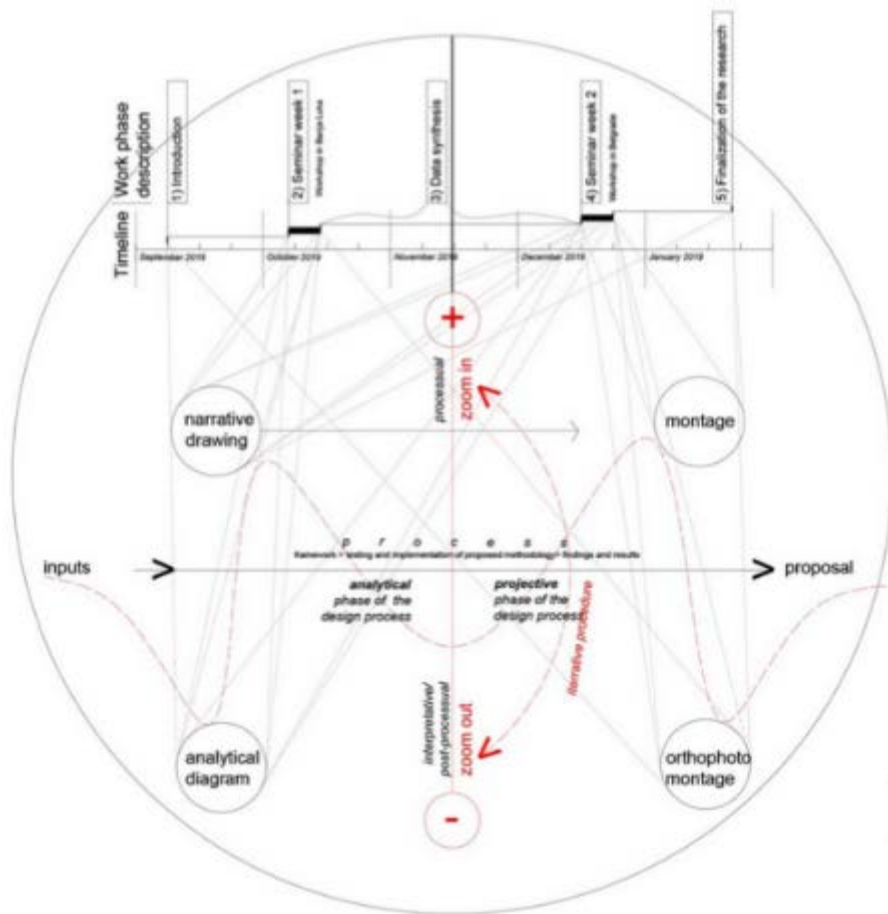


Figure 1. *Narrative Spatial Analytics (NSA) process diagram* [10]

4. CONTEXT ANALYSIS

4.1. CONTEXTUAL ISSUES

Banjaluka is the largest city in Republic of Srpska, and the second largest city in Bosnia and Herzegovina. According to the last census (2011), the urban settlement numbers 179,349 inhabitants, while the overall number of inhabitants in the city of Banjaluka is 227,603. The urban area covers an area of 17,900 ha, out of which 5,224 ha fall on the inner urban area of the city [15]. The green structure of the city is deeply woven into its urban matrix. Even though the urban landscape has transformed through its genesis, the green matrix has remained directly related to development trends, so that the 'green city' has become a synonym for Banjaluka [16]. The need to preserve and arrange the existing and plan new buildings of landscape architecture in connection with the further development of Banjaluka is evident. It is also a part of the strategy outlined in previous urban plans. Basic analyses of the 1975 Urban Plan of Banjaluka [17] indicate that the creation of optimal conditions for a healthy and pleasant life, the establishment of creative harmony of natural and created values and environmental protection were the starting point for defining basic planning determinants. The definition of the urban territory space came after a complex analysis of long-term economic and social development with the possibilities of physical transformations in the context of spatial distribution. Understandably, the projection of development is accompanied by all the undesirable processes of transition, urbanization and demographic growth. Therefore, it is necessary to take measures to ensure a sufficiently efficient green system as a tool that will mitigate the negative consequences and contribute to a sustainable and resilient city with its functions in protecting the quality of the environment.

Spatial and functional analysis of the facilities of the Banjaluka urban greenery system pointed out the relevant characteristics of the development so far. In the City Regulation Program [18], the author cites three (out of nine) guidelines dedicated to green spaces - two with natural features of

green structure and one with the role of landscape architecture in shaping the city's identity. It emphasizes the importance of urban greenery and the Vrbas coast as structural elements of urban concept and the organic connection of the city with the river. Also, it points out that development flows should change the direction of the longitudinal expansion of the city. The explanation of integrating the green spaces in the immediate vicinity of the river as well as those in other parts of the city is clear.

The greenery system in the 1975 Urban Plan of Banjaluka [17] includes forest complexes and orchards in the area, parks, and tree lines in the inner urban area. At the same time, the term park includes integrated green spaces next to buildings or complexes, which do not have adequate equipment in the form of urban furniture and infrastructure which encourages their use. The identity of the landscape character of the city was not missing in this document either. The theme of integrated landscape architecture is set as a unique greenery system, which in the spatial organization of urban territory is a connecting element of the composition of urban structures and an important environmental factor, pointing to the development processes that follow. The concept of green structure is cited as an instrument for shaping the urban matrix, that is, the spatial level of the green structure and its continuity are considered important factors in city planning.

The focus of the concept of the 1975 Urban Plan of Banjaluka [17] is the introduction of forest massifs in the urban fabric, green corridors of primary roads, and watercourses of the Vrbas and Vrbanja rivers. Greenery from the southern and southwestern forests is introduced through the longitudinal corridor of the highway, western and eastern transit continuously through the entire urban area, all the way to Zalužani, where it drowns in the northern protection zone that introduces the Trappist forest, thus permeating the northwestern industrial zone. The Trappist forest, which touches the inner urban area in the form of wedges on the east side, is interpolated into the urban structure via transverse roads. The penetration of the Trappist forest into the urban fabric in the western direction is especially significant through the central transverse move of the future expansion of the city over the large meander of the Vrbas river. The plan envisages arranging free open spaces in the urban area by greening residential, work and recreation zones through a network of urban greenery, forest complexes and agricultural landscape into a single system of greenery (Fig. 2).



Figure 2. The position of the Laush settlement in relation to the more significant existing green spaces in Banjaluka

Observing the planned patterns of development and distribution of green spaces, the intention is to establish a unique system throughout the territory, which should meet the criteria of even, continuous and homogeneous distribution of green spaces. Comparing the then planned green spaces with the current situation, it can be stated that a unique greenery system has not been established in the entire urban area, but only in its narrowest part. Apart from the incoherence of the green corridors, the problem of not arranging the coasts of the Vrbas, Vrbanja and Suturlija rivers is also acute. Although it represents a natural whole, the move of the Vrbas through Banjaluka is marked by differences in individual sections and sectors. A similar problem is an interference in the construction of green spaces in the central parts of the city. Undeveloped free spaces, which could be integrated into the greenery system, are mostly designed with a very low degree of greenery. The newly created objects of urban greenery do not correspond to the category to which they belonged in terms of dimensions,

function and spatial form. They often do not represent parts of an organized greenery system but are formed without a planning concept, so their ecological contribution to the protection and improvement of the environment is minimal. Parks, with their dimensions and contents, still do not provide equal access to their users. According to the Accessible Natural Green Space standard (ANGSt), parks should be arranged in such a way that no resident lives more than 300 m (5-minute walking distance) away from the nearest accessible public green space of at least 2 ha in size. Also, at least one park of at least 20 ha in size should be accessible within 2 km from home.

Certain discrepancies have been noticed after seeing into the data on the analysis of the state of green spaces in the inner urban area of Banjaluka (Tab. 2), which are following valid classifications and indicators. ANGSt was used for planning settings at the level of settlements and statistical circles, in relation to the residential buildings that represented the spatial distribution of residents in a most accurate way. Table 2 shows the areas of green spaces in more detail. The data from 1975 is reliable because the Plan is the outcome of very detailed research on all parameters. When it comes to data from 1991, the high number of lined trees remains questionable (9,462) because, in the period from 1991 to 2019, there was no reduction in the length of tree-lined streets. On the contrary, their number increased. If we compare the amount of greenery between buildings in 2008 and 2019, we can notice a significant decrease. This decrease occurred due to turning some green spaces around residential complexes into construction land [19]. In that context, it should be noted that there was no greenery in the new residential zones at all. There were no park formations either, which is a big problem for the quality of the city life. Even though Banjaluka has excellent bio-ecological and spatial conditions for the formation of a quality green matrix, the analysis of the current situation shows that the areas of parks, squares and other public green spaces haven't significantly changed throughout the observed period, despite the fact that the city development and population have a growing tendency. There is also an evident spatial disproportion of the existence and quality of content in parks and the lack of space for their formation, which is also worrying. The ratio of public green spaces and the number of inhabitants as a standard parameter is 10.3 m² per inhabitant, which is lower than the European norm, according to which 12-15 m² per inhabitant is recommended. In Banja Luka the total area of green spaces per inhabitant is 28.9 m² per inhabitant [20].

Table 2. Analysis of the state of green spaces of inner urban area of Banjaluka [20]

Elements of greenery	Unit of measure	1975.		1991.		2008.		2019.	
		Area (m ²)	m ² /st.	Area (m ²)	m ² /st.	Area (m ²)	m ² /st.	Area (m ²)	m ² /st.
Parks, squares, other public green areas	m ²	19,629	2,0	191,320	1,27	233,979	1,39	241,781	1,53
Greenery between buildings	m ²	96,439	0,98	578,809	3,87	900,000	4,83	495,938	3,14
Tree lines	kom.	5,667	-	9,462	-	8,000	-	7,579	-
Cemeteries	m ²	305,000	3,11	342,825	2,29	571,500	3,07	766,486	4,85
Population		98,095		149,526		186,312		157,926	

In the current period, regulatory plans of individual city units were made. The Draft of 2020-2040 Urban Plan of the City of Banjaluka [20] was also made after the adoption of the Spatial Plan of the Republic of Srpska [21]. Urbanization and all the changes (demographic, sociological, cultural, ethnic and other structures) in the Republic of Srpska, have significantly affected the changes in the greenery system. The permanent population growth has led to an increased need for housing, so the need for construction land is growing. The city penetrates natural landscapes, protected objects of landscape architecture and park forests, creating a peri-urban zone with morphological features without clear meaning. Green spaces are spatial resources for new construction, and this major problem needs to be solved.

4.2. CASE STUDY – URBAN PLANNING CONTEXT AND DEVELOPMENT OF LAUSH SETTLEMENT

The Laush settlement is located in the western part of Banjaluka (Fig. 2). According to a theory, the origin of its name dates back to the period of the Greeks and Romans. It is derived from the word *laus*, which means *tump/hill*. According to another theory, the settlement was named after the Laush stone that was extracted from the quarry on the hill. However, the most probable of all theories is one according to which the name of the settlement comes from the Hungarian medieval nobleman

Ljudevit Lajosh, who once built a church on Pobrđe. Later, 'Lajosh' was formed into 'Laush', and the river that flows through the settlement was named after the word *church* – the Crkvena [22].

The settlement is distinguished by a dense population, unplanned construction, and poor inaccessible infrastructure. There are two local communities in Laush: Laush 1 and Laush 2. The 5-kilometer-long Crkvena stream flows through Laush, running northwest-southeast. According to the data of seismic maps from the Book of Rules on Technical Norms for Construction of High-Rise Buildings in Seismic Regions, the subject area is in the zone of maximum expected earthquake intensity 90 MSK, seismic coefficient $K_s = 0.100$ [23].

According to the 1991 census in the Socialist Federal Republic of Yugoslavia, there were 10,910 inhabitants in Laush. According to unofficial data, Laush numbers as many as 30,000 people today. This number is the approximate number of inhabitants in Trebinje, for example. The first industrial zone in Banjaluka was in Laush, so this settlement used to be the city center. Namely, after the annexation of Bosnia and Herzegovina in 1878, the Austro-Hungarian monarchy opened a brown coal mine at the foot of Laush Hill (in 1980), and later a narrow-gauge railway to the railway station in Banjaluka. This way, Laush coal was transported to Croatia, Slovenia, and other parts of Austria-Hungary. The main street that passes through the settlement, Rudarska Street, which was later renamed Karadjordjeva Street, is also named after the mine. Since the mine ran out of ore, it stopped working in 1937 [22]. The 1900 map shows the Coal Trade Association (*Kohlen-Berufsgenossenschaft*) (Fig. 3).

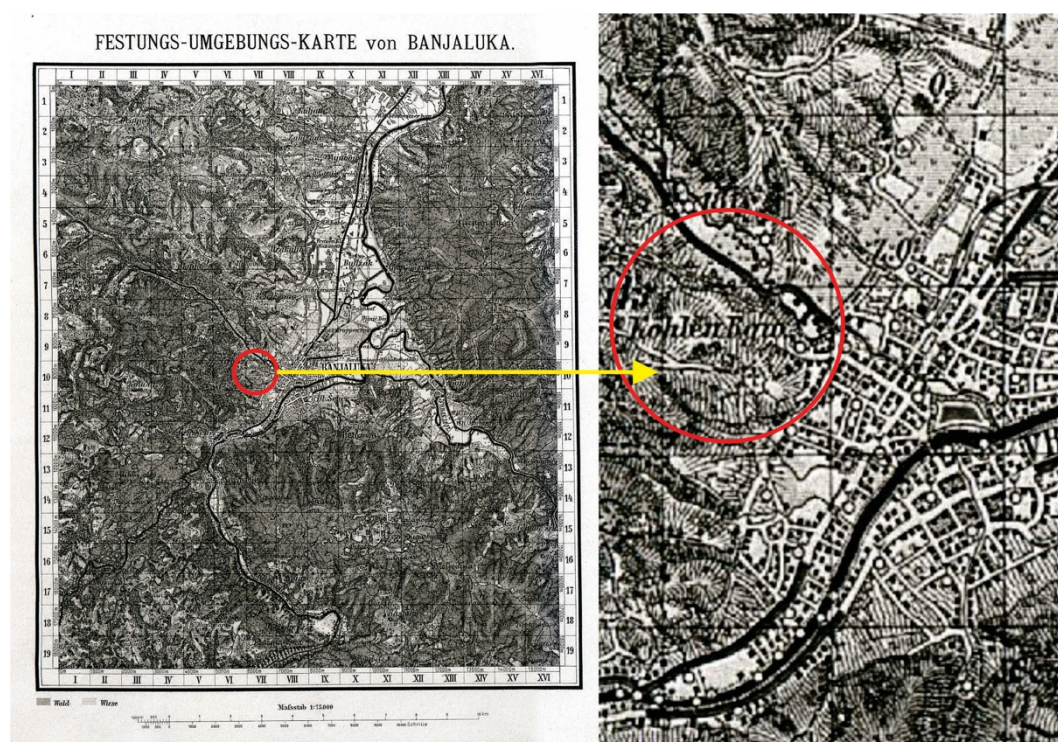


Figure 3. *Festungs - Umgebungs - Karte von Banjaluka, 1900.* (Source: Authors according to [24: 50], the map is taken from Map department of Austrian National Library)

Laush was the location of the first thermal power plant ever built in Banjaluka. The Laush thermal power plant started operating in 1923. and was then one of the higher-capacity thermal power plants in Bosnia and Herzegovina. Besides the Trappist hydroelectric power plant, this thermal power plant supplied Banjaluka with electricity in the following 30 years. The construction of hydroelectric power plants on the Vrbas and the transmission line to Zagreb in 1957 finally solved the electricity supply in Banjaluka, so the thermal power plant ceased to operate that year [22].

The Google Earth image clearly shows the dense construction along Karadjordjeva Street, which connects the settlement to the city center. The buildings are mainly single-family houses, built without a plan and on sloping terrain. The green structure behind the built structures is also dominant (Fig. 4).



Figure 4. *Built area of the Laush settlement*

4.3. CONCEPTUAL DESIGN OF URBAN PARK

The subject area is located in the western part of the city of Banjaluka, about 3 km from its center. It is in the Laush settlement, between Karadjordjeva Street, Užička Street, St. Nikola Street and Pavlovac Street. The predominant purpose of the subject space is single-family housing. Near the location, there is also the Čenić cemetery, the Saint Sava elementary school and a commercial building. The backbone of the settlement is the Karadjordjeva Street. Local roads are "branching" from it, which are very steep, narrow and inadequately equipped. Single-family housing is concentrated around them, characterized by unplanned/illegal construction (without building permits). All that is the consequence of the slow resolution of housing needs for an increasing number of inhabitants (Fig. 5).



Figure 5. *Location of the subject area*

The green spaces in the subject area are mostly private yards. The most important landscaped green space is the schoolyard of the Saint Sava elementary school. Within the school complex, a yard with a sports field and green areas has been formed. There are no other contents related to sports and recreation. The recreational function of greenery, through the attitude towards housing, indicates the need to use green spaces in the process of planning the functional-spatial organization of physical structures of the residential area. When designing the greenery of residential zones, it is necessary to first see how the position of the residential zone is related to the structure of the settlement. Also, the evaluation of existing green components such as groups of trees, massifs or individual trees should be taken into account. It is necessary to plan a block park in all major settlements of the city. Williams [25] argues that city dwellers participate in most of their daily leisure activities in the urban area in which they live - at or near the home. Therefore, according to the Laush 3 Regulatory Plan [23], one of the basic goals related to the arrangement of green spaces is forming a local park area of at least 2 hectares in size (according to ANGSt [19]), in a free area that exists as a meadow owned

by the City of Banjaluca. Within the park, it is necessary to organize recreational facilities and enrich the living environment of the inhabitants. This is the backbone of the design concept.

The concept design was created through the presented NSA methodology. Trying to connect the peripheral territories to the urban matrix of Banjaluca, the theme of the city landscape and green hinterland stood out as a significant spatial potential of the city. Its significance, function and morphology in the contemporary context of the city were re-examined through the research process. The methodology enabled a research and design process that simultaneously explored the entire area and a specific small area. Since the research of landscape design relied on the interpretation that „landscape design is a means of acquiring knowledge about spatial composition via architectonic plan analysis“ [13], analytical mapping was conducted through analysis on a geodetic map. The scale is zoom-out. The result of the analytical mapping procedure is a series of diagrammatic analytical drawings and maps which enabled new context readings (Fig. 6). Analytical maps, above all, show the layering of the selected space and housing as the dominant existential space.



Figure 6. Analytical maps: buildings, traffic and greenery

Furthermore, the paper is connected to the contemporary narrative planning theory which includes experiential, "subjective" ground-based information, during in-situ research [11]. Places are defined by a multitude of individual impressions and experiences based on which were created sketches of key places within the subject context (Fig. 7). The scale is zoom-in. The authors concentrated on experiencing the life of the place through the keyspace functions.



Figure 7. Spirit of the place, the Laush settlement

Sketches of key places of the subject context are the first step in defining a narrative drawing. Namely, the narrative drawing records a series of events of a certain spatial scenario and seeks to unite all the peculiarities of the characteristic space pattern. The scale is zoom-in/zoom-out. Samples of context, its features and spatial attributes are taken, using architectural montage as a complementary technique. Architectural montage revitalizes the space, giving it new meanings. The narrative drawing represents the atmosphere and the character of the landscape. Dominant family houses surround the site in the north and south. They are arranged along the high slope road. The cemetery is west of the site, which is bare and neglected. The road, cemetery and family houses are presented in the narrative drawing. Its focus is „empty space“, which is the abandoned subject location chosen for the park design (Fig. 8).



Figure 8. *Narrative drawing through architectural montage*

The synthesis of all these data and new knowledge influenced the definition of the spatial design concept - the "merging" of the dominant forest context through the subject location. Such dense trees are a response to a pronounced landslide in order to biologically reinforce the soil. The problem of dense unplanned construction is opposed by green open space with a multitude of public facilities for the purpose of better social cohesion. The Laush Park is formed spontaneously in the spirit of the settlement itself. Spontaneity is reflected in the way we use the various contents of the space: sports fields, open amphitheater, lake, recreation trails, cafe-restaurant and many micro ambiances which improve urban life. In the area of 43,000 m² (4.3 hectares), three zones stand out: 1) cafe-restaurant /vacation/walk, 2) lake with open amphitheater and 3) sports fields (Fig. 9).



Figure 9. *Master plan with spatial zones*

The first zone is located at the highest point of the park and occupies the widest zone below the zone intended for the cemetery infrastructure expansion. The leveling of the terrain is solved by a natural amphitheater for sitting and resting. A green-roofed cafe-restaurant is built in the field, in front of which the main pedestrian promenade for walking and passive recreation was designed (Fig. 10).



Figure 10. *First zone: cafe-restaurant, rest zone, recreation trails*

The second zone is connected to the first zone and represents the central part of the park with an artificial lake and an open amphitheater. The shore of the lake is natural with aquatic plants and natural materials. An open amphitheater has been designed on the north side of the lake. It is also a wooden structure for resting, sitting, lying down and gathering. The whole area is enriched with greenery: a variety of trees and shrubs (Fig. 11).



Figure 11. *Second zone: lake, open amphitheater*

The third zone is the closest to Karadjordjeva Street. Since it is the closest to the elementary school, sports fields for active recreation have been designed. Sports fields are set at different altitude levels, leveling the plateau of the sloping terrain. Height levels are mastered by the stands. A screen for video projections is planned on the east side of the middle sports field (Fig. 12). The goal is to provide all the settlement residents with adequate space for rest and recreation, sports and children's games, in order to enable better social contacts and relations among the residents. Also, Dadvand et al. [26] prove that a larger green environment around home and school is associated with the improved cognitive development of school children: better progress in working memory and better attention. The whole area is richly greened in order to biologically reinforce the land and ecological and aesthetic improvement of the space.



Figure 12. *Third zone: sports fields*

It is distinctive that this student project did not remain 'locked in a drawer' as usually is the case. On the contrary, it was presented to the Mayor of Banjaluka by the Association of Citizens called 'Zeleni Lauš'. The initiative for the construction of this park was adopted at the session of the City Assembly in October 2021. The re-drafting of the Laush 3 Regulatory Plan is currently underway, and the initiative for the construction of a multifunctional park in Laush will be taken into account.

5. CONCLUSION

Undeveloped urban landscapes have a natural potential more important than the potential of being considered as building plots intended for urbanization by built structures. The increasing population density in city centers and their simultaneous expansion have become a threat to the existence of open and green spaces. In order to improve the condition of green spaces and achieve satisfactory efficiency of endangered landscape elements, this paper examines their importance for the city. There are opportunities to improve the quality of green infrastructure in the built-up urban matrix. One of them is the arrangement of neglected green spaces owned by the City of Banjaluka. Their regeneration is an acceptable method in the function of increasing comfort in the inner urban area of Banjaluka and therefore provides the opportunity to restore the identity of the green city.

The research methodology used in this paper is based on simultaneous design procedures on opposite scales, starting from the overall importance of the perception of the whole and its parts. The special focus is not on reading the concept of (urban) landscape, but on the techniques by which space is analyzed while clarifying the concept of design and defining the meaning of the place. The proposed method of Narrative Spatial Analytics (NSA) includes three research design techniques that allow landscape designers to expand their research practice: 1) Analytical mapping, 2) Narrative drawing, and 3) Architectural montage. The result of this research is the concept of spatial design which takes into account both quantitative (analytical) and qualitative (narrative) procedures during the research process.

In applied research, the emphasis is on the protection and improvement of the existing biodiversity and the quality of human life. Research has shown that the restoration of neglected green spaces and their integration into the environment also provides space users with an appropriate level of safety and comfort. The project sought to create a stimulating space, which affects the development of localities and increases land and real estate value. Protecting existing biodiversity and interpolating the new green structure provides safe, attractive, and economical places for work and active and passive recreation. Upgrading the ecological and aesthetic quality of the environment undoubtedly affects the significant improvement of the quality of life of people who live and work in this area.

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