UDK: 796(497.16)

G. Svetislav Popović
University of Montenegro, Faculty of Architecture (Podgorica, Montenegro)

URBAN PARAMETERS FOR PLANNING THE NETWORK OF PHYSICAL EDUCATION FACILITIES IN MONTENEGRO

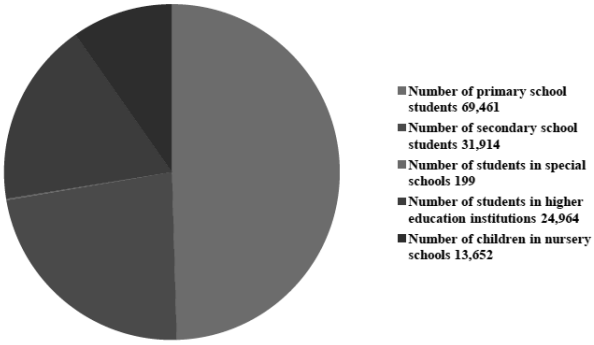
Introduction

The evolution of sports areas in Montenegro in the late twentieth and early twenty-first century, the period of quality sport development, led to the construction of a large number of modern facilities for various sports. A large sports construction fund is evident. In despite of this, experience from the past period tells us about an inadequate planning approach in building sports facilities, as well as their spatial distribution on a territory that is specific in its spatial and geographical form. The main parameters for forming a concept for development of areas for sports and recreation are given through spatial and urban plans, through which an objective need for sport and recreational activities is considered. The construction and development of facilities for sport and recreation require great financial resources. After the research conducted in 2013 in the north of Montenegro, it can be concluded that there are significant deviations from standards prescribed in this field. Namely, from 59 surveyed primary schools 31 has a gym, and form 17 secondary schools only 12 of them have gyms with good conditions. For more efficient planning of areas for sports and sports recreation in our conditions, the introduction of an information system is imposed.

Methods

By observing urban design as a very important factor for proper development of a city, both in a physical as well as an economic, social and cultural sense, the urban indicators which derive from such planning are very important for determining the disposition and size of structures intended for physical education facilities - areas of urban recreation and sports. The network of sports facilities in Montenegro is perceived in this example - the network of physical education facilities of educational institutions and the network of sports and recreational facilities of the municipalities, which are presented by graphical and analytical indicators. The research method conducted in this paper is based on certain indicators and analyzes that are defined through: spatial and geographical conditions and limitations, given the specificity of the morphology of Montenegro, socio-demographic conditions, which give us the population number with the planned natural and migration growth; on indicators related to the expressed needs for sport and recreational activities; on analysis of the existing areas (of outdoor and indoor type) in which sports activities are performed, which are based on records of the existing and planned facilities, as well as on defining the needed areas that would be formed on free sites. All these indicators are followed by appropriate algorithmic and transformational vector processes that give the network structure of sports facilities.

The State of Montenegro (13,812 km^2) borders with Albania, Kosovo (as defined under UNSCR 1244/99), Serbia, Bosnia and Herzegovina and Croatia. Its total surface is dominated by an area over 200 meters above the sea level, where hilly and mountainous areas from 200 - 1000 meters above the sea level cover about 35% of the territory, the mountainous area from 1000-1500 meters above the sea level covers about 45%, while the highest mountain parts over 1500 meters above the sea level account for about 15% of the territory[1]. The total population of Montenegro according to the 2011 census was 620,029 inhabitants, of which 293,509 inhabitants live in the Central region, 148,683 inhabitants in the Southern region and 177,837 people in the Northern region. In comparison with the 2003 census the number of inhabitants in 14 Montenegrin municipalities has decreased. The largest population decline was recorded in Šavnik by 29% and by 23% in Plužine. The largest increase was recorded in Budva by 24%. The total number of inhabitants who have changed their place of residence within the borders of the state was 4,369, which represents 0.7% of the estimated population of Montenegro which is 620,029 inhabitants. The education process in Montenegro includes 126,532 inhabitants (20.40%) of the total population, and the number of those in preschool is 13,652 (2.20 %) [2, 3].



Picture 1. *Number of students in Montenegro – beginning of school year 2011/2012*

Urban planning for construction of sports facilities[4] relies on analysis of all types of activities that will take place in a certain area, that is in a particular environment, taking into account the spatial and geographical conditions, facility location, technological possibilities as well as the possibilities of usage depending on the space purpose (school sport, recreational sport, professional sport). The normative equipment of recreational space for facilities intended for outdoor sports is 3m^2/inhabitant, of which the usable area is 1.3m^2/inhabitant, while the supporting area is 1.7m^2/inhabitant. Facilities intended for indoor sports according to valid standards are from 0.50m^2/inhabitant. Standards for free recreational areas such as areas around schools and children's institutions, outside the city, are applied for educational institutions and should be 25-35m^2 per student, taking into consideration only one

school shift. In the dense tissue of block buildings the optimal area per student can be 10-15m^2 and in no case less than 4m^2. In this case, physical education classes are held at the nearest sports centre. When planning the network of facilities in certain areas on every 1,000 inhabitants the number of facility units is provided in accordance with the table.

Table 1[5]***.*** *The program of physical education facilities in the municipalities*

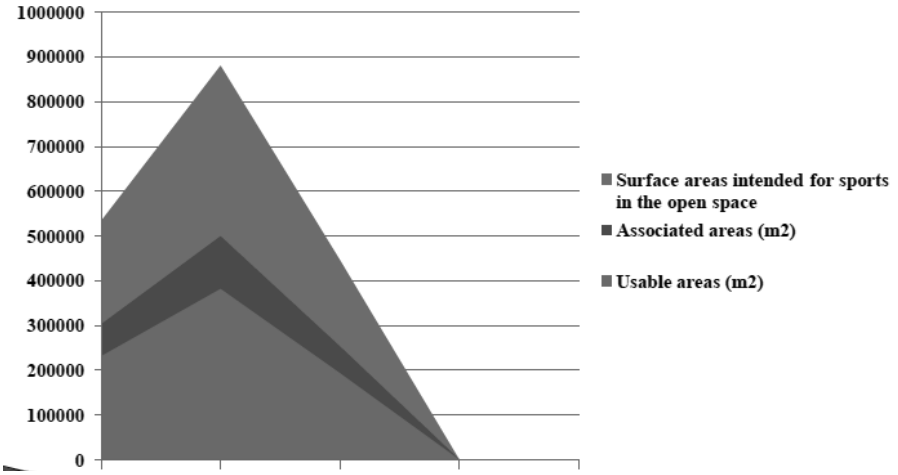
Inhabitants	Playgrounds for children and youth	Sports grounds	Athletics tracks	Warehouse and bowling	Playground for indoor sports	Gyms	Total m^2
for 1,000 inhabitants	1,000m^2	60x90m 5,400m^2	4 tracks	1,000m^2	1,000m^2	10x18m	8,5000m^2
1-3,000 inhabitants	1,000m^2	70x100m 7,000m^2	100-1,000m^2	1,000m^2	1,000m^2	12x24m 18x33m	11,0000m^2
3-5,000 inhabitants	1,000m^2	100x110m 12,000m^2	4 tracks - 100m or 6 round	1,000m^2	1,000m^2	12x24m Or 18x33m	16,0000m^2

Results

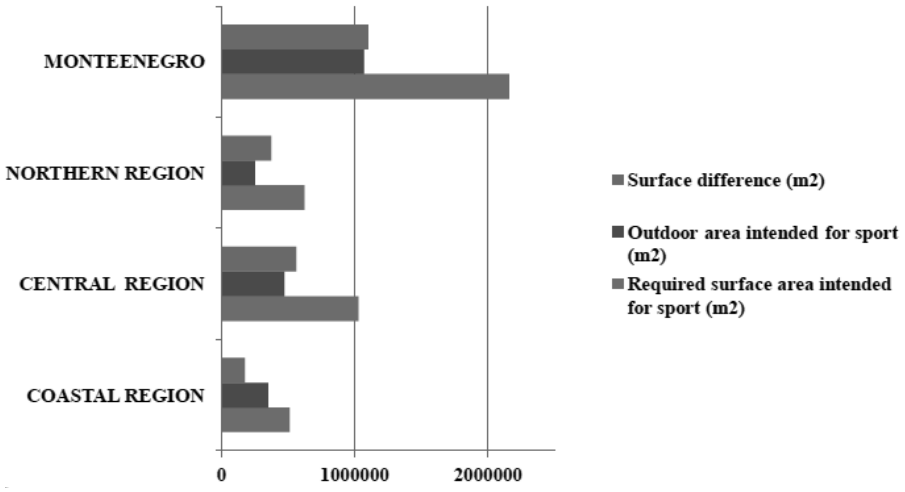
Based on the analyzes carried out on the overview of the existing facilities that are located on the territory of Montenegro, the anticipated or planned facilities and elements that are defined by rulebook standards, arising from certain legal standards for this type of facilities, a distribution network of physical education facilities has been set.

Public facilities of physical education

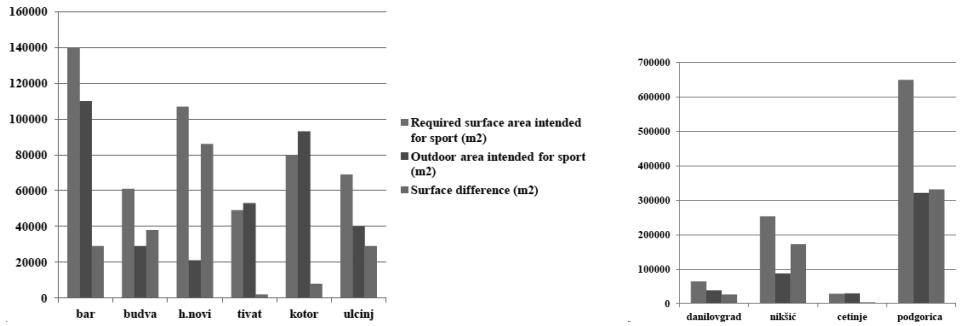
The normative equipment of recreational space for facilities intended for sports in the open air is 1,860,87m^2, of which the usable area is 806,037m^2, while the supporting area is 1,054,049m^2. The surface of facilities intended for indoor sports is 310,014 m^2. The example of facilities distribution in the municipalities of Montenegro, which is a result of urban parameters, can be subjected to serious criticism regarding the criteria on the basis of which the distribution is performed.



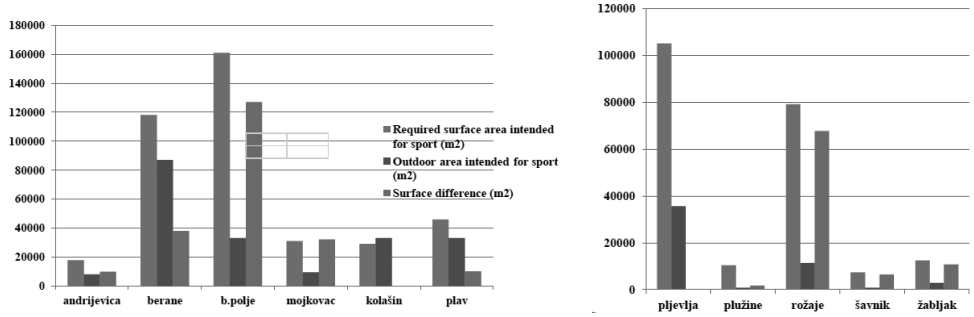
Graph 1. *The ratio of areas intended for sports in the whole of Montenegro*



Graph 2. *Review of areas intended for sports by region*



Graph 3. *Review of areas intended for sports by city (Coastal and Central region)*



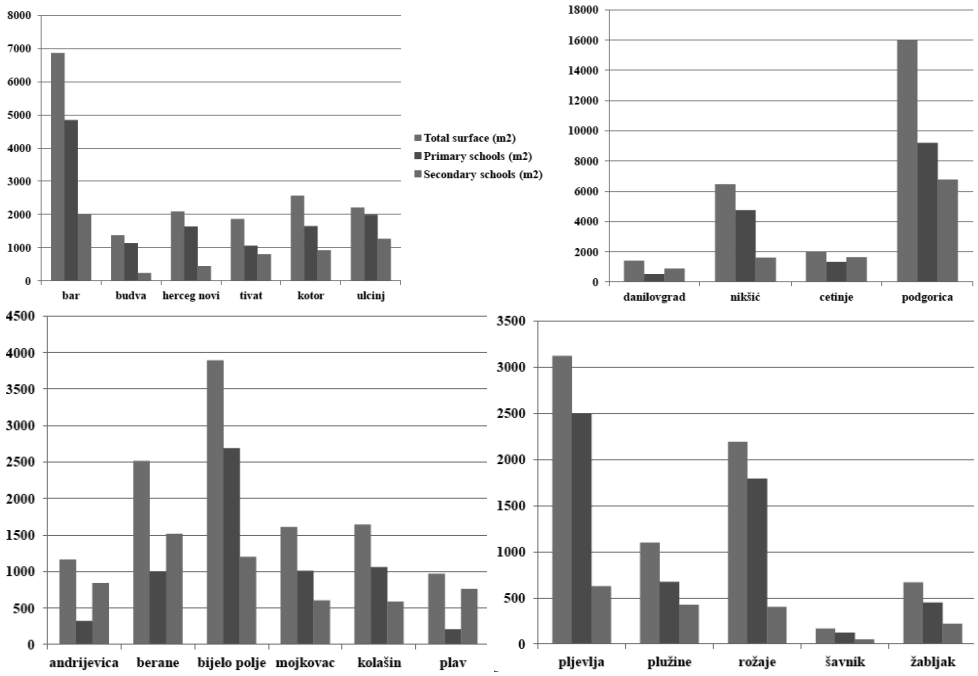
Graph 4. *Review of areas intended for sports by city (northern region)*

In the coastal region, in regards to meeting the standards, the following towns lead: Bar with 8,500m^2 of indoor space and 23,956m^2 of outdoor space, then Kotor which fully meets the standard for outdoor space intended for sports and recreation with 22,469m^2 of surplus, while a lack of indoor space of 7,963m^2 has been recorded. In the northern region the town of Kolašin fully meets the standards for outdoor and indoor surfaces with a positive balance of 860m^2 and 3,110m^2. The following indicators are evident at the national level: out of the total required areas 51% is developed space for outdoor facilities and 49% is space for indoor facilities.

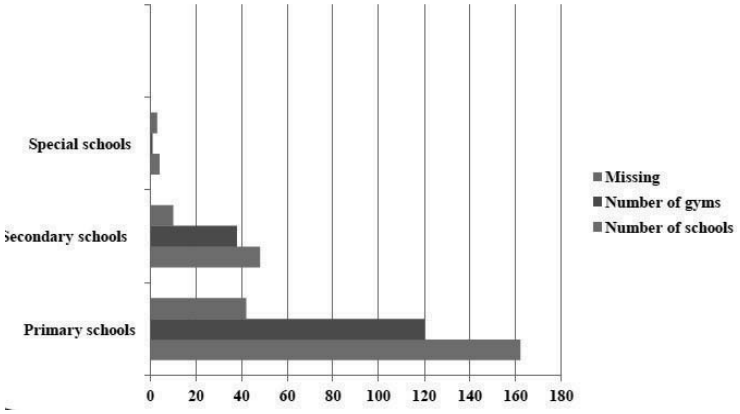
Physical education facilities in educational institutions

Regarding physical education facilities in educational institutions, the study showed the following: in primary schools they are represented with an area of 0.61m^2/student on the level of Montenegro, in the coastal region with 0.77m^2/student, in the Central region with 0.47m^2/student and in the Northern region with 0.59m^2/student. Physical education facilities in secondary education are represented with 0.72m^2/student at the state level. This makes only 20.44% in the total amount in relation to the anticipated indoor areas intended for sports facilities. The spatial

distribution of physical education facilities is uneven at the municipal level. These activities are mainly developed in major cities: Podgorica (0.42m^2/student), Nikšić (0.60 m^2/student), Bijelo Polje (0.47 m^2/student) Pljevlja (0.84 m^2/student) and in Bar (1.04 m^2/student). Out of 207 school buildings 55 have no gym, inadequate conditions for physical activities, respectively.



Graph 5. *Review of surfaces of indoor school sports facilities by municipality (Coastal, Central and Northern region)*



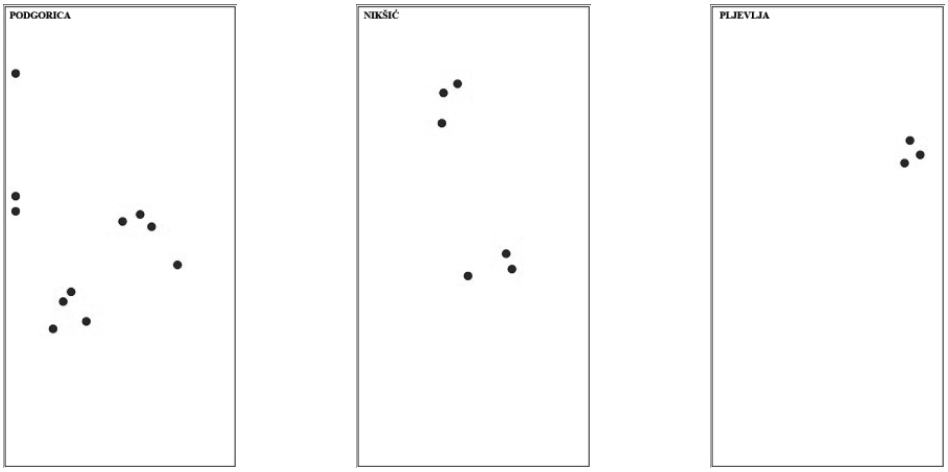
Graph 6. *Number of gyms in relation to the number of schools*

Discussion

Analysis of the current distribution of physical education facilities in Montenegro on the basis of established determinants (defining a unique standard, standardization of facilities and equipment, availability and quality of access to facilities, access to planning resources) for sport and recreation should result in a new model for distribution of areas for urban physical education.

The network of sports facilities in Montenegro

In the process of previous analysis, which was perceived through several parameters such as: the distribution of potential users, belonging to a territory (accessibility), attachment to corridors, time accessibility followed through isochronous lines, access to facilities in the winter and summer period, the size of the catchment area in accordance with certain urban parameters and regulations for this type of facilities in Montenegro, four groups for linking sports facilities can be formed as follows: a completely separate network where each element operates independently and separately, a dispersed network as a group of sports points of facilities scattered in space and time while each facility has its own development which gives the impression of complete independence, a grouped network which is a result of a specific cohesion force that attracts them to be similar in content, space and time, but remain independent in developing and a concentrated network which is a result of a concentration of a larger number of facilities in a common cohort where they can still act independently but safely effect each other. [6,7,8.]



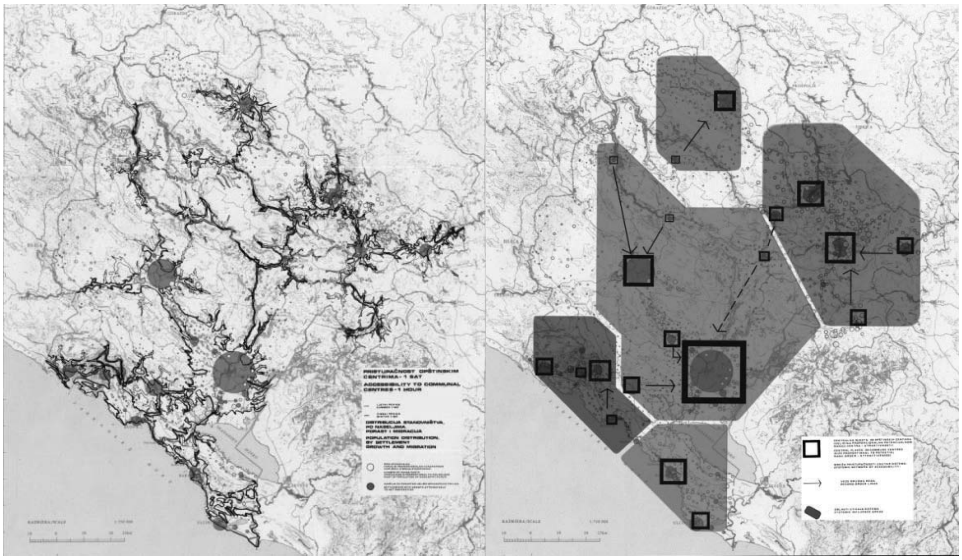
a) Dispersed network ***b) Grouped network*** ***c) Concentrated network***

Graph 7. *Linking sports facilities on the level of cities*

On the basis of a comprehensive analytical approach, which is based on the fact that, according to the character of the (relevant) components of urban systems and their content attributes, all elements that make the network structure are clearly identified.

Bijelo Polje and Berane with 165,673m^2 (7.8%) of required areas form a centre of regional importance. Herceg Novi and Kotor in conjunction with Tivat and Budva with 134,736m^2 (6%) of required areas also create a centre of regional importance. Bar and Ulcinj with 76,203m^2 (3.6%) of required areas form a centre on the south-eastern part of the Montenegrin coast. In the central region a linear systems strategy has been applied, linking several points from Nikšić, Podgorica Danilovgrad with Cetinje that is gravitating towards them, which includes within its urban areas 32% of the total population of Montenegro and the required surface area of 529,799m^2 (25%), where the corridor, adequately to its values and capacities, becomes the backbone of development of the entire system.

Picture 2 ***Picture 3***



Picture 2. *Distribution of population by settlements with isochronous lines*
Picture 3. *Network zones*

This model requires the introduction of a unique information system of sports facilities that would consist of individual network zones and would contain information that would include a basic record of sporting facilities, valorisation of sports facilities and an annual report on the use of facilities.

REFERENCES

1.DODEROVIĆ M, Ivanović Z. Održivi gradovi u Crnoj Gori (Sustainable cities in Montenegro), Matica Podgorica, 2010.2.MONSTAT, Women and men in Montenegro, Statistical office of Montenegro, Podgorica 2012.3.MONSTAT, Djeca u Crnoj Gori (Children in Montenegro), Zavod za statistiku, Podgorica 2012. 4. Grupa autora,

Sportski objekti u Crnoj Gori (stanje i bonitet) – Sports facilities in Montenegro (state and bonitet), Podgorica. 1996. 5. ILIĆ S. Sportski objekti (Sports Facilities), Beograd 1998.6.ALEKSANDER C, The City as a Mechanism for Sustaining Human Contact, University of California, Berkley 1967.7.ALEKSANDER C. and POYNER B, The Atorns Environmental Structure, University of California, Berkley 1966. 8. ISARD W, Introduction regional Science. Prentic –HallInc, NewYersey.1975.

URBAN PARAMETERS FOR PLANNING THE NETWORK OF FACILITIES FOR PHYSICAL CULTURE IN MONTENEGRO

The aim of this paper is to indicate, through researches related to the overview of the existing network of physical education facilities in the municipalities of Montenegro, the urban parameters on the basis of which systematisation and classification of space used for active physical education is carried out. A special emphasis is placed on the ratio of the anticipated areas (outdoor and indoor sport areas) which amount to 2.122.418m^2 in relation to the entire territory of Montenegro. Through graphical illustrations the ratio of developed and missing areas in the municipalities classified by region can be seen, as well as their difference, which is particularly pronounced in the northern region of Montenegro. At the end, a recommendation is given that emerged from the researches and relies on specific determinants in terms of linking sports facilities at a municipal and regional level, with an emphasis on the information system of sports facilities.

Key words: *inhabitants, area, number, sports facility, network*