

STUDY ABOUT THE FISH FAUNA CHANGES IN THE ORGANIC POLLUTED STRETCHES OF CRIȘUL REPEDE RIVER (BIHOR COUNTY, WESTERN ROMANIA)

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INTRODUCTION

The rivers pollution due by the waste-waters spilling downward from the villages is caused a visible impact on the river's fish fauna. According to recent studies (Telcean & Károly, 2000; Telcean et al. 2002 a, 2002 b, Telcean et. Bănărescu, 2002 c) the organic pollution are affecting an increased number of the Romanian rivers. Crișul Repede River is one of the most important rivers in the north-western Romania. Its course is passing the state border to Hungary there were join the Tisa River. The fish fauna of Crișul Repede River is maintaining less affected comparing to the other Romanian rivers. Although the industrial pollution is missing, the fishes from middle and lower stretches of Crișul Repede River are threatened by a number of human activities. Worst of them are the river damming or levees building along the riverside, also the house-wastes left in the riverbed and the waste-waters spilling. The most harmful is the river damming that is caused the water level fluctuations and the lost of long flowing river sections (Bănărescu, 1994). The present paper aims to reveal the local effect of waste-water spilling and the organic accumulation on the riverbed. We need to determine how are these factors to bring the species number decline and the changes of some species occurrence. The diffuse pollution with waste-waters derivate from the villages has a long term influence. The fish populations are not disappearing in these river stretches, but they are registering different changes, more of them being less visible.

MATERIAL AND METHOD

The study on the fish fauna from middle and lower Crișul Repede River was carried out during the years 1997-2003. The collecting trips was planned to be done from the springtime to the autumn, when the water level and sites access is most practicable. The following 6 sampling sites were studied: upstream city of Aleșd, Urvind, Ineu, Oșorhei (upstream the city of Oradea), Sântandrei (downstream Oradea) and Tărian (see the map). Nearby of these sites a number of additional samples were collected occasionally from the river

between Aleșd and Oradea. Fish fauna in the downstream of water reservoirs at Lugas and Tileagd villages was except from our study because the species occurrence are modified here by the river damming.

The fishing methods were combined using the fishing nets and electro-fishing. We used a portable electro-fishing gear type I.U.P. 12 (12V, 4-10 A, 360W). All the fish specimens were released in the river after the species determination and recording.

RESULTS AND DISCUSSIONS

In the middle and lower Crișul Repede River was found a number of 37 fish species representatives of 7 fish families (Tab.1). The distributions of these species are as following: 22 of Cyprinidae, 7 species Percidae, 4 Cobitidae, 1 Siluridae, 1 Ictalridae (Bagridae), 1 Esocidae and 1 of Gobiidae. The species *Carassius gibelio*, *Pseudorasbora parva*, *Lepomis gibbosus* and *Ictalurus nebulosus* are exotic fishes that are naturalized in this river. Apparently the increased number of fish species denotes good conditions in the river. The effect of waste-waters spilling is gradually present from the middle river downward.

At the samples sites located close to the city of Aleșd and downstream (the number 1-3), fish fauna are less affected. The fewer amounts of waste-waters that are spilled on this river section are washed by the fast flowing water. Also the organic suspensions are not dredged on the riverbed here, but they are accumulated downstream in the water reservoirs at Lugașul de Jos and Tileagd. The sensitive fish species *Leuciscus leuciscus*, *Alburnoides bipunctatus*, *Gobio uranoscopus*, *G. kessleri*, *Barbus petenyi* and *Sabanejewia balcanica* registered from here are proving that the middle river has no polluted waters. The only major threatening factor on the middle river is the two dam lakes that determine larges fluctuations in the water level and temperature. Some of the most rheophilic fishes (*Barbus petenyi*, *Gobio uranoscopus*, *Phoxinus phoxinus* and *Alburnoides bipunctatus*) have a restricted distribution on the middle river. The absence of these species in the lowland river is due by the ecological condition present here.

Zingel streber a rheophilic fish species representative of Percidae was not recorded from here. This species was recorded in the Crișul Repede River only in the lower river near the city of Oradea

(Bănărescu, 1964). We found this species on the similar biotopes from Crisul Alb and Crisul Negru Rivers but never in the hilly section of Crişul Repede River. However this species is maintaining his scarce presence in the lowland river. *Zingel streber* and its congener *Z. zingel* have no larges populations in any river (Bănărescu, 2002a, 2002b) and perhaps therefore they have a scarce presence in our samples. *Leuciscus leuciscus* is a very rare fish and one of the most endangered species in the Romanian rivers. This survives in the middle Crişul Repede River.

In the lowland river (sites 4-6) the slight organic pollution and the rocky bottom of river have befriended the upstream extending of two species *Chondrostoma nasus* and *Vimba vimba*. Both of them are feeding with benthic larvae and the periphyton layer from the bottom gravels. The species *Vimba vimba* from Crişul Repede River was recorded first time in 1953 (Bănărescu, 1953) from the lowland river. This fish is reaching now the middle section of the river but its natural population is fragmented by the dam lakes. The same population fragmentations are affecting also the fish species *Chondrostoma nasus*.

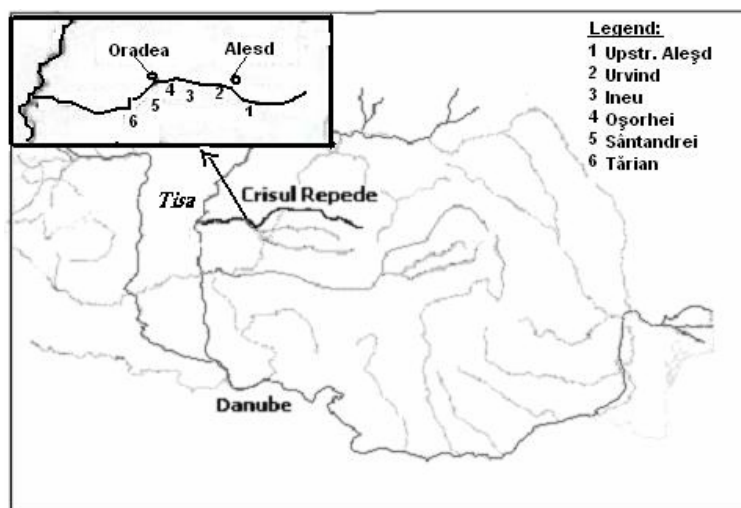


Fig. 1. The Crişul Repede River and sampling sites location

Table.1. The fish species from the middle and lower Crişul Repede River.

SPECIES	Occurrences on the sampling sites			Species status
	Sites 1- 3	Site 4	Sites 5-6	
<i>Esox lucius</i>	+	+	+	C
<i>Rutilus rutilus</i>	+	-	+	C
<i>Scardinius erythrophthalmus</i>	+	+	-	C
<i>Leuciscus cephalus</i>	+	+	+	C
<i>L. leuciscus</i>	+	+	-	V
<i>Aspius aspius</i>	+	+	+	C
<i>Chondrostoma nasus</i>	+	+	+	C
<i>Alburnus alburnus</i>	+	+	+	C
<i>Alburnoides bipunctatus</i>	+	+	-	V
<i>Abramis sapa</i>	-	-	+	V
<i>Abramis ballerus</i>	-	-	+	V
<i>Phoxinus phoxinus</i>	+	-	-	C
<i>Vimba vimba</i>	+	+	+	C
<i>Rhodeus sericeus</i>	+	+	+	C
<i>Gobio gobio</i>	+	+	+	C
<i>G. uranoscopus</i>	+	-	-	V
<i>G. albipinnatus</i>	-	+	+	C
<i>G. kessleri</i>	+	+	+	C
<i>Barbus barbus</i>	+	+	+	C
<i>B. peloponnesius petenyi</i>	+	-	-	C
<i>Carassius gibelio</i> *	-	+	+	C
<i>Cyprinus carpio</i>	-	-	+	C
<i>Pseudorasbora parva</i> *	+	+	+	C
<i>Orthrias barbatulus</i>	+	+	+	C
<i>Misgurnus fossilis</i>	-	-	+	C
<i>Cobitis danubialis</i>	+	+	+	C
<i>Sabanejewia balcanica</i>	+	+	-	C
<i>Perca fluviatilis</i>	+	+	+	C
<i>Gymnocephalus schraetser</i>	-	+	-	V
<i>G. cernuus</i>	-	+	-	V
<i>Stizostedion lucioperca</i>	-	-	+	V
<i>Zingel zingel</i>	-	+	-	V
<i>Z. streber</i>	-	+	+	V
<i>Lepomis gibbosus</i> *	+	+	+	C
<i>Silurus glanis</i>	-	-	+	C
<i>Ictalurus nebulosus</i> *	-	+	+	C
<i>Proterorhinus marmoratus</i>	-	-	+	?

Sampling sites: 1= Aleşd; 2= Urvind; 3= Ineu; 4= Oşorhei (upstream Oradea); 5= Sântandrei (downstream Oradea); 6= Tărian.

Symbol key: +Present; -Absent, V= Vulnerable; C= Common; ?= Unknown status; *= Exotic fishes

In the lowland river located downstream the city of Oradea, the organic pollution is amplified by numerous sources of waste-waters that is spill directly into the river. Close to the wastages is founding larges filaments of colonial bacteria (*Sphaerotillus*) and also the organic sediments are present on the bottom. No putrefaction processes are occurring in these places because the level of oxygen saturation is maintaining high by the water flowing. Although the water quality is decreased, a number of fish species are frequently recorded here. They establishing a new fish association based on their nurture habits. The most characteristic species in these river sections are *Leuciscus cephalus*, *Alburnus alburnus*, *Gobio gobio*, *Pseudorasbora parva*, *Rhodeus sericeus*, *Cobitis danubialis* and *Orthrias barbatulus*. On despite of the previous statements, the species *Orthrias barbatulus* is not an only clean water dweller. This small fish is frequent also in the rivers with stony bottom and organic sediments. No fish species are permanently dwelling or spawning in these places close to the wastages. The other fishes like *Alburnoides bipunctatus*, *Gobio kessleri*, *G. albipinnatus* and *Sabanejewia balcanica* are missing in the polluted area. Also the rheophilic Percidae species *Gymnocephalus schraetser*, *Zingel zingel* and *Z. streber* are not present here.

Downstream to the wastages sites the thickness layer of periphyton and numerous larvae developed on the river bottom are representing a supplementary food for a lot of fish species. *Chondrostoma nasus*, *Vimba vimba* and *Rutilus rutilus* are recording together with the species previous mentioned in the organic polluted waters. The predatory fishes *Aspius aspius*, *Perca fluviatilis* and *Lepomis gibbosus* are present in the lowland river there where the organic pollution is washed by the river flowing. The fish community has recovering his formerly structure far downstream. The species recording here are *Rutilus rutilus*, *Leuciscus cephalus*, *Alburnus alburnus*, *Chondrostoma nasus*, *Vimba vimba*, *Carassius gibelio*, *Gobio gobio*, *Cyprinus carpio* and *Cobitis danubialis*.

CONCLUSIONS

The organic pollution caused by the waste-waters spilling in the Crișul Repede River has a slight harmful effect on the fish fauna. In the middle river the fewer amounts of organic wastes were not determined any changes of the fish fauna.

In the lowland river, downstream the city of Oradea, the organic pollution is amplified by the numerous wastages. Their effects on the fish species are diverse:

- Species replacements and the establishing of a new species association based on nutrition requirements;
- The thickness layer of periphyton as well the increased number of benthic larvae from the

polluted area consist a supplementary nurture for a lot of fishes;

- Species *Chondrostoma nasus* and *Leuciscus cephalus* are favored by the organic accumulation on the river bottom;
- In the lowland river no fish species is became extinct because of the waste-waters spilling. The retirement of some rheophilic fish species can be a symptom of forthcoming species extinction.
- Species that attending the wastages area are not a permanent dweller in here and is not spawning in these waters.

REZUMAT

Deversările de ape menajere în sectorul mijlociu și cel inferior al Crișului Repede determină modificări ale componenței ihtiofaunei. În sectorul inferior al râului se constată înlocuirea unor specii sensibile la degradarea calității apei și de asemenea reducerea numărului de specii. În locurile situate în apropierea scurgerii de ape menajere se formează o comunitate piscicolă distinctă care cuprinde specii adaptate la hrănirea cu detritus organic și nevertebrate de pe substrat. Modificările ofertei trofice favorizează speciile perifitonofage și bentonofage. Dintre speciile caracteristice în sectoarele colinare și de șes *Alburnoides bipunctatus*, *Gobio uranoscopus*, *G. kessleri*, *Sabanejewia balcanica*, sunt înlocuite cu specii comune euribionte *Alburnus alburnus*, *Rutilus rutilus*, *Gobio gobio*, *Cobitis danubialis*. Aceste specii frecventează locurile cu deversări pentru hrănire, dar nu sunt sedentare și nu se reproduc aici. Prezența speciei *Orthrias barbatulus* în porțiunile de albie cu sedimente organice contrazice constatările anterioare conform cărora specia ar fi prezentă numai în apele curate.

Refacerea structurii de specii a comunității piscicole are loc aval unde nu se află sedimente sau suspensii organice.

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