REGIONAL AND LOCAL HAZARDS IN TOURISM – CASE STUDY OF MINEFIELDS IN THE PROTECTED AREAS OF CANTON OF SARAJEVO

Ranko Mirić[1]
Nusret Drešković[2]
Edin Hrelja[3]
Boris Avdić[4]

Abstract: Research of hazards and risk in tourism is one of important segments in the concept of management and planning in destination development. In the concept of long-term strategy of economic development, Bosnia and Herzegovina has set its tourist industry goals very high. It is recognized as the strategic branch of economy, which should increase competitiveness, foreign-exchange influx, tourist traffic and employment rate. One of the basic preconditions of achievement of these goals is the process of formation of protected areas, by which territorial share Bosnia and Herzegovina is placed very low on the list of European nations.
Accordingly, this paper represents the research of protected areas development concepts in Canton of Sarajevo, and of problems with theirs establishment, with the special focus on hazards like minefields and unexploded ordnance (UXO).
Although it has passed 20 years since the end of the war, Bosnia and Herzegovina is not safe country regarding this issue (current suspected area is 1.176,5 km^2 or 2,3% of total land), while the situation in Canton of Sarajevo is even more concerning (suspected area is 80,78 km^2 or 6,3% of total land). Hazards and risks related to minefields and UXO represent very significant limiting factor in the process of establishment of new protected areas, which are planned by legal documents on the Cantonal and Federal level. This is especially emphasized through high concentration of mine suspected areas in the southern regions of Canton of Sarajevo, where are located mountains like Igman, Bjelašnica, Visočica, Treskavica, as well as Rakitnica canyon. These locations are among the most valuable tourist attractions in Bosnia and Herzegovina.

Key words: Bosnia and Herzegovina, minefield, hazard, Canton of Sarajevo, protected area

INTRODUCTION

Pursuant to the provisions of the Framework Law on the Protection and Rescue of Persons and Material Goods in the Event of Natural and Other Disasters in Bosnia and Herzegovina, the Council of Ministers adopted a National Methodology for Making Risk Assessments regarding Natural and Other Disasters in Bosnia and Herzegovina (2009), in which the term "hazard" is defined as a threat, phenomena, activity that causes natural or other disasters; potentially damaging physical event, phenomenon or human activity that may cause loss of life or injury, property damage, social and economic disruption or environmental damages.

[1] Assistant Professor, Department of Geography, Faculty of Science, University of Sarajevo, Sarajevo, Bosnia and Herzegovina.
[2] Associate Professor, Department of Geography, Faculty of Science, University of Sarajevo, Sarajevo, Bosnia and Herzegovina.
[3] Senior Assistant , Department of Geography, Faculty of Science, University of Sarajevo, Sarajevo, Bosnia and Herzegovina.
[4] Assistant , Department of Geography, Faculty of Science, University of Sarajevo, Sarajevo, Bosnia and Herzegovina.

At the same time, hazards can include latent conditions that may pose future threats and can have different origins: natural (geological, hydro-meteorological and biological) or be caused by human processes (environmental degradation and technological hazards). Hazards can be single, sequential or combined in terms of their origin or effects. Each hazard is characterized by its location, intensity, frequency and probability. Accordingly, it would be necessary to consider a continuing but also a situational assessment regarding the presence and the effects of hazard elements on the safety of persons, their property and the environment, and the exposure through the number, types, quality, and value of different kinds of material goods or infrastructure and life that may all be subject to undesirable dangers.

The said methodology is focused also on the assessment of the socio-economic impact of mines and unexploded ordnance (UXO) on the population and the economy, where among other elements there is also a mention of a quantificational analysis of facilities and attractions of cultural and tourism significance (of great importance for economic development in Bosnia and Herzegovina) in the risk zones (high, medium and low risk zones).

According to the assessments made in January 2015, the current size of mine suspected areas in Bosnia and Herzegovina is 1,176.5 km^2, which represents 2,3% of the total area. Through a number of systematic survey operations, we defined 9.185 mine suspected hazardous micro-locations that are estimated to be infested with approximately 120,000 mines/UXO. (BH MAC, 2015)

Within the database (BHMAIS) there are currently registered 19.205 minefield records, which, according to the evaluation of Mine Action Center (MAC) experts accounts for only about 60% of their actual number. So far in Bosnia and Herzegovina there were 1,732 casualties, of which number 603 persons ended up as fatalities. There were more than 240 children among the victims. (BH MAC, 2015)

The sites contaminated with mines/UXO have a direct impact on safety of about 540,000 citizens. Out of the total number of vulnerable communities affected by mines/UXO, 136 or 10% were categorized as vulnerable persons exposed to high levels of risk (about 152,000 vulnerable citizens), 268 or 19% as vulnerable persons exposed to a medium level of risk (about 180,000 vulnerable citizens) and 1,013 or 71% as vulnerable persons exposed to low levels of risk (about 208,000 vulnerable citizens).

As a party to the Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction/Ottawa Convention (Anti-Personnel Mine Ban Treaty), at the third Maputo Review Conference held last year in Maputo, Bosnia and Herzegovina has committed itself to increasing the required budgetary allocations in order to meet its remaining obligations in the mine action implementation, because it is a precondition for the fulfillment of the goals set in the Mine Action Strategy towards enabling the local authorities to take a greater deal of or full ownership over this particular domain. However, at this rate and through this kind of attitude present among the institutions, no sufficient funds have ever been allocated during the course of these six years of implementation of the current Strategy. The implementation of the planned dynamics and timetables required the allocation of about BAM 80 million; however, only about BAM 45 million were allocated.

For the purposes of further consideration of this problem, this paper also takes into account a very significant share of the intended land use categories, because according to a report made in January of this year, approximately 2/3 (about 61%) of mine suspected areas were situated in the zone of woodland and forest areas. In this regard, Canton of Sarajevo shares

the destiny of the same situation present all over Bosnia and Herzegovina. Mine suspected areas amount to 80.78 km^2 or 6.3% of the overall territory of the Canton, where the first category accounts for 26.5%, the second for 17.2%, and the third for 56.2%. (BH MAC, 2015).

Bearing in mind that in the 2003-2023 Spatial Development Plan of Canton of Sarajevo, as part of the general objectives of spatial development, a high position is occupied by the activities such as, for example, promotion of special quality of the environment and preservation of a distinctive environment, but also protection and valorization of values associated with natural resources, natural and cultural heritage, the hazards and risks of landmines and UXO are an extremely prominent limiting factor in the process of establishing a number of entirely new units of natural heritage that are planned in the legislative documents at the Cantonal and Federation levels. Consequently, this paper explores the concepts of development and establishment of protected areas in Canton of Sarajevo, and the problems accompanying their establishment, with a focus on the hazards related to mines and UXO.

This is particularly evident in the concentration of mine suspected areas in the territory where there are 14 planned protected areas to be established in the zone which is regulated by law, among which the perspective of a national park within the stretch of Mount Igman-Mount Bjelašnica-Mount Treskavica-Mount Visočica and the Raktinica River canyon stands out clearly as one of most attractive tourist resources in Bosnia and Herzegovina.

MATERIALS AND WORK METHODS

Materials used for the development of this paper are based on documentary grounds contained in the relevant laws, reports and strategies at national and lower levels of legislative and executive authorities (the Council of Ministers, the Government of the Federation, the Government and the Ministries of Canton of Sarajevo) and spatial planning documents and special purpose plans of the Federation of Bosnia and Herzegovina and Canton of Sarajevo. In addition to the above documents, the extensive documentation works and cartographic materials have also been used from the sources of the Mine Action Center in Bosnia and Herzegovina. (BH MAC, 2015)

The work methodology was based on the collection, systematization and analysis of documentary and cartographic materials, whose verification was conducted through the application of field research, where analytical observations were made and mapping was carried out. Through a complex synthesis and a number of comparative methodological procedures in the domain of identification and evaluation of the natural and social resources in the surveyed area, the output parameters have been obtained as required for the assessment of the situation in the field of qualitative and quantitative indicators which resolutely show the realistic situation, trends and prospects of development. In addition to the methodology of using GIS software application, an annex of original diagrams and charts has been created for purposes of making a comparative conceptual imagery of qualitative and quantitative database, based on which a number of conclusive considerations have been made.

DISCUSSION

According to the current trends, the most efficient model used to respond to the increasing reduction of the physical-geographical diversity and biodiversity is the establishment of protected natural areas. Only in this way can we at least partially compensate for the huge losses generated in the recent and inappropriate attitudes toward natural resources and ensure the survival and preservation of natural ecosystems and ensure the natural heritage for the generations to come. Bosnia and Herzegovina is among the richest European countries in terms of possessing a tremendous variety of natural resources, represented through a high diversity of physical-geographical and bio-ecological systems concerning the size of the country itself. Regrettably, through its previous and current activities, in terms of the different degree of protected nature areas according to the international standards and conventions signed by Bosnia and Herzegovina, this country is satisfying only 2% of the required criteria, which is making it thus one of the last countries in Europe and among the most lagging countries in the world. Canton of Sarajevo also has a number of considerable natural resources, which are recognized on an extremely small scale, because the share of its protected natural areas is about 2%, which makes an extremely small proportion having in mind what the Canton's genuine potentials are. In addition to the objective circumstances that are a consequence of the war period in which natural resources have suffered significant devastation (degradation of forest lands, uncontrolled exploitation of mineral resources, illegal and unplanned construction, negligent management of water resources), the presence of landmines/minefields and UXO-s represents a constant threat and objectively highest obstacle to further processes in planning the protection of natural areas in the territory of Canton of Sarajevo and consequently of their great value from the point of view of tourism industry.

Situation and Planning in the domain of protected areas of Canton of Sarajevo

Nature conservation areas and national parks are declared under the Law by the Federation of Bosnia and Herzegovina, whereas natural monuments and protected landscapes are declared as such by the Cantonal Legislature. The nature conservation areas are managed by public institutions, whose main activities in that respect include protection, maintenance and promotion of the protected areas aimed at preserving their original nature and its processes, and ensuring their use to the extent that does not endanger the inherited values.
According to the Law on Nature Protection, the basic document of relevance for their management is the management plan, which is adopted for a period of ten years. Spatial organization, the method of planning and protection are determined but he Spatial Plan for the Areas with Special Features (see the 2008 Information on the Protected Natural Areas in Sarajevo Canton).
The current activities carried out so far with regard to the situation analysis and planning in the domain of protection of natural areas in Sarajevo Canton were first initiated in 1999 under the authority of the Ministry of Physical Planning, Construction and Environmental Protection, through the delivery of technical studies required to declare certain natural areas as areas under legal protection. Some more effective instruments were also introduced later on, ranging from the establishment of the administration of protected areas to the provision of financial resources for that purpose, resulting in a legally regulated status of the establishment of four protected areas, whose categorization is defined according to the guidelines and principles set by the International Union for Conservation

of Nature (IUCN). These are protected areas Skakavac, Vrelo Bosne, Bijambare and Trebević. According to the relevant data the total size of the territory occupied by the four protected areas is 2,742.70 hectares, which is about 2% of the total area of the Canton. Each of these areas has its own specifics in terms of physical-geographical and biological diversity. Bearing in mind the natural-geographical and bio-ecological potentials of Canton of Sarajevo, the conclusion is that the share of the protected natural areas is at an immense disproportion with the potentials.

Judging from the current functioning of the above four protected areas, it can be noted that there is a high degree of justification for their establishment, because by their attractiveness and complementarity in the tourist offer of Canton of Sarajevo they have taken a very important position, thus enhancing the overall well-being of local population and visitors. By guiding themselves with the justification of the needs and obligations undertaken under the international treaties, and in accordance with legal regulations applicable in this area, the Canton of Sarajevo institutions have incorporated into the 2003-2023 Spatial Planning Document the planned units of natural heritage that are registered as units designated for protection. (Đug, Drešković, 2010)

Tab. 1. Protected areas and planned units of natural heritage in Kanton Sarajevo

Index	Name of the protected area (PA)	Status of PA	Area
1	National Park Bjelašnica	Planned PA	25,265.0
2	National Park Treskavica	Planned PA	3,722.70
3	Nature Park Visočica	Planned PA	2,778.20
4	Strict Nature Reserve Raktinica	Planned PA	1,882.30
5	Natural Area Sliv Bijele Rijeke	Planned PA	8,556.40
6	Nature Park Jahorina	Planned PA	1,506.80
7	Natural Monument Vrelo Bosne	Existing PA	537.40
8	Protected Landscape Bentbaša	Planned PA	135.80
9	Protected Landscape Trebević	Existing PA	400.70
10	Nature Park Ozren	Planned PA	7,207.20
11	Natural Monument Skakavac	Existing PA	1,434.20
12	Forest Park Debelo Brdo	Planned PA	1,808.20
13	Special Nature Reserve Misoča	Planned PA	519.60
14	Area of Natural Beauty Čemerska Planina	Planned PA	1,706.10
15	Area of Natural Beauty Podlipnik	Planned PA	1,331.20
16	Protected Landscape Bijambare	Existing PA	370.30
17	Nature Park Zvijezda	Planned PA	2,709.70
		Total:	**61871,8**

Source: Spatial Plan of Canton of Sarajevo 2003-2023 (2006)

Planned protected areas represent complexes that are abundant in rare natural and biogeographic phenomena, incorporated into projection of formation of circular green belt

around Sarajevo. Regarding the fact of documented 66 individual natural monuments (geomorphological, hydrological, dendrological, horticultural, paleontological, etc.), in combination with evident cultural and historic values (112 individual monuments – nearly half of them are necropolises), it can be stated that potential for all year long tourism in these areas is very high.

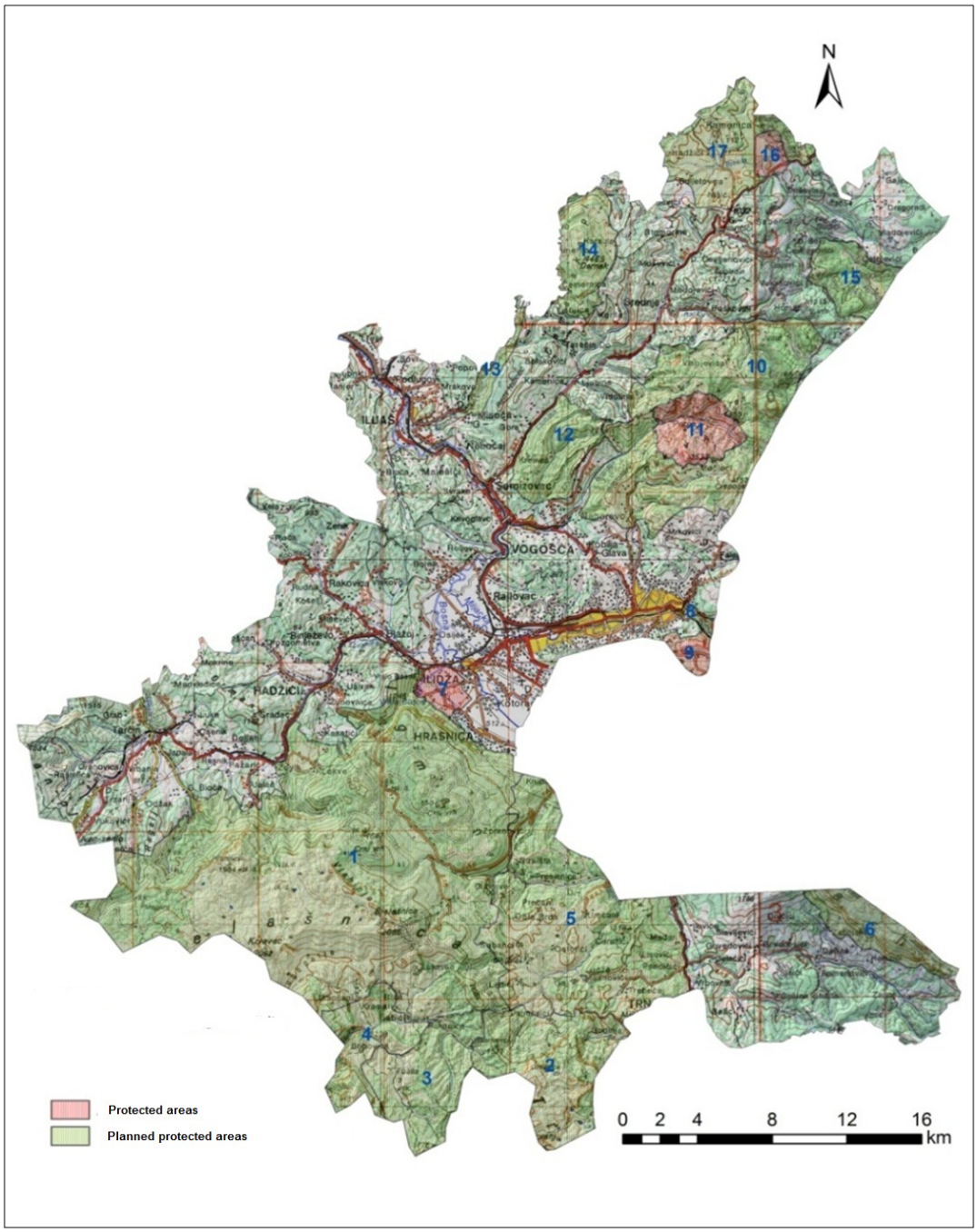

Fig. 1. Map of natural heritage in the Canton of Sarajevo (According to Spatial Plan of Canton of Sarajevo 2003-2023, 2006, and Prirodno naslijeđe Kantona Sarajevo, 2015)

According to official planning documents, special attention is dedicated to development of tourism zones in rural areas, among others. In this context, tourism is seen as important segment of general rural development, and is advocated as the most acceptable in ecological sense and appropriate in relation to available resources and existing infrastructure. It also coincides with the objective need for economic restructuring in depopulated traditional rural areas, as well as with the contemporary trend of tourist demand.
For that purpose, zones of rural ecotourism are planned on the area of 6,199 ha (Municipality of Hadžići – Lokve 83.57 ha and Ljubovčići 78.55 ha; Municipality of Ilijaš – Bioča 723.67 ha, Kamenice 452.97 ha, Misoča 668.45 ha, Nišići 762.72 ha, Taračin Do 1,381.99 ha and Vrutci 779.38 ha; Municipality of Trnovo – Ledići-Dujmovići-Dejčići 310.97 ha, Sinanovići-Tušila 128.21 ha and Umoljani-Šabići 786.51 ha). (Spatial Plan of Canton of Sarajevo, 2006.)

Recent condition and problem of minefields in the extisting and planned protected areas in the Canton of Sarajevo

Although it is estimated by project dynamics in Spatial Plan of Canton of Sarajevo 2003-2023 that suspected area of first category will be completely cleared by 2010, and that other two categories will be drastically reduced, it is obvious that these planned objectives were not accomplished, i. e. achieved progress is considered as unsatisfactory. Official data of relative share of mine suspected area in total area of Canton of Sarajevo in 2006 show relatively modest decline – 12,1% in 2006, 6,8% in 2011 and 6,3% in 2015. Very small progress is especially emphasized since 2011, when it has been cleared only 6,75 km² or 0,52% in four years. This alarming information becomes even more worrying with the additional fact that demining of area of first category is not completed yet. First category accounts for 25,2% of total suspected area in Sarajevo region, according to a recent data in 2015.
At the level of municipalities, concentration of mine suspected areas is connected with spatial relation between city and periphery. Out of four municipalities in City of Sarajevo, two of them (Centar and Novo Sarajevo) are completely cleared, while the other two (Stari Grad and Novi Grad) have relatively small proportion of suspected areas (Tab. 2.).
Territory of Sarajevo municipalities is dominant demographic and economic pivot area of Canton of Sarajevo, with high urbanization and concentration of infrastructure elements on the relatively small area of 141,5 km^2 and average population density of 2,059.5 people per km^2. (Prirodno naslijeđe Kantona Sarajevo, 2015.) That fact resulted in small number of micro-locations of mine suspected areas. However, they still exist in certain places, e. g. Protected Landscape Bentbaša (Municipality of Stari Grad).
Based of GIS analysis, different parameters of spatial relations are stated for other municipalities in the Canton of Sarajevo, where the majority of planned protected areas are located. Geographical features of these municipalities are determined by lower concentration of population. This is especially emphasized in the municipalities with large territories – Trnovo, Hadžići and Ilijaš. Municipalities of Ilidža and Vogošća are characterized by very high population density in the urban centres, while their mountainous periphery are generally rural, or planned for gaining the status of protected area, because of low degree of nature degradation.

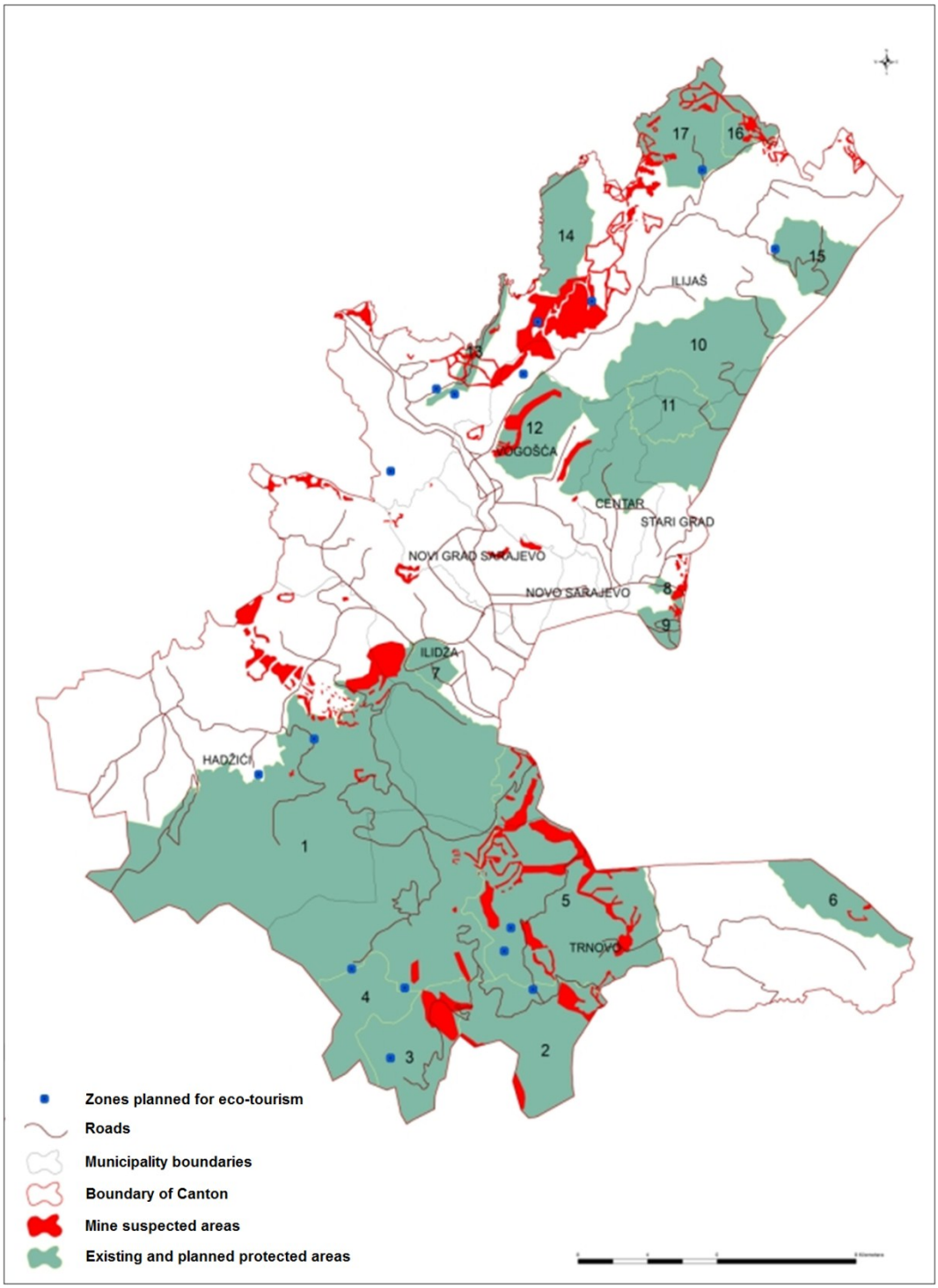

Fig. 2. Map of existing and planned protected areas and minefields
(Source: Spatial Plan of Canton of Sarajevo 2003-2023, Prirodno nasljeđe Kantona Sarajevo, 2015.)

Tab. 2. Indicators of mine suspected areas at the municipal and cantonal level in 2015

Municipality	Suspected area (km^2)			Total suspected area (km^2)	Suspected area (%)
	I category	II category	III category		
Novi Grad *	0,98705	0,00929	-	0,99634	2,1
Stari Grad*	0,92256	0,01733	-	0,93989	1,8
Novo Sarajevo*	-	-	-	-	-
Centar*	-	-	-	-	-
Hadžići	1,54848	0,91923	9,12010	11,58780	4,25
Ilidža	0,83594	1,17044	4,18365	6,19002	4,3
Ilijaš	8,46255	1,62129	19,80280	29,88664	9,67
Vogošća	1,87423	0,22458	2,78303	4,88184	6,77
Trnovo	5,63954	10,86480	9,20847	25,71281	7,6
TOTAL	20,27035	14,82696	45,09805	80,19534	6,28

*Municipalities of City of Sarajevo
Source: BH MAC (2015)

For the purpose of complete understanding of this issue, complex geospatial database is created. It includes data for 58 micro-locations of mine suspected areas within the existing and planned protected zones of natural heritage in Canton of Sarajevo. (Fig. 3., Tab. 3.)

Tab. 3. Numerical indicators of mine suspected areas in the areas of natural heritage in the Canton of Sarajevo

Number (Fig. 1.)	Area of natural heritage	Mine suspected area (ha)	Mine suspected area (%)
1	Bjelašnica	510.03	2.02
2	Treskavica	290.71	7.81
3	Visočica	409.07	14.72
5	Sliv Bijele Rijeke	1,473.92	17.23
6	Jahorina	22.31	1.48
8	Bentbaša	23.05	16.97
9	Trebević	25.00	6.23
10	Ozren	34.40	0.47
12	Debelo brdo	257.45	14.23
13	Misoča	76.29	14.68
14	Čemerska planina	71.00	4.16
16/17	Bijambare -Zvijezda	343.52	12.67
	Total (ha)	3,536.74	5.71

Source: BH MAC (2015)

Through analysis if geospatial database, it can be stated that only Vrelo Bosne, Rakitnica, Skakavac and Podlipnik represent the areas of natural heritage that are not endangered by minefield hazards. They comprise only 8,36% of total existing and planned protected areas in the Canton of Sarajevo. Remaining areas of naturat heritage carry the various degrees of hazard risk. Relevant indicator of this issue is percentage of suspected areas in total land area of these existing and planned zones. Total mine suspected area in existing or planned protected zones are cca 3,540 hectares and it comprises 44% of all suspected area in the Canton of Sarajevo. This percentage value varies from 0,5% in Ozren up to 17,2% in Sliv Bijele Rijeke.

Mutual characteristic for all areas of natural heritage is very high proportion of woodland (richness, rarity, representativeness, threats, endemism, function, diversity etc.) in combination with geological, geomorphological, hydrological and other values. From the aspect of demining process and eliminating the mine and UXO hazards, these kinds of terrain are the most demanding and take the highest risk. Establishing the normal spatial functions in these areas is extremely difficult and complex procedure, according to personal experience of certain authors of this paper.

Contaminated forest land with mines and UXO comprises 11% of total forest area in the Canton of Sarajevo, or 8,237.64 hectares. Because of that, conditions for the implementation of forest protection and management measures are largely impeded.[1] On the basis of cartographic analyses of spatial relations between the real forest vegetation and mine suspected areas, it can be stated that over 90% of all minefields are located in the forested zones. Additionally, some of the most attractive geomorphological, geological and hydrological motives are located in suspected forested areas (e. g. canyons of the Misoča River and Bijela Rijeka). Access to certain elements of natural heritage, that is reflected in existence of narrow corridors with cleared tracks, but still contaminated wider area, also should be considered. In that context, formation of attractive zones of eco-tourism, which could have function of a cores of economic development in these rural areas is very problematic, because some of them are placed close to the identified minefields (e.g. Dejčići, Ledići and Taračin Do).

In accordance with previous facts, it is possible to get some other parameters about recent situation in the aspect of considering mine and UXO hazards on the territory of Canton of Sarajevo in relation to the protected areas. First of all, great standstill in activities focused on reducing mine suspected areas in the Canton of Sarajevo is evident. It resulted in exceeded deadlines set by the Cantonal local government. Lack of investment is the biggest limitation factor. Obtained data show that BAM 106 million is required for the completion of demining process in existing or planned protected areas of Canton of Sarajevo (with realistic premise of costs – BAM 3 for square meter). In the time of extremely difficult economic situation that is a burden for the budget of Canton of Sarajevo, continuation of this very important process is uncertain. According to the available data, even the terrain of the prior category is not completely cleared, and the financial assets for that purpose amount to BAM 60 million. Also, it should be noted that according to estimations, regestered minefields comprise only about 60% of total minefields in this area.

[1] Source: http://mp.ks.gov.ba/content/deminiranje-suma (24. 08. 2015.)

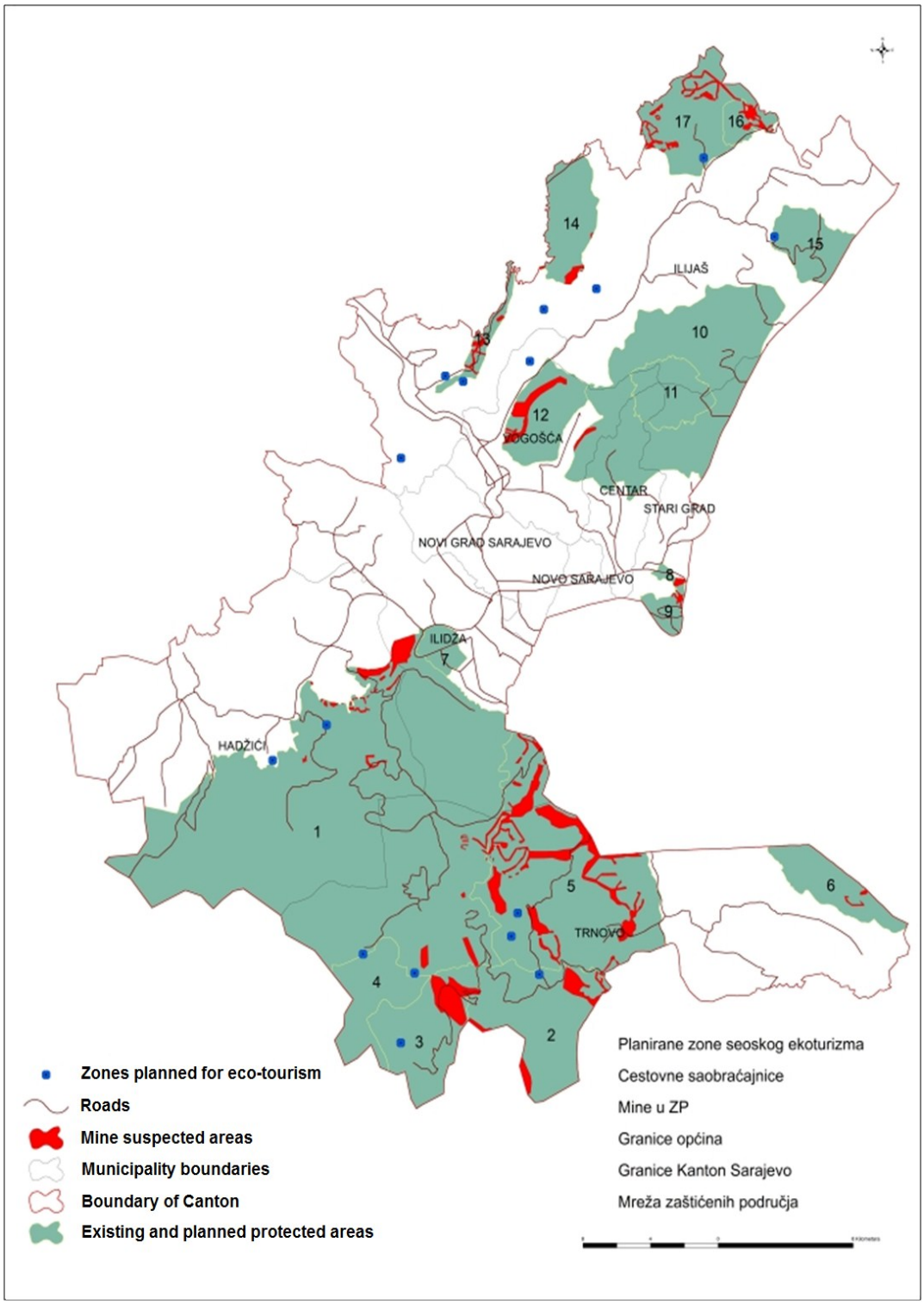

Fig. 3. Spatial distribution of mine suspected areas within the areas of natural heritage

CONCLUSION

Minefields and UXO related hazards require very complex and serious approach in professional and scientific research, including the aspect of tourism. Through methodological consideration, it is concluded that existing and planned protected areas posses high degree of geographical and bioecological diversity, and that they have extraordinary potential for overall economic and social development of Canton of Sarajevo, especially its rural periphery. In projection, planning and implementation of this type of space and belonging content valorization should reach international standards and values in the area of environmental protection (from current 2% of total territory of the Canton that is protected up to projected 30%).

As one of the most important limitation factors in projection of future development, minefield and UXO hazard is researched in this paper. Results are reflected in acquired exact indicators of spatial-functional distribution of minefields in the Canton of Sarajevo in accordance with its administrative parts (municipalities) and areas of natural heritage. Through the quantification of spatial reality, authors have found high values of mine suspected zones proportion in 17 existing and planned protected areas. These values vary from only 0,5% up to 17,2% in Sliv Bijele Rijeke, area of natural heritage that can be considered as very risky to visit. Total surface area of suspected minefields in the existing or planned protected area covers 35.4 km^2, or almost half of all suspected minefields on the territory of Canton of Sarajevo. For the full implementation of demining process in existing or planned protected areas, it is necessary to invest more than BAM 100 million, and for cleansing of the whole territory of the Canton around BAM 240 million. According to the current pace, objectives and projections in the field of planning of protected areas will not be achieved in set deadlines by Spatial Plan of the Canton of Sarajevo 2003-2023.

REFERENCES

1. Metodologija za izradu Procjene ugroženosti BiH od prirodnih ili drugih nesreća „Službeni glasnik BiH“ broj 86/09. (2009) Sarajevo: Council of Ministers of Bosnia and Herzegovina.
2. Izvještaj o protivminskom djelovanju u Bosni i Hercegovini za 2014. godinu (2015). Sarajevo: Centar za uklanjanje mina u BiH – BH MAC.
3. Đug, S., Drešković, N., Hamzić, N. (2010). Prirodna baština Kantona Sarajevo - naučna monografija. Sarajevo: Arch design.
4. Spatial Plan of Canton of Sarajevo 2003-2023 (2006). Sarajevo: Zavod za planiranje razvoja Kantona Sarajevo.
5. Drešković, N., Mirić, R., et al. (2015). Prirodno naslijeđe Kantona Sarajevo - naučna monografija. Sarajevo: Geografsko društvo u Federaciji Bosne i Hercegovine.
6. http://mp.ks.gov.ba/content/deminiranje-suma (24.08.2015.)
7. Table with data of suspected area municipalities of Canton of Sarajevo and maps of minefield situation (on request – 24. 08. 2015.). Sarajevo: Centar za uklanjanje mina u BiH – BH MAC