

## MODIFICATIONS OF THE FISH FAUNA IN THE UPPER TISA RIVER AND ITS SOUTHERN AND EASTERN TRIBUTARIES

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### Abstract

In the upper Tisa and its main tributaries on the left shore: Vișeu, Iza, Săpânța, Someș, Barcău, Crișul Repede, Crișul Alb, Crișul Negru and Mureș, there were identified a number of 64 fish species and one of lamprey, *Eudontomyzon danfordi*. A number of 54 fish are native species, including an additional endemic species (*Scardinius racovitzai*), and 11 fish species are allochthonous. Some of them have been recolonised in some of the rivers where they were formerly abundant. In the case of many of these species, the data represent the last results of our field research carried out along the rivers (during 1992-2001), pointing out that considerable changes of the ichthyofauna occurred. In the last decades we attend to the alarming numerical decrease of the number of fish species, or the range and numerical modifications of fish from some rivers' sections. For the present day a number of 17 native species are undergoing a numerical regression or have become almost extinct, and 8 fish species have been favoured by the modification of the aquatic biotopes. The natural life conditions changed in the river bed, modifying the fish communities, especially in those located downstream to the towns. According to the ecological requirements of the fish species and their adaptive resources, we propose a number of four fish categories, living in many of the studied rivers. The presence of these fish categories along the affected stretches of the rivers represents a measure for the fish fauna changes.

**Keywords:** Fish fauna; Tisa River basin; range and numerical modifications.

### Introduction

The first records about the fish species from the upper Tisa and its main tributaries on the left shore (the Transylvanian basin) belong to Fridvalsky (1767), Benkő (1778) Bielz (1853, 1888), Herman (1887) and Vutskits (1918). The data presented by these authors mentioned the occurrence of the fish species from the entire Transylvania and some of the tributaries from Hungary. Many of these authors published those papers without mentioning the localities where they found the fish species. A complete faunistical list with regard to the freshwater fish species from Romanian rivers is

published by Bănărescu (1953), and Bănărescu and Müller (1959). They mention a number of 51 fish species from Transylvanian rivers. More details are provided in the monograph of Bănărescu (1964). This is a fundamental work devoted to bony fish from the entire Romania. The earlier data about the fish from the Hungarian section of Someș River and the other tributaries of the Tisa River were published by Heckel and Kner (1858), Vutskits (1904) and Vásárhelyi (1960). More recently the fish fauna from the Hungarian section of the Tisa rivers' system was mentioned by Harka (1995, 1997, 1999). The recent papers of Nalbant, and Bănărescu et al. (1995, 1997, 1999) concerning the fish fauna of the Tisa River and its main tributaries: Mureș, Someș, Crișul Negru, Crișul Alb, Crișul Repede and Barcău represent the results of the latest field research carried out between the years 1991-1996. The modifications occurred in many of the aquatic habitats in the catchment area of the Tisa basin (i.e. dam lakes, water amount decrease, pollution and eutrophication of flowing and standing water bodies and the overfishing) have a negative impact on the fish fauna. We attempt to establish the number of species which became extinct or numerically declined in certain river sections and, despite of that, which species are favored by human activities.

### Materials and Methods

The present paper is based on the field investigations carried out during the years 1992 to 2001 in the upper stretch of the Tisa River and its southern tributaries and subtributaries (Vișeu, Vaser, Ruscova, Iza, Mara and Săpânța). We also investigated the Romanian stretches of the eastern tributaries of the Tisa: Someș, Crișul Repede and its subtributaries Barcău and Ier, Crișul Negru, Crișul Alb, Mureș and its subtributaries, as well as the channels connecting the Rivers Criș near the villages Tărian, Toboliu, Cefa and Homorog, the ponds and oxbows in the Criș basin, the damlake Tileagd, the ponds from Vășad, Andrid, Alceu, Miersig and Apateu and finally the thermal pond of Băile Episcopoști (formerly Püspök Fürdő) on the rivulet Petea, tributary of the Crișul Repede River.

### Results and Discussions

A number of 64 species of fish and one of lampreys are present in the area under study, 54 species of fishes and the lamprey *Eudontomyzon danfordi* being native and eleven fish being introduced.

According to their abundance and survival capacity, the 55 native species can be ascribed to the following categories:

(a) Ten species are found in small number and seem to have always been rare, a few of them having also undergone a numerical decline or range reduction: *Acipenser ruthenus* (extinct from the middle Someș, surviving in the lower Someș and the Mureș), *Anguilla anguilla*, *Rutilus pigus*, *Idus idus*, *Pelecus cultratus*, *Lota lota*,

*Gymnocephalus baloni*, *Stizostedion volgensse* among inhabitants of rivers, *Misgurnus fossilis* and *Leucaspis delineatus* among those of standing waters.

(b) Four species have small or very small ranges, however without having undergone a numerical decline: *Telestes souffia* and *Cottus poecilopus*, confined to the upper Tisa basin, *Sabanejewia romanica*, present only in six south-western tributaries of the Mureş and *Scardinius racovitzae* endemic to the very small thermal pond Băile Episcopceşti.

(c) Sixteen species underwent a numerical decline or reduction of the range, namely:

- four inhabitants of standing water: *Umbra krameri*, *Tinca tinca*, *Scardinius erythrophthalmus* and *Carassius carassius*; the latter was some sixty years ago quite abundant in all lakes and ponds, but is now almost totally extinct (it seems that the species is surviving in small number of individuals only in the thermal pond from Băile Episcopceşti, on the lower reach of Crişul Repede River).

- three inhabitants of montane rivers: *Eudontomyzon danfordi*, *Thymallus thymallus*, *Hucho hucho*;

- six inhabitants of lower and partially middle sectors of rivers: *Stizostedion lucioperca*, *Gymnocephalus schraetser*, *G. cernuus*, both *Zingel* species (*Z. zingel* and *Z. streber*) and especially *Leuciscus leuciscus*, which became extinct from the Someşul Mic and Săpânţa, surviving, with certainty only in the Crişul Repede River.

- three other species inhabiting the hilly and lowland sectors of rivers, but only in the fast flowing water, underwent some local decline or even extinction, but still remained numerous or even quite abundant on long stretches of other rivers: *Alburnoides bipunctatus* (abundant for example in the upper and middle section of the Crişul Alb River), *Gobio kessleri* (quite abundant in the Someş), *G. uranoscopus* (numerous in the rivers Someşul Mare and Lăpuş).

Sixteen other species have not been affected and maintained their former ranges and abundance, or underwent only a slight decline:

- four inhabitants of montane rivers: *Salmo trutta*, *Cottus gobio*, *Phoxinus phoxinus*, and *Barbus peloponnesius petenyi*;

- one species lives in the submontane and lowland sectors of rivers: *Sabanejewia balcanica*;

- eleven inhabitants of lowland rivers and standing waters: *Esox lucius*, *Alburnus alburnus*, *Blicca bjoerkna*, *Abramis brama*, *A. sapa*, *Aspius aspius*, *Rhodeus sericeus*, *Barbus barbus*, *Cyprinus carpio*, *Cobitis* af. *taenia* and *Silurus glanis*;

(d) Nine species have been favoured by human activities, increased their number, partially also extended their ranges: *Squalius cephalus*, *Rutilus rutilus*, *Chondrostoma nasus*, *Abramis ballerus*, *Vimba vimba*, *Gobio gobio*, *G. albipinnatus*, *Orthrias barbatulus*, and *Perca fluviatilis*.

Changes in the habitat have modified the fish communities and the relative abundance of the species, especially downstream to towns. On the base of the ecological requirements of the species and reaction to modifications of the habitat, four unsharply delimited categories of fish species can be accepted:

**(I) Specialized fish species, each typical for a habitat:**

– *Salmo trutta*, *Thymallus thymallus*, both *Cottus* species (*C. gobio* and *C. poecillopus*), *Barbus peloponnesius petenyi*, *Telestes souffia*, in montane sectors of rivers;

– *Chondrostoma nasus*, *Barbus barbus*, *Vimba vimba*, *Aspius aspius*, *Gymnocephalus baloni*, *G. schraetser*, in lowland rivers;

– *Ciprinus carpio*, *Blicca bjoerkna*, the three *Abramis* species (*A. brama*, *A. sapa* and *A. balerus*), *Esox lucius*, *Silurus glanis*, *Gymnocephalus cernuus*, *Stizostedion lucioperca*, from the lowland and standing waters;

– *Umbra krameri* and *Leucaspis delineatus* in standing waters;

– *Scardinius racovitzai* only in thermal waters.

**(II) Sensitive species-** again specialized to a certain habitat, but also not tolerant to water pollution and other major modifications of the habitat:

– *Eudontomyzon danfordi* and *Thymallus thymallus* in montane sectors of rivers;

– *Gobio uranoscopus* in submontane and partially in the middle sectors of rivers;

– *Sabanejewia romanica* in submontane and partially in the lowland sectors of rivers;

– *Gobio kessleri*, *Sabanejewia balcanica*, *Alburnoides bipunctatus* and both *Zingel* species in lowland sectors of rivers with rapidly flowing water;

– *Gobio albipinnatus*, *Idus idus*, *Rhodeus sericeus*, *Gymnocephalus baloni*, and *G. schraetser* in sectors of rivers with slowly flowing water;

– *Scardinius erithrophthalmus* in stagnant water.

Most of these species underwent a numerical decline, except *Gobio albipinnatus* which increased its number and extended its range.

**(III) Rare species:**

– *Anguilla anguilla* and *Lota lota* –in all sectors of rivers, but everywhere in a small number;

– *Hucho hucho* in montane rivers;

– *Leuciscus leuciscus* in hilly and lowland rivers;

– *Acipenser ruthenus* and *Rutilus pigus* in lowland rivers;

– *Carassius carassius* and *Misgurnus fossilis* in stagnant water.

**(IV) Ubiquitous and tolerant or opportunistic species-** tolerate a moderate degree of water pollution and living in several habitats: *Squalius cephalus*, *Rutilus rutilus*, *Alburnus alburnus*, *Gobio gobio*, *Orthrias barbatulus*, *Cobitis* af. *taenia*, and *Perca fluviatilis*.

The impact of human activities on the fish fauna in the various rivers in north-western and western Romania is not the same. The Tisa and its tributaries are the only rivers in western Romania in which *Hucho hucho*, *Telestes souffia* and *Cottus poecilopus* are native. The negative influence of human activities is reduced, compared to other areas of the Tisa River basin; nevertheless, *Telestes souffia* and especially *Hucho hucho* underwent a numerical decline.

The various components of the Someș River draining area have undergone different human influences. The Someșul Mare and its tributaries have not been affected; the Someșul Mic is strongly polluted downstream the town of Cluj; the upper sector of the united Someș (downstream the town Dej) is partially polluted, but the middle and lower sectors of the river are slightly affected and some sensitive fish species maintain their presence. Downstream of the confluence with the tributary river Lăpuș, the Someș River becomes slightly polluted, but only on a short sector. The species *Rutilus pigus* is confined to the lower sectors of the Someș Rivers and its tributary, the Tur in both Romania and Hungary. The proportion of the four ecological categories of fish species which live in the middle and lower Someș River showed that the ubiquitous and opportunistic species prevail (fig.1). The sensitive fish species have a lower percentage. The specialized fish species from the lowland rivers are represented by *Chondrostoma nasus*, *Barbus barbus*, *Vimba vimba*, *Esox lucius* and *Silurus glanis*.

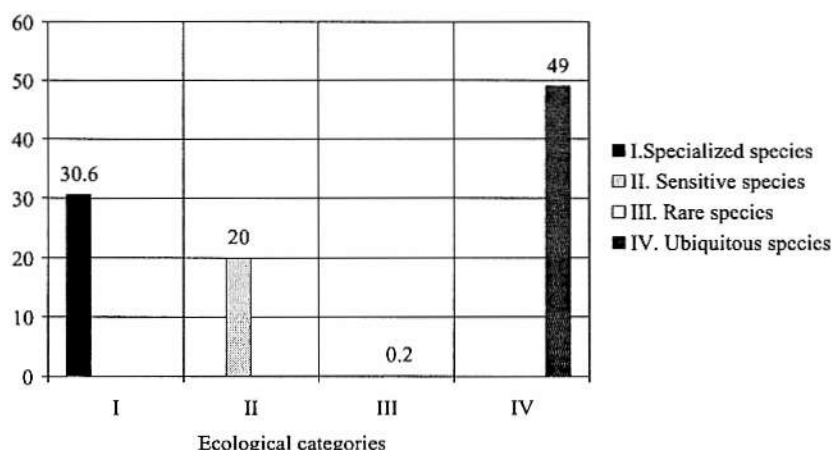


Figure 1. The proportion of the ecological categories of fish species from the lower Someș River

The components of the Criș River drainage have been variously affected, too. The Barcău River suffered both from pollution and reduction of the water discharge; *Leuciscus leuciscus* and *Zingel streber* became extinct, at least in the Romanian sector, *Gobio kessleri*, *Sabanejewia aurata*, *Gymnocephalus schraetser*, formerly numerous (1953-1964), are presently very rare. The situation of the three Criș rivers is better; Crișul Repede is the only river in Romania in which *Leuciscus leuciscus* and *Stizostedion volgense* still survive; Crișul Negru is the only river in which *Zingel zingel* retains its number; the same river and the Crișul Alb being, besides the Nera,

the only rivers in which *Z. streber* is still relatively abundant. *Scardinius racovitzai* is endemic to a thermal pond in the basin of Crișul Repede.

The Mureș River and its tributaries, especially the Arieș and the Ampoi, then the lower sector of the Cerna (Hunedoara county), partially the Târnava Mare are the rivers of the Tisa basin that are most strongly affected by pollution and other human activities. The proportion of the four ecological categories of fish species from the Mureș River reflects the prevailing of ubiquitous and opportunistic species. Both categories of the sensitive and rare fish species are represented by a minimal percentage (fig.2).

Many rheophytic fish species became extinct, or at least underwent a strong numerical decline in long sectors of these rivers.

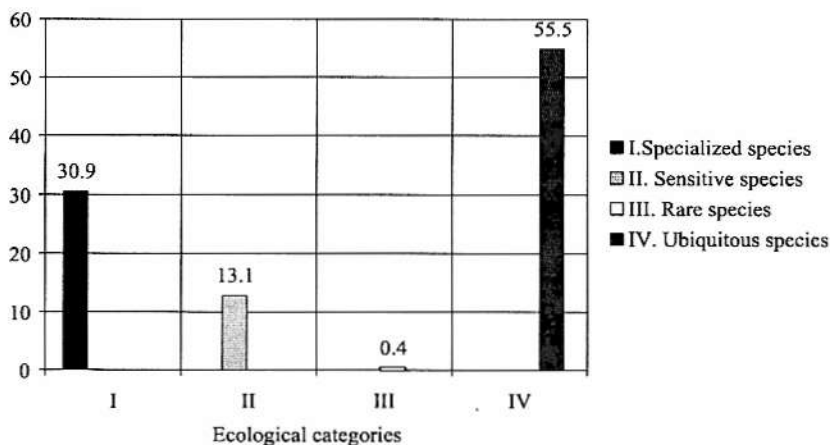


Figure 2. The proportion of the ecological categories of fish species from the main channel of the Mureș River

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