

Additional material

Noteworthy Flora

It should be emphasized that wetland region Bardaca has relic representatives of terciar flora: *Nympaea alba* L., *Nuphar lutea* (L.) Sm., *Najans marina* L., *Hydrocharis morsus-ranae* L., *Ceratophyllum demersum* L., *Myriophyllum spicatum* L., *Trapa natans* L., *Butomus umbellatus* L., *Vallisneria spiralis* L., which deserve special attention (Kovačević, 2005).

It is important to mention that Bardaca is the first known locality of *Potamogeton rutilus* Wolfg. in Bosnia and Herzegovina, and it is one of few known localities at Balkans peninsula (Montenegro) till now. This submerge macrophyta is registered only in Rakitovac basin, where in large groups grow in deep water of this basin (Davidović et al., 2006).

Noteworthy Fauna

Mammals

The groups of mammals are rare in the swamp areas, but they occasionally appear for catching plunder, when water drops. There can be found different species of fieldvoles, small herbivorous animals, foxes, rabbits, moles, hedgehogs and weasels.

Physical features of the catchment area

Geografically, Bardaca area belongs to the Vrbas river basin.

The Vrbas river is right tributary of the river Sava and is draining the central part of the north slopes of Dinaric Mountains. Water current is appearing on the south slope of Vranica mountain on about 1'530 mnm and flowing into the Sava near Srbac on about 90 mnm. The average fall of the main current is about 6 m/km, which makes this river very attractive for energy use.

Catchment area is extended, length is about 150 km, and width to 70 km. Average height above sea level is about 690 mnm. Total catchment area is about 6 386 km². The Vrbas is fast mountain river, which by one part flowing through plains and valleys. On this part of flow, it leaves the riverbed, making the big number of stagnant tributaries.

Hydrographic system is developed in the upper and lower part of basin. The most significant tributaries are Pliva, Ugar, Crna and Vrbanja.

Catchment area of the Vrbas has moderately continental, mostly mountain humid climate. The average annual temperatures of air mostly depend from height above sea level and morphologic characteristics of the area and are moving from 5.6°C to 10.4°C. Average rainfall are moving from 800 l/m² near estuary of the Vrbas into Sava to 1 500 l/m² on the south part of the catchment, and the average amount is about 1 090 l/m²

The Sava river, forms the biggest river of ex Socialistic-Federative Republic of Yugoslavia SFRJ rises in Slovenia, flows through Croatia, Republic of Srpska, north part of Serbia and in Belgrade empties into the Danube river. Practically, the Sava originates from two rivers Sava Dolinka, which rises in low part of Julian Alps and the Sava Bohinjka.

The Sava catchment is unsymmetrical and extended, and it surrounds the north and north-west part of ex SFRJ. Catchment surface is about 96.400km², and river length is 950 km.

In the area of Bardaca eco-system, the Sava is already a lowland river, surrounded by arable land protected from flooding by embankments, though flood can appear in the rainy period.

The wetland of Bardaca itself encloses around 3.500 ha, and it is divided into the categories where 765 ha belongs to the natural eco-systems and 2744 ha to

artificial eco-systems.

Climatic features

Surrounding area of the Vrbas river, in the middle and upper course is encircled by mountains from all sides, which height rises toward watershed of Black Sea and Adriatic basin on the south, where are formed high Herzegovinian mountains. Lower course belongs to low Peripannonic area. So, local relief conditions, openness toward Pannonic valley in the north and relatively large height above sea level of broadened valleys in the Vrbas catchment, with weakly expressed influence of Adriatic Sea and parameters of general atmosphere circulations under Europe, causing moderately-continental climate in lower areas, while hilly-mountain areas are characterised with sub-mountain or mountain climate.

Hydrological values

On the area of Lijevece polje the hydrological system is very developed. The area is confined with two big rivers from two sides, Vrbas in the east and Sava in the north, while the field is intersected by small rivers network. Significant rivers are Matura, Stublaja, Aržaba and Kraljica. Watercourses are intersected by building of channel Osorna-Borna-Ljevcanica, and only Matura inflow into channel, while other courses sink into the underground and coming to the surface again, north from the channel. Therefore, the riverbed of Matura, downstream of the channel, is never empty. The rivers Osorna and Borna have their headwaters on Kozara mountain and at the foothill there are conducting into channel and continue to flow as the channel Osorna-Borna-Ljevcanica. These two rivers do not belong to Lijevece polje, but there are the main sources of water in channel. That is the reason why they are so significant for this area. Ljevcanica-Dugo polje channel served as a supply channel for filling of fishponds, conducting them with the channel Osorna-Borna-Ljevcanica, channel Brzaja (which is currently used for supplying the fishponds with water) and channel Bardaca. The role of these channels is water concentration and protection from flooding. The current water supply of Bardaca is from the river Matura and Brzaja.

Social and cultural values

Bardaca area was intensively colonised at the beginning of the 20th century. At that time land reclamation measures and building of fishponds started, but area was colonised from the oldest times. On the locality Donja dolina, which is located near the fishponds, archeological remains from the early classical period have been found, which represent significant value of this area and motif for touristic visits. Settlements of the first inhabitants were pile dwelling type, because the entire area was located in flooding area of the rivers Sava and Vrbas. With building of water defense embankments and fishponds, Bardaca is becoming more attractive area for settling and life with main activities such as agriculture, cattle breeding and fishing.

Human interest for settling in this area was huge, because of natural values such as abundance of water, agricultural land, biodiversity richness especially fish, birds and flooded forests. That represent preconditions for high-quality development of economic activities of this area.

Today, Bardaca area includes fishponds, flooding forests and meadows, agricultural land and settlements with about 1500 inhabitants.

The main economy branch is fish growing which has tradition longer than 100 years. With building of channels and arranging of embankments, besides natural watercourses, preconditions for sport fishing development have been produced. At the old riverbed of Stublaja, at the banks of the river Matura and channels, sport fishermen competitions have been organized. In the last ten years, at the banks of the Stublaja, pile dwelling settlement has been built, which is under management of the Fishermen society Stublaja, which represents significant resource for sport-fishing development.

Since 1983, art-ecologic colony has been organizing on Bardaca, in the aim to

address the appeal for nature protection on Bardaca through art expression. Every year, this colony entertains about 10 renowned artists and many visitors, nature and art lovers.

Current recreation and tourism

In the last ten years, there didn't exist an organised program for tourist activities Bardaca. Reasons for that can be found in devastation of existing touristic capacities, chaos in property rights relations, non-existence of professional and committed staff, many conflicts in the space (fish growing, farming, hunting, fishing, nature protection). All tourist activities, which were conducted, haven't been based on management plan and use of resources of Bardaca for tourism development, but on individual (ad hoc) attempts of organizing of tourist activities which were conducted by the small local innkeepers, fishing and hunting associations. Most of visits have been accomplished through hunting and fishing tourism, that is additionally burdened the environment and endangered the individual animal species. In recent time, existing motel Bardaca has been repaired and brought into function of receiving tourists, which mainly refer on accommodation and restaurant services.

Next to the main object, there is an open pool, with atypical shape, which serves for the purposes of recreation and daily rest. Eventually, by its size and depth it could be adapted for sport preparations, although for that purpose additional equipment should be provided. In that area and around the pool, there are arranged picnic spaces, which could be adapted as well, for the purposes of camp, with previous rehabilitation and arranging of water crossing, in respect of hygiene, functionality and treatment of waste water, as well. The motel Bardaca has middle-size parking space, which is adapted for amateur sport activities, such as basketball and volleyball.

Except for the motel Bardaca, accommodation organisation is potentially possible in private households (assumed 200 beds) for which is necessary to conduct the education of the small contractors/hosts in organisation and giving services of handicraft. The big number of households has inappropriate water supply and no regulated water sewage system. For handicraft improvement, significant financial resources are necessary, which would be intended for adaptation and education.

Scientific visits, tourist activities in relation with photo-safari, educative excursion and students' picnics are very rare on the Bardaca area.

More than ten years, art colony has been organizing on the locality of Bardaca, on which every year participate around ten renowned artists, whose art works represent cultural and artistic value. Event Savski kotlić, assumes competition in fish soup preparation, when large number of lovers of such type of fun gather on Bardaca. Because of low level of visitors awareness and non-existence of adequate infrastructure, unfortunately this and similar events represent the great pressure on the environment, especially in regard to creating and non-adequate waste disposal.

Currently, tourist activities include organization of celebrations in the hall of motel Bardaca and sporadic, usually non-registered and uncontrolled visits of hunters and fishermen. It is hard to talk about number of tourists, because all inclusive statistics of entering visitors in this area hasn't been conducted, but certainly, that number is not significant for tourism development and economic profit. Seasonal aspect is indefinite and it is exclusively in relation with seasons of allowed hunting and fishing, although there is some evidence of disregarding the same one. The biggest chance for the development of Bardaca, regarding the tourism is to improve scientific work, educational excursions, recreation activities, conferences, manifestations as well as rural, agro-tourism and eco-tourism.

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