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## THE INFLUENCE OF A REGULATED CITY COAST ON THE QUALITY OF LIFE IN THE CITY OF BRČKO

### *Abstract*

Urban development has always been related to the proximity of watercourses and the possibility of their use. Water in urban areas is essential for various infrastructure systems. Water areas in cities are also crucial for the population because they enable multiple activities. On the city shores along rivers or lakes, different spatial concepts are being developed that have a specific impact on the quality of life of the city's inhabitants. In this paper, the influence of such shores on the quality of city life will be examined in the example of the arranged city coast in the city of Brčko. Therefore, a structural analysis of the coast will be done, followed by an analysis of the quality of that area. The research results seek to raise awareness of the importance of these areas in cities.

*Keywords: city coast, structure, quality criteria, impact*

## УТИЦАЈ УРЕЂЕНОГ ГРАДСКОГ ПРИОБАЉА НА КВАЛИТЕТ ЖИВОТА У ГРАДУ БРЧКО

### *Сажетак*

Урбани развој је одувек био везан за близину водотока и могућност његовог коришћења. Вода у урбаним срединама је неопходна за различите инфраструктурне системе. Водене површине у градовима су значајне и за становништво јер омогућавају вишеструке активности. На градским обалама уз ријеке или језера развијају се различити просторни концепти који специфично утичу на квалитет живота становника града. У овом раду ће се на примјеру уређене градске обале у граду Брчко испитати утицај оваквих обала на квалитет градског живота. Због тога ће бити урађена структурна анализа обале, као и анализа квалитета тог подручја. Резултатима се настоји подићи свијест о значају ових подручја у градовима.

*Кључне ријечи: градско приобаље, структура, критеријуми квалитета, утицај*

## 1. INTRODUCTION

Cities and their development have always been related to waters and shores. The importance of watercourses for the inhabitants of a particular area has been crucial throughout history because its proximity to the place of residence meant the possibility of water supply, irrigation of the agricultural regions, and many other benefits [1]. Such importance of water is identical in modern cities, with, of course, different ways of treatment. In urban agglomerations, water surfaces are unavoidable elements of city infrastructure. These areas are an integral part of the supply of residential buildings with sanitary water and drinking water and maintaining urban cleanliness [2]. Water in cities is also used as a recipient of wastewater, i.e. wastewater from households and industry is discharged into it. Unfortunately, these wastewaters are not adequately treated and thus pollute watercourses and affect their quality and capacity [3]. Therefore, it is clear that water surfaces directly impact the functioning of cities and hence the quality of life in them. Another vital role of watercourses in cities is the impact on the quality of the environment. Water surfaces in urban areas are regulators of harmful effects, but they also can cause specific adverse effects. Watercourses affect the air quality in urban areas because they enable air circulation over their surfaces. In the warmer months, they regulate thermal differences in their environment [4]. The advantage of water in cities is that they encourage the development of green areas in their immediate environment, but course, if that space is not concreted [5]. All this, of course, indicates that water affects the environment in cities and thus improves citizens' quality of life. On the other hand, polluted or blocked watercourses can cause damage to urban areas due to floods [6]. The rapid urbanization of space, which increases built and paved sites, dramatically affects the increasing floods in urban settlements, especially those located along rivers [7].

However, watercourses play another crucial role in urban areas. Rivers or lakes in cities can be considered parts of the landscape that give a unique quality to urban environments. Namely, in addition to water surfaces in cities, it is almost always possible to find coastal areas with specific economic, sociological, cultural, ecological, or other values. Due to the proximity of water, flat terrain, width or different potentials, these spaces are often used in cities to develop quality housing. However, on the other hand, many cities worldwide treat these spaces differently, i.e. as open public spaces. Coastal areas are, without a doubt, places that have historically attracted the population of the urban regions in various ways. These areas, as mentioned, were primarily forested, grassy areas that allowed the people to connect with nature [8]. Also, the coastal parts of cities have attracted, and still attract, anglers and all other lovers of activities related to water areas [9]. Due to the mentioned numerous other qualities, these spaces are still one of the essential open public spaces in cities. In urban areas, spaces for sports activities are being developed in coastal areas today, making them more attractive to different population categories. Also, in recent years, catering facilities have been a natural magnet for people and these spaces. If we consider the fact that open public spaces are places that should allow residents of a particular city to spend quality free time [10], it can be concluded that well-equipped coasts are. Urban spaces, including coastal areas as open public spaces, attract more attention from researchers and various actors in space [11]. This can be especially noticed if we analyze the New Urban Agenda of UN-Habitat, in which inclusive, accessible and green public spaces are characterized as very important in the formation and regeneration of healthy, smart cities [12].

From the above, it can be concluded that open public spaces are significant parts of urban areas and that urban areas and water areas are substantial for urban spaces. However, this paper raises the question of whether this is the case, i.e. how vital the city coast is in quality of life. More precisely, the specific question is: What is the impact of an organized urban space on the quality of life in the city? The term "arranged coastline" can mean a built space intended for housing and work, but it can also be an open public space adapted to citizens' needs. These needs certainly include performing recreational activities or physical and mental rest [13]. Precisely such a coast will be analyzed in this paper. In other words, this paper aims to investigate the impact of the urban coastline, which is characterized as a public space, on the quality of life based on its morphological characteristics. According to Cliff Moughthin [14], the morphological component of a specific space is very important because urban forms and space configurations play a crucial role in terms of the quality of life in the city.

The real impact of public space along the river on the quality of life in the city will be researched in the example of the city of Brčko, i.e. the coast in this city. First of all, a structural analysis of the regulated coastal area will be done and shown on the map. After that, the elements located along the river will be evaluated according to specific criteria to determine their importance in attracting residents. The quality of the city's coastline certainly directly impacts the quality of life. Finally,

based on the results obtained in this research, relevant conclusions will be drawn on the effect of the regulated urban coastline, which is characterized as an open public space, on the quality of life in the city. These conclusions will undoubtedly raise awareness of the importance of water bodies and their immediate environment for the city. Also, the research aims to remind all actors in spatial planning of the importance of natural open public spaces in urban areas.

## 2. BACKGROUND RESEARCH

Urban coastlines, as mentioned in the introductory part of the paper, are of great importance for metropolitan areas and the quality of life in those areas. That is why these spaces are exciting for all actors in the processes of urban development. This primarily refers to city architects and urban planners, then investors who want to use these spaces for personal profit, including citizens. During the development of these spaces, the decision of local authorities is the most important because it depends on whether the areas along the water surface will become part of the built structure intended for housing or enjoyment only by specific layers of society or will be treated as quality public spaces that all residents can use. Examples of the use of the coast as new development centres in urban areas can be found around the world. Such a case can be observed in Hamburg, Germany, where a completely new city called Hafen City has sprung up on the coast. The area where the new city was developed was once used for the needs of the port of Hamburg, and today it is one of the most attractive spaces in this City in northern Germany [15]. It is important to emphasize that the development of this new settlement in Hamburg has affected the overall quality of life in the city by increasing new open spaces by the water and increasing the number of jobs.

Another example is the City of Belgrade, Serbia, where the Belgrade Waterfront project is underway, seeking to create an entirely new urban identity for the city coast [16]. This project also encourages the settlement of people but also forms new open public spaces. However, it is vital to conclude that such restoration of neglected urban coasts can be considered projects for restoring brownfield sites [17].

In addition to treating coastal areas as neglected sites needing restoration, there are many cities where these sites are open public spaces. Many cities worldwide located along the coastal waters use promenades that attract visitors and are, therefore, critical local public spaces [18]. Such promenades in themselves indeed represent public spaces that, due to the environment in which they are located, which certainly includes watercourses as a fundamental element, affect the presence of a more significant number of people and thus the interactions between them. In addition to the riverfront promenade, Mark Francis defines waterfronts as open public spaces in his research on urban public areas [19]. He explains that these are spaces that cities along the watercourses are trying to develop as public and therefore form various parks or playgrounds with them. Although it is clear that urban shores with housing infrastructure are rarely designed to support biodiversity and other ecosystem features [20], it is evident that spaces treated as open public support this to a large extent. In recent years, the general awareness among the city's residents is that the city's shores are ideal places for rest and recreation. Many cities strive for this kind of coastal treatment, and one example is undoubtedly the coast in the City of Kuching, Malaysia, which has been going through a sort of transition for many years from the historic coast, through neglected space to new mixed development with the coastal park [21]. Also, throughout North America and Europe in recent decades, the flourishing of parks and other facilities on the coast has been recorded, so in addition to the development of mixed-use space on the coast, an increasing number of different activities such as exhibitions on the coast and some festivals and other events in such public areas [22]. All this certainly shows that using city shores as public spaces is a specific way to group people and raise the quality of their lives.

In this paper, however, this statement is analyzed, i.e. it is difficult to define the precise impact of the regulated urban coast, which is treated as an open public space, on the quality of life of urban residents. Coastal areas used as open public spaces can be considered golden urban zones because they provide access to freshwater air and, most importantly, allow escaping from city crowds and pressure [23]. Furthermore, parks and arranged public spaces on the city shores can be defined as extremely valuable and unique because they represent a combination of watercourses and green areas that meet urban residents' physical and social needs [24]. Finally, it is essential to note that residents in cities worldwide believe that landscaped coastal areas, treated as open public spaces, impact the quality of life, as shown by various studies in Boston, USA [25].

Without a doubt, it can be said that there is a strong link between urban space and the quality of life in the city, which can be seen in the example of the city of Barcelona. There is a policy of reducing carbon emissions in this city. This is achieved by providing residents with more accessible and

efficient access to quality open public spaces. However, an aggravating circumstance for these residents is a large number of tourists every day who make it difficult to access these areas, resulting in dissatisfaction among the population. Of course, all this reflects on the quality of life in Barcelona [26]. Also, when it comes to quality open public spaces that attract citizens and other visitors, it is necessary to list the essential features they must possess. First of all, these spaces must be comfortable, enjoyable, and inclusive [27]. Indeed, these spaces must provide a sense of security, physical and environmental comfort, and feelings of control and enjoyment [28].

The city of Brčko is undoubtedly one of the cities that was developed on the river banks, so even today, the coast is a crucial segment of the urban structure. In the example of the city coast, i.e. one part of the coast called Ficibajer, in this paper, we will investigate the contribution of a landscaped coast to a better quality of life in the city. The mentioned locality is a city picnic area used daily and has the infrastructure typical of open public space. Structural analysis of the Ficibajer picnic area will be done with a clear definition of all segments used by the population to determine the real impact of the coast on the quality of life. Then these elements will be assessed using quality criteria. Finally, the analysis will be performed with the help of a map to make it easier to understand the space.

### 3. METHODOLOGY

Analyzing the structure or form of a particular phenomenon or entity is called morphological analysis [29]. With the help of morphological analysis of a city or a specific space, it is possible to obtain relevant data on all the elements that create that space. For this particular case, in the example of the analysis of the urban coast, it is possible to obtain data on the distribution, connection and representation of various elements and spatial functions through morphological or structural analysis. In her research on park elements as bearers of recreational potential, Petra Pereković [30] states that structure is defined as a set of pieces of which that space is composed in open spaces. With such analyses, it is undoubtedly possible to separate individual elements from the whole and then classify them into specific categories according to the idea of the research [31]. This is precisely the analysis of space that is the core of this research. By isolating the spatial elements that create a particular open public space, the city coast in this research, it is possible to examine its direct impact on the quality of the coast and thus the effect of the overall observed space on the quality of life in the city. Of course, the connection between spatial elements, the quality of open public space, and quality of life can be made because each spatial piece affects visitors' feelings or creates a specific feature of open public space. For example, a bench allows them to develop a sense of comfort, security or connection with space and, at the same time, influences the creation of a spatial landscape.

When it comes to the criteria for the quality of open public spaces, it can be said without a doubt that they are numerous and represent an entire area ideal for research. However, in this paper, certain specific criteria will be used to show the influential spheres of any particular space on the life of urban residents. It is important to note that many researchers have dealt with quality criteria, and many of them are still dealing with this topic. One of the researchers is Jan Gehl, who classified the criteria into three categories and defined them on specific issues [32]. For the analysis of the city coast in Brčko, a criterion will be used to analyze comfort, which Gehl states is satisfied if the space allows users to sit, talk, watch, enjoy or play. Another crucial criterion for the analysis of the city coast is the representation of green areas and the quality of the environment. For an open public space located along a river or other body of water in the city, it is crucial that it has green areas or is not fully concreted or built, and this certainly affects the quality of the environment that the population has within the built urban space [33]. For the area to have a broader impact on society, all demographic categories must visit it. Therefore, it is imperative to analyze whether the space in the structure has elements that attract all types of people, regardless of whether they are the oldest or youngest citizens [34]. With the help of these three criteria, it is possible to clearly define whether the regulated city coast impacts the quality of life in the city. Of course, a much more extensive range of quality criteria can be used. Still, with the three described, it is possible to explore the spatial elements isolated through structural analysis and determine their impact on the quality of urban life.

As mentioned, the area of the city coast in Brčko will be shown on the map with all the elements of the spatial structure. Mapping spatial elements are beneficial because it helps all stakeholders discuss a particular space. After all, it helps form an image of a specific area [35]. Therefore, in this research, the map will certainly be significant to justify the results obtained by structural and qualitative analysis. Furthermore, by mapping the space, the results of a morphological analysis can be

presented, and the study of the quality of open public space because they define the arrangement of spatial elements. Therefore, a map of a specific area, together with morphological analysis and analysis of the quality of open public space, can undoubtedly help obtain clear answers to whether and in what way the city coast affects the quality of life in the city.

#### 4. CASE STUDY - CITY OF BRČKO

The city of Brčko is one of the cities in Bosnia and Herzegovina, located along the Sava river in the country's northeastern part. This city represents a specific local community because it primarily functions independently of the entities located in BiH and the state itself [36]. The position of the city, as well as the entire municipality, is designed so that it stretches from the mountain Majejica in the south to the river Sava in the north [37]. In that way, hilly and lowland areas participate in the relief. From the entire geomorphological structure of the city, one site along the Sava River is interesting for this work, which represents an arranged city coast. This locality is called Ficibajer, and in the Urban Plan of the city of Brčko, it is characterized as the most crucial city park [38]. The plan states that the advantage of this location is that clean air comes from the river, which has a specific impact on the microclimate of the coast. The total area of this space is just over 40ha. However, only the part located next to the river, which was developed as a picnic area, will be analyzed in this research.



Figure 1. *The position of the arranged urban coast in the structure of the City of Brčko*

As shown in Figure 1., the Ficibajer public space is located within a narrower urban area. It is a location accessible to all residents of the city of Brčko. The name of this location dates back to the period of Austro-Hungarian rule, which can be concluded based on the words from which the name was formed. "Bayer" in German means hill, coast, uphill, while the etymology of the word "Fici" is not known [39].

#### 5. RESULTS

Urban coasts in recent decades have influenced the movement of urban development by opening new aesthetic, economic, social and environmental opportunities to cities [40]. The regulated coastline in Brčko shows its importance precisely through the stated potential. The social possibilities of such spaces attract the population and enable their connection with the help of various structural elements [41].

### 5.1. STRUCTURAL ANALYSIS OF THE CITY COAST

As stated, this part of the paper analyzes the morphology of the city coast in Brčko. Based on this analysis, it is possible to determine the purpose of the space elements. Also, with the help of this analysis, it is possible to find out further what impact these spatial elements have in attracting the population. Finally, the structural analysis will be done with the help of a table that will list the spatial features, their total number, and information on whether these elements are currently in operation.

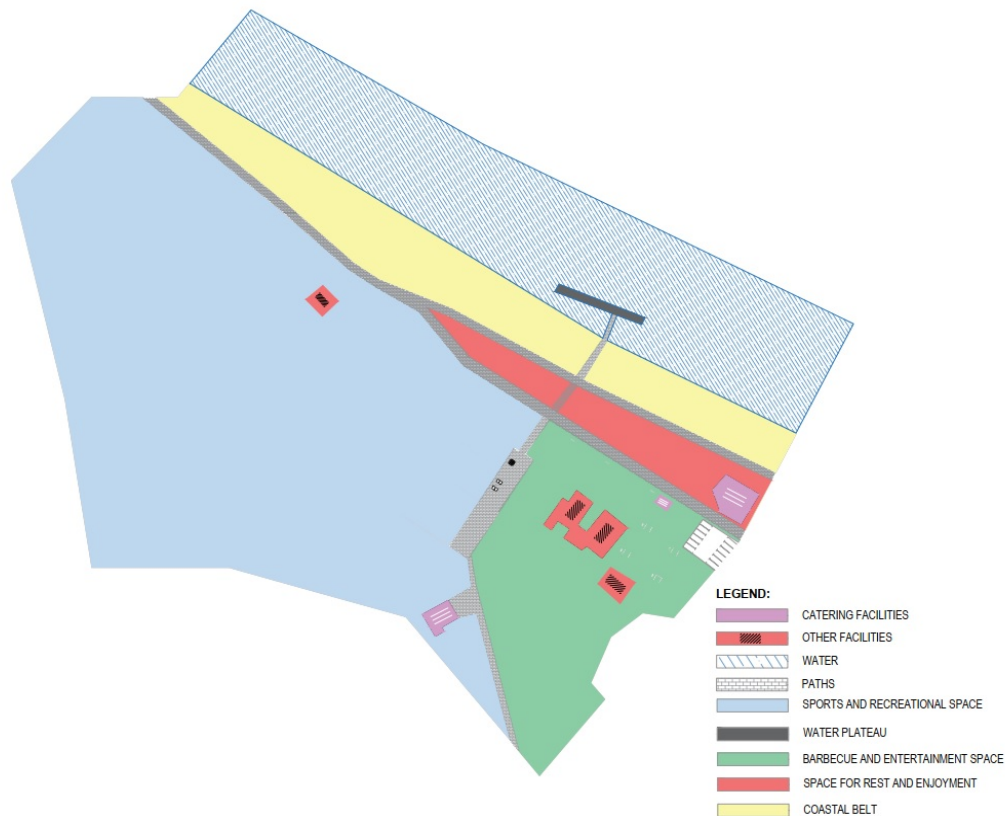


Figure 2. Morphological map of the city coast of Ficibajer

Figure 2. presents the morphological structure of the city coast in Brčko. As can be seen on the map, the morphological structure is dominated by space for sports and recreation, while also a large part of the coast is predestined for day trips with barbecue and entertainment. Paths have a crucial role in the structure of this coast because they connect all morphological units.

Table 1. Structural analysis of the urban coastline

<i>Land use</i>	<i>Land description</i>
<i>Sports and recreational space</i>	<i>Area for sports and recreational activities with lots of green spaces and forests.</i>
<i>Barbecue and entertainment space</i>	<i>Space intended for barbecue and socializing.</i>
<i>Space for rest and enjoyment</i>	<i>Part of the city coast is destined for enjoying the landscape and mental and physical rest.</i>
<i>Coastal belt</i>	<i>Part of the open public space along the river with defined access to water.</i>
<i>Paths</i>	<i>Hiking trails that connect different spatial units of the city coast.</i>

Table 1. defines the purposes of spatial units that participate in the structure of the city coast in Brčko. Different spatial units within this open public space provide all visitors with many different ways to use their free time. Pedestrian paths that pass along all the listed spatial units have a significant role. Also of great importance are the green areas present in all these spatial units, the presence of the river, and the access to the river. Certainly, spaces for socializing and entertainment and a space for rest are essential. It is clear that the whole area has excellent potential and the quality to provide entertainment to citizens every day and thus improve their life in the city.



Figure 3. *The position of the arranged urban coast in the structure of the City of Brčko*



Figure 4. *The position of the arranged urban coast in the structure of the City of Brčko*

Figures 3. and 4. show their actual appearance and purpose and the presence of almost all spatial elements on the city's coastline.



Figure 5. Map of the city coast of Ficibajer

As can be seen on the map (Figure 3.), the city coast of Ficibajer possesses a large number of different spatial elements. Therefore, based on the map (Figure 3.), all the features that make up the structure of this open public space will be recorded.

Table 2. Spatial elements on the city coast

<i>Spatial elements</i>	<i>The total number of the specified element</i>	<i>In the function of (+/-)</i>
<i>Sports fields</i>	4	+
<i>Concrete table tennis</i>	2	-
<i>Great chessboard</i>	1	+
<i>Paths</i>	2	+
<i>Shed tables with benches</i>	13	+
<i>Benches</i>	16	+
<i>Concrete grills with tables</i>	10	+
<i>Catering facilities</i>	3	+
<i>Showers</i>	3	-
<i>Water plateau</i>	1	+



<i>Forests</i>	<i>1</i>	<i>+</i>
<i>Outdoor gym</i>	<i>1</i>	<i>+</i>
<i>Beaches</i>	<i>0</i>	<i>-</i>
<i>Parking</i>	<i>1</i>	<i>+</i>
<i>Other facilities</i>	<i>3</i>	<i>+</i>

As can be seen in Table 1, there are a large number of different spatial elements in the Ficibayer coastal area. Almost all the listed features have the fundamental purpose of attracting the population to the location of the observed coast. Also, these elements are characteristic of open public spaces, such as the city coast of Ficibayer. This coast has all the necessary elements to attract the population and their mental and physical rest and perform recreational activities in morphological structure. Also, these elements certainly encourage mutual interaction between different demographic categories of the people. However, it is undoubtedly important to note that some spatial elements in this locality are not in function. Their re-training would undoubtedly raise the quality and attendance of this city coast. Also, this space has a lot of potential for further development and progress. This primarily refers to the possibility of introducing content such as water sports or the use of free space for exhibitions and other activities.

## 5.2. QUALITY ANALYSIS OF THE CITY COAST

In this part of the paper, the quality of the city coast of Ficibajer will be examined. This study should help define the answers to the impact of the city's coastline on the quality of life in the city. To accurately determine the quality of this public space and its effect on the quality of life in the city, a descriptive criterion will be analyzed with the help of the already presented spatial elements.

*Table 3. The quality of the city coast as an open public space*

<i>Quality criteria</i>	<i>Description</i>
<i>Comfort</i>	<i>The visible presence of many different spatial elements enables the comfort of all visitors to this space.</i>
<i>Green spaces; environment</i>	<i>As shown in the morphological analysis, this space has many green areas and, with their help, creates an exciting, attractive, and relaxing environment.</i>
<i>Demographic categories of visitors</i>	<i>The city coast in Brčko has many different spatial elements that meet the needs of all users, regardless of which demographic category they belong to.</i>

Table 3. defines the answers to the quality criteria based on the analysis of the morphological structure and existing spatial elements within the scope of the regulated urban coast in Brčko.

Based on the spatial elements, it can be concluded that there is spatial heterogeneity, i.e., fragments from different categories are represented. In this regard, it can be supposed that comfort as a quality criterion is satisfied because all visitors to this area are allowed to spend their free time and rest excitingly. Furthermore, the space for recreational activities is undoubtedly provided, which improves the quality of this location and the existence of catering facilities which, together with water surfaces and other segments of the structure of this area, are a magnet for most residents of Brčko.

When it comes to the criteria related to the representation of green areas and the quality of the environment, it is clear that he is also satisfied. As already mentioned in the paper, water surfaces with open public spaces are essential in creating a microclimate with lower temperatures than within

the built urban fabric and cleaner and better quality air. Also, as can be seen on the map (Figure 5.), in the area of the studied urban coast, green spaces make up much more than half of the spatial coverage, which certainly means that they are represented in a large percentage. Of course, there is a lot of potential for the introduction of other elements of landscaping, such as new flower beds or a city garden.

The city coast in Brčko, treated as an open public space, is indeed a location that can complete the free time of all residents of Brčko, and this can be seen based on the presence of various facilities such as sports fields, chess boards, barbecues, etc. Undoubtedly, it can be stated that multiple elements on this coast of the city can attract entire families on full-day trips or at shorter intervals. The advantage of this coast is that it creates a charming and attractive urban landscape with all the built elements and natural resources.

## 6. DISCUSSION AND CONCLUSIONS

Examining the impact of a specific open public space on the quality of life in an urban environment is exciting research. Seeking answers to this question can be helpful to the urban profession but also to science in defining the interrelationships between a particular space and its users. Therefore, three interrelated types of analysis were applied in this paper. First, with the help of the map of the arranged city coast in the city of Brčko, the morphological structure of this area was defined. Also, all the elements that make up this space are determined based on the map. All this was done to get a clear picture of the arranged city coast in Brčko, which represents this city's vital open public space. As mentioned, such spaces are part of the everyday life of citizens, and therefore they must be adequately equipped and accessible [42]. After the structural analysis of space, this paper uses specific criteria that can answer the connection between the quality of open public space and its impact on the lives of residents in the city. In that way, the answer was given to how much the structure of the arranged city coast is adjusted to all citizens and whether it affects the improvement of the quality of their life in the city.

City coasts are vital segments of the urban structure. Regardless of whether these spaces are intended for housing or are used as open public spaces, their spatial potential and the impact on the quality of life in the city are of great importance. These spaces in cities are a fascinating field of research because, in recent decades, these spaces have become attractive to various private investors. On the other hand, their importance for society and the city, in general, is far-reaching [43]. City coasts with a specific infrastructure are undoubtedly areas that are interesting to all city residents and, as such, have a crucial role in their lives.

As can be seen in this research, landscaped urban coastlines treated as open public spaces are elements of the urban structure that directly impact the quality of life of the city's residents. Let's go back to the beginning and consider that open public spaces are those parts of cities that allow informal socializing and rapprochement of different demographic categories of the population while providing the possibility of physical or mental rest and recreation. It is clear that Brčko certainly is. With the help of various spatial elements that participate in the morphology of the city coast in Brčko, this space can attract almost all city residents and provide them with a wide range of activities. All this certainly speaks enough in favour of the fact that these spaces certainly impact the quality of life in the city.

It is essential to point out that many coasts worldwide are not adequately developed and that their full potential is not being used. With intelligent planning policies, these spaces can become the central places of cities in terms of their sociological, economic, and social life. However, suppose these spaces are left to the will of various investors without the control of the local government or responsible planners. In that case, it can cause adverse effects on that location and the environment of the entire city. Therefore, to use such spaces in cities more actively and thus raise the quality of life in the city, it is proposed:

- Location of adequate locations along watercourses in cities that have spatial and social potential to become new open public spaces;
- Development of a plan for a new open public space along the river in which citizens, i.e. future users of that space, would participate throughout the entire process to express their wishes and requests to visit that space in the future;
- The existing open public spaces along the watercourses in the cities must be supplemented with different contents and green areas, if possible, to increase the quality of life in the city.

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