COMPOSITION OF THE FISH COMMUNITY OF THE RIBNICA RIVER WITH RESPECT TO THE CONSERVATION STATUS

Vesna Djikanović[1*], Jelena Čanak Atlagić[1], Katarina Zorić[1], Stefan Andjus[1], Marija Ilić[1], Vera Nikolić[2], Katarina Jovičić[1]

[1]University of Belgrade, Institute for biological research "Siniša Stanković"- National Institute of the Republic of Serbia, Bulevar despota Stefana 142, 11060 Belgrade, SERBIA

[2]University of Belgrade, Faculty of Biology,Studentski trg 16, 11000 Belgrade, SERBIA

[*]*djiki@ibiss.bg.ac.rs*

Abstract

The aim of the present study was to determine the current status of the fish community structure and composition in the Ribnica River. The Ribnica River, a tributary of the Kolubara River, is classified as a Type 3 watercourse according to the current national regulations. A total of 347 fish specimens were collected and analysed, and seven fish species were identified. Over 60% of the fish community consists of the species Barbus balcanicus and Alburnoides bipunctatus, and the community has high diversity and Evenness. The conservation status of the present fish species was also reviewed, and three identified fish species are protected by national and international regulations. The occurrence of Sabanejewia balcanica is very interesting. This fish species is strictly protected by national legislation as well as by the Bern Convention (Annex III) and the Habitats Directive (Annex II). With the presented study results we would like to point out the importance and conservation of these types of watercourses. As a result of anthropogenic pressures, potential impacts in the form of habitat alteration and degradation are expected, which may lead to threats to local fish populations.

Keywords: fish species, community structure, hill-mountain river, threat status.

INTRODUCTION

Most activities related to the use of water disrupt, degrade and even destroy the functioning of aquatic ecosystems. There are a whole range of factors that affect the biodiversity of fish habitat, the state of fish stocks and their fisheries use in inland waters. According to EIFAC (European Inland Fisheries Advisory Commission), there are three main reasons for the continuous decline of fish stocks in European inland waters and thus for the persistent threat to ichthyofauna biodiversity: 1. insufficient knowledge of the relationships between fish species and their habitats; 2. fishing exploitation of fish stocks in inland waters is not adequately assessed in relation to other forms of water resource use; and; 3. commercial and recreational fishing has traditionally been conducted separately from other water resource users.

For the fish resources of Serbian inland waters, there are no estimates of their size, as well as no good estimates of the impact of current fishing pressure on the biodiversity of ichthyofauna, and it is practically impossible to properly assess the actual status and potential of this resource.

According to the WFD [1], fish represent one of the most important elements of the biological quality of aquatic ecosystems, with species composition, abundance and age structure representing the minimum set of data that should be used in the assessment of ecological status. In addition to various anthropogenic impacts, fragmentation of river courses also has a negative impact on fish, especially migratory species.

According to the Regulation on the Designation of Surface and Underground Waters [2], the Ribnica River is designated as TYPE 3 (MSL up to 500 m, medium and small streams with dominance of hard bed substrate). The riverbed is formed of limestone and granite substrate. The ecological status of this watercourse is assessed as good (II) according to some previous ecological studies [3].

The objective of this study was to determine the current fish community composition of the Ribnica River and to assess whether this habitat harbours endemic or protected fish species that would require future conservation measures.

MATERIALS AND METHODS

Sampling area

The Ribnica is a right tributary of the Kolubara River, which belongs to the Sava river basin. It is formed in Brežđe (Kozomor) by the Paklešnica and Manastirica streams. The Ribnica catchment area is 148.75 km^2 and the river course is 28.38 km long [4].

Methodology

The fish fauna was sampled with standard electrofishing equipment at two locations, site one (Paštrić near the Ribnica monastery) in autumn, and sites one and two (Brežđe village) in spring of 2022/23 (Table 1). A selected section was studied to gain insight into the current fish fauna. The sampled fish were identified on site based on morphological characteristics using identification keys [5,6].

Table 1 *Sampling locality data*

Date of sampling	Sampling site	Coordinates	Altitude (msl)	Watercourse width	Watercourse depth	Researched stretch
01.11.2022.	Paštrić village	N 44.205687 E 20.092431	255m	4-8m	30-90cm	90m
19.04.2023.	Brežđe village	N 44.183509 E 20.075534	255m	3-4m	30-50cm	100m

RESULTS AND DISCUSSION

The middle course of the Kolubara River and some of its tributaries are a typical area dominated by common barbel (*Barbus barbus* L.1758) and grayling species (*Thymallus thymallus* L.1758). The water body of the Ribnica River is characterised as a middle rithron, dominated by Danube barbel and common chub (*Barbus balcanicus* and *Squalius cephalus* L. 1758) [7]. This watercourse is characterised by a high water conductivity and a high dissolved oxygen content, which is typical for many limestone streams.

Table 2 *Recorded fish species, measured body lengths and weights of sampled fish individuals*

Species	English name	Number of individuals	Length (cm)	Weight (g)
CYPRINIDAE				
Alburnoides bipunctatus	Riffle minnow	114	3-11	0,5-17
Barbus balcanicus	Danube barbel	104	4-20	0,5-69
Squalius cephalus	Common chub	17	6-23	3-198
Gobio gobio	Gudgeon	44	4,3-10,2	0,5-12
COBITIDAE				
Sabanejewia balcanica	Balkan spined loach	52	5-8,5	1-4
BALITORIDAE				
Barbatula barbatula	Stone loach	2	5-8,8	1-5
LEUCISCIDAE				
Phoxinus phoxinus	Eurasian minnow	14	4,5-6,3	0,5-3

A total of 347 fish individuals of seven fish species were measured in terms of standard body length and weight (Table 2). The composition and structure of the sampled fish community in the researched area of the Ribnica is shown in Figure 1. More than 60% of the fish community were Danube barbel (*Barbus balcanicus*) and riffle minnow (*Alburnoides bipunctatus*). The species *Sabanejewia balcanica* (Balkan spined loach) and *Gobio gobio* (gudgeon) were represented with a lower percentage. The species *Phoxinus phoxinus* occurred only in the upper part of the watercourse at site two.

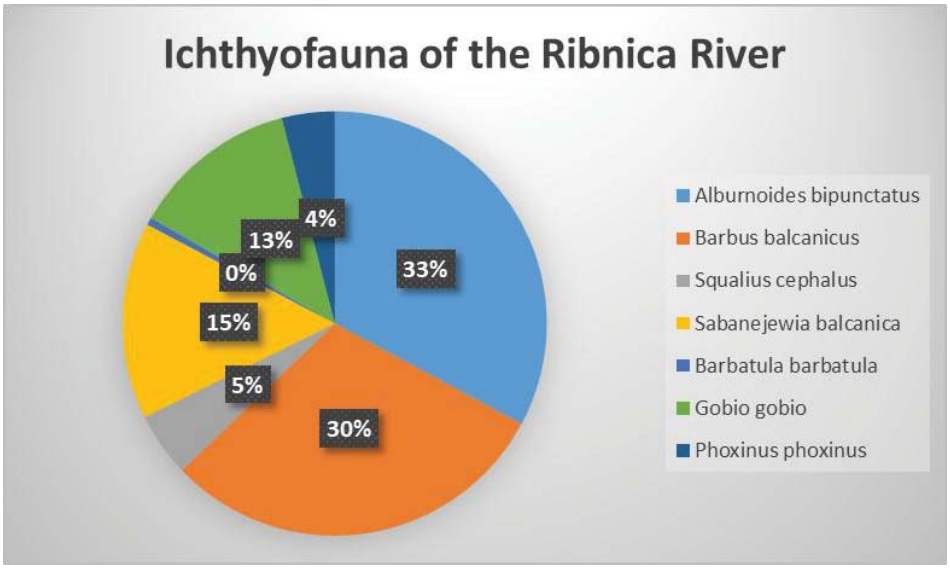

Figure 1 *Illustration of fish community structure at upper section of the Ribnica River based on three electrofishing samples*

Standard biodiversity parameters, diversity indices and evenness were calculated and presented in Table 3. By sampling in the fall and spring, which have different water regimes, we can say that the pooled samples can give a realistic insight into the Ribnica fish community. The river has high fluctuations in water flow with the change of seasons and a

discontinuous course with several smaller concrete weirs. The fish community showed to have high diversity according to the results of Simpsons (0,88) and Shannon-Wiener indices (1,55), and Evenness can also be considered very high (0,8).

Table 3 *Results of applied biological indices*

N (number of species)	D (Simpson)	H (Shannon-Wiener)	Evenness (Pielou)
7	0,88	1,55	0,80

The fish community can be considered typical for this type of water body. The same species and a similar community structure for the Ribnica River were found during the commercial fisheries survey in the Kolubara River catchment [7]. No non-indigenous fish species were found in the surveyed section. Also, no salmonid or migratory fish species were found at the surveyed site during this preliminary survey.

Three of the seven identified species present in researched area are protected by national legislation [8]. *Sabanejewia balcanica* is strictly protected, while *Alburnoides bipunctatus* and *Barbus balcanicus* are protected. In addition, the Balkan spined loach is protected by international legislation, the Bern Convention (III) [9] and the Habitats Directive (II) [10], while the Danube barbel is protected by the Habitats Directive (V). According to the IUCN Red List [11], all identified fish species have conservation status LC. Although classified by the IUCN as LC, the Balkan spined loach is usually present in small numbers and is sensitive to changes in its habitat. It stays in the upper parts of river and may be absent in the lower sections if the habitat is altered, e.g. by slower water flow, more silt and mud (sedimentation) in the riverbed and pollution from industry and agriculture [12]. According to Marešova *et al*. [13], *Sabanejewia balcanica* has been detected in three rivers in Serbia, the Kolubara River, the Kutinska River and the Crni Timok, and may also be present in their tributaries. There are no detailed data on the actual occurrence of this strictly protected species in Serbian waters.

CONCLUSION

The anthropogenic pressure via direct and indirect pollution and reconstruction of the river flow could have potential negative impacts. Changes in water level fluctuations, a decrease in oxygen concentration, and a change in the ecological characteristics of the river ecosystem, as well as fragmentation of the water continuum, may threaten the existence of local populations of fish species, especially protected species. Further research is needed to provide a basis for future conservation action for protected species found in this preliminary survey.

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