

## RELATION BETWEEN AUTOCHTHONOUS AND ALLOCHTHONOUS FISH SPECIES IN SOME SERBIAN RESERVOIR

SIMONA KOVAČEVIĆ<sup>1</sup>, NATAŠA RADOJKOVIĆ<sup>1</sup>, SNEŽANA SIMIĆ<sup>1</sup>,  
VLADICA SIMIĆ<sup>1</sup>, MILENA PAVLOVIĆ<sup>1</sup>, ALEKSANDRA MILOŠKOVIĆ<sup>1</sup>  
<sup>1</sup>*Univerzitet u Kragujevcu, Prirodno-matematički fakultet, Radoja Domanovića 12,  
34000 Kragujevac*

### ODNOS AUTOHTONIH I ALOHTONIH RIBLJIH VRSTA U NEKIM AKUMULACIJAMA SRBIJE

#### *Abstrakt*

Poslednjih godina u svetu je veoma aktuelno pitanje alohtonih ribljih vrsta. Bilo da su unete slučajno ili namerno, alohtone vrste najčešće uspevaju da opstanu u novom okruženju, u kojem zbog degradiranosti staništa i narušenih biocenoloških veza vremenom postaju dominantne. Alohtone vrste često imaju invazivan karakter jer se brzo i nekontrolisano šire u nove ekosisteme gde se ponašaju kao kompetitori za prostor i hranu autohtonim vrstama i polako ih potiskuju. Ovim radom prikazan je odnos u brojnosti i biomasi autohtonih i alohtonih ribljih vrsta u nekim akumulacijama u Srbiji.

Tokom istraživanja obračena je pažnja na veličinu i starost akumulacija u kojima je praćena ihtiocenoza. Istraživanje je obuhvatilo 15 akumulacija različite starosti, tipa postanka, morfometrijskih, fizičkih i hemijskih osobina.

Konstatovano je prisustvo 20 vrsta riba iz 9 familija, sa izrazitom dominacijom porodice Cyprinidae. Od ovog broja 8 vrsta su alohtone i pripadaju familijama Salmonidae (*Oncorhynchus mykiss*), Cyprinidae (*Carassius auratus*, *Arystichthys nobilis*, *Hypophthalmichthys molitrix*, *Ctenopharyngodon idella*, *Pseudorasbora parva*), Ictaluridae (*Ictalurus nebulosus* - cverglan) i Centrarchidae (*Lepomis gibbosus* - sunčica) (Simić i Simić, 2009). Cverglan i sunčica potiču iz Severne Amerike, dok su ostale azijske vrste.

U najvećem broju akumulacija, po brojnosti i biomasi, zastupljenije su autohtone riblje vrste u odnosu na alohtone. Izuzetak je Oblačinsko jezero, koje pripada grupi malih i starih jezera, gde brojnošću dominiraju alohtone vrste sa 61,63%, kao i biomasa sa čak 80,18%. Velika zastupljenost biomase alohtonih ribljih vrsta je i u jezeru Buljanka, 53.43%, dok njihova brojnost iznosi 17.07%. Najveći udeo u biomasi ima sivi tolstolobik. Autohtona ihtiocenoza dominira u jezeru Čelije i Zavojskom jezeru koja su u grupi starijih i većih jezera. U ovoj grupi su i akumulacije Gruža, Vlasina i Bovan,

gde se zbog neplanskog poribljavanja brojnost alohtonih vrsta približava abundanci autohtonih. Sa druge strane, planskim poribljavanjem očuvana je autohtona ihtiofauna u Miloševom i Ribničkom jezeru, koja su male veličine i stara.

Konstatovano je da u najvećem broju jezera i dalje dominiraju autohtone vrste u odnosu na alohtone. Uticaj alohtonih ribljih vrsta je uvek veći u manjim i starijim akumulacijama, upravo zbog većeg diverziteta autohtone zajednice u njima. Poznajući invazivni karakter i negativan efekat alohtonih vrsta na ekosisteme u koje su unete, kao i na faunu, neophodno je stalno pratiti stanje na terenu.

***Ključne reči:** akumulacije Srbije, autohtone riblje vrste, alohtone riblje vrste.*

## **INTRODUCTION**

For the last few years the worlds highly topical issue was question of alien fish species. Whether, they have been entered accidentally or intentionally, because of the greater degradation of habitat and degradation in community relations, they usually manage to survive in the new environment. Some introduced species are often invasive character, because of the rapid and uncontrolled spread into new ecosystems, where they act as competitors for space and food with autochthonous species, slowly pushing them. Ciruna et al. (2004) considered invasion phenomenon that affects autochthonous biodiversity, particularly in the fresh waters of temperate climate.

In Serbian landwater ecosystems were entered by accident or on purpose 22 non-native fish species, four of which occupy 51% of the inland waters of Serbia, and five between 21-50% of that territory (Lenhardt et al., 2010).

The aim of this paper is to show the relation between autochthonous and non-autochthonous fish species in some reservoirs in Serbia. During the research, we followed by the numerical ratio of native species and non-native and the relation of biomass.

## **MATERIALS AND METHODS**

Qualitative and quantitative analysis of the ichthyocenoses were performed since 2003 to 2010 year. The research included 15 reservoirs different ages, type of formation, morphometric, physical and chemical properties. Reservoirs greater than 20ha are: Lake Gruza, Vrutci, Potpec, Celije Lake, Barije, Bovan, Zavojsko and Vlasinsko Lake, and smaller reservoirs are: Ribnicko, Rastovnicko, Bagrdan, Milosevo, Lake Buljanka, Oblacinsko and Jovacko Lake. Young reservoirs are Vrutci, Barije, Bagrdan, Buljanka and Jovacko Lake, while the other reservoir are older then 20 years.

Fishes were collected using nets in length from 10 to 400m, a width of 2 to 10m with mesh size 10mm and 100mm. Part of samples were collected by angling and electrofishing.

Identification of the ichthyologic material was carried out in the field using standard methods (Ladiges und Vogt, 1979; Wheeler, 1983; Simonović, 2006).

## **RESULTS AND DISCUSSION**

The results of this study are presented in Table 1. During the research we determined the presence of 20 fish species from nine families, with a distinct dominance of the family Cyprinidae. Eight species are non-native and belonging to the families Salmonidae

(1 species), Cyprinidae (5 species brown bullhead (*Ameiurus nebulosus*)), Ictaluridae (1 species) and Centrarchidae (1 species) (Simić i Simić, 2009). Brown bullhead (*Ameiurus nebulosus*) and pumpkinseed (*Lepomis gibbosus*) are from North America, while the others are Asian species.

Through the analysis of ichthyocenoses was made a conclusion for the dominance of native species: bleak (*Alburnus alburnus*), bream (*Abramis brama*) and perch (*Perca fluviatilis*), as a subdominant species there are carp (*Cyprinus carpio*) and chub (*Squalius cephalus*). Among the allochthonous species dominates the prussian carp (*Carassius auratus*) in 12 of 15 lakes, and with little difference followed by pumpkinseed and bullhead.

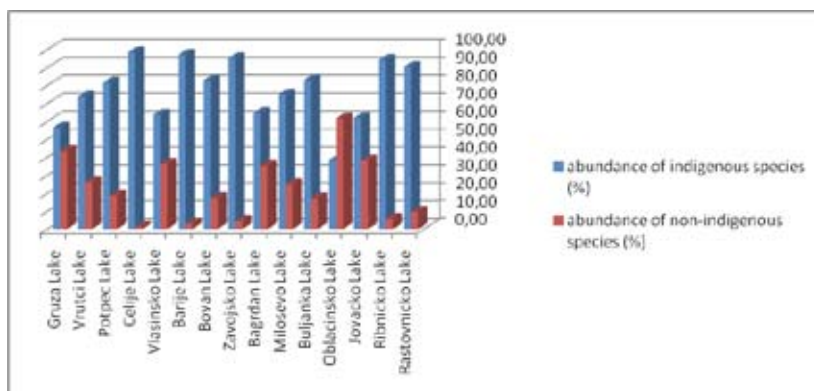
**Table 1.** The aspect of quantitative composition and biomass of native and non-autochthonous fish species in some reservoirs of Serbia

		% native species		% non-autochthonous species	
		number of species	biomass	number of species	biomass
<b>Gruza</b>	<b>Lake</b>	56,53	71,54	43,46	28,46
<b>Vrutci</b>	<b>Lake</b>	73,81	83,62	26,19	16,38
<b>Potpec</b>	<b>Lake</b>	81,59	90,59	18,75	9,41
<b>Celije</b>	<b>Lake</b>	98,59	99,96	1,41	0,03
<b>Vlasinsko</b>	<b>Lake</b>	63,68	71,32	36,32	28,68
<b>Barije</b>	<b>Lake</b>	97,06	95,01	2,94	4,99
<b>Bovan</b>	<b>Lake</b>	82,77	76,38	17,23	23,62
<b>Zavojsko</b>	<b>Lake</b>	95,24	99,63	4,76	0,37
<b>Bagrdan</b>	<b>Lake</b>	64,71	47,11	35,29	42,89
<b>Milosevo</b>	<b>Lake</b>	75,00	96,20	25,00	3,80
<b>Buljanka</b>	<b>Lake</b>	82,93	46,57	17,07	53,43
<b>Oblacinsko</b>	<b>Lake</b>	38,37	19,82	61,63	80,18
<b>Jovacko</b>	<b>Lake</b>	61,91	95,50	38,09	5,50
<b>Ribnicko Lake</b>		94,23	95,62	5,77	4,38
<b>Rastovnicko Lake</b>		90,37	74,76	9,63	25,24

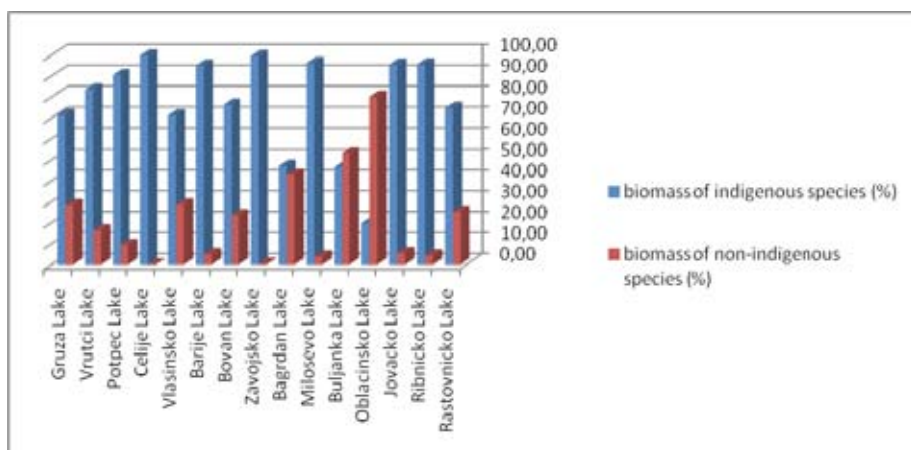
In most reservoirs, the abundance and biomass, the autochthonous fish species are more represented than non-native species (Fig. 1 and 2). The exception is Oblacinsko Lake with abundance domination of the introduced species with 61.63%, and even bi-

omass with 80.18%. Among them, in the greatest number, sunfish is represented by 18.6%, while white carp (*Hypophthalmichthys molitrix*) is dominated by biomass with 51.48%. Carp is numerically the most common species in this lake (37.21%).

The specific situation was observed in Lake Buljanka. Native species are dominated by abundance (82.93%), but when it comes to biomass, non-native species are represented with 53.43%. The largest contribution, to the high values of biomass, has been given by a gray carp (*Arystichthys nobilis*), with a share of 41.88%. Both reservoirs are part of a group of small reservoirs and generally, the presence of alien species is more pronounced in small than in large reservoirs. In addition, Oblacinsko Lake belongs to a group of old reservoirs which is largely the reason of the state of ichthyocenoses in it.



**Figure 1:** Graphic review of abundance of autochthonous and non-autochthonous species



**Figure 2:** Graphic review of biomass of autochthonous and non-autochthonous species

Autochthonous fish species were dominated in Lake Celije and Zavojsko Lake which belong to the group of older and larger reservoirs. This group includes the reservoir of Gruza, Vlasina and Bovan in which are introduced non-native fish species by unplanned

stocking and they become closer to the autochthonous community abundance. Planned stocking preserved the autochthonous ichthyofauna in Milosevo and Ribnicko Lake, which are small and old. In the Celije Lake bream is dominant with 67.61% and with the abundance was followed by roach with 19.72%. Besides being the numerous, bream dominated also with biomass (40.57%). Ichthyofauna of Ribnicko Lake are characterized by domination of nase (*Chondrostoma nasus*), numerically (86.54%) as well as with biomass (76.41%). Perch is the dominant native species in Lake Barije, Milosevo and Zavojsko Lake. In terms of biomass in the Lake Barije perch (*Sander lucioperca*) dominates with 50.49%, in Milosevo Lake that is northern pike (*Esox lucius*) with 20.52%, and in Zavojsko Lake catfish (*Silurus glanis*) with 57%.

## CONCLUSION

During this research the relation between autochthonous and non-autochthonous fish species was analyzed in 15 reservoirs in Serbia. It was found that in most lakes native fish species still dominate in relation with non-autochthonous species. Impact of alien fish species was always higher in smaller and older reservoirs, in relation to larger, because of greater diversity of native fish species. Knowing the invasive character and the negative effects of alien species on ecosystems that have been made, it is necessary to continue monitoring the situation on the ground.

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