

THE ICHTHYOFAUNA OF DRINI I BARDHË RIVER (KOSOVO)

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Summary

This paper presents data obtained from literature and by sampling of the fish fauna in the Drini i Bardhë River (the White Drin). A table containing all 18 fish species of Drini i Bardhë River, which were collected by the authors in the period between 2005 and 2007, is presented. The results from the two-year research period in Drini i Bardhë River show that the composition of fish fauna is very complex. In total, 457 individual fish of different taxa were caught or 164.9 kg of ichtyomass. In six selected sampling sites of the river, 18 taxa fish belonging to 6 families were found. Based on complex research we can conclude that the Drini i Bardhë River is an ecosystem with relatively favorable ecological conditions for the development of ichthyofauna.

Key words: fish, taxonomic composition, Drini i Bardhë River

1. Introduction

Ichthyofauna research has been the recent study of many scientists of different profiles from the USA, Central and Western Europe as well as Asia and Africa. In the countries of former Yugoslavia, many scientists conducted ichthyofaunal research: Karaman (1926, 1928, 1938), Taler (1945, 1953), Stefanović (1948), Habeković (1978) Habeković et al., (1986, 1990), Vuković (1963, 1977, 1982), Vuković and Ivanović (1971), Ivanović et al., (1983), Apostolski (1973, 1976), Mikavica (1987), etc. Their studies have provided a significant contribution to the knowledge of ichthyofaunal ecology in this part of Europe. The studies were conducted in

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order to understand the general effects of human impact and to decrease the biodiversity reduction. In Bosnia and Hercegovina many genetic researches were conducted on fish population, mainly by the following authors: Vuković (1982), Škrijelj (1991), Škrijelj and Masović (2001), etc. Fish composition of Kosovo's lakes and rivers has been less examined. The present study examined the current state of fish composition in Drini i Bardhe River (the White Drin) from its upper course to the Kosovor border with Albania (Vermnica Village, where the last research point is). The aim of this paper is to assemble all the data in the literature and the field data collected by the authors in order to have a better understanding of the actual state of the Drini i Bardhe River. This is the first attempt to document the current composition of fish species in Drini i Bardhë River; such data is extremely important and can be used to follow up the changes in fish species composition in future studies. All general observations apply to the Drini i Bardhe River also, because the river crosses the border between Republic of Kosovo and Albania.

2. Study area

The Drini i Bardhë River springs from a solid rocky hill close to Radavc Village, 580 m above sea level, about 12 km south of Peja Town. The length of the Drini i Bardhë River in Kosovo is 154 km, while its total length is 175 km. When the river leaves Kosovo it possesses a flow average of 60 m³/sec and for this criteria it is the richest stream in term of water flow in the territory of Kosovo. Research has been conducted and the fish specimens have been obtained in six separate localities along the river, including upper, medium and lower river courses. (Fig. 1) Several factors have been used as the criteria for the selection of these localities such as: type of substrate and its slope, sea level, vegetation etc.

The first locality is close to Drini i Bardhë waterfall in Radavc Village, 560 m above sea level. The riverbed in this locality is composed of rocks and partly of gravel. The second locality is located in Zllakuqan Village, where the river has a slower flow. The riverbed is wide and the substrate is composed of sand and gravel. The third locality (Klina Village) is located 365.5 m above sea level; riverbed is very wide, composed of sand and part slob. The fourth locality near Gjakova Town) is characterized by changeable water level which depends on the season. During the research, the water was turbulent, on both sides of the river garbage was present most of the time, river bed had a significant slope and the substrate was composed of gravel with some small rocks. The water in the fifth locality (village Gjonaj) is not as clear. The last locality (village Vermnica) has a huge amount of water where the turbulence is also great. Rocks and slob compose the substrate. The water level at this point increased because a dam was constructed on the Albanian side, which influences the water level



Fig. 1 Location of Drini i Bardhe River and the sampling stations
Slika 1. Lokacija rijeke Bijeli Drim i mjesta uzorkovanja, GIS data from
Dep.of Geografy, University of Prishtina

3. Materials and methods

A detailed research was conducted during 2005 and 2007 in all four seasons. The sampling was done using gillnets (14 mm² — 100 mm²), fish dip net (406,4 mm x 457.2 mm) and electrofisher (Hans Grassl GmbH) Nets was placed early in morning and they stand there during all time of electrofishing, so the time that the nets are left into the water varies from 2 hour apt u 5 hour. The overall length of gill net range between 25m–50m, and the highest of gillnet is 0.3m above riverbed. The total coast length varies from 5m up-stream section up to 50m in downstream section. The electrofishing is conducted aproximatly 45 min to 90 min. of timing, and by using both upstream and downstream stop nets with mesh side size 100mm (National Marine Fisheries Service, 2000), following the guidelines for handling. Mostly the direct current (DC) ore pulsed direct current (PCD) is used with initial 100 V, pulse width 500ns and pulse rate 30 Hz. If the capture was unsuccessful with initial low voltage gradually we have increase voltage settings. Electrofishing is performed in a meaner that minimizes harm of the fish.

The fish species identification was carried out according to Heckel (1851), Antipa (1916), Berg (1948–1949), Vuković and Ivanović (1971), (Rakaj, 1995) and Kottelat and Freyhof (2007). For the fish taxonomy actualization we used the internet site: www.fishbase.org and

www.wild-serbia.com. Also, fish samples were quickly measured in the field for individual fish standard length using millimeter caliper and the mass of each species was measured by Philips HR 2388 digital scale, after that the fish were returned.

4. Results and discussion

During the research period 457 individuals were caught. Based on the literature and sampling results the list of fish includes 18 fish species belonging to 6 families (Table 1). The biggest taxa number belongs to the Cypriniformes (family Cyprinidae, 10 different species and family Balitoridae only one species) and Salmoniformes (family Salmonidae, 3 different species), that also have important role for the fish communities structure in the Drini i Bardhe River. Perciformes follow with family Percidae and 2 different species, Anguilliformes with family Anguillidae, and Scorpaeniformes with family Cottidae. From the total number of fish species (18) cited in the literature, data for 3 species were obtained from a local fisherman (*Salmo marmoratus*, Cuv.1817), *Carassius auratus gibelio* (Bl.1783), *Ctenopharyngodon idella* (Val.1844) and 15 species were captured by authors. Only one species of Drini i Bardhë basin is endangered and listed as a protected species in Habitat Directive 92/43/EEC Annex II (Animal and plant species of community interests whose conservation requires the designation of special areas of conservation). Generally speaking, the structure of Drini i Bardhe River fish fauna is similar to that of other Adriatic basin rivers. The ecological and faunal analysis of the data proves that the actual structure has a mixed character. The fish fauna composition and distribution between different sections (sampling sites) of Drini i Bardhe River depends mostly on their dimension, the water flow and specific data on the floods and droughts alternations and the presence of the fish ponds along them. The authors found 15 fish species in Drini i Bardhe River. In upstream part of the Drini i Bardhe River (villages Radavc and Zllakuqan) most of the species belong to Salmonidae family (Table 1). The middle sector of the Drini i Bardhe River (village Klina and area in the vicinity of Gjakova Town) the fish fauna composition comprises of 13 different species. This sector is rich in most species. The fish resources in this area include migratory species such as European eel (Anguillidae family, *Anguilla anguilla* L). The downstream sector of the Drini i Bardhe River (villages Gjonaj and Vermica) have smaller species number (12 species) and include mostly representatives of Cyprinide and Percidae family. In this sector of the Drini i Bardhe River annual droughts occur because of a large hydropower dam on the Albanian side, which has a direct impact on fish fauna structure. The differences between the sectors of Drini i Bardhe River, based on their fish species number are not significant. However, the diversity of the habitat types

Table 1. Taxonomic composition of ichthyofauna in the Drini i Bardhë River

Tablica 1. Sastav ihtiofaune u rijeci Bijeli Drim

Nr.	Taxa — Sastav	Literature data Podaci iz literature	Authors data — Podaci autora			Conservation status according to IUCN 2010 Status zaštite prema IUCN 2010
			US	MS	DS	
Order Anguilliformes, Family Anguillidae						
1	<i>Anguilla anguilla</i> (L.,1758)	+	–	C	–	CR
Order Cypriniformes, Family Cyprinidae						
2	<i>Cyprinus carpio carpio</i> (L., 1758)	+	–	C	C	VU
3	<i>Carassius gibelio</i> (Bl.1782)	+	–	I	I	NE
4	<i>Leucaspis delineatus</i> (Heck. 1843)	+	–	C	C	LC
5	<i>Leuciscus leuciscus</i> (L.1758)	+	–	C	C	LC
6	<i>Squalius cephalus</i> (L.1758)	+	C	C	C	LC
7	<i>Scardinius erythrophthalmus</i> (L.1758)	+	–	C	–	LC
8	<i>Chondrostoma nasus</i> (L.1758)	+	–	C	–	LC
9	<i>Barbus sp.</i> (Koll., 1926)	+	C?	C?	C?	LC
10	<i>Ctenopharyngodon idella</i> (Val., 1844)	+	–	I	I	NE
11	<i>Gobio gobio</i> (L., 1758)	+	–	C?	C?	LC
Order Cypriniformes. Family Balitoridae						
12	<i>Barbatula barbatula</i> (L.1758)	+	–	C	C	LC
Order Salmoniformes, Family Salmonidae						
13	<i>Salmo trutta m. fario</i> (L.1758)	+	C	C	–	LC
14	<i>Oncorhynchus mykiss</i> (Walbaum, 1792)	+	C	–	–	NE

15	<i>Salmo marmoratus</i> (Cuv.1829.)	+	I	-	-	LC
Order Scorpaeniformes, Family Cottidae						
16	<i>Cottus gobio</i> (L.1758)	+	-	-	C	LC
Order Perciformes, Family Percidae						
17	<i>Perca fluviatilis</i> (L. 1758)	+	-	C	C	LC
18	<i>Sander lucioperca</i> (L. 1758)	+	-	C	C	LC

US — upstream river section — gornji tok rijeke; MS — middle river section — srednji tok rijeke; DS — downstream river section — donji tok rijeke; + species cited in literature — citirane vrste iz literature; C — species by authors — vrste koje su skupili autori; C? — species identification need to be check up — vrste za koje treba provjeriti identifikaciju; I — species information from fishermen and need confirmation — podaci o vrsti dobiveni od ribara koji se trebaju utvrditi; CR — Critically endangered — kritično ugrožena; VU — Vulnerable — rizična; LC — Least concern — najmanje zabrinjavajuće; NE — Not evaluated — neobrađena

and ecological conditions are important. It is worth mentioning that because of the human impact (mostly gravel excavation from the river bed) the qualitative and quantitative composition of the fish fauna decreases (Table 2) Our study also proves that there is a general trend of the valuable fish species being replaced by the species without economic value. The hydrologic alternation caused by the dam in the Republic of Albania site, causes major changes in the aquatic habitats and transforms the structure of the fish communities. A decrease in the diversity is caused by the human impact, and partially because of the insufficient studies of the area.

The study of the literature and the data obtained by sampling suggest that the fish fauna of the Drini i Bardhe River still have a lot of unknown but interesting scientific and practical data to offer. According to the IUCN 2010 Red List, of all the species of Drini i Bardhë River basin only the European eel (*Anguilla anguilla*) is critically endangered; according to K o t t e l a t and F r e y h o f (2007) this species' number is in significant decline for unknown reasons. There is no evidence that the decline is related to the infections by *A. crassus*. The Common carp (*Cyprinus carpio carpio*) is vulnerable and according to the relevant literature the wild populations slowly but continuously decline due to river flow regulation and hybridization with domesticated stock. The Grass carp (*Ctenopharyngodon idella*) is not evaluated. All other species are present in different numbers and in different sectors of the river.

Table 2. Qualitative and quantitative composition of the catch
 Tablica 2. Kvalitativni i kvantitativni sastav ulovljenih riba

Family/Species — Porodica/vrsta	Abundance		Biomass	
	n ⁽¹⁾	%	kg	%
Anguillidae				
<i>Anguilla anguilla</i>	4	0.88	2.380	1.44
Cyprinidae				
<i>Cyprinus carpio carpio</i>	64	14.00	47.970	29.09
<i>Carassius gibelio</i>	3	0.66	1.175	0.71
<i>Leucaspis delineatus</i>	32	7.00	3.210	1.95
<i>Leuciscus leuciscus</i>	16	3.50	1.775	1.08
<i>Squalius cephalus</i>	48	10.50	11.500	9.97
<i>Barbus sp</i>	61	13.35	19.405	11.77
<i>Scardinius erythrophthalmus</i>	5	1.09	0.750	0.45
<i>Chondrostoma nasus</i>	59	12.91	14.940	9.09
<i>Ctenopharyngodon idella</i>	2	0.44	0.875	0.53
<i>Gobio gobio obtusirostris</i>	14	3.06	1.535	0.93
Family Balitoridae				
<i>Barbatula barbatula</i>	3	0.66	0.46	0.28
Family Salmonidae				
<i>Salmo trutta m. Fario</i>	51	11.16	21.595	13.10
<i>Oncorhynchus mykiss</i>	10	2.19	4.60	2.79
<i>Salmo marmoratus</i>	2	0.44	0.53	0.32
Family Cottidae				
<i>Cottus gobio</i>	5	1.09	0.520	0.32
Family Percidae				
<i>Perca fluviatilis</i>	35	7.66	9.105	5.52
<i>Sander lucioperca</i>	43	9.41	22.575	13.69
TOTAL	457	100	164.9	100

¹n — number of caught specimen — broj ulovljenih primjeraka

5. Conclusion

The Drini i Bardhe River is diverse and complex. It includes one rare species (*Salmo marmoratus* Cuv. 1829) that needs to be protected and preserved. The protection of the rare and vulnerable fish species of the Drini i Bardhe River can be efficient only by the common effort of the neighboring countries such as the Republic of Albania. In order to improve the conservation measures, we need to include the aquatic habitats, extend the protected areas, create new fishery protection areas and ensure the reproduction areas. An international agreement between the Republic of Albania and the Republic of Kosovo needs to be established in order to ensure sustainable fisheries and conservation of water resources.

Sažetak

IHTIOFAUNA RIJEKE BIJELI DRIM (KOSOVO)

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Ovaj članak sadržava podatke o ihtiofauni rijeke Bijeli Drim dobivene iz analize prikupljenih uzoraka ribljih vrsta i usporedbom s dostupnom literaturom. Sastav ihtiofaune rijeke Bijeli Drim obuhvaća 18 ribljih vrsta prikupljenih tijekom 2005. i 2007. godine. Rezultati dvogodišnjeg istraživanja u rijeci Bijeli Drim upućuju na vrlo složen sastav ihtiofaune te rijeke. Ukupno je ulovljeno 457 jedinki različitih vrsta riba koje čine ukupnu ihtiomasa od 164,9 kg. Na šest izabраниh postaja istraživanja u uzdužnom profilu rijeke ustanovljeno je 18 ribljih vrsta koje pripadaju šestorim porodicama. Na osnovi iscrpnih razmatranja može se zaključiti da je rijeka Bijeli Drim ekosustav s relativno optimalnim ekološkim uvjetima, ali zbog izravnih negativnih raznih antropogenih utjecaja razvoj ihtiofaune u toj rijeci slabi.

Ključne riječi: ribe, taksonomski sastav, rijeka Bjeli Drim

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