

RECREATIONAL POTENTIAL OF DANUBE WATERFRONT SEGMENT IN NOVI SAD

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Abstract

The purpose of this research is to examine the potential of a segment of the Danube waterfront in Novi Sad for recreational and leisure activities. Today, the significance of the waterfront has been re-evaluated and it has become a great asset for the city, not only for the riparian ecosystem, but also in terms of public open space. The segment included in this research is a part of left Danube waterfront in Novi Sad, Serbia. The segment is a 50 m wide area, starting from the delta of the irrigation canal Danube-Tisza- Danube up to the city outskirts. It includes the river embankment and the safety zone, green areas and riverfront brownfields. The area is analysed from the aspect of land use, accessibility and availability of open space for recreational use in terms of urban equipment, maintenance and design. Furthermore, the inventory of the facilities for leisure, recreation and tourism is made. The results show that the accessibility of the Danube waterfront in Novi Sad is not satisfactory, neither in terms of water accessibility nor in terms of the access to the analysed area from the city. For the purpose of activating this area of the city as a green-blue infrastructure, the results of the analysis should be implemented by connecting, redesigning or introducing the area into the coherent system of public open space.

Keywords: accessibility, Danube waterfront, Novi Sad, recreational use

INTRODUCTION

In modern cities, with densely built areas, that have a tendency of further density increasing, waterfront is recognized as a very important structure. According to Marshal, especially in these areas we are in the position to "isolate and realize specific answers to problems of amorphness and confusion of contemporary urban space." [3].

Problems of development and significance of the waterfronts must therefore be dealt with multi-disciplinary approach in order to respond to wider social interest [2].

The utility function of streams is reflected not only in the importance of waterfronts in the system of public green areas, but also in their recreational potential. Recreation programs are not merely improvement of physical skills, but a set of activities that give individuals the change of pace in relation to work and improve the quality of life in the city. Waterfronts as a

system of public green areas with high environmental values are an adequate place for the introduction of these activities.

Novi Sad is one of numerous towns in Vojvodina that was founded by the river. Although in the present day flooding of the Danube River has been largely under control, the town is still separated from its waterfronts, and with low usage of recreational potential of the river. Planning principles that would overcome these problems are to be found in the modern tendencies of planning and design of urban open space which are based on the freer usage of and relationship with open green spaces [4].

MATERIAL AND METHOD

Research included left bank of the river that belongs to the municipality of Novi Sad from the mouth of the Danube-Tisa-Danube Canal to the end of the cadastral municipality.

The area is designated as coastal zone and includes: the river bank, coastal land width of 50 m according to the Water Act [5], as well as areas that are functionally, programmatically, or physically in continuance to this belt. Nearby park areas, objects and facilities for hydro technical procedures are functionally related to the river, while the outdoor sports facilities, as well as the old city centre are programmatically related to the waterfront.

Spatial analysis included the aspect of land use, accessibility and availability of open space for recreational use in terms of urban equipment, maintenance and design. Furthermore, the inventory of the facilities for leisure, recreation and tourism is made.

The area is analysed from the aspect of quality and maintenance of existing open green space regarding the state of greenery and equipment, street furniture, organization and maintenance of paths and general organization of space. The accessibility of public space was also taken into consideration.

The following are the major categories in terms of improving recreational resources:

1. Unmaintained open spaces - refers to areas that are left to natural succession, do not have the equipment, the tracks are spontaneously formed or are not maintained.
2. Poorly maintained open spaces - this category refers to the open spaces that are not equipped with street furniture, adequate infrastructure, with lack of maintenance, and because of this the possibility of its usage is reduced.
3. Well maintained open spaces - this category includes areas that are equipped with street furniture, vegetation is maintained, with developed facilities and programs for leisure activities.
4. Inaccessible open spaces - in this category are included areas that are not available to public usage hence of its disrespect for the principle of public usage of river banks.

The analysis of the accessibility of Danube waterfront aimed to provide information about the movement pattern within the waterfront zone and between the waterfront and the urban areas. By improving deficiencies in this pattern, firm connections and involvement of all segments of the waterfront into urban fabric are

consequently to be achieved. It covered the existing modes of transport from the aspect of availability of uninterrupted access to the waterfront, in particular to the water. Likewise, the communications which link together all segments of the shoreline were indicated. The following categories were defined:

1. Correlation between shoreline segments for pedestrian communication - pedestrian path along the waterfront.
2. Access to the embankment for pedestrians - paths that provide direct access to pedestrians and access by road, which is regulated by traffic lights are taken into account.
3. Access to water for pedestrians - access for pedestrians is provided directly to the water in the form of trails or stairways.
4. Access to motor vehicles - maintained trails available for motor vehicles that provide direct access to the water.
5. Feasibility of motor vehicle traffic along the waterfront segments - traffic routes along the waterfront.
6. Access to the embankment for motor vehicles - roads that provide direct access to the river bank and have parking spaces that do not obstruct other traffic participants were taken into consideration.
7. Access to the embankment for service vehicles - an embankment sections that allow the passage of service vehicles.
8. Access to embankment from bicycle route - describes the connection between waterfront segments and urban areas for bicycle traffic.
9. Access to waterfront by means of public transportation - stations of public transport.
10. Seasonal access to water - is the access for small boats.
11. Access for boats - an access to the large, cruise ships.

Likewise, inventory of programs that meet user needs for leisure and recreation (sports fields, playgrounds, water sports, shopping and catering facilities) was done. Inventory also included protected cultural and natural resources.

1. Outdoor sports facilities - this category includes public outdoor sports facilities. Sports that are represented are: football, basketball, tennis, bowling, athletics, beach volleyball, mini golf.

2. Children's playgrounds - this category includes all public children's playgrounds.
3. Beaches – includes only equipped, maintained beaches.
4. Water sports - this category includes water sports clubs, both public and private. These are kayak and canoe clubs, sailing clubs, yacht clubs.
5. Accommodation and catering facilities - restaurants, cafes, bars, resort, clubs.
6. Running trails
7. Bicycle lanes
8. Protected areas and landmarks – natural and cultural heritage, historical sites, landmarks, and archaeological sites.

RESULTS AND DISCUSSIONS

Analysis of suitability of waterfront segment for recreational usage in terms of maintenance and design showed that the majority of open

green space is under-maintained and unequipped and the rest of the greenery are forests that are left to natural succession.

Unmaintained open spaces (Table 1) are characterized by an unfavourable organization of pedestrian paths, access roads and illegal parking lots are present along the river bank, while other roads are earthy, unfurnished. Spaces are not equipped with street furniture or lighting. The vegetation is dense and impenetrable, left to natural succession. Periodically, illegal waste dumps and parking lots are formed (Figure 1).

Apart from that, these unregulated areas are the last parts of indigenous vegetation within the settlement and the richest ecosystems of the river corridor within the town, but in the present unfavourable condition for purposes of recreational and other leisure activities.

Table 1. Categorization of open spaces of Danube waterfront in Novi Sad in terms of recreational usage

Unmaintained open spaces	Poorly maintained / unequipped open spaces	Well maintained / equipped open spaces	Inaccessible open spaces
Kamenička ada	Univerzitetski park	Greenery along the embankment from the mouth of the canal DTD to Danube to the beach "Štrand"	Beach "Štrand" - partially
"Ribarsko ostrvo" peninsula	Omladinski park	Beach "Štrand"	Open spaces around the sports clubs along the flooding edge of the embankment
Green belt from Navy to the end of analysed waterfront segment	The greenery around access points to the bridge "Varadinska duga"	Greenery around the student dormitories	Open spaces around Navy and Shipyard
Green spaces from beach "Štrand" to Navy	Open green spaces of the Museum of Contemporary Art	Tourist resort "Ribarsko ostrvo " on Ribarsko ostrvo peninsula	
		Sports center "Đačko igralište"	

Poorly maintained, i.e., unequipped areas (Table 1) are characterized by maintained greenery, but there is no street furniture, trails, or design concept. For these reasons, these areas in its current state are not suitable for recreational purposes and other leisure activities (Fig.1).

Well maintained spaces (Table 1) were equipped and well connected with paths and

street furniture, lighting, vegetation in good condition.

Inaccessible open spaces do not respect the principle of public usage of waterfront areas (entrance is allowed only to certain groups of visitors). Beach "Štrand" allows only seasonal usage of space and does not fully comply with the previously mentioned principle (entrance is only allowed for a fee).

SUITABILITY OF DANUBE WATERFRONT SEGMENT IN NOVI SAD FOR RECREATIONAL USAGE IN TERMS OF MAINTENANCE AND DESIGN



Fig. 1. Suitability of Danube waterfront segment for recreational usage in terms of maintenance and design

Accessibility analysis (Fig. 2) revealed that most of the waterfront segment (from the mouth of the channel DTD to the Navy) is connected via pedestrian and bicycle lines. Pedestrian access the embankment in the segment from the confluence of the DTD to Car Lazar Street was resolved with traffic light, which does not provide uninterrupted movement and reduces the overall availability of the embankment for pedestrians. There is no access for bicycle traffic. Access to means of public transportation is possible from the segment of the railway bridge to the beach "Štrand" and lines cover most of the urban areas, while the rest of the waterfront areas are not covered by public transportation. All segments of the embankment are available to

motor vehicles, but there is a lack of parking lots, resulting in the present large number of illegal parking (car parks and roads that do not have adequate parking is not marked on the map, because it does not provide adequate access to the embankment for motor vehicles). Access to water in most segments is not safe, there is in the form of stairs or earthy, unregulated slopes (rough, spontaneously made tracks are not marked as adequate access to water).

Inventory of the facilities for recreational and leisure activities (Fig. 3) showed that for the entire area there are few children's playgrounds. Other facilities are mainly concentrated in the area of Sunny quay and the beach "Štrand" to the Navy.

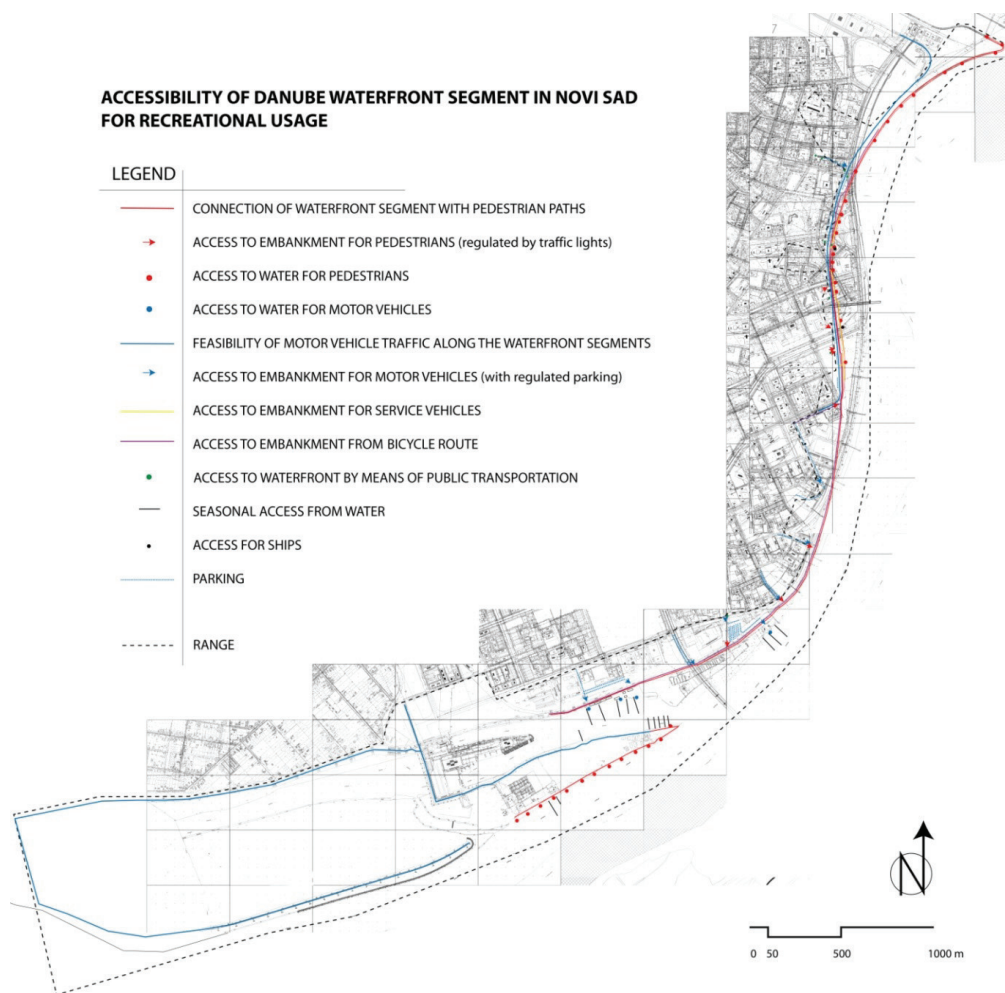


Fig. 2. Accessibility of Danube waterfront segment in Novi Sad for recreational usage

Areas from the mouth of the canal DTD to Car Lazar Street, and "Ribarsko ostrvo" peninsula facilitate a much smaller number of contents for recreational or leisure activities.

CONCLUSIONS

The utility function of streams is reflected in the importance of waterfront areas in the system of open green spaces in urban environment, but as well as a recreational area. To make the space functional, it needs to be accessible to all, linked to other green spaces in the city and hinterland, and to offer a variety of programs, tailored to the needs for recreation

and that is attractive to visiting. "Recreational programs are helping people to develop interests and skills that enable them to constructively use their leisure time, which affects the physical and mental health, safety, community belonging, confidence and character development." [1].

In order to determine program offerings and recreational potential of the Danube waterfront segment in Novi Sad spatial analyses were made which included an analysis of accessibility, quality of maintenance and design and inventory of significant spaces for leisure activities according to defined categories.

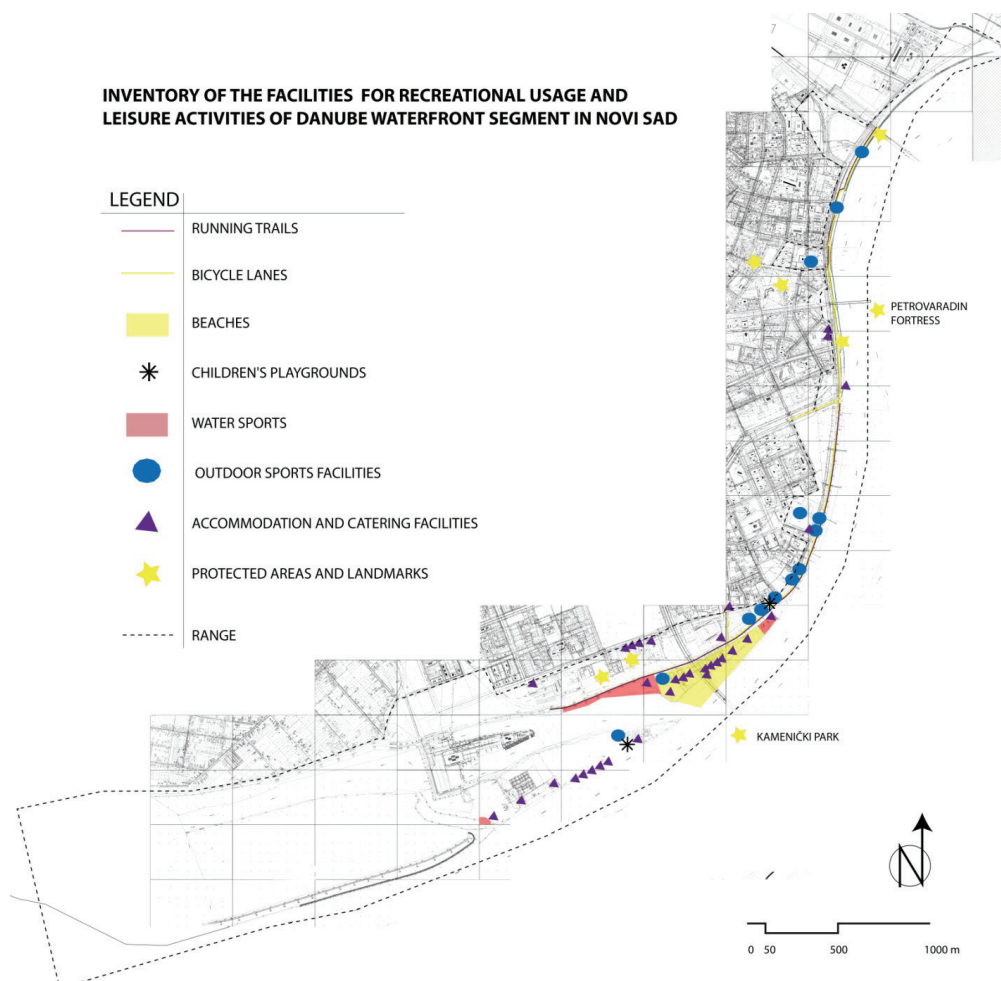


Fig. 3. Inventory of the facilities for recreational and leisure activities of Danube waterfront segment in Novi Sad

Results of analysis showed that in terms of recreational program waterfront areas do not satisfy user needs for recreational purposes, and that the river is insufficiently accessible from urban areas, green spaces are largely unequipped and under-maintained and that there are not enough facilities for leisure activities that rely on the proximity of water. Waterfront areas are mostly well-connected with pedestrian and bicycle paths, and connections to other parts of the city varies. Apparent is a need for new planning and design of open spaces, particularly in locations that are left to natural succession and insufficiently accessible.

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