

# **SOCOLĂU RIVER BASIN (VIȘEU WATERSHED) ICHTYOFAUNA,**

## **MARAMUREȘ MOUNTAINS NATURE PARK**

(MARAMUREȘ, ROMANIA)

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**KEYWORDS:** Romanian Carpathians, Maramureșului Mountains, lotic systems, fish associations, biotopes, river ecological status.

**ABSTRACT:** This paper summarizes a fish survey of the Socolău and some of its tributaries Rosoșu Mare, Rosoșu Mic, Răchita and Rica (the Vișeu River, respectively the Tisa River watersheds). From the fish fauna analyse perspective, some of the studied river sectors can be considered as lotic sectors in a natural ecological state and some sectors under a significant human impact. The main fish species of direct conservative interes is *Cottus poecilopus*.

### **INTRODUCTION**

In the last six decades, diverse economic development pressures have modified rivers all over the Romanian territory. Almost everywhere the lotic systems alterations have resulted in adverse habitat modifications with impact on numerous fish associations (Bănăduc, 1999, 2005, 2006, 2007; Battes et al., 2003; Costiniuc et al. 2006; Davideanu et al., 2006; Moșu et al., 2006; Vornicu et. al., 2006; Ardelean G. and Wilhelm S., 2007; Jecu E., et al., 2007), and structural and functional related biota (Curtean-Bănăduc 2005 a, b, c; Curtean, et al., 1999) and have contributed to important declines in native fish populations.

Streams in good or almost good natural condition are relatively rare and mostly localized in not easy accessible areas, especially in mountainous zones. These rivers study are important for comparative studies with the rivers which are no more in natural status due to the aggressive human impact.

This paper summarizes a fish survey, in the summer of 2007, of the Socolău River and some of its tributaries Rosoșu Mare, Rosoșu Mic, Răchita and Rica, relate these results to some of the local natural factors which affect the fish fauna diversity of this lotic system. The Socolău River is a main tributary of the Ruscova River, which is one of the main tributary of Vișeu River. The studied river spring in the

Bârsănescu (1542 m) and Copilașu (1611 m) peaks, very close to the border with Ukraine. The remote area of this river basin and the proximity with this border (fig. 1) is the explanation of the missing data concerning the local fish fauna.

The main objectives of this survey for the Socolău River basin were: the fish associations structure description and the characteristic habitats state assessment, in the condition in which these rivers flows through one of the remotest and new one Romanian natural protected area, the Maramureșului Mountains Nature Park, in the extreme northern part of the country.

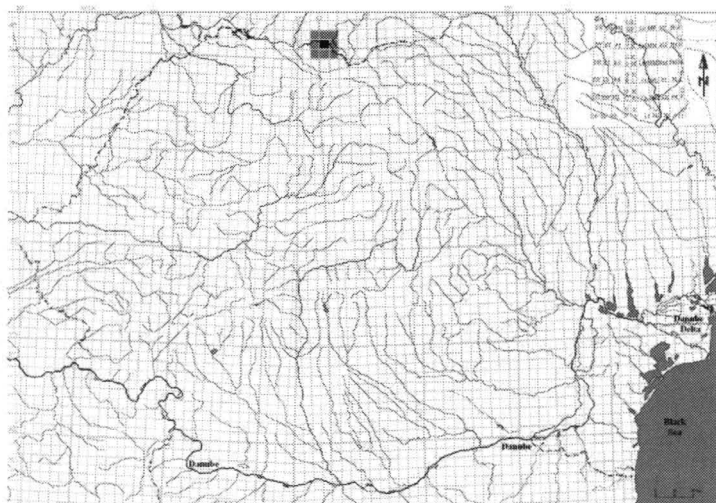


Fig. 1: The studied area localisation (■).

## MATERIAL AND METHODS

For the fish associations structure description were sampled quantitative samples (in the time and effort unit), with a hand net, from six sampling stations in the studied lotic systems (tab. 1).

The sampling stations were chosen according to: the biotope specificity, the type of river substratum, the confluence with the main tributaries and the human activity presence.

The fish individuals were released in their environment after they were identified and counted.

## RESULTS AND DISSCUSIONS

The sampled biological material (Tab. 1) was formed by four species: *Salmo fario* Linnaeus, 1758; *Cottus poecilopus* Heckel, 1835; *Phoxinus phoxinus* (Linnaeus, 1758) and *Orthrias barbatulus* (Linnaeus, 1758).

Table 1. The sampling stations positions and the relative abundance (A%) of the sampled (in time/effort unit) fish species in the Socolău River basin. (*S.f.* – *Salmo fario*, *P.p.* - *Phoxinus phoxinus*, *O.b.* - *Orthrias barbatulus*, *C.p.* - *Cottus poecilopus*).

| Watershed      | Sampling station  | Code                 | GIS position |            |            | Species     | A% |
|----------------|---|----------------------|--------------|------------|------------|-------------|----|
|                |   |                      | Altitude (m) | latitude   | longitude  |             |    |
| Socolău        | <b>Rosoșu Mare</b> 50 m upstream the confluence with Rosoșu Mic | <b>S<sub>1</sub></b> | 867          | 713640.62N | 462240.90E | -           | -  |
|                | <b>Rosoșu Mic</b> 20 m upstream the confluence with Rosoșu Mare | <b>S<sub>2</sub></b> | 864.10       | 713560.04N | 642231.35E | -           | -  |
| Ruscova        | <b>Socolău</b> 20 m upstream the confluence with Răchita        | <b>S<sub>3</sub></b> | 747.72       | 712007.65N | 464260.62E | <i>C.p.</i> | 20 |
|                |   |                      |              |            |            | <i>P.p.</i> | 45 |
|                |   |                      |              |            |            | <i>O.b.</i> | 35 |
| Socolău        | <b>Răchita</b> 50 m upstream the confluence with Socolău        | <b>S<sub>4</sub></b> | 747.18       | 712016.49N | 464271.01E | <i>S.f.</i> | 66 |
|                |   |                      |              |            |            | <i>P.p.</i> | 34 |
| <b>Socolău</b> | <b>Socolău</b> 50 m   | <b>S<sub>5</sub></b> | -            | -          | -          | <i>S.f.</i> | 25 |

|                |  |                      |   |   |   |             |    |
|----------------|--|----------------------|---|---|---|-------------|----|
|                | downstream the confluence with Rica                  |                      |   |   |   | <i>C.p.</i> | 50 |
|                |  |                      |   |   |   | <i>P.p.</i> | 25 |
| <b>Socolău</b> | <b>Rica</b> 50m upstream the confluence with Socolău | <b>S<sub>6</sub></b> | - | - | - | -           | -  |

**The characteristic habitats description and of the fish communities structure of the studied lotic sectors**

### **Rosoșu Mare 50 m upstream the confluence with Rosoșu Mic River - S<sub>1</sub>**

The river bed present a typical structure for a small mountainous river, at 867 m altitude, in coniferous forest. The minor river bed average width is 2 m, (maximum width 2.5 m), average water depth 25 cm (maximum water depth 40 cm), the substratum is formed of boulders, rocks and pebbles. On the river banks and in the river bed are cuted trees and in the left side bank also deposits of sawdust.

Fish were not founded here. The upper positon of this sampling station, the high speed of the water, can be an explanation for this situation. The habitats are good for the period of salmonids migration.

### **Rosoșu Mic 20 m upstream the confluence with Rosoșu Mare River - S<sub>2</sub>**

Rosoșu Mic River is a right side tributary of Rosoșu Mare River, has a torrenticoll aspect. In the studied sector the river present few branches, the average width of the minor river bed is 2 m (maximum width 2.5 m), the water average depth is 25 cm (maximum depth 30 cm), the substratum is formed of boulders, roks and pebbles, in the river bed are also loggs.

Fish were not found here. The upper positon of this sampling station, the high speed of the water and relatyvely low water flow and depth can be an explanation for this situation. The habitats are good for the period of salmonids migration.

### **Socolău 20 m upstream the confluence with Răchita River - S<sub>3</sub>**

This sector is at 747.72 m altitude, in a mixed coniferous-deciduous forest, the average width of the minor riverbed is 4 m (maximum width 6 m), the water average depth 40 cm (maximum depth 60 cm), the river bed substratum is formed of boulders, rocks and pebbles. The river course present branches.

The presence of the individuals belonging to the species *Cottus poecilopus*, *Phoxinus phoxinus*, *Orthrias barbatulus*, reveal a river sector in a not complete natural ecological regime, in the passing sector from the inferior trout subzone to that of the grayling and mountainous barbell zone. The trout individuals missing here can be explained by the upstream forest exploatation with direct impact on the river (posible the suspensions regime modification influence).

### **Răchita 50 m upstream with the confluence with Socolău River - S<sub>4</sub>**

The studied sector is localised at the superior limit of the mixed coniferous-deciduous forest (the coniferous are dominant), at the altitude of 747.18 m, the average minor river bed width is 4 m (maximum width 5 m), the average depth is 25 cm (maximum depth 50 cm), the substrata is formed of boulders and pebbles. On the river banks are logs of wood and sawdust deposits (the forest is exploited upstream). The presence of the individuals of the species *Salmo fario* and *Phoxinus phoxinus*, and the missing of the *Cottus poecilopus* reveal a river sector in a relatively natural regime.

#### **Socolău 50 m downstream the confluence with Rica - S<sub>5</sub>**

The average width of the minor river bed is 7 m (the maximum width 8 m), the average water depth is 30 cm (maximum depth 60 cm). The substratum is formed of boulders, rocks and pebbles. In the slow moving water sectors the boulders are covered with a thin layer of mud and some with moss.

The presence of the individuals belonging to the species *Salmo fario*, *Cottus poecilopus*, and *Phoxinus phoxinus*, reveal a river sector in natural regime, with a good ecological state, in the inferior subzone of the trout.

#### **Rica 50 m upstream the confluence with Socolău - S<sub>6</sub>**

The average width of the river bed is 5.5 m (maximum one 6 m), the average depth is 30 cm (maximum depth 50 cm), the substrata is formed of boulders, rocks and pebbles. In the river bed and on the river banks are logs. No fish were found here, the intensive logs transport on the river bed can be the explanation. The habitats are good for the period of salmonids migration.

### **CONCLUSIONS**

From the fish fauna analyse perspective, there are some sectors considered in a natural (S<sub>1</sub>, S<sub>2</sub> and S<sub>5</sub>) or almost natural ecological state (S<sub>3</sub> and S<sub>4</sub>) and sectors where the human impact pressure is accentuated present (S<sub>6</sub>).

In the first category the aquatic habitats present an ecological state very close by the natural one and the human impact is certainly insignificant. In the second category the lotic sectors are slightly affected by the forest exploitation impact. The third category are more seriously affected by the forest exploitation impact.

This variability is more or less a common one in the Maramureşului Mountains Natural Park area (Staicu, Bănăduc and Găldean, 1998; Curtean-Bănăduc 2007, Bănăduc, 2007).

The main fish species of direct conservative interest is *Cottus poecilopus*. The Eastern Bullhead (zglăvoaca răsăriteană) is a territorial, benthic, typical inhabitant of mountainous rivers with stony bedrock and cold fast running water and has a relatively small spreading area in the Romanian territory, (upper part of the Vișeu, Iza, Bistrița Moldovenească and Moldova rivers). It is under the protection of the Law 13 of 1993 through which Romania became a part of the Bern Convention and its practical protection should be based on its characteristic natural habitats preservation. In the studied area the Eastern Bullhead can act as an umbrella species for the local ichthyofauna.

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