

Ecological disaster in the Lăpuș river area

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Abstract. This article aims to pull an alarm trigger to the whole local and national administration, in order to protect our treasures, because there are many threats. In the following article, we will see how important anthropic factor is and how much people can influence things around them. People can influence even the fauna and flora through their actions. That's why we need to be careful not to hurt ourselves. We will study the Lăpuș river water consistency from its spring through the river gorge area. Important data we have obtained throughout the study and we must be aware of how important the element that keeps us alive is, and that's water. Water is the most important element in human, animal and plant life. We will study its quality on the above-mentioned segment and we will and we will show recent disasters caused by the anthropic factor. Besides all this, we will also point out the fact that this region deserves to be promoted and deserves increased tourist potential. We will analyze the strengths of this area and the manner how we can emphasize the qualities of the Lăpuș Land.

Key Words: gorge, Lăpuș river, natural resources, project, sustainable development, regional development.

Introduction. The purpose of this paper is to analyze the regional development of Lăpuș Country and the sustainability of future investments and also to emphasize that there are destruction threats of this area and also for the fauna and flora from it. The discussion is driven by the idea that the environment influences every human activity. My project is focused on the in depth analysis of the geomorphologic and landscape resources. I presented detailed information about the gorge of Lăpuș river, about the Mountain of Preluca, and the Șatra Plateau and last but not least about the Meadows of Lăpuș. Another key point of our research was the study of the landscape elements found in this territorial unit, which is a natural reservation, part of "Sit Natura 2000" and thus protected by the law. Restoring the environment in order to encourage biological diversity is the main goal of those working inside the reservation, their ultimate goal being that of ensuring a bright future for the gorge. The gorge itself is in the administration of several municipalities such as Târgu Lăpuș, Vima Mică, Boiu Mare, Șomcuta Mare, Remetea Chioarului, Coaș. This means that regional development can sometimes advance at a very slow pace, even when the European Union funds the projects. I tried to describe the arguments that make these projects important, highlighting aspects such as nature, tradition and adventure-tourism.

Being the place where I came from, but also with the risk of being subjective, I think that Maramures is the county in Romania with the most powerful tourist attraction when it comes to tradition, habits and went further away from generation to generation, the nature and last but not least, the folklore. This part of Maramureș is maybe, the most attractive, if we are looking from the tourists point of view.

The integration of Romania into the European Union has produced true metamorphoses, felt also on the tourist objectives promotion level, which it has at its disposal. The harmonization of national policies with the European ones, brought on the decision makers table the aspects related with policies of regional development policy. Conceived at European level since the signing of the Rome Treaty (1957), regional development policy has as main objective the reduction of the disparities present at the level of the Member States through the dynamic and lasting projects to promote local and regional potential, in order to improve living conditions. The main action of the regional development policies are relating domains like economical development of the small and medium enterprises sector, improvement of infrastructure, development of agriculture, urban development, protection and promotion of the environment, etc.

The article in discussion is aimed at highlighting the potential of the regional and local potential, at the same time, to promote it, with all the values and qualities of the Lăpuș country, especially Lăpuș Gorge, even more, to pull an alarm signal on what is going in the already mentioned area and to try to solve the reported threats.

Material and Method. This article requested engagement of several types of materials and combining several types of methodologies. Thus, the material used was diverse, represented, first off all, by the camera, the vehicle which was used on our field visits starting with Băiuț (geographical coordinates 47.613608, 23.996119) and ending with Vima Mica (geographical coordinates 47.437475, 23.709850). As a methodology, fieldwork has been done to identify the objectives that could bring added value to the area and should be promoted. There have been researches in the literature and on the internet from 2013 until now, supported by articles, questionnaires among the population of Țara Lăpușului, but also consultations with the local administration from Tîrgu Lăpuș, with the main developers from the area, and of course multiple field visits.

Also, with the recent problem of pollution caused by mine water, a field trip was made to determine the degree of pollution and the damages produced, which we will present below.

The Lăpuș Country is a geographical and a Romanian ethno-cultural region from Maramureș county, which is located in the north-western part of the depression of Transylvania. The Lăpuș Country is located in the depression with the same name, namely, the Lăpuș Depression, on the east and top of the Lăpuș river, which is the main tributary right of the Someș river. The Lăpuș Depression has an area of 918 km² and is part of the following communes: Băiuț, Coroieni, Cupșeni, Groșii Țibleșului, Suciu de Sus and Lăpuș (Butian 2004).

The Country of Lăpuș is geographically located in the north-western compartment of the Transylvanian area and it represents a clearly individualized territory, tightly closed on three sides, where it reaches up to Preluca Mountain (810 m) and the Pietriș hill (Dumbrava) and then to the Satra Mountain (1041 m, with a piedmont well developed especially to the east and south), and to the south is flanked by Breaza pick (974 m), which together with the Preluca Mountain constitute a bridge toward the Apuseni Mountains (Dezsi 2006).

After the spatial and geographical individualization of Lăpuș Country, we will describe an important pawn of this zone, namely the river Lăpuș, who is also the longest of Maramureș county, with 114,6 kilometers in length and a basin surface of 1820 km² (Etimological dictionary of the localities in Maramureș County/Maramureș County Regions 2016). The River Lăpuș dug along the time in the rock wall named Lăpuș gorge, which, incidentally or not, is bearing his name: the Lăpuș rocky gorge. It has a length of more than 36 kilometers and, from these 36 kilometers, 25 kilometers are protected as natural area („Lăpuș Gorge" 2013). Although, the gorge of Lăpuș is one of the most impressive gorge in Romania and it is being classified as "Sit of Natura 2000". Due to the lack of promotion, the Lăpuș gorge is not reaching the peaks, the representatives of the area have made inquiries in this regard.

Due to the Spring season and due to a flood of mine water, on March 27, 2018 at 3:30 (What Coversim says about the pollution from the Lăpuș River. Who is responsible for the incident? 2018) in the morning, the Băiuț Work Point at the Breiner Orizont Gallery 0, a very unfortunate event occurred. The dike at the entrance gallery was destroyed. As a result, all polluted water from the mine spilled into the Lăpuș River, causing considerable damage to the fauna. Tons of fish have been found dead in Lăpuș waters because of pollution. The color of the water is reddish, like mine water (Figure 1 - A; B; C; D).

In Figure 1, photo A we have the actual color of the Lăpuș Gorge after the already mentioned disaster and photos B, C and D are from Băiuț, exactly from the source of the problem. Beside the fauna from Lăpuș river, the people are badly affected and this is a serious threaten to their health.



Figure 1. Mine water pollution, source V. Coroian.

In the Appendix 1, we can see the water quality, before the disaster, recorded by Romanian Water Authority, at the end of 2017, more precisely in October 2017. We can see that even before the March 27th event, the Lăpuș river waters were affected by the old mine workings on the Baiut segment. It was a tacit acceptance until a flood broke the wall of the mine and the previously discussed ones, happened and mass-media, the authorities and especially people were revolted by what was happening.

In Figure 2, photo A and B we can see how Dobric stream is a saving water for the fish from this portion of the river, separating the healthy water from contaminated water. In C photo we can see the fish damage that people found on the bank of the Lăpuș river.



Figure 2. The damage caused by Băiuț water mines, source V. Coroian.

Results and Discussion. Speaking of results, from the beginning of the research period of time, we could say that the authorities gave their interest in promoting and protecting the area even more so, Tîrgu Lăpuş is renowned as the most ecological city in Romania (The wonder of Maramures. The city where it is recycled 10 times more than in the rest of the country 2017), but updating us with the latest information, we could change our minds and make us work harder to protect our environment. Aware of the tourist potential of the earlier mentioned county, the representatives of the Maramures County Council launched in July of 2011 within the framework of the conference the "Nature, tradition adventure-Promotion of tourism in the gorge Lăpuş" project, in line with the Priority Axis 5, the field of intervention 5.3. "The Promotion of tourist potential and the creation of the necessary infrastructure, in order to increase the attractiveness of Romania as a tourism destination". By the initiated project, Maramures County Council proposes to revive the interest for the Lăpuş Defile area and to promote the resources of the cultural and historical tourism, rural areas and environmentally friendly and active rural tourism .

According to the manager of the project, the initiative is aimed to promote the most important tourist resources which make the gorge Lăpuş an attraction for visitors:

- geomorphological components: Lăpuş gorge, Preluca and Şatra Mountain, Lăpuş meadow;
- landscape elements: Lăpuş gorge, Şatra Mountain, Tibles Arcer Peak, Bran and Chioarului Peak;
- archeological sites: "Podul hotarului" and "Gruiul Târgului" - sites dating from the Bronze Age, the Chioar Fortress;
- religious and patrimony objectives like the Wooden Churches of Rogoz, Cupşeni, Costeni, Răzoare, Groape, Preluca, Larga, Stoiceni, Inau, Dealul Corbului, Peteritea, Vima Mică, Salnita, the Stone Church of Aspra, the monasteries: Rohia, Rohita, Dealu Mare, Breaza, Ruoaia and Şatra;
- museum objectives, reserves and protected areas like the Boiu Mare Cave, Lăpuş gorge;
- folk events, ethnographic and architectural elements.

Immediately after they have been in contact with the natural objectives, the visitors can discover the most important churches and monasteries in the area (Figure 3 - B), through The National Tourism Information And Promotion Center (Figure 3 - A) the most interesting museums (Figure 3 - E), local accommodations and outdoor activities (Figure 3 - D). Many tourists come to Maramureş specifically for the quality of their products from local farmers and for the fact that they are natural and preservative-free.

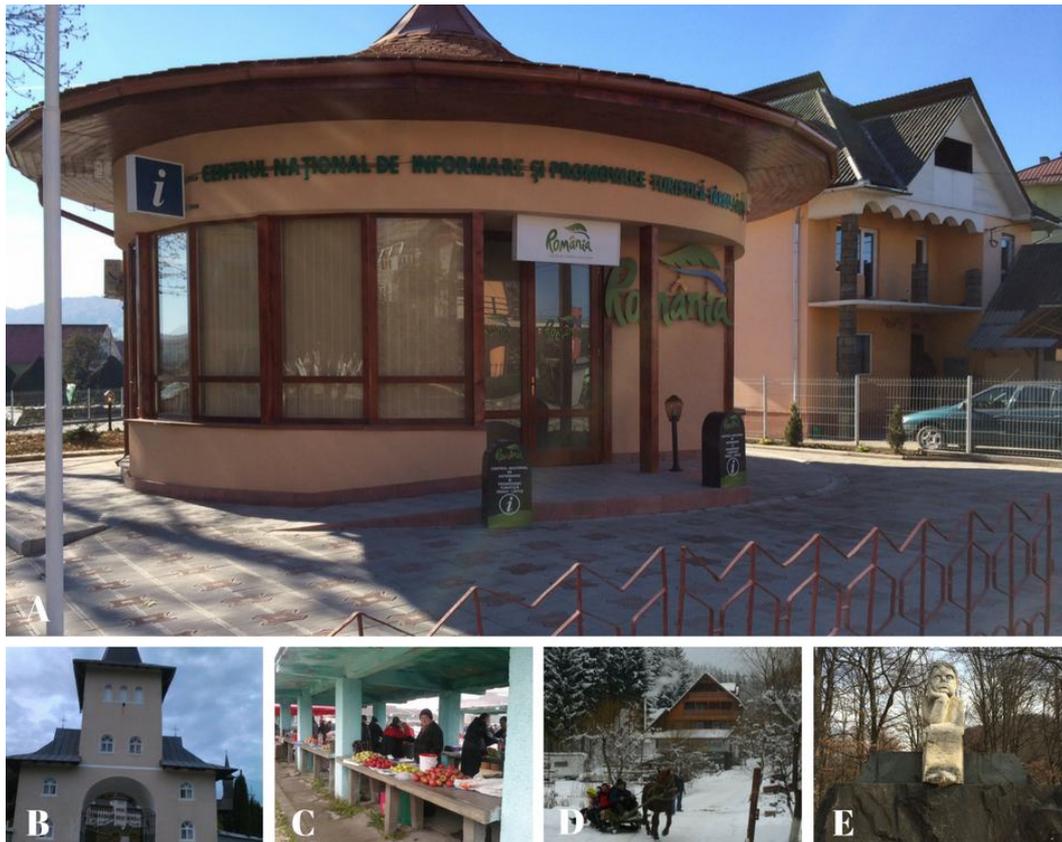


Figure 3. Strong elements of Lăpuș Land promoting: A - The National Tourism Information And Promotion Center, B – Ruoia Monastery, C – Local products, D – Smarald Guesthouse and horse drawn sled outdoor activity for tourists, E – Florian Outdoor Museum; source M. Moldoveanu

Conclusions. As a conclusion, since we started the research for this region, I conclude a situation: instead of increasing the tourist and the ecological potential of this area, we neglect it, and here we refer to the unfortunate event discussed above. We have to prevent this kind of situations, by finding a non-invasive solution to protect nature and for that we need the authorities support.

I believe that this article will have a major importance in making the world aware of the dangers we are in, at the moment, and the elements that people depend on: the fauna and the flora, but above all, we must protect the element that we all depend on: THE WATER. However, if we will succeed all that and if we can manage the current situation, the area has great tourist potential and we have to work for its development, so the area Lăpuș Gorge will attract more tourists and will represent an important tourist region.

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References

- Butian F., 2004 [Lăpușului County]. Galaxia Gutenberg Publishing House, Țirgu Lăpuș, 11 pp. [in Romanian]
 Cocean P., 2010 Geografie regională, Presa universitară clujeană, Cluj-Napoca.
 Dezi Ș., 2006 [The Land of Lapus. Regional Geography Study]. Presa Universitară Clujeană, 18 pp. [in Romanian]

Axe prioritare POR. Available at: <http://www.mdrt.ro/dezvoltare-regionala/-2257/programul-operational-regional-2007-2013/-6220>. Accessed: September, 2017.

Politica de dezvoltare regională. Available at: http://www.ier.ro/sites/default/files/pdf/Politica_regionala.pdf. Accessed: September, 2017.

*** www.defileul-lapusului.ro. Accessed: March, 2018.

*** <http://www.emaramures.ro/ce-spune-conversmin-despre-poluarea-de-pe-raul-lapus-cine-este-vinovat-de-producerea-incidentului/>. Accessed: March, 2018.

*** https://ro.wikisource.org/wiki/Dic%C8%9Bionar_etimologic_al_localit%C4%83%C8%9Bilor_din_jude%C8%9Bul_Maramure%C8%99_/Regiuni_ale_jude%C8%9Bului_Maramure%C8%99. Accessed: March, 2018.

*** <https://recorder.ro/minunea-din-maramures-orasul-in-care-se-recicleaza-de-10-ori-mai-mult-decat-in-restul-tarii/>. Accessed: March, 2018.

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APPENDIX 1

Body of water "Lăpuș-springs-cf. Suci and tributary streams" (RORW2.1.66_B1)

1. General Information

This body of water is 186 km long, it falls under the RO 01 classification and it includes 3 water quality monitoring sections where the following monitoring programmes are being implemented:

- "Lăpuș at Izvor Alb-Negru", with the following monitoring programmes: O, R;
- "Lăpuș upstream conf. Botiz", with the following monitoring programme: T;
- "Lăpuș at Lăpușul Românesc", with the following monitoring programme: O.

2. Assessment of the Ecological Status of the Body of Water

a. Biological Elements:

The assessment of the quality of biological elements was performed based on the zoobenthos and phytobenthos analysis.

Ichthyofauna Status

The ichthyofauna of Lăpuș river was monitored at Lăpușul Românesc in 2016.

The following species were captured: *Barbatula barbatula* (stone loach), *Chalcalburnus chalcoides* (bleak), *Alburnoides bipunctatus* (schneider), *Pseudorasbora parva* (stone moroko), *Phoxinus phoxinus* (minnow), *Lepomis gibbosus* (pumpkinseed sunfish), *Gobio gobio* (gudgeon), *Barbus petenyi* (Romanian barbel), *Sabanejewia aurata* (golden spined loach), *Leuciscus cephalus* (chub) and *Carassius auratus* (goldfish).

The salmonid breeding score matched the moderate status range (IM=0.561).

Zoobenthos Status

Upstream the confluence with Botiz River, the benthonic community was poorly represented, with a small number of species identified from the following taxonomic groups: *Ephemeroptera*, *Plecoptera*, *Trichoptera*, *Coleoptera* and *Diptera*. Samples were gathered in July and October. In July, the zoobenthos was dominated by rheobionts (I_Reo_{July}=60,42% good status), among them the group of Ephemeroptera, Plecoptera and Trichoptera (I_EPT_{July}=29,16% poor status). In October, the invertebrates consisted solely in Diptera: *fam. Simuliidae* and *fam. Chironomidae*.

A more diverse benthonic community (ID: 1.64_(min).2.025_(max)) was identified at Lăpușul Românesc, compared to the community in the section upstream the confluence with the Botiz River. Samples were gathered in April, July and October. A higher saprobic index, favourable to the development of species which are more tolerant to organic pollution, was noted in April and October. During these campaigns, the representation of rheobionts and Ephemeroptera and Trichoptera species was modest, within the limits of poor status (I_Reo_{April/October}: 20.45/6%; I_EPT_{April/October}: 13,63/6%). The tests performed in July showed a lower organic load, and a higher density of rheobionts, especially Ephemeroptera and Trichoptera species (I_Reo_{July}=55.07% moderate status; I_EPT_{July}=40.57% good status).

Insufficiently treated mine waters determined dramatic changes in the structure of the zoobenthos and affected the specific diversity.

At the level of the body of water, the zoobenthos status was moderate (IM=0.547).

Phytobenthos Status

The algal community was diverse and better developed in the section from Lăpușul Românesc. The Shannon Wiener diversity index ranged from bad status (ID=1.116 - upstream cfl. Botiz) to high status (ID=2.43 Lăpușul Romanesc). The poor results for the Shannon Wiener diversity index were caused by the extreme abundance of the "*Achnanthes minutissima*" species (75.75%). The diatom biological indices remained within the limits of high status (IBD: 18-18.6) and good status (IBD: 16.8-16,9).

The phytobenthos status was high (IM=0.81).

The biological elements status was moderate (ichthyofauna and zoobenthos).

b. General physico-chemical elements.

The parameters monitored this year indicated high status according to the specific indicators for the groups "thermal conditions" and "acidification status"; good status for the indicators "salinity" and "nutrients", and moderate status for the group "oxygenation conditions" (O_2 diz.= 7.958mg/l), which determines the classification of the body of water.

The status assessment according to the physico-chemical elements which determine the classification of the body of water indicated **moderate status**.

c. Specific pollutants.

Chemical indicators monitored in the group "specific pollutants" indicated **high status**, for the body of water.

d. Integrated Ecological Status Assessment

The ecological status of the body of water recorded in 2016 was **moderate**, and it was determined based on the values for the *biological elements*, and on the specific indicators for the *supporting physico-chemical elements* registered during the year.

3. Chemical Status Assessment.

The chemical status assessment included tests for synthetic (organic) and non-synthetic (metallic) hazardous and priority hazardous substances and indicated compliance with quality standards both for the average values and for the maximum values registered.

In 2016, the body of water was assessed as **good chemical status**.

**Body of water "Lăpuș-cf. Suciucf. Căvnic"
(RORW2.1.66_B2)**

1. General Information

This body of water is 48 km long, it falls under the RO 05 classification and it includes one water quality monitoring section where the following monitoring programmes are being implemented:

- „Lăpuș at Răzoare”, with the following monitoring programme: O.

2. Assessment of the Ecological Status of the Body of Water

a. Biological Elements:

The assessment of the quality of biological elements was performed based on the ichthyofauna, zoobenthos and phytobenthos analysis.

Ichthyofauna Status

The following species were identified: *Barbatula barbatula* (stone loach), *Sabanejewia aurata* (golden spined loach), *Leuciscus cephalus* (chub, dominant species – 57.45 %), *Barbus barbus* (barbel), *Barbus petenyi* (Romanian barbel), *Chalcalburnus chalcoides* (bleak), *Salmo trutta fario* (brown trout), *Carassius auratus* (goldfish), *Rhodeus siriceus* (bitterling), *Gobio gobio* (gudgeon) and *Lepomis gibbosus* (pumpkinseed sunfish – invasive species). The low density of generative rheophilic species determined a low cyprinid breeding score, within the moderate status range.

According to the EFI + application, the ichthyofauna status was moderate (IM=0.619).

Zoobenthos Status

The zoobenthic community was represented by oligochaetes, gastropods, hydrachnidia, amphipods, odonates, trichopters, ephemeropters, plecopters and dipters. Zoobenthos samples were collected in April, July and October. The following aspects were noted:

- The spring and autumn campaigns indicated a higher saprobic index, moderate status ($IS_{April/October}=2.5380-2.5385$) which favoured the development of species more tolerant to aquatic environment degradation; the representation of rheophilic species, as well as Ephemeroptera and Trichoptera species remained

modest ($I_{\text{Reo}}^{\text{April/October}}: 31.9/40.4\%$ - moderate status/good status;
 $I_{\text{EPT}}^{\text{April/October}}: 27.21/ 31.4\%$ - moderate status);

- In the summer campaign (July) the organic load decreased ($IS_{\text{July}}=1.946$ good status), which enabled the revival of rheobionts, especially the Ephemeroptera, Plecoptera and Trichoptera species ($I_{\text{Reo}}^{\text{July}}=79.6\%$ high status; $I_{\text{EPT}}^{\text{July}}=56.8\%$ good status);
- The Shannon Wiener diversity index and the number of families were maintained within the range of high status throughout the monitoring period;
*According to the assessment methodology, **the zoobenthos status was high.***
($IM=0.748$).

Phytobenthos Status

In terms of taxon density and Shannon Wiener diversity index, both parameters were maintained within the range of high status. The saprobic index and the diatom biological index ranged within the limits of good status and high status ($IS: 1.66-1.96$; $IBD: 14 -16.6$).

The phytobenthos status was high ($IM=0,918$).

The biological elements status was moderate (ichthyofauna).

b. General physico-chemical elements.

The parameters monitored this year indicated high status according to the specific indicators for the groups "thermal conditions" and "acidification status"; good status for the indicators "salinity", "oxygenation conditions" and "nutrients".

The status assessment according to the physico-chemical elements which determine the classification of the body of water indicated **good status**.

c. Specific pollutants.

Chemical indicators monitored in the group "specific pollutants" indicated **good status**, for the body of water.

d. Integrated Ecological Status Assessment

The ecological status of the body of water recorded in 2016 was **moderate**, and it was determined based on the values for the *biological elements* registered during the year.

3. Chemical Status Assessment.

The chemical status assessment included tests for synthetic (organic) and non-synthetic (metallic) hazardous and priority hazardous substances and indicated compliance with quality standards both for the average values and for the maximum values registered.

In 2016, the body of water was assessed as **good chemical status**.

Body of water "Strambu Baiut" (RORW2.1.66.2_B1)

1. General Information

This body of water is 10 km long, it falls under the RO16 classification and it includes one water quality monitoring section where the following monitoring programmes are being implemented:

- "Strambu Baiut – *upstream cf. Lapus*", with the following monitoring programme:
T.

2. Assessment of the Ecological Status of the Body of Water

a. Biological Elements

The assessment of the quality of biological elements was performed based on the macrozoobenthos and phytobenthos analysis.

Zoobenthos Status

The zoobenthos consisted in species of amphipods, ephemeropters, plecopters, trichopters, coleopters and dipters. The following methodological aspects were noted:

- Poor representation (if any) of oligochaetes (high status) and dominance of rheophilic species ($I_{\text{Reofil}}: 89.66-91.84\%$ -high status);
- Very good representation of ephemeropters, trichopters and plecopters ($I_{\text{EPT}}: 80.57-91.27\%$ high status)

- The Shannon Wiener diversity index ranged within the limits of high status (ID_SW: 1.68- 2.37);
- Species that feed by scraping and chipping were quite abundant, which indicates high status (I_GF:85.66-89.17%)
The zoobenthos status was high (IM=0.957).

Phytobenthos Status

The biological parameters involved in the phytobenthos assessment provided the following results:

- The saprobic index ranged within the limits of good status and high status (IS:1.58-1.92);
- The Shannon Wiener diversity index (ID:2.38-2.82) and the taxon density (28-30) ranged within the limits of high status;
- The diatom biological index indicated good status (IBD:16.3)
*According to the assessment methodology, **the phytobenthos status was high (IM=0.939).***
The biological elements status was high.

b. General physico-chemical elements.

The parameters monitored in 2016 indicated high status according to the specific indicators for the groups "thermal conditions", "nutrients" and "acidification status"; good status for the indicators "salinity", and "oxygenation conditions".

The status assessment according to the general physico-chemical elements which determine the classification of the body of water indicated **good status**.

c. Specific pollutants.

Chemical indicators monitored in the group "specific pollutants" indicated **high status**, for the body of water.

d. Integrated Ecological Status Assessment

The ecological status of the body of water recorded in 2016 was **good**, and it was determined based on the values for the *elements* registered during the year.

3. Chemical Status Assessment.

The chemical status assessment included tests for synthetic (organic) hazardous and priority hazardous substances and indicated compliance with quality standards both for the average values and for the maximum values registered.

In 2016, the body of water was assessed as **good chemical status**.

Body of water "Cavnic" (RORW2.1.66.16_B1)

1. General Information

This body of water is 39 km long, it falls under the RO 16 and it includes four water quality monitoring sections where the following monitoring programmes are being implemented:

- "Cavnic upstream Cavnic", with the following monitoring programme: O;
- "Berbincioara, Valea Alba, Suior - SC Vital SA Baia Mare- Cavnic Agency", with the following monitoring programme: P;
- "Gutin, Boldut – Psychiatric Hospital Cavnic", with the following monitoring programme: P;
- "Cavnic at Copalnic", with the following monitoring programme: O.

2. Assessment of the Ecological Status of the Body of Water

a. Biological Elements

The assessment of the quality of biological elements was performed based on the zoobenthos and phytobenthos analysis.

Zoobenthos Status

Upstream Cavnic locality, the zoobenthos consisted in species of amphipods, hirudineans, ephemeropters, plecopters, trichopters, coleopters and dipters. The following methodological aspects were noted:

- Poor representation (if any) of oligochaetes (high status) and dominance of rheophilic species (I_Reofil: 94.26-97.23%- high status);
- Very good representation of ephemeropters, trichopters and plecopters (I_EPT:63.5-94.52 % high status)
- The Shannon Wiener diversity index ranged within the limits of good status (ID=1.29) and high status (ID=1.95);
- Species that feed by scraping and chipping were quite abundant, which indicates high status e (I_GF:59,25,87-93.79%)

The zoobenthos status was high (IM=0,939) in the "upstream Cavnic" section.

At Copalnic, the benthos consisted in hydrachnidia, coleopters, ephemeropters, plecopters, trichopters, odonates, heteropters and dipters. The following results were obtained:

- Very good representation of rheophilic species, oligo-beta- and beta-saprobic;
- The Shannon Wiener diversity index ranged within the limits of bad status (ID=1.19) and high status (ID=1.65);
- The representation of the main taxonomic groups was in line with seasonal dynamics; dipters-chironomids (I_OCH=63.75% moderate status) dominated during spring months, and ephemeropters, trichopters and plecopters dominated during summer and autumn months (I_EPT_{July}=75.89%; I_EPT_{October}=68.64% high status);
- The high abundance of species that feed by scraping and chipping were quite abundant, which indicated good regeneration capacity and biocenosis.

The zoobenthos status was high (IM= 0.827) in the "Copalnic" section.

According to the assessment methodology, the zoobenthos status was high (IM=0.883).

Phytobenthos Status

The biological parameters involved in the phytobenthos assessment provided the following results:

- The saprobic index ranged within the limits of good status and high status (IS:1.76-1.91);
- The Shannon Wiener diversity index (ID:2.3-3.019) and the taxon density (15-34) ranged within the limits of high status;
- The diatom biological index indicated good status and high status (IBD:14.9-17.2)

According to the assessment methodology, the phytobenthos status was high (IM=0.923).

The biological elements status was high.

b. General physico-chemical elements.

The parameters monitored in 2016 indicated high status according to the specific indicators for the groups "thermal conditions", "nutrients" and "acidification status"; good status for the indicators "salinity", and "oxygenation conditions".

The status assessment according to the general physico-chemical elements which determine the classification of the body of water indicated **good status**.

c. Specific pollutants.

Chemical indicators monitored in the group "specific pollutants" indicated **high status**, for the body of water.

d. Integrated Ecological Status Assessment

The ecological status of the body of water recorded in 2016 was **good**, and it was determined based on the values for the *biological elements* registered during the year.

3. Chemical Status Assessment.

The chemical status assessment included tests for synthetic (organic) and non-synthetic (metallic) hazardous and priority hazardous substances and indicated

compliance with quality standards both for the average values and for the maximum values registered.

In 2016, the body of water was assessed as **good chemical status**.

Body of water "Lăpuș - cf. Cavnic - cf. Someș" (RORW2.1.66_B3)

1. General Information

This body of water is 38 long, it falls under the RO 07 and it includes 2 water quality monitoring sections where the following monitoring programmes are being implemented:

- „Lăpuș at Lăpușel”, with the following monitoring programmes: O, CBSD;
- „Lăpuș at Bușag”, with the following monitoring programmes: O, EIONET-Water.

2. Assessment of the Ecological Status of the Body of Water

a. Biological Elements

The assessment of the quality of biological elements was performed based on the ichthyofauna, zoobenthos and phytoplankton analysis.

Ichthyofauna Potential

The following species, characteristic for the cyprinid area, were identified at *Lăpușel* in 2016: *Leuciscus cephalus* (chub), *Vimba vimba* (vimba bream – migratory species), *Gobio gobio* (gudgeon), *Chondrostoma nasus* (nase), *Rhodeus sirceus* (bitternling), *Alburnus alburnus* (oblete), *Alburnoides bipunctatus* (beldița), *Chalcalburnus chalcoides* (oblete mare), *Barbus petenyi* (Romanian barbel,) *Barbus barbus* (barbel - migratory species), *Pseudorasbora parva* (stone moroko) și *Sabanejewia aurata* (golden spined loach).

The very good representation of rheophilic species, which are sensitive to the level of dissolved oxygen, indicated maximum potential (IM=0.828).

Ichthyofauna ranged within the limits of good potential (IM=0.828).

Zoobenthos Potential

The zoobenthos was diverse, consisting of representatives of the following taxonomic groups: *Hydrachnidia*, *Oligochaeta*, *Isopoda*, *Gastropoda*, *Ephemeroptera*, *Trichoptera*, *Plecoptera*, *Coleoptera*, *Odonata* and *Diptera*.

At Lăpușel, the saprobic index was type β, without exceeding the threshold for good potential (IS: 2.17-2.56). The representation of Ephemeroptera and Trichoptera, as well as of Oligochaeta and Chironomidae species depends on the level of organic impurity. In this case, the development of Ephemeroptera and Trichoptera species was higher during the first two harvesting campaigns, and it was favoured by the slightly lower saprobic index (IS_{April/July}: 2.21/2.17) which coincided with larvae hatching (I_{EPT}_{April/July}: 42.256 / 68.93% maximum potential).

At Bușag, the saprobic index was very high, exceeding the threshold for good potential (IS: 2.81-3.48- moderate potential). The benthonic community was mainly limnophilic, and Oligochaeta and Chironomidae species registered the highest levels of abundance (I_{OCH}: 93.54-94% moderate potential; I_{Reo}: 91.94- 94.76 moderate potential).

The zoobenthos ranged within the limits of good potential (IM=0.678).

Phytoplankton Potential

Species of the following subkingdoms were identified: *Bacillariophyta*, *Euglenophyta*, *Cryptophyta*, *Chlorophyta*, *Chrysophyta* and *Cyanophyta*, and diatoms dominated (88.24-94.4% maximum potential). Plankton associations were very diverse, both in terms of taxon density and Simpson index, with both parameters maintained within the range of good potential. The saprobic index was type β, good potential (IS: 1.93-2.246). Chlorophyll "a" concentrations were not exceeded.

Phytoplankton quality was maintained within the limits of maximum potential (IM=0.952).

From a **biological perspective**, the potential of the body of water was **good**.

b. General physico-chemical elements.

The parameters monitored indicated maximum potential according to the specific indicators for the group "acidification status"; good status for the indicator "salinity" and moderate potential for the indicators "oxygenation conditions" (CCOCr= 36.5mg/l) and "nutrients" (NH₄= 0.9705mg/l), which determine the classification of the body of water.

The status assessment according to the general physico-chemical elements which determine the classification of the body of water indicated **moderate potential**.

c. Specific Pollutants.

All specific indicators monitored in the group "specific pollutants" indicated **maximum potential**.

d. Integrated Ecological Potential Assessment

The ecological potential of the body of water recorded in 2016 was **moderate**, and it was determined based on the values for the *biological elements* registered during the year.

3. Chemical Status Assessment.

Priority substances monitored in 2016 indicated non-compliance with the quality standards for the maximum values registered for the indicator Cd diz. (2.25µg/l) which determines the status of the body of water.

The body of water was assessed as **bad chemical status**.