

QUALITY DEGRADATION ISSUES REGARDING HYDRO TOURIST RESOURCES FROM ARIEȘ CATCHMENT AREA UPSTREAM OF BURU

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ABSTRACT. Quality degradation issues regarding hydro tourist resources from Arieș catchment area upstream of Buru. monitoring of hydro tourist resources is ensured by a dense network of hydrometric stations and checkpoints aimed strictly on specific quality aspects. For underground waters there are three water quality monitoring sites, two of them aimed at karst springs, and the third provides data collection for determining physical and chemical parameters of Bulz underground stream of Huda lui Păpără Cave. The only indicator of pollution are chloride, definite proof of a domestic pollution in discharges The situation is explained by the presence of Poieni Valley and Ponor village across the Cheia basin.

Keywords: aesthetic degradation, underground drainage, vulnerability, pollution

1. Introduction

Qualitative peculiarities of the rivers, with reverberations in tourism, refers primarily to aesthetic issues and less in terms of actual chemical composition (Băținaș, Sorocovschi, 2011).

The first visual impact in a confrontation of tourist "supply and demand", which has rivers the main concern, is given by the presence of floating waste or sweepings trapped in vegetation from the river banks (Fig. 1.). Also the existence of unnatural scents and inadequate color of water are keeping away the potential tourists.

The chemical composition of water causes the development of leisure tourist activities represented by angling. It is known that intense water pollution, from this point of view, can lead to the



Fig. 1. Sweepings trapped in vegetation from Arieș river banks (after <http://www.aico.ro/wp/blog/2010/04/10/doar-despre-fraieri-iv/>)

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2. Rivers

Regarding toxic and special indicators the analysis revealed an increased degradation of the main rivers: Arieș, Abrud, Iara, Roșia, Valea Șesei.

Category includes heavy metals (high remanence), cyanides, detergents and phenols. According to the correlation between biochemical oxygen consumption (CBO₅) and harmful effects of heavy metals, manifested by attacking organic substances, was established the following order of decreasing toxicity: Hg>Ag>Cu>Cd>Pb>Mo>Fe (Bătănaș, 2010).

Increased degradation of water quality on toxic and special indicators is a direct consequence of pollutant discharges resulting from mining activities in Munceii Roșiei. Degraded areas are: Arieș – section Câmpeni-Buru, Abrud, Roșia Montană, Valea Șesei and the lower flow of Iara (see fig. 3.).

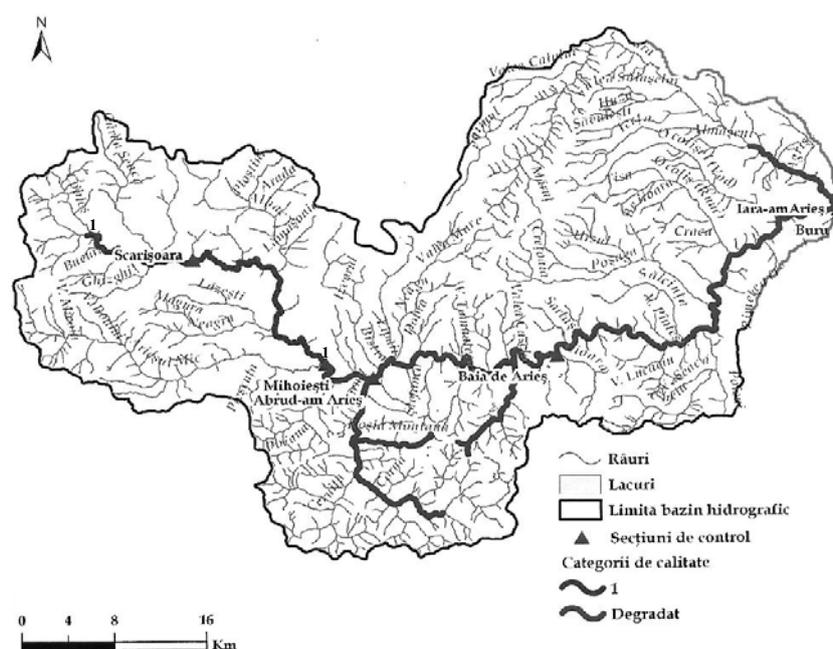


Fig. 3. Distribution map of toxic and special quality categories of Arieș catchment area upstream of Buru (modified after Bătănaș, 2010)

Natural result, but unwanted one, is affecting the organisms inextricably linked to those water resources: fish fauna, ornithofauna. The entire food chain receives harmful substances whose effects are perpetuated over time, causing even

somatic changes. Restricting the area for recreational tourism activities, especially fishing, is dramatic. The only favorable sectors for this form of tourism is limited to the tributaries of Arieș where there are no harmful human activities (forestry and primary wood processing, mining, wastewater disposal, industrial wastewater discharge points): Cheia, Albac, Poșaga, Arieșul Mic, etc. In Arieș, the only sector that is felt not chemical pollution is located upstream of Mihoiești, possible drawback consisting in a certain degree of visual degradation.

But the qualitative features of the Arieș river basin refers primarily to aesthetic issues and less on the actual chemical composition. This account is the first objective to be achieved when you want a river sector to be capitalized in terms of tourism. According to morphometric, morphological and quantitative indicators, the most relevant stream that can be tourism exploited is without doubt, Arieș. Instead, the negative visual impact due to the abundance of floating or suspended elements in vegetable borders of the banks (waste, mostly plastic), cancels to a large extent, this approach. According the distribution of river sectors, strongly degraded in this respect, the situation is as follows: Arieș, Mihoiești-Buru sector; Arieșul Mare, Arieșeni-Mihoiești sector; Arieșul Mic, Avram Iancu-Mihoiești sector; Abrud, Abrud-Câmpeni sector (Fig. 4.).

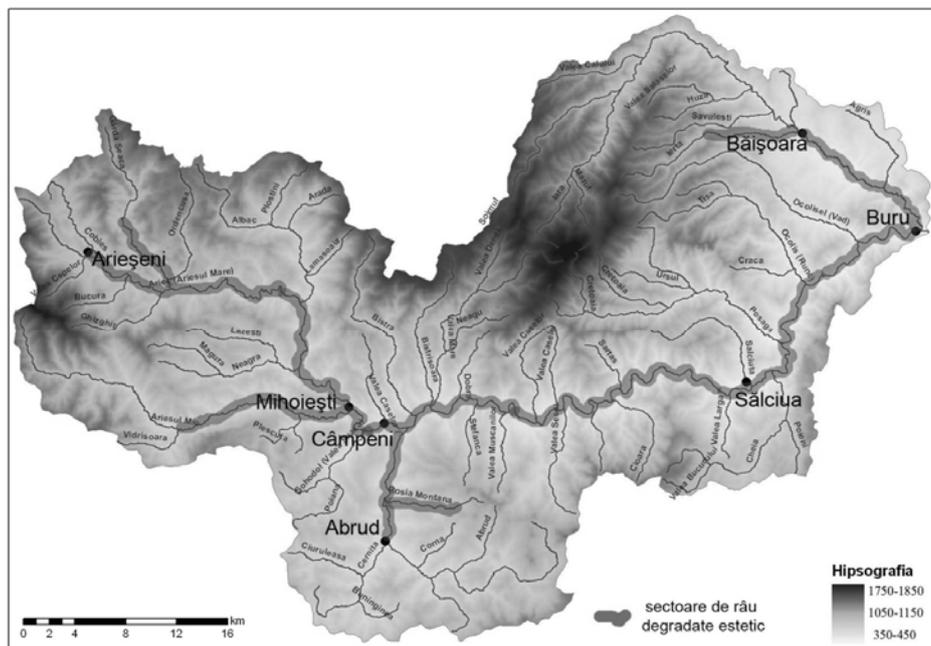


Fig. 4. Distribution map of aesthetic degraded rivers sectors - Arieș basin upstream of Buru

3. Underground waters

Into the studied area the main hydrogeological unit is located in highlands of Bihor Mountains and Muntele Mare Massif, mountains composed by crystalline schist, granite, eruptive Mesozoic, Mesozoic limestone, dolomite, marls and Paleozoic shales. This unit does not form a phreatic layer itself, but the water seeps through the soil layer, flow through rock cracks, temporarily accumulated in deluvia deposits. Among all these, there is a subunit of limestone formations, quantitatively important.

Groundwater bodies have emerged in the Triassic and Jurassic limestone deposits belonging to Gârda Seacă basin, where they were outlined three major aquifers. Related to carbonate deposits, but this time belonging to Paleozoic crystalline limestone, are detected two most representative areas: Poieni Plateau and the aquifer from Vulturese Ridge (Fig. 5).

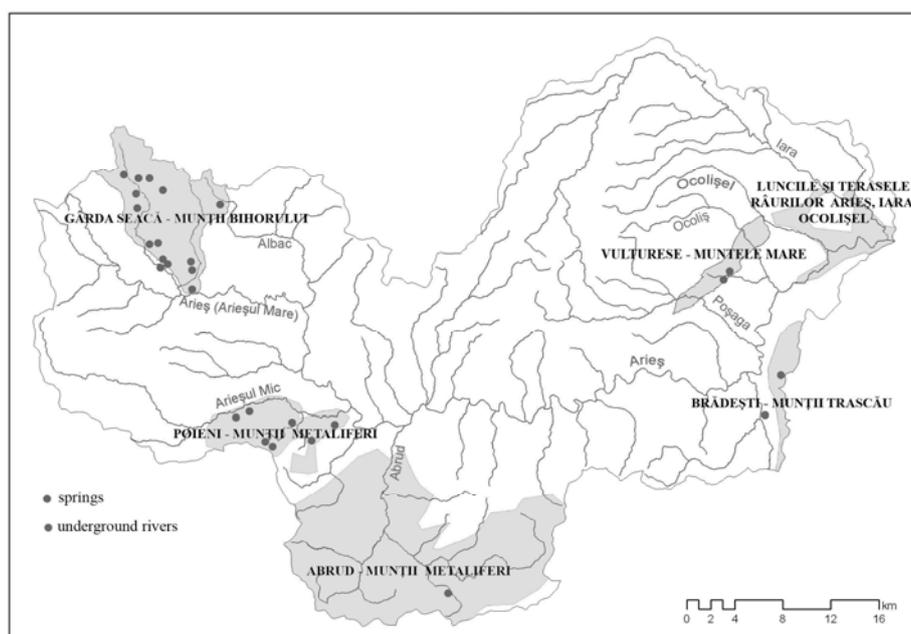


Fig. 5. Distribution map of the main groundwater bodies and the related hydro tourist resources - Arieș basin upstream of Buru

The main groundwater bodies of the analyzed basin are: Gârda Seacă- Bihor Mountains, Poieni – Metaliferi Mountains, Abrud – Metaliferi Mountains, Brădești - Trascău Mountains, Vulturese – Muntele Mare Massif, floodplains and terraces of Arieș, Iara and Ocolișel.

In the catchment area of Arieş upstream of Buru, karst springs are representative: outlets category, fewer in number are emerges.

An inventory of springs in the studied region is ongoing. For Valea Cerbului Spring and Valea Dolii Spring there are physical-chemical data from samples taken in July 2009.

Underground rivers and lakes are linked inextricably to the great karst systems, the most relevant are located in Ocoale – Scărișoara karst plateau and West side of Bedeleu Massif from Trascău Mountains, Vânărtara – Huda lui Papară (Fig. 6.).

In terms of composition, for Bulz underground stream water of Huda lui Papară, general chemistry do not deviate from the typical situations in carbonate karst, predominant cations are Ca^{2+} and Mg^{2+} , and dominant anion, HCO_3^- . Regarding the chloride (Cl), another indicator of pollution, one sample was taken in November 2009, and the value is 4.5 mg/l. (Table 1.).

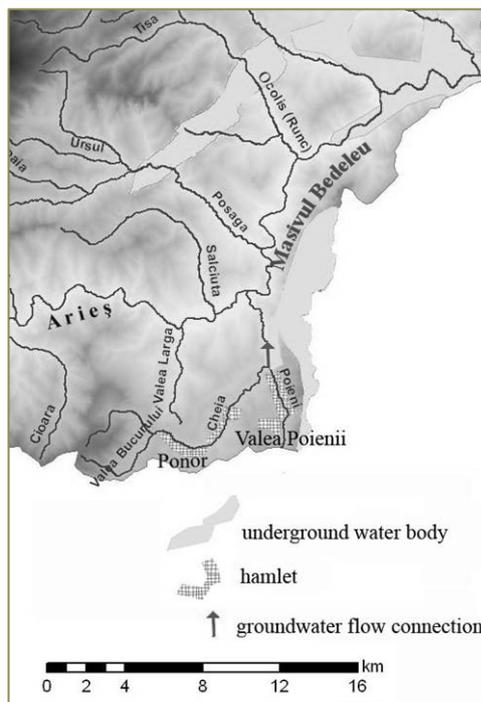


Fig. 6. Vânărtara – Huda lui Papară karst system

Table 1. Values of Ca^{2+} , Mg^{2+} , HCO_3^- and Cl^-
(after Administrația Bazinală de Apă Mureș, 2009)

Nr. crt.	Chemical indicators	UM	Data					
			02.02	07.04	16.06	03.08	06.10	09.11
1.	Chloride	mg/l						4,5
2.	Calcium	mg/l	51,2	46,4	57,6	52,8	59,2	40
3.	Magnezium	mg/l	1,92	8,64	5,76	8,64	5,76	3,84
4.	Bicarbonates	mg/l	164,7	183	165,9	197,6	195,2	129,3

The appearance of values over 1 mg L⁻¹ concentration draws attention to a very probable groundwater pollution with waste discharges (situation due to the presence of hamlets in the Cheia basin: Ponor, Valea Poieni).

In this karst areas, the soil provides a weak protection to the karst aquifer, being easily and frequently by-passed by the permanent or temporary flows, while

the karst network is very well developed (Orășeanu, 2010). In the considered area, the vulnerability of the karst aquifer is extremely high (Fig. 7.).

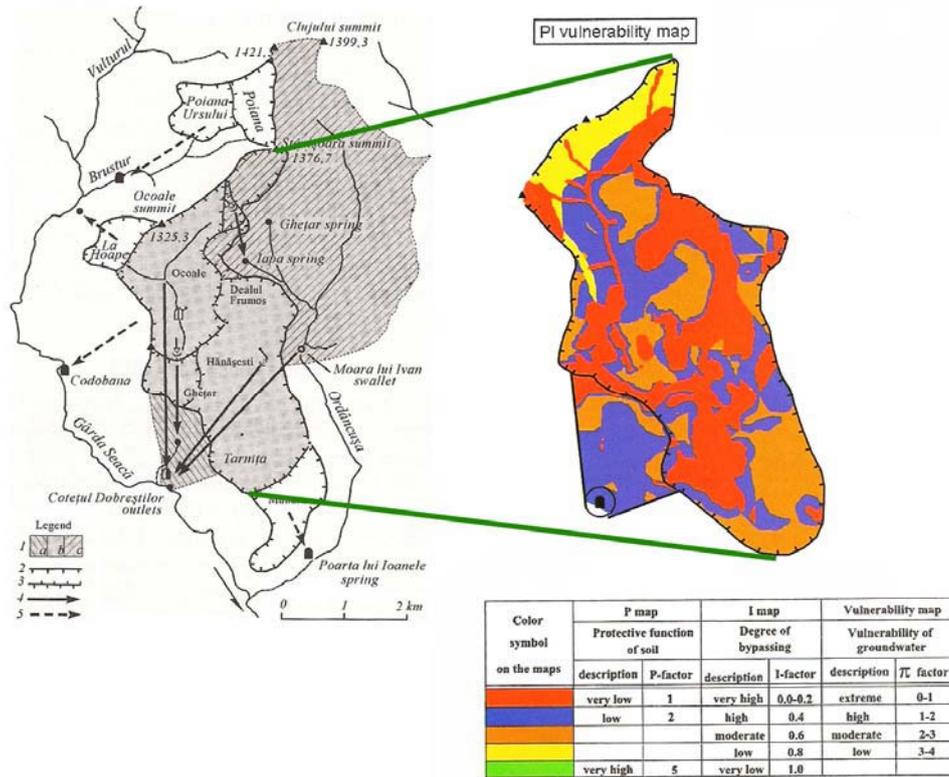


Fig. 7. Vulnerability map of Cotețul Dobreștilor karst aquifer (modified after Orășeanu, Parichi, Scărădeanu, 2005)

4. Conclusions

Quality deterioration of the Arieș river, especially downstream of Câmpeni, includes all levels considered to delimit the sectors that could fall within preoccupations of tourist interests: visual, physical-chemical, organoleptic.

The catastrophic pollution dimensions of the Arieș river cause the futility of any recovery efforts in the interest direction. Some initiatives of ONG's cannot replace a legal framework and lack of application, a direct consequence of the general depreciation of society.

Huda lui Papară's underground river submit to universal laws that govern the flow of a liquid, the only difference between this and an epigeic stream, except key or canyon sectors, being the absence of the major bed, whose purpose is to dissipate a fraction of the energy rate in flood water.

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