Conclusions of the River Someş/Szamos[1] researches

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Abstract

This study is the summary of the different articles appearing in this volume. To illustrate the human impact, there are presented the River Someş/Szamos and their different sections one by one as they come. Final conclusions of the River Someş/Szamos researches are also listed.

Keywords: River Someş/Szamos, human impact

Discussion

This study is the summary of the different articles appearing in this volume and it lists the final conclusions of the researches conducted on the Somes/Szamos.

The Someş/Szamos river system is one of the most polluted ones of Transylvania. It has a lot of sectors from which sensitive organism populations like ephemeroptera and trichoptera larvae and Bivalvia species are totally missing. To illustrate the human impact, we will present these rivers and their different sections one by one as they come.

The **Someşul Cald/Meleg Szamos** springs are karst-waters, and this river has a natural aspect until the dam-lake from Beliş. A very valuable territory is the „Bazarul Someşului Cald" Strait in the upper section of the river. The entire valley up until Beliş is covered by large spruce wood forests, and in spite the fact, that there are some human settlements along the river, it hosts even the most sensitive organisms, like trout, plecoptera larvae and others. In the lower section of the river three dam-lakes were constructed: Beliş, Tarniţa and Gilău. In these twenty year old lakes significant sediments accumulations are to be found only where the river streams in and along the shorelines.

In the Tarniţa lake the sampling site was in the middle of the lake, where the water is 46 m deep. Due to this fact and because there is a rocky bottom, we managed to lift out sediment using the Van-Venn dredge only after numerous attempts. In this sediment we have not found living organisms at all.

In these lakes a process of eutrophication can be observed because of the still water, but inspite of this fact, the water can be considered as having good quality.

Although most of the drinking water of Cluj city comes from the third lake (Gilău) the upper lakes (Beliş, but especially Tarniţa) are intensively used for turistic purposes.

[1] The first name is Romanian, and the second Hungarian

The **Someşul Rece/Hideg Szamos** springs are heliocren ones, rising from cristal-stony areas. This region is home of large peat-bogs. Woody areas can be found only on slopes, while in the vicinity of the river there are grasslands, marshes and peat bogs. At Blăjoaia sampling site the water of the River Someşul Rece is brown coloured, because of the high humic acids content. The benthic fauna of the Someşul Rece differs from that of the Someşul Cald due to the different geological conditions.

From Blăjoaia to Gilău - where the Someşul Rece confluences with the Someşul Cald - two dam-lakes were constructed. In these places the water of the Someşul Rece river is conducted into the Someşul Cald river valley's dam-lakes through underground conducts. Downstream these places of drastic manipulations, the river simple stops to exist, and only the dried riverbed indicates where the Someşul Rece river was previously flowing. Downstream the dam-lakes the river is re-formed by the brooks from nearby areas and until the next dam-lake, the River Someşul Rece exists again, with its characteristic montainous fauna.

In the valley of Someşul Rece the intensive wood-cutting, and the numerous cottages on the two sides of the river, significantly modify the natural aspect of this region.

Downstream Gilău the river is called **Someşul Mic/Kis-Szamos**, and it runs in a concreted artificial canal, having a natural river-bed only from Floreşti on.

In the catchment area of this sector can be found the old drinking-water wells of Cluj, most of them being still in use. At the sampling site upstream Cluj the water of the river can be considered of good quality, and a lot of sensitive organisms can be found here (e.g. ephemeroptera and trichoptera larvae, *Ancylus fluviatilis*, *Unio crassus*, a. o.).

In Cluj most of the drain pipes flow directly into the river without any sewage treatment, so the organic-matter content of the river is high. The characteristic organisms of the benthic fauna are the oligochaeta; and macrophytes (*Potamogeton crispus, Myriophyllum spicatum*) can also be found in the river.

Twenty-thirty years ago in this portion of the river there were no macrophytes at all, but in some places the *Fontinalis antipyretica* could be found, which is a very sensitive species and it grows only in clean waters.

The river flowing through the town becomes more and more polluted, it's water smells bad, and it's high detergent content is indicated by the foam floating on the water-surface. Downstream Cluj, at Someşeni sampling site we have not found fish in the river at all.

From Cluj to Gherla both riversides are surrounded by agricultural crops. At the sampling site downstream Gherla an increased pollution of the river can be observed. The sediment is formed by thick silt in putrefaction, a lot of macrophytes are present and the benthic fauna is represented only by oligochaets.

The springs of the **Someşul Mare/Nagy-Szamos** are in Rodna Mountains, upstream Şanţ village. Until Rodna the river shows the characteristics of a typical mountain stream. At Şanţ sampling site the water quality is good, all the organisms which are characteristic to mountainous brooks are present. Downstream Şanţ, around Rodna there are non-ferrous metal exploitations and ore processing, and in this sector the river is polluted. In addition, the intense wood-cutting and processing also polluted the river, as in some places significant quantities of sawdust can be found in the river.

At Sângeorz Băi sampling site the most sensitive benthic organisms are missing.

Our theory was that by observing the Ilva tributary (which is a river in its natural state), we will be able to draw conclusions about the previous state of this section of Someşul Mare. But while working on the site, we realized, that the two rivers have a completely different geological substratum; therefore they can not be compared.

At the sampling site downstream Năsăud, the town's dumping ground is placed on the catchment area of the river. The sewages of the riverine settlements (especially those of Năsăud) increase the pollution that caused by the ore processing, so the Unionidae shells are missing, inspite the fact that the riverbed of this sector is suitable for the settling of these organisms.

At the sampling site near Beclean we have observed, that the sewage-treatment station of the town is incapable of purificating the sewages coming from the town, so near the place were the drain pipes pour into the river we have observed large *Sphaerotilus natans* colonies. However on the other side of the river, in 1992 we could still find *Spongilla lacustris*, but they disappeared by 1996 when we looked for them in vain. In 1996 we were able to collect here a single living specimen of *Unio crassus*, a species which we could not find in the past, but we suspect that this specimen probably came from a tributary of Someşul Mare.

At Dej the Someşul Mare confluences with the Someşul Mic. The tenth sampling site is downstream Dej, and inspite the fact, that the Someşul Mare is not so polluted, when its water mixes with that of the highly polluted Someşul Mic, the water quality of the **„united" Someş** decreases considerably. The waste waters coming from the cellulose-processing industry of Dej increase the pollution. The quality of the water and the living organisms are more or less the same as in the River Someşul Mic downstream Gherla.

The Letca sampling site was introduced later, in 1996, because we have observed that the quality of the water improved significantly until the 11 sampling site (Someş-Odorhei). The quality of the water in this sector was so high, that even moss-animals and shells are living in it. We concluded that this improvement is due to the fact, that the river is shallow, with high velocity, and stony bed, which make the increase of the water's oxygen-content possible. The high oxygen-content allows the rapid chemical break-down of organic matter. This process is accelerated by the activity of filtering-organisms observed at Someş-Odorhei, Sălsig and Ţicău sampling sites. In the biological purification of the water moss-animals are playing a very important role. In some places these animals covered up to 25% of the riverbed.

The Lăpuş tributary brings with it the industrial and communal sewages of Baia Mare town, so the Someş is polluted again, not only with organic matter, but also with heavy metals and toxic materials.

Downstream Pomi sampling site the Someş can be considered very polluted: the moss-animals, shells, ephemeroptera larvae are all missing.

At Păuleşti sampling site the river is deeper, has slower velocity and sandy bottom. As a consequence, the oxidative processes are slower.

From Vetiş sampling site which is downstream Satu Mare (a town that also deverses significant quantities of sewages in the river) to Vásárosnamény (in Hungary), the Someş river's quality does not improve. As a result the River Someş deverses polluted water in the Tisa, which can be observed at the confluence of the two rivers.

Final conclusions

The Someş/Szamos river system is composed of five rivers: Someşul Cald/Meleg-Szamos, Someşul Rece/Hideg-Szamos, Someşul Mic/Kis-Szamos, Someşul Mare/Nagy-Szamos and the „united"Someş. Because of the different geographical and geological conditions all of these rivers present a unique aspect. All of them are characterized by specific chemical conditions, flora and fauna. In spite the fact, that in their reservoir there are a lot of valuable natural and seminatural areas, the human impact is also important.

The Someş/Szamos is one of the most polluted East tributary of the Tisa river.
The characteristics and problems of the Someş/Szamos are as follows:

1. The construction of the dam-lakes in valleys of the Someşul Cald and Someşul Rece rivers modifies the aspect of these regions. In addition the unregulated tourism and construction of cottages has a disastrous effect upon this region.

2. In the spring sectors the wood-cutting action is intense, and the wood-processing waste treatment is done irresponsibly.

3. The forests are absent in the middle and lower sections, where there are large agricultural crops in the immediate vicinity of the river. There are few trees, and the existing groves were felled. The river-banks are neglected, there is a lot of illegal waste accumulation, and in some cases (e.g. Năsăud) even the town's dumping ground is placed on the riverside right next to the riverbed.

In these sectors the gravel and sand exploitation is intense, too, and because of the mismanagement the oil pollution (from the exploitation-machines) is intense.

4. In the lower sectors the dams are too close to the riverbed, so the catchment areas are missing.

5. The non-ferrous metal exploitation and ore-processing pollute intensely the spring sector of Someşul Mare and the sector downstream Baia-Mare of the „united" Someş.

6. The communal and industrial sewage-production of the big towns and industrial establishments (Cluj, Gherla, Dej, Baia Mare, Satu Mare) is so intense that in some sectors it destroyed the existing associations. Some species have disappeared completely.

7. The segmental pollution isolates the local populations, fragmenting the once continous area. The disappearance of local populations decreased the intraspecific diversity, because in most of the cases the typical ecological forms have disappeared.

8. The water of the Someş presents a fast autoepuration because it is shallow and with high velocity. The runoff of the water on the rocky bed increase the oxygen content of the water and this makes regeneration possible within 70-80 km.

9. The river provides a lot of settlements with drinking-water, but because of the high pollution level it is unfit for human consumption, so there is urgent need for construction of the efficient sewage-treatment.

10. There are a lot of valuable wild areas in the Someş rivers' valleys, which need increased protection, like: „Cetatea Rădesei - Bazarul Someşului Cald" Strait, the peat-bogs from the upper section of the Someşul Rece, „Fânaţele Clujului" reservation, the „Sic-Săcălaia" lake, the „Suatu" reservation, the spring-region of the Someşul Mare, the lawns from Mogoşeni-Floreşti, and the mezohygrophil lowns from Benesat-Ardusat.

11. The protection of the river and that of the valuable wild areas is unimaginable without reconstruction, that is the restoration of at least some of the wetlands from the catchment areas and that of the groves. The „ecological corridor" created in this way should become an important link between the valuable areas under increased protection.

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