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Original scientific paper

A CONTRIBUTION TO THE KNOWLEDGE ON BIOLOGICAL DIVERSITY OF THE JEZERAČKA RIVER (THE REPUBLIC OF SRPSKA, BOSNIA AND HERZEGOVINA)

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Summary

Analyses of physical, chemical and biological parameters of the Jezeračka River were conducted in 2020. Given that the planning documents of the Republic of Srpska recognized these natural spawning grounds of *Salmo trutta* as a potentially protected zone, the aim of the paper was to evaluate ecological and biological water properties of our target river and its surrounding area. Following the application of standard methods, biological research covered microbiological analyses and the analyses of phytobenthos, periphyton, macrozoobenthos, ichthyofauna and flora. Values of the analyzed physical-chemical and sanitary-microbiological parameters suggested that the water quality of the Jezeračka River was 1st class. Analyses based on the qualitative and quantitative composition of the phytobenthos, periphyton, macrozoobenthos and ichthyofauna community indicated that the water was of the 1st class quality and qualified for the high ecological status. The well-preserved autochthonous flora and vegetation along the riverbank are favorable to the water quality maintenance. Results imply that biological and ecological conditions are suitable for life and spawning of *Salmo trutta* and that the upper Jezeračka River stream, the natural spawning grounds of the species, meets all requirements to preserve and improve *Salmo trutta* population.

Key words: Jezeračka River, biodiversity, *Salmo trutta*, natural spawning grounds

INTRODUCTION

The upper stream of the Jezeračka River (Luke site) is situated at the slopes of Vučja Planina (759 m altitude) in the municipality of Teslić. The waterstream length is around 7 km, of which the 500-1000 m long upper stream (from the river source to the village of Jezera) is located in the Republic of Srpska (RS) and the rest of the river runs through the B&H Federation (FB&H). In the village of Podjezera (FB&H), the Jezeračka River meets the Stupnička River to finally form the Blatnica River (RS) which drains into the Velika Usora (RS) (UG ``Planina", 2020; SRD "Usora" Teslić, 2020, personal communication) (Figure 1).

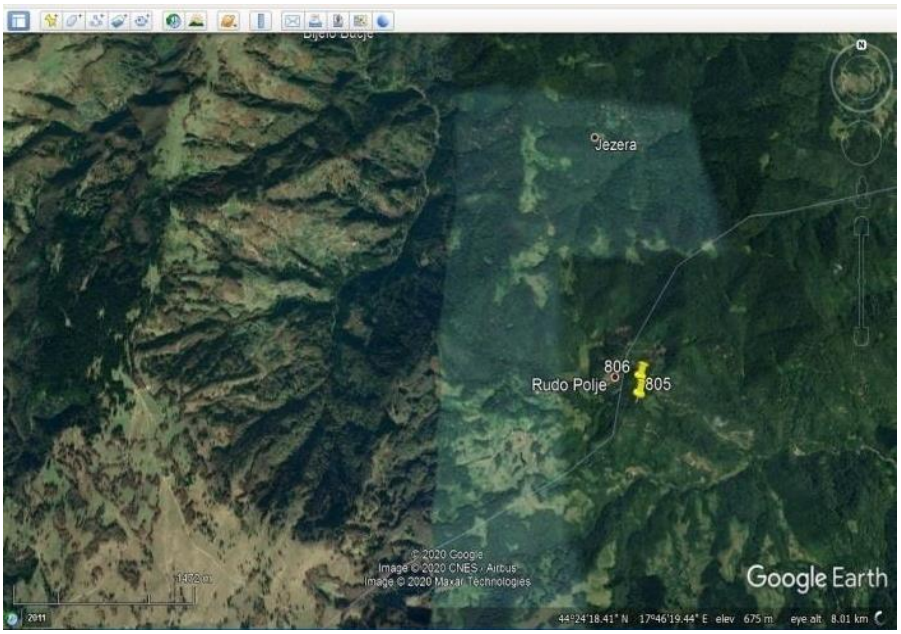

Figure 1. Position of the upper part of the Jezeračka River (*Google Earth*, modified by Lubarda, B., 2020)

According to the Amendments and Addenda to the Spatial Plan of the Republic of Srpska until 2025 (Novi Urbanistički zavod RS, 2013), there are twelve areas in the municipality of Teslić designed for protection, including "Luke – the brown trout's natural spawning grounds" which should be categorized as a habitat management area (IUCN IV category). Furthermore, according to the Law on Fisheries of the Republic of Srpska (Official Gazette of the Republic of Srpska, 72/12), fish stocks are protected by establishing special habitats. A special habitat is a part of the prohibited fishing zone and is protected due to its role in natural revitalization of fish stocks. Special habitats cover natural spawning grounds, growth and feeding grounds, shelters and migration routes. Natural spawning grounds are particularly important as permanent reservations and locations where autochthonous fish species reproduce; they are relevant for the diversity and sport fishing. Fish would either migrate or be relocated from the natural spawning grounds to more damaged ecosystems in order to boost the basic fish stocks, which would improve the fishing prospects. Consequently, it was in 2019 that "Planina" UG and "Usora" SRD associations from Teslić started an initiative to make "Luke – natural spawning grounds" a protected area. According to the initiative, the largest brown trout's spawning grounds in the municipality of Teslić are located at the Luke site on the upper Jezeračka River (Figure 1), and the protected area should cover around 3 square kilometers. Another growing concern is a large number of small hydroelectric plants (SHEP) in the vicinity. More specifically, there is a SHEP at the mouth of Jezeračka and Stupnička rivers in the village of Podjezera with the power of 0.6 MW built in 2017. The SHEP uses water from both water streams (the water station on the Jezeračka River is situated 3-4 km down the river source, in the village of Jelići). The 2 km long pipeline carries the water from the water station to the power plant. Fish migrate up and down both rivers and the SHEP on the Jezeračka River has an acute slope angle and cascades too high, preventing fish migrations (UG "Planina", 2020, personal communication). The inability of many fish species

to reproduce, migrate and exist due to the aforementioned factor and the altered living conditions is precisely why this area must be protected.

The aim of the paper is to provide preliminary information on biodiversity of the target river, focusing on fauna and vegetation of the upper Jezeračka River stream, in order to support the protection of the target area.

MATERIALS AND METHODS

Physical and Chemical Characteristics

Water sampling for the purpose of physical-chemical analysis at the Jezeračka River location was performed in late July, 2020. The samples were collected at 10-15 cm below the water surface in sterile glass 500 ml bottles under aseptic conditions at middle riverstream (Petrović *et al*., 1998). Immediately after the sampling was completed, the following parameters were determined: water temperature, pH value, electrical conductivity, turbidity, dissolved oxygen concentration, and saturation. Water temperature, dissolved oxygen concentration and saturation were determined by means of HACH HQ 30d oximeter; pH value and electrical conductivity were determined by means of EUTECH CyberScan pc 10 pH-meter; and turbidity was determined by means of EUTECH TN100 turbidimeter. The analysis of other parameters was conducted in the laboratory at the Faculty of Natural Sciences and Mathematics, Banja Luka. Samples were transported in a portable refrigerator at +4 °C and the analysis was complete within the following 24 hours. HACH DREL Complete Water Lab DR2800 (DR 2800, User Manual) spectrophotometer was used to determine concentrations of suspended material, ammonia nitrogen, nitrate nitrogen, nitrite nitrogen, orthophosphate and sulfate. The analysis and water quality assessment followed the Regulation on water classification and categorization of watercourse (Official Gazette of the Republic of Srpska, 42/01).

Microbiological analysis

Sanitary-microbiological parameters of water in the Jezeračka River were determined by using indirect breeding methods (APHA, 1999; Benson, 1998; Wistreich, 2003). BioMérieux and Torlak nutritive bases were used to establish the number of total aerobic heterotrophs, total coliform bacteria, fecal coliform bacteria, and fecal streptococci (Official Gazette of the Republic of Srpska, 42/01). The obtained results were inspected in line with the Republic of Srpska legislation in the field of surface water quality (Official Gazette of the Republic of Srpska, 42/01).

Periphyton and phytobenthos

Materials from the river bottom and flooded objects were collected and fixed with Lugol's iodine solution in order to study the qualitative composition of phytobenthos and periphyton. Samples were observed through a Leica DM 1000 microscope with the adequate Leica DSF245 camera. The following keys were used to identify algae: Hindak (1978, 2005 and 2008), John *et al*. (2005), Kannan and Lenca (2013), Krammer and Lange-Bertalot (1988), Lange-Bertalot *et al*. (2017), Lazar (1960), and Wehr and Sheath (2003). The saprobic index was determined based on the relative number of indicator organisms in line with the classic

Pantle-Buck method (Grginčević and Pujin, 1998), by using the Wegl list of indicator taxa (1983).

Macrozoobenthos

Sampling of macrozoobenthos was conducted in the upper Jezeračka River stream on July 22, 2020. The "multi habitat" sampling concept was applied in line with the instructions provided by AQEM consortium (2002); Surber sampler (frame dimensions 25 x 25 cm, pane diameter 500 μm) was used to collect twenty samples of macrozoobenthos, i.e. one composite sample of 1.25 m^2 surface. The collected materials were fixed in 95% ethanol and labeled. The rinsing, subsampling, and analysis of macrozoobenthos were conducted in the laboratory at the Faculty of Natural Sciences and Mathematics, Banja Luka. The subsampling procedure followed the method suggested by Caton (1991). The analysis covered one subsample, in which process more than a thousand individuals were singled out and analyzed. The qualitative and quantitative analyses were performed by using Leica EZ4D stereomicroscope, following the adequate body of work (Radoman, 1983; Kerovec, 1986; Brittain and Saltveit, 1996; Timm, 1999; Eggers and Martens, 2001; Sundermann *et al*., 2007; Waringer and Graf, 2013; Živić and Marković, 2017). The macrozoobenthos community density was calculated as the number of individuals per square meter of bottom surface (ind/m^2). The water quality assessment was performed based on the macrozoobenthos community structure by using a modified Pantle-Buck method and an indicator taxa list provided by Walley *et al*. (2001). The water quality assessment at the upper Jezeračka River stream also used the Trent Biotic Index and interpretation given by Miljanović (2001).

Ichthyofauna

The field faunistic study of the fish in the upper Jezeračka River stream was conducted on July 22, 2020. The sampling was performed by using fishing rods, i.e. by the sports fishing technique. The collected fish were first determined (Kottelat and Freyhof, 2007), and then the ichiometer was used to measure the total and standard body length (cm). The body mass (g) was measured by using First FA-6402 digital scales with 1g precision. After the measurements, the individuals were returned to water unharmed. In order to calculate Fulton's body condition factor (K) (Akombo *et al.,* 2013), the following formula was used: $K = W \times L^{-3} \times 100$K = W*100 / L^3, in which W – body mass in grams and L – total body length in centimeters.

Flora and vegetation

The research covered the area around the upper part of the Jezeračka River, which is located at an altitude of 750-800 m. Floristic research was carried out during August 2020. Determination of the collected plant material was carried out based on keys in basic and standard floras, checklist and iconographies (Jávorka and Csapody, 1975; Јосифовић, 1970-1979; Сарић 1986, 1992; Tutin *et.al*., 1968-1980; Tutin *et.al*., 1993).

RESULTS AND DISCUSSION

Physical and Chemical Characteristics

The Jezeračka River's water is of an utmost quality and agrees with a high ecological status based on all the monitored physical-chemical parameters (Table 1). There is an abundance of dissolved oxygen; at the moment of measurements, the oxygen concentration was 9.18 mg O_2/l, which suggested the saturation of 90.1% at 10.7 ˚C water temperature. The pH value is neutral (pH 7.34) and the ion concentration is low since the measured electrical conductivity was 319 µS/cm. The water is extremely clear and the measured turbidity value is only 1.19 NTU, which suggests there are some undissolved suspended materials due to presence of phytoplankton, dead organic substance and mud from the river bed or river bank. Concentration of all the monitored forms of inorganic nitrogen and phosphorus, which affect the primary production and trophicity of the water ecosystem, was rather low. There was no ammonia nitrogen registered in the water and the nitrite concentration was on the verge of detection. It is vital for the living organisms that the concentrations of these two compounds in the water are low, since they are rather toxic if the concentration rises. The water is poor in sulfates with a concentration of only 4 mg/l. Their presence in surface water is conditioned by the geological foundation. The biological consumption of oxygen was only 0.32 mg O_2/l which suggested low concentration of organic materials in the water.

Table 1. Classification of water quality of the Jezeračka River based on physical and chemical parameters

Parameter (Unit)	Measured value	Permissible limit value	Water quality class
GENERAL PARAMETERS			
Temperature (˚C)	10.7	-	-
pH	7.34	6.8-8.5	I
Conductivity (µS/cm)	319	<400	I
Total suspended solids (mg/l)	0	<2	I
Turbidity (NTU)	1.19	-	-
OXYGEN REGIME			
Dissolved oxygen (mg/l)	9.18	>6	I
Saturation of diss. oxygen (%)	90.1	80-100	I
BOD_5 (mg O_2/l)	0.32	<2	I
NUTRIENTS			
Ammonia nitrogen (mg/l)	0.00	<0.10	I
Nitrate nitrogen (mg/l)	0.2	<5	I
Nitrite nitrogen (mg/l)	0.001	<0.030	I
Sulfate (mg/l)	4	<50	I
Orthophosphate (mg/l)	0.02	-	-

Microbiological analysis

Results of sanitary-microbiological analyses also corroborate the fact that there is little organic matter in the water (Table 2). Namely, the number of bacteria accompanying the

organic matter grows exponentially. In addition, they decompose the organic matter and spend the dissolved oxygen, which further increases values of biological oxygen consumption. Hence, these parameters are excellent indicators of how much the water is loaded with organic matter. The number of total aerobic heterotrophic bacteria was only 250 N/ml which matches the first class water quality free of organic matter. It is the bacteria that also suggest the mixture of surface water and wastewater; total coliform bacteria, fecal coliform bacteria and fecal streptococci were not detected at all.

Table 2. Classification of water quality of the Jezeračka River based on microbiological parameters

Groups of microorganisms	Abundance	Permissible limit value	Water quality class
Aerobic heterotrophic bacteria (N/ml)	250	<1000	**I**
Total coliform bacteria (N/100 ml)	<1	<50	**I**
Fecal coliform bacteria (N/100 ml)	<1	<20	**I**
Fecal streptococci (N/100 ml)	<1	<20	**I**

Based on all the monitored physical-chemical parameters, oxygen regime parameters, the concentration of nutrients and sanitary-microbiological parameters of the Jezeračka River's water and in line with the Regulation on water classification and categorization of watercourse (Official Gazette of the Republic of Srpska, 42/01), the water is of the first class quality and has a high ecological status. Even when the obtained values were matched against the highest values allowed by the Rulebook on regularity of drinking water (Official Gazette of the Republic of Srpska, 75/15), they were within the limits set for water which was not filtered and disinfected (springs and wells).

Periphyton and phytobenthos

In the Jezeračka River's water, we identified 11 different algae taxa, among which was one cyanobacteria or blue-green algae, and others were silicates (Table 3). Silicates are common in these water streams (phytobenthos) or they are located on the rocks and water plants (periphyton). They are used as indicators of water quality since some species are sensitive to the presence of decomposing organic matter.

Table 3. Qualitative composition of periphyton and phytobenthos of the Jezeračka River

Taxa	sap*	s	G	h
Cyanobacteria				
Microcystis sp.		2.00	3	1
Bacillariophyta				
Amphora ovalis Kützing	o-β	1.70	1	3
Asterionella gracillima Heiberg	o- β	1.20	4	3

Cocconeis placentula Ehr.	o- β	1.40	3	3
Cyclotella sp.		1.50	3	3
Diatoma hiemale Heib	o- β	1.70	4	5
Epithemia actor Kützing	o- β	1.40	3	3
Eunotia bilunaris (I.) Schaar.	o- β	1.50	3	1
Melosira arenaria Moore	o- β	1.30	3	2
Navicula oblonga Kützing	o- β	1.50	3	2
Pinullaria nobilis Ehrb.	o	1.10	3	3
Pantle-Buck saprobity index				**1.49**

*sap – saprobic zone; s-saprobic index; G-indicator reliability; h-relative abundance

Based on the qualitative and quantitative algae composition, we calculated the Pantle-Buck saprobity index, which was 1.49, suggesting the first class water quality. Quantitatively, *a Diatoma hiemale silicate alga*, which is an indicator of oligo saprobic and β-mezosaprobic water, dominates the Jezeračka River's water. Other detected species are also indicators of extremely clear oligo saprobic water, except cyanobacteria *Microcystis sp*. which usually populates β-mezosaprobic water. Such composition of phytobenthos and periphyton communities suggests a clear water of first class quality and high ecological rank.

Macrozoobenthos

Representatives of 37 invertebrate taxa were found during the qualitative analysis of a macrozoobenthos sample collected at the upper Jezeračka River stream (Table 4). Nematoda samples did not undergo a detailed determination. Two classes of Mollusca (Gastropoda and Bivalvia) and Annelida types (Oligochaeta and Hirudinea) were found as well. The largest diversity was found in Arthropoda representatives, with three classes (Arachnida, Crustacea and Insecta). Among Arthropoda types, most taxa belonged to the Insecta class and the following orders: Ephemeroptera, Plecoptera, Megaloptera, Coleoptera, Diptera and Trichoptera.

Table 4. Macrozoobenthos of the Jezeračka River with data on bioindicators

Taxa	**Assemblages density**		**Indicator characteristics**		
	ind/m^2	**%**	**s**	**w**	**h**
NEMATODA					
Nematoda und.*	72	1.03	2.65	2	3
GASTROPODA					
Hydrobiidae	624	8.91			
Bythinella sp.	1206	17.22			
BIVALVIA					
Pisidium sp.	36	0.51	1.83	3	3
OLIGOCHAETA					
Oligochaeta und.	162	2.31			
Tubificidae	42	0.60			
HIRUDINEA					
Glossiphonia sp.	6	0.09			

Dina sp.	18	0.26			
ARACHNIDA					
Acari und.	24	0.34	1.44	3	3
CRUSTACEA					
Gammarus sp.	2148	30.68			
Niphargus sp.	6	0.09	1.02	5	1
EPHEMEROPTERA					
Heptageniidae	6	0.09			
Ecdyonurus sp.	30	0.43	1.36	3	3
Leptophlebiidae	12	0.17			
PLECOPTERA					
Plecoptera und.	126	1.80			
Perlidae	78	1.11			
Nemouridae	90	1.29			
Nemurella sp.	18	0.26			
Protonemoura sp.	18	0.26	0.91	5	3
Leuctra sp.	198	2.83	1.23	3	5
MEGALOPTERA					
Sialis sp.	30	0.43			
COLEOPTERA					
Limnius sp.	12	0.17	1.29	3	3
DIPTERA					
Dicranota sp.	6	0.09	1.28	3	1
Psychodidae	12	0.17	2.15	2	3
Ptychoptera sp.	36	0.51			
Chironomidae	1566	22.37	2.48	1	5
Ibisia marginata (Fabricius, 1781)	6	0.09			
Empididae	12	0.17			
TRICHOPTERA					
Trichoptera und.	6	0.09			
Psychomyiidae	6	0.09			
Rhyacophila sp.	6	0.09	1.18	4	1
Goeridae	30	0.43			
Limnephilidae	192	2.74	1.19	4	5
Halesus sp.	60	0.86			
Thremma sp.	24	0.34			
Sericostoma sp.	42	0.60	1.01	5	3
Odontocerum sp.	36	0.51			
Total number of individuals	**7002**		**Oligo-saprobity of water (S=1.38)**		
Total number of taxa	**37**				

*und. – undetermined

During the qualitative analysis of a macrozoobenthos sample collected at the upper Jezeračka River stream, the total macrozoobenthos density was 7002 ind/m^2 (Tabele 4). Numerically dominant were crustaceans of *Gammarus* genus with 2148 ind/m^2 or 30.68%.

Secondly, there were Diptera larvae of the Chironomidae family with 1566 ind/m^2 or 22.37%, and thirdly there were snails of *Bythinella* genus with 1206 ind/m^2 or 17.22%. A small number of individuals were found for other taxa per bottom unit. The following macrozoobenthos taxa had the smallest density at the upper Jezeračka River stream: *Glossiphonia* sp., *Niphargus* sp., Heptageniidae, *Dicranota* sp., *Ibisia marginata*, undetermined larvae Trichoptera, Psychomyiidae and *Rhyacophila* sp. Results of the water quality analysis obtained by using a modified Pantle-Buck method and the data on characteristics of macrozoobenthos communities both suggest that the water is of a first class quality or olisaprobic (Table 5; S = 1.38). The application of Trent biotic index only corroborated the high quality of water of the upper Jezeračka River stream. We should point out that the composition and density of discovered macrozoobenthos representatives is an excellent natural food source for predominantly insectivorous fish, such as brown trout (Trožić-Borovac, 2002; Kerkez *et al*., 2014).

Ichthyofauna

During the sampling at the upper Jezeračka River stream, only one brown trout species was detected (*Salmo trutta*, Linnaeus, 1758) belonging to the Salmonidae family, and five individuals were caught. According to the available data, there have been no earlier studies on ichthyofauna of this area. SRD "Usora" Teslić provided us with information that brown trout existed in the river but the number was not monitored because most of the water stream is located in the B&H Federation. They also believe that the population of brown trout has been severely affected by the small hydro-electric plants. Basic morphometric parameters, body mass and Fulton's condition factor of brown trout are provided in Table 5. Given these data, we may infer that the upper Jezeračka River stream is populated with young brown trout individuals. The timeline of our study did not match the spawning period, so larger individuals were not expected to be found. The analysis of Fulton's coefficient suggests that the mean value of the analyzed brown trout samples is 1.48 (>1), which indicates that fish is well fed.

Table 5. Morphometric characteristics and Fulton's condition factor of brown trout (*Salmo trutta*) from the Jezeračka River

Parameter	Average value	Standard deviation	Minimum value	Maximum value	Coefficient of variation %
Total body length (cm)	15.04	4.35	10.40	19.80	28.92
Standard body length (cm)	13.24	4.11	8.80	17.50	31.06
Body mass (g)	38.40	30.49	12.00	77.00	79.41
Fulton's condition factor (K)	1.48	0.48	0.76	1.85	32.68

Brown trout populates cold mountain springs and streams, rarely rivers, characterized by clear, clean and unpolluted water, rich in oxygen and with small temperature oscillations (Bogut *et al*., 2006; Simonović, 2001; Sofradžija, 2009). Given that the species is an indicator

of water quality, brown trout indicates water ranging from xeno to oligo saprobic status (x-o), and is a species intolerant to altered life conditions. Xenosaprobic water is fully clean water (source water) with primary producers, whereas olisaprobic water is the first class stream with clean or slightly polluted water (Grginčević and Pujin, 1998). In such water streams, brown trout remains in narrow areas in lower streams, deep whirlpools and river bank areas difficult to access. It feeds on different bottom organisms: aquatic insect larvae, molluscs, crustaceans and worms. Great sources of food are insects which fall into the water, fish and juveniles. Due to its distribution and high-quality meat, brown trout is popular for sports fishing. Artificial spawning and aquaculture make brown trout economically pertinent species. What threatens this species the most are regulation and division of water streams, in which process the water regime is changed and migration up to the river source is disabled. Additional problem is timber felling along the stream and river bank, which changes the microclimate, especially in summer (Mrakovičić *et al*., 2006; Sofradžija, 2009). According to the Regulation on strictly protected and protected wild species of the Republic of Srpska, brown trout is ranked as a protected species (Official Gazette of the Republic of Srpska, 65/20).

Flora and vegetation

According to Stefanović *et al.* (1983), the wider research area of the Jezeračka River and its surroundings belongs in the area of the inner Dinarides, in the sub-area of the Central Bosnia and Vrandu region. The geomorphological and geological analysis of this region, which has a hilly-mountainous character (300-1450 m above sea level), shows that it is built of Jurassic flysch with limestone islands and smaller units of marl. The largest part of this region is occupied by forests of beech and fir without spruce (*Abieti-Fagetum*), especially in the lower parts. Forests of beech and fir with spruce occupy the higher areas of Vučje Mountain. In addition to the mentioned types of forests, secondary beech forests (*Luzulo-Fagetum*) are also widespread, and fir and spruce forests (*Abieti-Piceetum silicicolum*) are much smaller. During the field research, it was established that beech forests belonging to the *Luzulo-Fagetum* group were developed in the area of the Jezeračka River research site. Broadly speaking, beech forests, that is, beech and fir, which develop on silicate substrates - soils with a primarily acidic reaction, belong here. This means that they have a similar floristic composition throughout the area. Among them, the number of species of the order *Fagetalia* is smaller, and the species of the orders *Quercetalia robori-petraeae* and *Vaccinio-Piceetalia* predominate. Floristic as a whole, they are much poorer compared to the neutrophilic-basophilic communities of beech / beech-fir. Important species are: *Fagus sylvatica, Luzula luzuloides, Polytrichum formosum, Vaccinium myrtillus, Pteridium aquilinum, Luzula pilosa, Dicranum scoparium, Leucobryum glaucum*. Field research of selected localities in the immediate vicinity of the source and the upper part of the course of the Jezeračka River recorded the presence of plant taxa, which are given in Table 6.

Table 6. Overview of the flora of area of upper part of Jezeračka River

Family	Species
Mosses, hornworts and liverworts (Bryophyta)	
Dicranaceae	*Dicranum scoparium* Hedw
Leucobryaceae	*Leucobryum glaucum* (Hedw.) Ångstr.

Polytrichaceae	*Polytrichum formosum* (Hedw.) G.L. Smith
Ferns, horsetails and lycophytes (Pteridophyta)	
Dryopteridaceae	*Dryopteris filix-mas* (L.) Schott
Dennstaedtiaceae	*Pteridium aquilinum* (L.) Kuhn
Polypodiaceae	*Polypodium vulgare* L
Seed-bearing plants (Spermatophyta)	
Apiaceae	*Sanicula europaea* L.
Apiaceae	*Angelica sylvestris* L.
Betulaceae	*Carpinus betulus* L.
Compositae	*Sonchus palustris* L.
Compositae	*Prenanthes purpurea* L.
Compositae	*Telekia speciosa* (Schreb.) Baumg.
Compositae	*Petasites hybridus* (L.) G. Gaertn. & al.
Compositae	*Lactuca* muralis (L.) Gaertner
Euphorbiaceae	*Euphorbia amygdaloides* L.
Euphorbiaceae	*Mercurialis perennis* L.
Fagaceae	*Fagus sylvatica* L.
Geraniaceae	*Geranium robertianum* L.
Juncaceae	*Luzula luzuloides* (Lam.) Dandy & Wilmott
Juncaceae	*Luzula pilosa* (L.) Willd.
Lamiaceae	*Salvia glutinosa* L.
Lamiaceae	*Lamium orvala* L.
Lamiaceae	*Lamium galeobdolon* (L.) Crantz
Lamiaceae	*Stachys silvatica* L.
Oxalidaceae	*Oxalis acetosella* L.
Plantaginaceae	*Veronica urticifolia* Jacq.
Poaceae	*Melica uniflora* Retz.
Primulaceae	*Primula acaulis* (L.) L.
Ranunculaceae	*Helleborus odorus* Willd.
Ranunculaceae	*Caltha palustris* L.
Rosaceae	*Aremonia agrimonoides* (L.) DC.
Rubiaceae	*Galium odoratum* (L.) Scop.
Rubiaceae	*Galium sylvaticum* L.
Salicaceae	*Salix cinerea* L.
Thymelaeaceae	*Daphne mezereum* L.

By listing the flora in the mentioned site, it can be concluded that the recorded species are typical of beech forests. A certain number of species are associated with wet habitats, which is expected considering the proximity of the river. It should be emphasized that the species are generally not represented with great coverage and abundance. The exception is some species related to the Jezeračka River itself. The results of these investigations represent only part of the flora that inhabits this area. A number of species, which are normally expected in forests, appear in early spring and early summer, so it was not possible to ascertain their

presence. A survey of the entire site shows that the forest has been exploited in the recent past and that it is dominated by young trees, especially beech trees. The presence of young spruce and fir plants was also noticed on the ground floor. At slightly higher positions in the immediate vicinity of the researched site, there is a conifer forest, so we assume that the spread of seeds occurred spontaneously.

CONCLUSION

Bearing in mind the results of all physical-chemical, microbiological and saprobiological analysis, it can be concluded that Jezeračka River has water of high ecological status, i.e. water of first class quality. The qualitative and quantitative composition of algae in the Jezeračka River indicates the first class of surface water quality, i.e. clean water of a high ecological status, which is confirmed by the results of the macrozoobenthos analysis of this stream. The flora of the target area has been preserved to the greatest extent and as such represents an adequate ambient unit with the upper part of the Jezeračka River, and through direct and indirect influence ensures the maintenance of the typical living conditions of this mountain watercourse. The only species of fish found in the upper part of the Jezeračka River course, i.e. brown trout, an indicator species of clean, cold and fast waters rich in oxygen, fits into the previous conclusions. All previously elaborated data obtained on the basis of research into various aspects of the abiotic and biotic components of the researched site speak in favor of the fact that the upper part of the Jezeračka River is a preserved part of this watercourse, with good natural conditions, i.e. ecological factors for the life and spawning of brown trout. On the other hand, it cannot be stated with certainty to what extent the small hydro electric plant in Podjezeri has violated the natural conditions of the Jezeračka River, especially those concerning the existence of brown trout. An analysis of the efficiency of the fish lanes was not possible, given that the small hydro electric plant is privately owned and located in the B&H Federation, and in such circumstances, special permits would be necessary for operation. Also, there is no official data on the state of the ichthyofauna of the Jezeračka River in the past, and monitoring of the efficiency of fishing lanes has not been carried out. It should be emphasized that when choosing and defining locations suitable for natural fish spawning, special attention must be paid to the general ecological conditions, biological and reproductive characteristics of fish species, and the possibilities of reliable control and perseverance. In this regard, it is necessary to carry out additional research, especially during the spawning period of brown trout, in order to establish to what extent the existing small hydro electric plant influenced the state of the ichthyofauna of the Jezeračka River, with an emphasis on the efficiency of the existing fishing lanes.

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