

THE BALNEOTOURISTIC POTENTIAL OF THE MINERAL WATERS FROM THE NORTHERN PART OF ELONGATED BASIN (DRĂGOIASA-GLODU-BILBOR-BORSEC-CORBU-TULGHEȘ) AND THEIR CAPITALIZATION

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Abstract

The Drăgoiasa-Tulgheș Flume represents an entity with a specific geographic-touristic personality, that has an important hydrogeographic potential, poorly capitalized at the present moment, represented by the hydromineral resources from the Căliman-Harghita mofette reservoir, where ever since the 16th century there has been a so called „*mineral water civilization*”. Therefore, the mineral waters that exist here have lead to the development of a certain type of set up and a certain type of tourism, *the spa tourism*, seen as a „*journey*” made for treatment, recovery or preventing ailments, for people with functional problems, for relaxation, recreation and wellbeing, through therapeutic treatment.

Keywords: mineral waters, borcut, borviz swamps, the Căliman-Harghita mofette, spa tourism.

1. INTRODUCTION

The Drăgoiasa-Tulgheș depressionary alignment is a well defined geographic unit, whose shape is that of a narrow and high depressionary passageway, made up of string of small depressions (Drăgoiasa, Glodu, Bilbor, Secu, Borsec, Corbu and Tulgheș), situated in the Central group of the Eastern Carpathians, where the *crystalline-Mesozoic* area of the Bistricioarei Mountains (to the east) and the *Neogene eruptive* of the Căliman Mountains (to the west) meet. This suspended intramountainous depressionary compartment is the middle area that connects Dornelor Depression with Giurgeu Depression, its margins being flanked by the Căliman Mountains to the west and north-west, by the Giurgeului Mountains to the south-west, Hăghimaș and a bit of the Ceahlău Massif to the south-east, and Bistricioarei Mountains to the east.

The mineral waters from the analysed territory are part of the northern sector of the Căliman-Harghita mofette, comprising the springs from the Dornelor Area (mineral water springs at Păltiniș, Drăgoiasa and Glodu) and those from the Bistricioara Basin (Bilbor, Borsec, Corbu and Tulgheș).

From the detailed analysis conducted on the entire territory, a number of 43 mineral water sources were surveyed, most of them being *bicarbonated, calcic, magnesian carbogaseous*, sometimes *sulfurous, iron* and *mildly radioactive* (see figure 3). The intent of this study is to create a clear picture of all the mineral water sources that exist at this moment in the area, since, due to the many drillings in the surrounding area and to the lack of maintenance, some no longer exist today (Tofan, 2013).

Once the correlation with the reality in the field is completed, it is extremely important to indicate some clear solutions for a better capitalisation from an economic and pharmaceutical-dynamic point of view.

2. METHODS

The first steps regarding the identification, chemical analysis and complex hydrogeological research on the geology of the reservoir and water mineralization were conducted in the Bistricioara Basin by the geologist *I. Atanasiu*, and then continued by the Geology State Committee under the guidance of *E. Davidescu* and *A. Pricăjan*, who have conducted, starting in 1953, a series of hydrogeological surveys in the Dornelor Area and in the Bistricioara Basin.

We can also mention the research conducted by *Selényi Zsuzsanna Szabo* and *M. Székely* (1961), who assessed the main chemical characteristics of the mineral waters from Bilbor; *E. Goliță* and *Natalia Goliță* made a report on the hydrogeological surveys for the mineral waters and the mofettes of the Panaci-Șaru Dornei Area (1964); *Preda & Toderiță* (1978) studied the mineral waters of the Hăghimaș-Tulgheș Mountains; *Preda & Vulpe* (1979) published a preliminary report on the mineral waters of the Drăgoiasa-Panaci-Șaru Dornei-Vatra Dornei region. Further important information concerning the mineral waters of the Drăgoiasa-Tulgheș Flume can be obtained from the works of *A. Pricăjan* and *Șt. Airinei* (Tofan, 2013).

Unfortunately, the research of these resources has always been neglected, with the exception of Borsec, that has been capitalized ever since 1594.

For the rest of the territory, only in 2000 a series of physical-chemical and microbiological analyses were made, at the Larex and Frasenius Laboratories in Germany, for the Păltiniș and Șeștina mineral springs (Bilbor), analyses that revealed the quality of these sources, such as the natural carbon dioxide, the high potassium content, essential for the health of the human body, the lack of nitrates, as well as a balanced ratio of calcium and magnesium. In the same period, in Tulgheș, at the initiative of an engineer from *Romaqua S.A Borsec*, with the support of „*Carpathian Foundation*”, chemical analyses were made for some of the more important mineral springs in the area, with their touristic capitalization in mind, excluding however their bottling, due to their very low flow (after <http://www.romaqua-group.ro/> and <http://www.bilborwater.ro/>)

Therefore, besides an updated survey, it is important to find sound solutions for a better touristic capitalization, without neglecting the environmental component, by protecting these sources from negative factors like pollution, because many springs are unattended, and do not correspond with the technical-sanitary regulations. According to the results of previous bibliographical research, within the analysed space, there are a series of mineral springs that no longer exist today, due to drillings in the adjacent areas or due to abandonment, which makes these resources even more rare.

In 2005, the Harghita County Council, through the Decision no. 162/2005, approved a list of existing mineral springs within the county, but without any correlation with the real situation in the field, mentioning several springs that no longer exist (Tofan, 2011 b).

Therefore, this study tries to present an exact situation of all existing mineral sources, within the Drăgoiasa-Tulgheș Flume.

Within the Bistricioara Basin, almost every tributary has its own mineral spring. From the point of view of the morphological units in which they appear, the mineral springs can be divided into: the springs from the Drăgoiasa, Glodu, Bilbor, Borsec depressions and the springs of Corbu and Tulgheș, from the valleys of Bistricioara and Putna and their tributaries.

3. RESULTS AND DISCUSSION

On the territory of the three villages that are part of Panaci commune, Suceava County, three mineral springs have been surveyed. The first one and the most important is the one in *Păltiniș*, where 417 physical-chemical and microbiological analyses have been made, every time proving its purity. Today, it is brought through an underground pipe to Coverca, where, in 2010, a mineral water bottling plant was built (*Aqua Carpatica*). The other two held in fir tubs (*știube*) can be identified in Drăgoiasa, in a spot locally known as „*Bolovăniș*”, and another one downstream of Gura Glodului hamlet, Glodu village.

Most of the springs here are rudimentary captured and used by local people only during summer, because they are very far from the base of the depression.

All these springs have some common properties, which are: low temperature (7-10°C), high content of carbon dioxide, low total mineralization (up to 5g/l salts), as well as no nitrates, like the mineral spring in Păltiniș (Preda & Vulpe, 1979).

Within the Bilbor Depression, the mineral water springs are situated in the western part of it, on the right side of Bistricioara, in a relatively small area, where we can find 15 springs, mostly held in fir tubs or concrete tubes.

Most springs have been named after local people that contributed to the care of these hydromineral sources. The most important are: *Simion Lungu*, *Șeștina*, *Iacobef*, *Truța*, *Raita*, *Vâlcănești* (where there are three mineral water springs), *Borcut* and along the Bistricioara Valley in the area known as *Hurubă*, spread on 300-400 m² one can find carbogaseous mineral waters springing from a travertine outgrowth.

It is important to know that at one of the six springs in Hurubă, situated at approximately 100-150 m from the main spring, there is an interesting phenomenon, named by the locals „*the death of birds*”, which can be explained by the high emissions of CO₂. The *Paharul*, *Șașcă*, *Hangan*, *Stan Ion*, *Bici*, *Ion a Nichitei*, *Albu* springs disappeared due to drillings in their vicinity (Pricăjan, 1972).

The Simion Lungu mineral water spring is the only one that stands out in terms of continuity and higher intensity of CO₂ emissions, which manifests itself through the „*noisy water boiling*” (see figure 1).

Even though the area of the spring „boils” because of CO₂, the water has little mineralization, the mixture with CO₂ taking place close to the surface and not in depth (Tofan, 2011 a).

The mineral waters that exist here are bicarbonated, calcic, magnesium carbogaseous, characterised by a high content of free CO₂ (1.3-2.1 g/l) and a total mineralization of 3-7g/l.



Figure 1. The Simion Lungu mineral spring (G. B. Tofan, 2011 a)

A characteristic of the Bilbor mineral waters is their high flourine content, which exceeds the content of the other mineral waters from the region and in the country (3.98 mg/l). This high flourine content explains the low frequency of dental cavities for the people that drink it.

Within Borsec Depression we find the most important hydromineral deposit, that distinguishes itself through 14 natural sources and 5 medium depth wells.

This deposit, used ever since the 19th century, for spa treatment, and also for bottling, earned its status especially due to its high concentration of free CO₂ (over 2.5 g/l) (after Pricăjan, 1972).

In recent years, according to some analyses, a decline in the content of CO₂ has been observed, so the bottled mineral water is currently artificially enriched with CO₂.

The bottled carbogaseous water, due to its pleasant taste and chemical stability is the most sought after table water. This explains that in most cases the concept of mineral water is associated with „Borsec”.

In the Borsec Depression, currently there are 9 springs and 8 wells that are being capitalized. The main mineral water springs are: *Spring no. 1 (the Main Spring)* situated in the northern part of the depression (Borsecul de Sus), at an altitude of 860 m, being the oldest spring. This spring was first caught in 1770, due to the fact that its water could be used both as treatment water, and as table water. Due to these qualities, the water from this spring was the first one to be bottled and widely known (see figure 2).

Spring no. 2 (Republicii, Elisabeta), situated at approximately 20 m from the Main Spring, due north-west. It received the name *Elisabeta* after the name of Grof Lazăr's wife.

At the beginning of the 19th century, this place had the first baths, mentioned by the poet Vasile Alecsandri, in his sketch entitled „Borsec”. In 1888, as instructed by Grof Lazăr, the first chemical analyses of the spring were made and it was observed that it has the same chemical composition as the Main Spring. This lead to the bottling of the water from both springs, which meant its detour through an underground pipe to the Main Spring, so both springs are currently in the same building.

Spring no. 3 (Boldizsár, Madonna, Cloșca) is situated in the lower third of the Borsec Valley, on the left bank of the Vinișor stream (Borul Mic), at an average altitude of 850 m.

This was actually made up of two springs, 1 m from one another, caught in two stone cylinders. In 1879, they were caught in a single stone well, and later in 1889 a pavilion was built on top of it. Its flow was 10 260 l/24h, which during 1958-1963 was increasing, due to the influence of Usturoiu stream. In 1963, this spring was caught again in normal conditions. This springs` water was bottled only when the Main Spring was under maintenance. Its is said that the name of this spring comes from a merchant or borviz seeker, who discovered it.

Spring no. 4 (Arany János) was discovered in 1879, in the lower part of the spa, in the vicinity of the Roman Catholic church. It was opened in 1886, when a pavilion was built, with the name of the poet Arany János. This spring disappeared at the end of the 60`s due to drillings in the „Parcul Pionierilor”. Currently, only the pavilion marks the spot of the spring.

Spring no. 5 (László, Horia) is situated at an altitude of 849 m, caught for the first time in 1830, used by locals and visitors as a water source. This spring is situated very close to the Boldizsár spring. Its name comes from Grof Lázár László, but later received the name Horia.

Spring no. 6 (Lázár, 6 Martie, Crișan) stands in the vicinity of the László and Boldizsár springs, at an altitude of approximately 860 m. On top of this spring, the cold baths named Lázár 1874 (Lazăr) were established. It was caught in 1879, while on top of it a beautiful pavilion was built in 1886. In 1958 it was caught again and refurbished. The flow of this mineral spring is currently low.

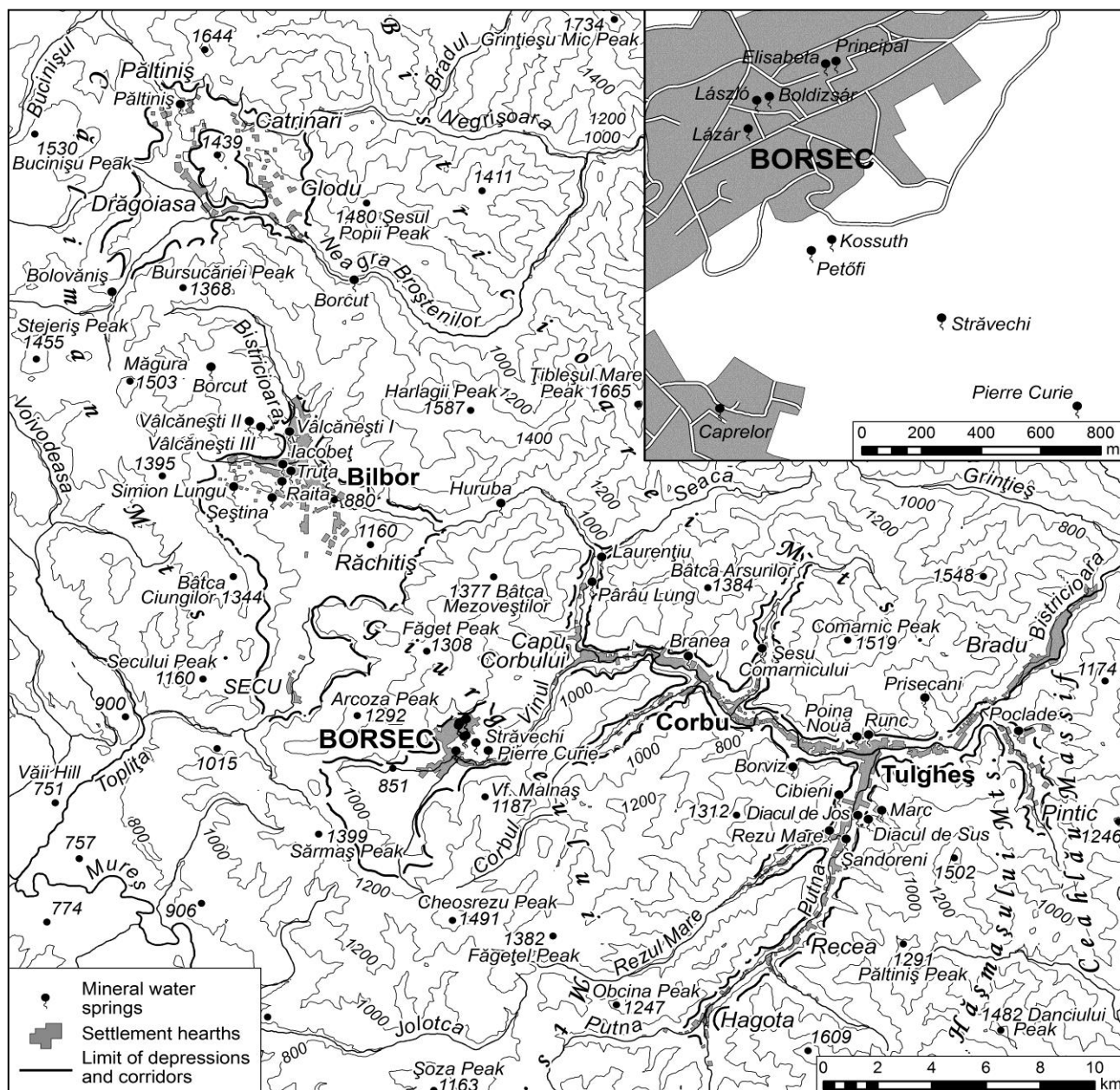


Figure 2. Localisation of mineral water springs (author G. B. Tofan).

Spring no. 7 (Izvorul Păstorului, Pásztor-kut), situated south of Arany Spring, was caught in 1881. According to legend, a sick shepherd was cured by drinking the water from this spring. Currently, this spring no longer exists, disappearing due to drillings in the area.

Spring no. 8 (Caprelor) can be found in Borsecul de Jos and was also caught 200 years ago, being rich in iron, and used only as table water.

Spring no. 9 (Bălcescu, Izvorul din pădure, Izvorul Carol) is situated near the Arcozei and Făgetului Mountains, at an altitude of 860 m. It was caught in 1859, and then a pavilion was built on top of it. From 1889 onwards it was fitted with a bottling station, that works especially in summer when the water from the Main Spring is not enough due to overuse. After some recatching attempts in 1970 this spring also disappeared.

Spring no. 10 (Kossuth, Miron) is situated in south-eastern part of the Borsec Valley, on the spot called „Scaunul Rotund”, at an altitude of 905 m, being discovered in 1868, then caught in a well in 1870, and then in 1875 being sheltered by a pavilion. The water from this spring is primarily used for therapeutic purposes.

Spring no. 11 (Petofi, Tisza Kálmán), situated close to Kossuth spring, was caught in a limestone well ever since 1884.

Spring no. 12 („Izvorul Străvechi”), is situated in a small limestone depression, at an altitude of 870 m. This spring is currently used as a mofette.

Spring no. 13 (Pierre Curie Spring), the farthest from the spa centre, situated at an altitude of 790 m, near the road that leads to „Peștera de Gheață”, at the foot of the Scaunul Rotund Hill, being almost parallel to the road that leads to Tulgheș. It was discovered in 1932, and then caught. This spring's water is radioactive, having a low carbon content. Currently, it is used as table water by the locals. In 2006, through an underground pipe, this spring is brought to Borsecul de Jos, close to DN 15, at the exit to Corbu.

Lobogó Spring was considered one of the most important mineral water springs in Borsec, mainly used for therapeutic treatments. It is said that the water from this spring was transported in wooden barrels all the way to Alba-Iulia, for Sigismund Bathory, who was treated using this water, at the advice of the Italian doctor Bucello, in 1594. Another well known person that used this water for treatment was the poet Vasile Alecsandri. Unfortunately, this spring also no longer exists, disappearing in 1926 due to works at the Main and Republica springs (Tofan, 2010 b).

Characteristic for the mineral waters of Borsec is the relatively low total mineralization, as well as the presence of iron in very small quantities, making it the one of the best table water.

On the territory of Corbu locality, there are four mineral water springs, all on the left bank of the Bistricioara, on major fault lines, with relatively low flow.

These are: *Izvorul Șesul Comarnicului*, on Barasău stream, where there is a predominance of limestone and crystalline dolomites.

The second spring, *Branea*, situated on the stream with the same name, stands out due to a high iron content and *Laurențiu spring* from Capu Corbului, situated on a upper terrace of Bistricioara.

The last spring in Corbu is situated in Capu Corbului, at the confluence of Pârâul Lung with Bistricioara, where there is also a „borviz” swamp. All these springs are part of the group that combine weak acids with alkaline-iron bases, with bicarbonated calcic character, and iron. Sodium can also be found in high quantities, more than the ones in Borsec, especially in Șesul Comarnicului Spring (0.08g/l). From all these waters the only ones that are used by the locals are the ones in Comarnic and Branea.

The mineral waters of Tulgheș appear both in the crystalline-mezozoic area, and at the contact with the flisch (on the Pintec stream).

They are bicarbonated waters, calcic, carbogaseous, used as table water by locals and tourists. There are only some rudimentary installations, that is digging a hole at a convenient depth for the insertion of a fir tree stump with a hole in the middle or a concrete tube. There are however a series of springs with no installations.

That is why all mineral water sources should be surveyed, analysed in order to fully know their chemical and physical properties and properly maintained, due to the fact that they still have unknown therapeutic effects.

At the Prisecani spring there was an attempt to catch it, due to the fact that it has a relatively high flow of 5 000 l/24 h, but unfortunately it was later abandoned. This water has been bottled before the First World War. The southernmost point from which mineral springs begin to appear in Tulgheș is the Balaj stream. From here to the north, six mineral springs appear on Putna's tributaries.

On Bistricioara's tributaries there are more frequent springs on the following streams: Asod, Borvizului, Poiana Nouă, Prelucuii, Văraiei, Petrenilor (the last three of Poiana Veche), Prisecani, with three springs, Pintecului, Diacul de Jos, Diacul de Sus, Rezu Mare.

It is said that within Tulgheș there are approximately 30 mineral water springs, considering the groups of springs situated at a distance of under 20 m as the same source. Currently, there are approximately 11 mineral water springs that have been surveyed.

Alongside the bicarbonated calcic characteristic, one can also find iron and sodium in the mineral waters from Tulgheș. Having a relatively high concentration of free CO₂ and low mineralizations, they could be used for bottling, but the low flows, between 20-40 l/h, only allow low capacity bottling installations, under 1000 litres/day. A spring that can be capitalized in the near future is the spring from *Poclade* (the spring from „Pârâul cu Pește”, a tributary of Pintec), with a flow of approximately 400 l/h.

It is known that, ever since 1594, the mineral waters of Borsec were known for their quality in Transilvania and at the imperial court of Vienna, which lead Borsec to become an attraction spot for ailing people, especially the nearby nobility, as well as many Moldavian boyars, only in the warm seasons. The lodging capacities were small, and the entire spa served a small number of tourists at high prices. The mineral water trade from Borsec developed more than its use as spa treatment, the Viennese merchants holding the monopoly.

After several pharmacists sold mineral waters under fake titles, on 13th March 1783, the pharmacists were stripped of their privilege to trade the water of Borsec, the local merchants gaining this right to capitalize this water in Transilvania, Ungary and Tirol, by being exempted of taxes.

The growth of the water trade and the earnings made by the so called „*borvizari*” attracted several merchant families to Borsec, families that established a permanent settlement, which, from the middle of the 18th century, began to develop as a spa resort.

Several carbogaseous baths were built: „*Baia Noroiosul vechi*”, one of the oldest baths, which had one basin with muddy water, hence the name. In 1865 the mineral water used at this bath was pumped in two basins, one for men and one for women, each having a separate compartment with 12 stalls. „*Baia Noroiosul nou*” was built in 1871 in a spacious building with separate entrances, *Baia Lázár* (1874) built on the spot of today`s no. 6 spring, in an circular Oriental style building, covered with glass, which contained one basin and 10 stalls, the mineral water having a high content of CO₂.

Baia Clocotitorul (Lobogó), also one of the oldest baths of Borsec, situated in the upper part of the spa, near the old bowling alley, with two basins: „*Clocotitorul vechi*”, with muddier water and a higher concentration of CO₂ than it the other basin and the „*Clocotitorul nou*”. The first one was used to treat wealthy customers, while the second, used by poorer people for free, had rudimentary installations. Both baths had 15 stalls. These twin baths, which actually formed a single one, were filled with water from the spring with the same name, which had the largest flow in the spa (around 360,000 litres/24h). In 1871, an ornamental building with two towers and a glass roof was built on top of the Lobogo bath (Tofan, 2011 c).

The cold baths, situated near Cloșca spring (Boldizsár), were actually shower baths, supplied with water from the Noroiosul and Lobogo springs. In their place, in 1879, a shower bath was erected, which, after three years of operation, was transformed in a cold water bath, with basins 1 metre deep, having stalls for massages and packaging. Besides these four main baths, Borsec also had smaller and rudimentary baths, used by common people, who could not afford to use the main ones.

Borsec also had hot baths, located near Lobogó spring, built in 1868, which had 10 compartments with 12 zinc tubs. They had boiler rooms in which a steam machine heated and pumped the water. They used the water from the „*Clocotitorul vechi*”, brought through an underground pipe.

Mud baths were also possible in a specially built compartment. In 1937, this bath had 30 stalls with mineral water from the Main Spring, heated in steam tubs.

Bathing in therapeutic mud had been going on in Borsec since 1889, using peat, which was impregnated with different mineral salts from the mineral water, as well as with several inferior shell fish that improved the content of this mud. The resulting peat could not be used right away, only after being treated in order to dissolve the salts in it.

Borsec, having multiple possibilities, was given special attention, therefore being one of the first permanent spas, in such a way that the spa treatment using muds and mineral waters was the most important function of the town.

In terms of spa therapy, the settlement had three main profiles: treatment of digestive disease, endocrinal disease and cardiac problems. The best procedures using mineral waters were: baths in carbonic acid and mineralized mud, hydrotherapy, electrotherapy and carbogaseous baths, the last two being the most sought after procedures.

All these services were carried out by the spa clinic, which ensured a complex and individualised spa treatment within the treatment base. After 1989, the „*Întreprinderea Balneo-Climaterică Borsec*” was taken over by the State Property Fund, becoming „*Societatea Comercială pe Acțiuni în Turism*” (S.C.A.T.).

The current offer no longer has the old characteristics, because, in 2001, through an inadequate management, S.C.A.T. seizes its activity, Borsec being „demoted” from a spa of national interest to a spa of local interest.

Recently, there have been a series of feasibility studies regarding the establishment of a complex and modern spa centre, with hydrotherapy, massage, electrotherapy, salt therapy, pools with mineral water and thermal baths, as well as a wellness centre. The total capacity per day of the entire complex is estimated at around 694 persons, taking into account a six hour/day shift, but without taking into consideration the capacity of the wellness centre, which does not need medical staff. At 1 500 m distance from the centre of Borsec, within the Scaunul Rotund speological reserve, there are two of the current main attractions: „*Izvorul Străvechi*”, used as a mofette, where a new building was raised with a capacity of 10 people and „*Poiana Zânelor*”, where recently the traditional baths were rehabilitated (baths for feet), with the financial support of the Harghita County Council, a 250,000 lei investment. In the exact same place, those with digestive tract problems can follow treatments with water from the Emese spring.

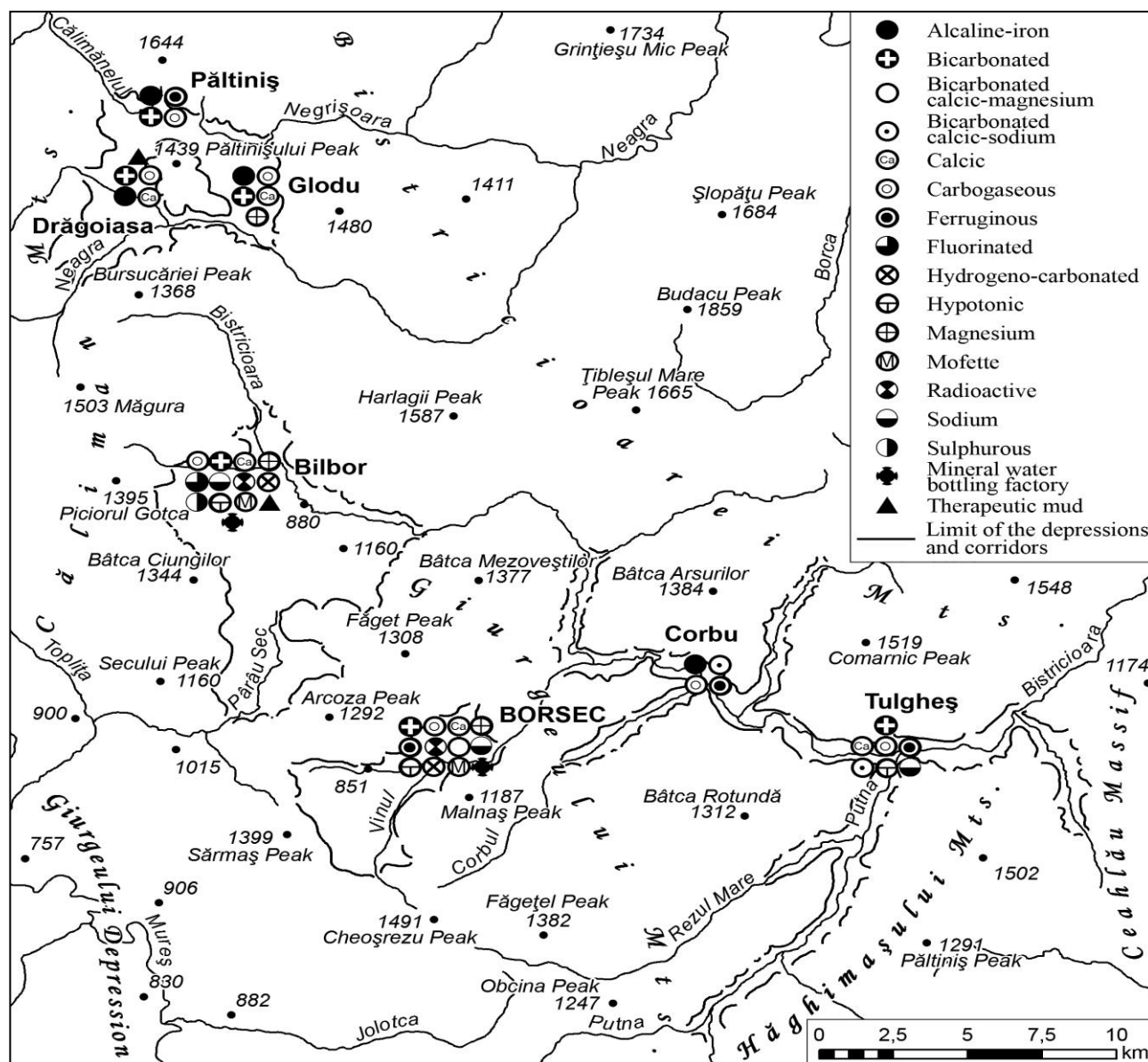


Figure 3. The map of the hydrographic network and of the mineral waters from the Drăgoiasa-Tulgheș Flume (author G. B. Tofan).

In Bilbor, close to the Vâlcănești Spring, there are two basins known by the locals as „*Băile Dobreanu*”, with waters rich in carbon dioxide, calcium, magnesium, hydrogen sulfate, good for the treatment of rheumatic ailments. They were used by the elderly locals, only during summer. Currently, these basins have been completely abandoned. The Vâlcănești no. 2 mineral water spring is also situated here, being used by a handful of locals with digestive ailments (stomach ulcers).

Another way of capitalizing the mineral waters of the Drăgoiasa-Tulgheș Flume is the mineral water trade, which has been going on since the Middle Ages, making Borsec the only national brand on the international market of mineral waters, being awarded the honorary title of „*The Queen of Mineral Waters*”.

In 2011, Borsec was the most sold mineral water of Romania, being one of the oldest Romanian brand, celebrating 205 years. According to the information from Romaqua Group, in 1806, 3 million litres per year were bottled, while in 2010 it reached over 335 million litres.

An encouraging fact is that in 2010 at Bilbor a bottling plant was opened (*Bilbor Mineral Water*), by using the spring with the largest flow (Șeștina, 12960 l/24 h). Two water types are being bottled here: *natural noncarbogaseous mineral water* and *natural carbogaseous mineral water*. Five months from launch, the Bilbor mineral water was awarded „*Best new non-alcoholic beverage*”. At the end of 2010 the mineral water installation from Coverca, Suceava County (*Aqua Carpatica*) was inaugurated, which bottles mineral water from the Păltiniș spring, especially for „luxury customers”.

The advantage of these two water sources is that they are among the few springs discovered at high altitude in Romania, far from any pollution source, with slogans like „Purity from high above”, and „The purest water in the world”.

In order to become a renowned international brand like Borsec, the producers intend to export it to the most high end Western and Arab markets (Dubai, Kuwait).

4. CONCLUSIONS

Spa tourism is one of the forms of tourism which, in the last two decades, has been remodelled according to the principle „*health is a state of wellbeing*”. The main starting point in creating the competitiveness of this area are the mineral water’s qualitative and the quantitative parameters, their variety and especially their therapeutic properties, which is why a combination of traditional treatment, modern technologies and year round possibilities to relax and spend one’s free time is necessary, therefore a proper infrastructure. In terms of the rehabilitation and the touristic remodelling of Borsec, it involves considerable financial and management efforts, the State playing a major role in ensuring a good general infrastructure, by investing in its modernisation, as well as creating a stimulating legislative framework. Accomplishing all these programmes will take time, local authorities also having to play a vital part, by attracting financial resources and granting exemptions to investors.

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