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The Salt Water Spring from Micești. Organoleptic Characters

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Abstract

Multidisciplinary and interdisciplinary studies on salt, under its various forms of presentation (solid, liquid, natural or processed) show the importance but also the role of salt in food and in maintaining human and animal health. Significant salt reserves are recorded in Romania, in the hilly depression of Transylvania. The paper presents the salt water spring from Micești village, Cluj county. The working method was the observation and physico-chemical analyzes performed in the laboratory, with specific audit monitoring and compliance with laboratory standards. The recorded data show that the smell, taste and color of the analyzed salt water samples attract attention, but there are no significant differences in their intensity for the period 2003-2018. Among the solutions proposed for the conservation of this ecosystem would be those of integral protection of the ecosystem (possibly a nature reserve "Cheile Turenilor"), arrangement and capture of the spring, creation of a bank of microbiological studies, feasibility studies for attracting funds for development. research, promoting the area from a tourist, spa, scientific point of view and, last but not least, an ecological education adequate to the importance of the site.

Keywords: saltwater ecosystems, resource conservation, anthropogenic impact.

1. Introduction

The salt deposits in the hilly depression of Transylvania represent a remnant of the Sarmatian Sea, a sea that covered our country a few millennia ago. Due to the complex tectonic movements, over time, the salt grains migrated to the surface, due to the tectonic movements, of "turbulence" of the earth [19].

Currently, as a result of research conducted in this area by renowned specialists in the field of geology and beyond, it has been concluded that these resources would reach for human use for 5000-6000 years: "If we had oil resources comparable to those of salt, we would be the richest in the world" [17].

Given the importance of salt in the life of any human community, in recent decades studies have been conducted and published on the exploitation of salt in salt springs in our country [1, 17, 20, 21].

The fundamental studies, but also the interdisciplinary-applied ones regarding the salt resources, emphasize the importance of this resource in the human diet, in therapies for maintaining his health, for the animal nutrition, but also limitations for the plant culture.

Salt is thus studied in the multitude of its forms of presentation in the environment, respectively: salt in solid, liquid state; salt in its natural state, with impurities, processed salt, with different granulations, with or without additions of other substances.

For our country, we can mention in this sense the permanent interest for the exploitation of salt deposits at industrial level, organized, in salt mines such as Ocna Dej, Ocna Mures, Cacica, Târgu Ocna, Slănic Prahova etc.

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There is interest in saline treatment bases, such as Turda, Praid, Bazna, Ocna Sibiului, Ocna Sugatag. But at the same time, there is a lack of long-term, multidisciplinary research [3, 9].

Rehabilitation and modernization of cement production systems could significantly contribute to reducing greenhouse gas emissions. In this context, the analysis and synthesis of technological processes for cement production could provide a correct assessment of the level of emissions in this sector of activity and would allow the development of clear, timely and effective strategies for the adoption of the best technologies for environmental protection.

The purpose of this study is to analyze the technological process of cement production, at the level of the company Holcim (Romania) SA.

2. Material and Method

Tureni commune is located in the N-V part of the Transylvanian Depression, on the southern and south-western slope of the Feleac Hills, at a distance of approx. 23 km from Cluj-Napoca and 10 km from Turda. Currently, from an administrative point of view, this commune includes 5 villages: Comşeşti, Ceanu Mic, Mărtineşti, Miceşti and Tureni. In the village of Micesti there is the salt water spring that is the object of the present study [2, 9].

The relief of the area is predominantly hilly, the commune stretching from Peana Peak (833 m) to the Trascău Mountains. The hills are made up of sedimentary rocks and limestone. The rich salt deposits in Transylvania have been exploited since antiquity [17]

The village of Miceşti is located at an average altitude of 576 m and has been documented since 1297, under the name of "Pass Mikis".

What characterizes the area of Tureni commune compared to other areas are the explanations regarding the genesis of the spring from Micesti and the practices of exploitation of this salt water resource.

Figure 1 shows the natural setting specific to this locality.

The researches on the salt water spring from Miceşti Village have been done since 2001, in the local area called «Mărătoare» [18]. Figure 2 shows aspects of fieldwork, from 2001-2018.

Figure 1. Aspects of the field work (original)

Figure 2. Aspects of the studied field (original)

The determinations for the organoleptic and physico-chemical indicators for the salt water from the spring from Micesti were made in the biochemistry laboratory of the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, respectively the Faculty of Animal Husbandry and Biotechnology [10, 11, 13].

The working method was the observation and physico-chemical analyzes performed in the laboratory, with specific audit monitoring and compliance with laboratory standards [4, 5, 8].

The organoleptic properties of water (smell, taste, color), as well as many other substances, can be determined with the help of human sense organs. Therefore, in these evaluations, there may be a higher or lower dose of subjectivism [12].

Each indicator was determined respecting the working methods from the specialized literature [13].

The choice of working method complies with Law no. 458/2002 regarding the quality of drinking water, respectively the values provided in Annex no. 1-Drinking water quality parameters [7].

The method of analysis for smell and taste complies with SR EN 1622-97 [14].

The color analysis method complies with SR ISO 7887-97 [15].

The analysis method for pH units complies with STAS 6325-75, respectively SR ISO 10523-97 [16]. Given the universal importance of the physico-chemical indicator pH, for each sample of water collected was determined the pH.

The analysis of the results was made taking into account the normative values in our country for drinking water. We mention that the Laboratory Norms respect the Norms of the European CEC commission, respectively the Norm 24-01-2005.

During the collection, transport of samples and laboratory analyzes, the Labor Protection Norms, respectively the provisions of Law 319-2006 were observed [6].

This paper presents results for indicators on drinking water quality, indicators regulated by Law 458/2002, updated [7].

3. Results and Discussions

The results obtained in the research are summarized in tables and graphs, as follows.

3.1. The smell of water

The smell of water is determined by the presence of natural substances, derived from chemical transformations of dissolved substances or substances derived from polluting processes.

The odor was identified by comparison with a known odor, such as that of hydrogen sulfide (H_2S), fish, puddle, mold, stinging, aromatic, odorless, indefinite, etc.

The intensity of the smell was established according to these criteria. Thus, the smell of water can be called: odorless, very faint, noticeably pronounced, very pronounced.

Table 1. Degrees of intensity for the smell and taste of salt water [14]

No.crt.	Smell or taste	Characterization	Degree of intensity
1	Absent	Inodorous	1
2	Perceived by an experienced researcher	Very weak	2
3	Perceived by the warned consumer	Weak	3
4	Slightly perceptible and may cause adverse reactions to water	Perceptible	4
5	Strong, it attracts attention and makes you give up drinking water	Strong	5
6	Very strong, makes the water unsuitable to drink	Very strong	6

Table 2. Results concerning the smell of analyzed water samples [14]

No. sample	Origin/meteorological conditions	Smell	Characterization	Degree	2003	2009	2018
1	Micești spring, clear sky	Easy perceivable	Strong	5	4	5	6
2	Micești spring, cloudy, rain and wind	Strong, of salt water	Strong	5	4	4	5
3	Micești spring, clear sky	Strong, of salt water	Very strong	6	5	5	6

The recorded data show that the smell of salt water samples is intense, attracts attention, but there are no significant differences in the intensity of the smell for the period 2003-2018.

3.2. The water taste

The taste of water is given by the substances contained, respectively mineral salts and dissolved gases (O_2, CO_2, etc.).

If these substances and gases are present in too much or too little in the water, it determines the perception of an unpleasant taste, respectively bland, bitter, sour, sweet, sweet-sour, salty taste.

Table 3. The taste identified in analyzed salt water samples [14]

No. sample	Taste	Characterization	Degree	2003	2009	2018
1	Absent	Inodorous	1	-	-	-
2	Perceived by an experienced researcher	Very weak	2	2	2	2
3	Perceived by the warned consumer	Weak	3	2	3	3
4	Slightly perceptible and may cause adverse reactions to water	Perceptible	4	-	-	-
5	Strong, it attracts attention and makes you give up drinking water	Strong	5	-	-	-
6	Very strong, makes the water unsuitable to drink	Very strong	6	-		-

Table 4. Results concerning the taste of the collected water samples [14]

No. sample	Origin/meteorological conditions	Taste	Characterization	Degree	2003	2009	2018
1	Micești spring, clear sky	Perceivable by consumer	Weak	3	2	3	3
2	Micești spring, cloudy, rain and wind	Perceived by the warned consumer	Perceivable	4	4	3	4
3	Micești spring, clear sky, without wind breeze	Perceived by the experienced researcher	Perceivable	4	4	4	3

The recorded data show that the taste of the analyzed salt water samples attracts attention, but there are no significant differences in their intensity for the time interval 2003-2018.

In general, the values of organoleptic indicators can register variations between certain limits due to the natural variation of some influencing factors, such as:

- concentrations during dry periods;
- dilutions during rainy periods;
- disturbing variations of some biotope factors (temperature, humidity);
- anthropically modified substrate.

3.3. The water colour

The color of the water can give valuable indications on the change of its quality. Thus, for example, waters containing colloidal clay have a yellow-brown color. The following table shows the results of the field determinations.

Table 5. Results concerning the colours of the collected water samples [15]

No. sample	Origin/meteorological conditions	Color	Sample	2003	2009	2018
1	Salt water Micești spring	Yellowish	Sediment occurence	Yes	Yes	Yes
2	Salt water Micești spring	White - yellowish	Sediment occurence	Yes	Yes	Yes
3	Salt water Micești spring	White - yellowish	Sediment occurence	Yes	Yes	Yes

It is known that the spring from Micesti appears on a calcareous substrate, which influences the color of any water source.

The recorded data show that, by comparison between the collected samples, there are no significant differences regarding the color of the water at the time of their collection.

3.4. The pH units

pH is the measurement of the activity of hydrogen ions, respectively of their concentration in an aqueous solution.

This indicator can be determined by different methods and with different degrees of accuracy.

For example, you can use the colorimetric method, the indicator paper but also high-precision electronic devices, usually called pH-meters.

The pH values recorded for the salt water samples collected from Micești are presented in tabular (Tables 6).

Table 6. Results concerning the pH of the collected water samples [16]

No. sample	Origin/meteorological conditions	Color	2003	2009	2018
1	Salt water Micești spring	Yellowish	8.5	8.6	9.2
2	Salt water Micești spring	White - yellowish	8.7	8.8	7.8
3	Salt water Micești spring	White - yellowish	9.2	9.1	8.6

As can be seen, there are slight differences for this indicator, due to a combination of factors, including:

- Working accuracy of pH meters used over time (years 2003, 2009, 2018),
- The moment - from a climatic point of view - when the samples were taken;

The differences recorded are in the range [0.1-1.0.7] pH units. We appreciate that the recorded values are relatively homogeneous, constant and, most likely, specific to the season.

As there is no national reporting methodology for natural salt water, compared to the standard pH for drinking water, we can say that the pH values are within the limits allowed by Law 458-2002, ie they are in the range of 6.5-9 ,5.

A natural richness of the place is also represented by the mud around the spring. Brief studies show that the mud from Micesti has curative properties compared to those from Durgău (Turda), Techerghiol or the salt water springs in sub-Carpathian Moldova [1].

The studies on the salt water biome from Micești were carried out between 2003-2018 and aim to promote in an ecological way, monitoring, conservation and use of natural resources here: water, salt, mud.

Among the measures proposed in this regard, we mention:

- conservation of these natural resources;
- their adequate monitoring;
- promoting the area as a tourist area;
- promoting the area as a natural site for research;
- research on its sapropelic resources.

4. Conclusions

Data from the literature on ecosystems that include salt water springs in our country are relatively poor.

The Micești salt water spring is part of a natural ecosystem, which is constantly changing. Naturally, it follows the successions of the seasons, of the biotope factors and has its own evolution.

In the current conditions of protection and capitalization of natural resources, a new ecological niche is outlined, that of the salt water springs studied within the local ecosystems. Only on the basis of such research can salt resources be fully exploited, in accordance with current ecological-economic regulations.

Among the solutions proposed for the conservation of these ecosystems, the ones of integral protection would be priority, respectively:

- protection of the local ecosystem (in this case possible a natural reservation "Cheile Turenilor");
- arrangement and/or capture of springs;
- detailed analyzes in order to use the sludge in the vicinity in different forms;
- creation of a microbiological database with a role in prediction;
- conducting studies to attract funds for the promotion and sustainable development of the identified ecological niche;
- adequate ecological education.

Based on the data presented, it can be stated that, so far, there are no significant differences, seasonal, annual or lasting, regarding the organoleptic characteristics of the salt water from Izvorul de la Micești, Cluj County.

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