

**THE CLASSIFICATION OF MINERAL WATER SPRINGS
IN THE SOUTHERN PART OF THE HARGHITA
VOLCANIC MOUNTAINS, ROMANIA, THE AREA OF
LĂZĂREȘTI PARISH, AND THEIR INTRODUCTION IN
THE TOURISM CIRCUIT ACCORDING TO THEIR
THERAPEUTIC PROPERTIES**

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ABSTRACT

This study is meant to reveal the variety and role of the hydro-mineral resources from the southern sector of the Harghita Volcanic Mountain chain and emphasizes the sustainability of a territory with a poorly developed and diversified economy, which shows a high rate of unemployment and an aging process and a high value of immigration among the young generation. This volcanic region of the Eastern Carpathians is justly considered a magnificent place with special powers. The numerous mineral water springs [2], [3] from this area prove the interest of the local communities to put to good use these natural resources [1], [9].

Within the region of Lăzărești parish 64 mineral water springs were identified [3], and only one of them is salt water spring [1], all the others have a different composition. Lăzărești settlement has the highest number of mineral water springs in this Neogen volcanic mountain chain – 64 [3], the area is being referred to as the "Oasis" of mineral waters. The mineral waters and the moffetta from „Nyír” (birch) Baths is of international fame. The local population, especially the elders, confirm that a couple of decades ago there were more than one hundred mineral water spring in the area. Their disappearance is a direct consequence of agricultural development, and of the new techniques of cultivating crops and managing the pastures and meadows. The locals switched from manual labor and animal power to mechanized technologies. The technological development and human neglecting of the mineral water resources changed, although these were constantly used and played an essential role in the community's life. Besides these aspects we need to mention the rise of the phreatic waters and appearance of marshlands, erosion and the spread of secundary vegetation.

For the analysis of the waters we proceeded with their chemical and mineral composition and their content of gases, respectively for their classification we chose only five springs. Three are widely known and in use: „Büdös”, „Nagy”, „Cigány”

(Stinking, Big, Gypsy). A spring wish is known under the name of „Fűrész” (Saw) (rehabilitated in 2017) which is often used by shepherds, being close the sheepfolds. The last one will be the salted - ”Sós” (Salted) - spring which is only known and sporadically used by the elders.

Keywords: *Lăzărești, Harghita volcanic chain, mineral water springs, rural and ecotourism, spa and treatment.*

INTRODUCTION

The volcanic eruptions ceased by the end of the Pliocene and beginning of the Quaternary ages in the Harghita Mountains. The geologists consider that in the southern part they ceased in the Quaternary age. The volcanic activity is active until the end of the Mid Pleistocene or even Superior, in the northern part of the Harghita Mountains the eruptions ceased earlier according to [5], based on the andesite pyroxene formations from the Harghita crater are the youngest lava rocks from the region. The last eruptions in the northern Harghita Mountains did not reach the limit of the Pliocene-Quaternary phase [6]. According to him, after the eruptions ceased the aspect of the Harghita Mountains hasn't change much on a large scale; the ten volcanic eruption sites created a continuous chain, and their altitudes were just a bit higher than those of today. Certainly some of the massive collapses affected some volcanic craters, others are still undrained, and the volcanic plateau in the western part of the mountain chains extended on a much larger area westwards and southwestwards. After the eruptions ceased, the post-volcanic activities continued to reflect the presence of the magma through cracks in the Earth's crust through: thermal water springs, mofettas, fumaroles [6], [7] geyseric manifestations, fumaroles from the Cucu crater, hydrothermal springs (at present in Băile Tușnad and Vlăhița settlements). Today we can find mofettas in Sântimbru Băi, in the crater of the Saint Ana Lake [6], in the Băile Harghita and Băile Tușnad, Puturoasa (Stinking) Cave, Lăzărești parish (Baia „ Nyír” (birch) Bath and Puturoasa (Stinking) Valley) [1], [3], [6], [8].

The Harghita Volcanic Mountain region is considered especially by those who come from further away, as a place of wonders, with special healing powers. The numerous mineral water springs described by [2], [3], [4] in this region shows the interests and involvement of the local communities to put to good use these resources [1], [9].

In the international literatures the Harghita Mountains are renowned for the high number of mofettas [8], especially in the southern part of the volcanic chain. Their chemical composition and degree of mineralization made them worldwide known as very productive hydrogeologic deposits [10] and with very strong curative powers [1]. According to geomorphologists these are young formations [6] but comparing it to human lifespan they represent ancient volcanic landscape, regardless, they represent the heart of the region. The Ciomad Mountain is the southernmost point of volcanic eruptions. Here is registered the highest evaporation rate of the carbon dioxide [3].

The residents call the mofettas “stick holes” which can be carbon dioxide baths (like the mofetta in Băile Tuşnad), or of hydrogen sulfide bath (like the mofettas from Lăzăreşti called Baia „Nyír” (birch) Bath). They have an unpleasant stench, similar to rotten eggs, and this is why the locals call them “stink holes” [1].

The mineral water springs appear in a vast number in the Harghita Mountains [6], especially in the southern region and they extend to the neighboring areas as well, like in the Ciuc Depression.

DISCUSSION AND RESULTS

Lăzăreşti village is located in the south-east of the volcanic mountain chain, in the south of the Inferior Ciuc Depression, and is in the north-east of the Ciomad Volcanic Cone. The parish possesses a large variety of natural resources: volcanic craters of Saint Ana Lake and Mohoş peat bog, volcanic cones, mineral water springs, mofettas, etc. Also possesses a large variety of anthropic resources, which are worthy to be presented and studied respectively the wealth and beauty of volcanism and post volcanic phenomena.

Within the village, according to the researches done by the geologist Csaba Jánosi there were sixty-four mineral water springs identified. One of them is a salt water spring, and although its flow rate isn't big, the salt within the water was used by the locals for the pickling of cabbage, for marinating bacon and it was used in cooking as well. At the moment a similar use has the salt water spring/fountain from Lueta, a settlement situated in the Harghita Mountains.

Lăzăreşti settlement has the most numerous registered mineral water springs within the Neogene volcanic mountain chain, sixty-four, according to [3], the area receiving the name “the oasis” of mineral water springs. The mineral water springs and the mofetta of Baia “Nyír” (birch) Bath justly carries the name of the settlement abroad. The elder residents remember that there were more than one hundred mineral water springs and wells. Their disappearance is explained by the agricultural development, of the new techniques used to cultivate the land and manage the meadows and pastures. The farmers don't use manual labor and animals to cultivate their lands. The application of new agricultural technologies and human neglecting towards the mineral water springs caused the disappearance of many, which were essential for the local population. Beside this aspect we need to mention swamping, erosion and the spread of secondary vegetation as well.

In order to establish the mineral composition and gas content of the mineral waters, there were taken samples from five springs presented in Table nr.1. The waters were analyzed in a specialized laboratory. There were taken samples from the three most well-known and utilized springs: „Büdös”, „Nagy”, „Cigány” (Stinking, Big, Gypsy) springs; a spring which is mainly used by shepherds named „Fűrész” (Saw) which was renewed in 2017 and the fifth spring, the “Sós” (Salted) water spring, which even today is mostly known by the elders and unfortunately is scarcely used today.

Table 1. Results of the physicochemical analysis of the mineral waters springs - Lăzărești

INDICATORS	SYMBOL	M.U.	“BÜDÖS” SPRING	“NAGY” SPRING	“CIGÁNY” SPRING	“FÜRÉSZ” SPRING	“SÓS” SPRING
Conductivity	-	μS/cm	821	830	1300	2350	13680
TDS	TDS	mg/l	411	416	650	1177	6840
Temperature lab.	T	°C	22,0	22,0	22,0	22,0	22,0
Ionic Concentration of hydrogen	Ph	-	5,64	5,70	5,85	6,06	6,54
Salinity	-	-	0,2	0,2	0,4	1,1	8,0
Free Carbon dioxide	CO ₂	mg/l	2288	2244	2332	1760	2614
Sulfurs	H ₂ S	mg/l	0,140	0,034	0,034	0,020	0,038
Hydrogen carbonates	HCO ₃	mg/l	567,3	597,8	951,6	1171,2	5294,8
Calcium	Ca ²⁺	mg/l	160,32	176,35	221,24	93,78	328,65
Magnesium	Mg ²⁺	mg/l	13,61	9,72	49,59	56,88	218,79
Iron	Fe _{total}	mg/l	13,9	41,5	13,2	5,9	7,4
Manga	Mn ²⁺	mg/l	3,3	2,8	2,1	0,868	1,40
Copper	Cu ²⁺	μg/l	<10	<10	<10	<10	<10
Dry Residues	-	mg/l	375	232	698	1224	9026
Total Mineralization	-	mg/l	668	543	1183	1809,6	11673

The classification of the mineral water springs and their therapeutic properties

Crenotherapy (cure by drinking mineral waters) for any gastrointestinal affections is recommended as internal treatment, as a medicinal curing method, with a high number of active well known elements, which manifest slowly and manifests later. The therapeutic springs exercise beside a local effect a general post absorption action which affect the metabolism of the minerals and that of the water itself [11].

The mineral waters can be used and marketed in **hydrotherapy** (external therapy with water), utilizing the proprieties of the waters, their benefic effects were noted even in ancient times. This would be an alternate method for treating locomotion affections, cardio-vascular or neuro-endocrine affections, etc. the mineral water presented in Table 1, according to [11] and [12] are: carbonated mineral waters, rich in bicarbonate-calcium-magnesium, iron and slightly alkalic („Nagy” and „Büdös” springs); carbonated mineral waters, rich in bicarbonate-calcium-magnesium, with sodium-chlorite, iron and highly alkalic („Cigány”

Spring); carbonated mineral waters, with sodium-chlorite, rich in bicarbonate-calcium-magnesium iron and highly alkalic („Sós” and „Fürész” Springs).

The recommended therapeutic properties of the „Nagy”, „Büdös” and „Cigány” springs according to Vancsa, G. – balneo physician, specialist at the Tourism Complex **Balványos Resort** (Băile Balványos, Covasna County, Romania), recommends through *Hydrotherapy* the treatment of the following affections:

- **Cardio-vascular diseases:**
 - Chronical ischaemic heart disease;
 - Sytemic atherosclerosis;
 - Disfunctions in arterial peripheral circulation – chronical peripheral atherosclerosis;
- **Locomotive diseases:**
 - Chronical rheumatism degenerative diseases;

Through *Crenotherapy* the same physician recommends treatment for the following affections:

- Gastroenterological diseases, chronical gastritis, gastroduodenal ulcer, transitory disorders - constipation;
- Chronical hepatobiliary disorders;
- Gout - hyperuricemia;
- Hypochromic anomalies;

For the „Sós” and „Fürész” springs, the recommendations of Vancsa, G., consist in *Hydrotherapy* for the following diseases:

- Diseases of the locomotor apparatus:
 - Degenerative chronical rheumatic diseases;
 - Orthopedic disorders, post operatory, post traumatic;
- Peripheral circulatory disorders of arterial origin

Crenotherapy is recommended for the treatment for the following disorders:

- Chronical gastrointestinal disorders;
- Chronical hepatobiliary diseases;
- Kidney diseases;
- **Metabolic diseases:**
 - Diabetes;
 - Gout;
 - Obesity;
- Inhaling – chronical diseases of the upper respiratory tract:
 - Chronical bronchitis;
 - Chronical rino-sinusitis in the unproductive phases;

CONCLUSIONS

The management and valorification of these natural resources through Spa-Tourism, especially through chrenotherapy, exclusively „Büdös” Spring from the „Nyír” (birch) Bath, which also can be used in hydrotherapy, because the waters of this spring are collected in a pool. Through ecotourism, rural tourism which will represent an important aspect for sustainable development of the settlement, which

has a scarce economy and a high rate of unemployment and present demographic aging and raised emigration among the younger generations.

These resources could significantly contribute to the increase of the tourism circulation and attractiveness for domestic and foreign visitors, who visit **Lăzărești** for a shorter or longer period of time, could beneficially affect the local economy, will lead to the diversification of accommodation facilities with tourism functions, and catering diversification. By this the tourism infrastructure will develop which will favor the increase of the standard of living of the local community by creating new job opportunities and a much more secure lifestyle at home.

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