The History of the Environmental Conditions Research in the Brăila Plain

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Abstract: The Romanian Plain has generally represented the study subject of research in the field of Geography and especially of the environment geography and resources. Due to the structure and the geological movements of the climate factors, the hydrography in the area of the Braila Plain has represents a subject of many geographers' interest. The divagation and the leaving of the water course phenomena of some rivers, the genesis and the classification of lake basins, underground waters, the links that are established between these hydrographical units, the water balance, the water chemism, the existence of the oil and gas resources made the researchers study them as a whole.

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1. Introduction

The Romanian Plain and especially its North-Eastern part of the relief unit in Romania where the most frequent areas with important salt accumulations are met, easily soluble in the lakes, underground waters or soil. The process is favored by several main factors: the dry climate with long drought periods, the semiendoreic area, the poorly fragmented and poorly drained relief, the existence in the Subcarpathians of saliferous rocks formations, from which salt could be transported through surface or underground waters.

The presence of numerous salted lakes in the Eastern part of the Romanian Plain, in the northern part of Ialomita, especially in the Braila Plain, has sparked the interest of many researchers, geologists, geographers, chemists or doctors even since the last century.

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2. Research History

The number of the scientific papers has significantly grown since the end of the XIX-th century.

Amongst the first contributions, we can emphasize the ones of Carol Davilla (1873), I. Romniceanu (1887), Gr. Stefanescu (1888), J. C. Apostoleanu (1884), G. M. Murgoci (1957) and others.

In 1884, J.C. Apostoleanu wrote about the Salt Lake in Braila, emphasizing the fact that ever since the last century, the issue of the therapeutic waters in this area has sparked the researchers' interest, who always tried to understand the phenomenon, and also to find solutions for their use.

In 1907, the "*Raport asupra lucrarilor facute de sectia agrogeologica in 1906-1907*" volume claims that "Mr. Em. I. Protopopescu-Pache has research the Ialomita Plain, Baragan, south from the Bucuresti-Fetesti railway and the Mostistea Valley"..”Mr. Murgoci, the head of the section"…”studied all by himself the Rusetu Crown Domain and the region of the salt lakes in Tatatru, the area around Braila and the Salt Lake"..(Murgoci, 1957).

G. M. Murgoci claims within this volume that "Calmatui Valley is nothing else than an old water course of Buzau, which divagated towards East, probably on the Iencei Valley and then towards north-east, across some parallel valleys, such as Batrana (with Jirlau), Infundu (with Amara), Boldu (with Balta Alba). (Murgoci, 1957).

Further, he argues that "the valleys and the plain have always been slimed, thus forming large cones of dejection where waters coming from the hills have spread. The waters that originated form the Buzau, Ramnicului Valley, etc. were spreading in more strong water courses, integrating more areas between them. One of the courses – Buzau – was Calamtui, another might have been Buzoielul with Ianca and another one the actual Buzau" (Murgoci, 1957).

"Another consequence of the sinking of the plain and of the sliming of the small rivers meadows was the filling of the tributary valleys of Ialomita, Calmatui, Buzau, etc., creating alongside the old tributary valley a series of river estuaries and even lakes, which nowadays became salty, such as: Strachina, Amara, Fundata, Saratuica, Jilava, Cotorca alongside Ialomita, Costeiu, Caineni, Jirlau, Balta Alba, Amara alongside Buzau" (Murgoci, 1957).

G. M. Murgoci further claimed that "Salt lakes are associated to two groups of depressions: the ones on the old, crossed and obstructed from a larger draining course; others are in depression in the middle of fields, at the meeting points of the prehistoric dunes in the loess area. They might also correspond to some river beds

of some water courses, which were subsequently obstructed, covered and transformed through the advance of the dunes or through the loess overlying. Their water though is an underground water, which emerges in deeper depression compared to the superior level of waters.

The underground water, fueled by atmospheric precipitations and poorly from the rivers that come from the hills, is full of soluble salts, due to the reactions that happen in the loose soil and underground, rich in many alkaline substances; depressions, in front of the atmosphere focuses more and creates the salt lakes.

Together with D. R. Rusescu, G.M. Murgoci developed a map of phreatic waters, which will be referred to for much time from now on.

These statements of G.M. Murgoci and the one regarding the fact that he supposes a flow of Danube more western from the actual one through Baragan on the Jigalia Valley have also been approved by G. Valsan and N. Popp, but fought by v. Mihailescu.

Pana A. (1911), in his volume, *„Cursul inferior al Călmăţuiului”*, develops the hypotheses launched by Gheorghe Murgoci regarding the flow of the Buzau Valley in the plain on the actual valley of Calmatui and Râmnicu Sărat. Vâlsan G., (1915) in his PhD thesis, named *„Câmpia Română-Contributiuni de geografie fizică”*, proposes an synthetically apparently general approach of the elements that are specific to the plain area, which in reality represent an analysis model of the relief in the plain area, emphasizing the paleogeographical evolution.

G. Valsan, in the “*Campia Romana. Contributiuni de geografie fizica*” volume, issued in 1915, continues the ideas displayed by G. M. Murgoci, but brings new geomorphological arguments and new statements regarding the fact that “Calmatuiul, which has a lower volume compared to Sarata, seems to be a poor steppe stream, lost in the middle of this sad meadow like in a coat that is too large for its poor being. The waters that start running it near Buzau, would have been long time absorbed by the humidity voracious land or by the sun beams of the summer, if it wouldn’t have received underground supplies from Buzau. Phreatic waters also fuel the several lakes especially under the right shores of the meadow in the old bays carved in deserted meandres. The only activity of Calmatui is the desertion of the several slimed ravines, that nowadays seem to be grinds which are higher than the rest of the plain, and in the nearby of the Danube where they form a very complicated small meadow where it deepens with approximately 2 meters. This small meadow is the result of the effort of Calmatui to create an own equilibrium profile in the cone of dejection of the meadow where it wanders, spreading it into the land of the Balta towards the nearby of the Danube flow.” (Valsan, 1971).

When talking about underground waters, G. Valsan uses the phreatic waters map developed by G.M. Murgoci.

The complex problems of Baragan from the geological perspective are underlined by E. Liteanu (1956) who made the first ranking of the underground waters between Arges and Siret, based on the significant extent of the psamo-psephitic, which represent the most important hydrogeological reservoir and establishes a series of hydrogeological and hydrogeochemical links between the waters of the salt lakes and phreatic waters.

A wide and complex study with significant value regarding this region, which emphasized the morphohydrographical climate conditions, the draining issues, in the case of the issues regarding the humidity excess has been carried out by P. Gastescu , I. Zavoianu, O. Bogdan, A. Breier, B. Driga.

Alongside this study, a reference map was developed - "*Sectorul de Nord-Est al Campiei Romane - excesul de umiditate*".

Research upon the hydrologic regime of the Danube was carried out by dr. Petre Gastescu in the paper called "Cateva aspecte ale bilantului hidrologic al lacurilor din Lunca Dunarii", S. Hancu, C. Bondar, M. Podani, I. Zavoianu

Regarding the issue of the lakes in Braila Plain, a wide research field was opened both regarding the origin of the lake basin and their chemism.

N. Florea, in the study called "*Geochimia si valorificarea apelor din Campia Romana de N-E*" (1976) proposes the description of the natural waters in the northern part of the Baragan regarding the salt accumulation, the examination of the issue regarding the balneare, industrial and agricultural value of the waters.

Data about the lakes in this area is found in the synthesis work on the lakes in Romania, which emphasizes the fact that the presence of the lakes in the Romanian Plain, contrary to the unfavorable climate conditions is especially related to the hydrographic network (Gastescu, 1971).

The origin and the genesis of the salts in the phreatic waters and the lakes in the Braila Plain have been explained under different approaches by Gr. Stefanescu (1888), L. Mrazec (1901), G. M. Murgoci (1907). The hypotheses they brought are explained, supported or fought with persuasive arguments by P. Petrescu (1940), E. Liteanu si C. Ghenea (1962), P. Marosi (1967), N. Florea (1970) si P. Gastescu (1971).

P. Gastescu (1971) gives arguments supporting the fact that the saltiness in this area depends on the underground and phreatic waters (study on the Caineni lake), but also on the climate conditions ant the role of the lake basins as slow salt concentration and preservation areas.

I. Ujvari (1972) takes again the issues regarding the hydrographic features (the flow, solid flows, hydrochemical particularities, etc.) and also the deserted flows of Buzau, the underground draining and the economic value of the water resources in the area.

Regarding the study of the underground waters in this area, significant contributions were brought by E. Liteanu, P. Marosi, A. Pricajan and A. Brandabur.

Amongst the first ones that begin the analysis of the environment factors we can also enumerate St. Hepites (1882), who made studies on the climate in the Romanian Plain.

E. Oteteleseanu (1914), C. D. Elefteriu (1921), O. Neacsa (1964), I. Gugiuman (1964) also write about the climate in the North-Eastern Romanian Plain.

A benchmark in the field remains the work called "Potentialul climatic al Baraganului" (*O. Bogdan, 1980*) which emphasizes the climatic potential of Baragan, based on significant field research and interpretations of the links between the climate, hydrographic, local and regional factors.

Vegetation and fauna were studied by I. Serbanescu (1965), R. Calinescu (1969), D. Ivan (1979) and N. Costache (1996) elaborets a study regarding the biogeographical regionalization of Romania.

Soils, with all their particular features specific to the area of the Braila Plain were analyzed by Cernescu (1961), C. Chirita (1967), C. Paunescu (1967), D. Teaci (1967), N. Florea (1976).

Wide research, especially on the soils and the phreatic waters has been carried at SCCASS Braila by a group of agricultural and hydrotechnic engineers, amongst which we can name I. Visinescu, M. Zamfir, etc. together with I. Cojocaru, they published in 2001 the volume „Insula Mare a Brailei. Reabilitare hidroameliorativa", which widely displays all the activities as well as the analyses and the conclusions they have reached. (I.Andronache,2008).

After 1950, research institutes have developed (IGAR, INMH, IPACH, ISPIF, ICITID etc.), wherein the most important studies regarding the complex arrangement of the Danube Meadow and monographic studies were carried out (*Zona de varsare a Dunarii - monografie hidrologica, Dunarea intre Bazias si Ceatal Izmail, Geografia Vaii Dunarii Romanesti* etc.).

3. Conclusions

Nowadays, the Romanian Plain is scientifically well known under all aspects (geophysical and geological, geomorphological and geographical ones, climate ones, hydrographic and hydrogeological, pedological and agro-ameliorative, geotechnical and geobotanical ones), through different individual or collective research, carried out by different specialty institutes or departments.

Besides the surface research, hundreds and even thousands of hydrogeological and geotechnical drillings were made, which impose their synthesizing and interpretation on lithological and stratigraphic complexes.

By valuing the tradition of the Romanian naturalist school, which set the basis of the scientific knowledge of the Romanian Plain at the end of the XIX-th century, the XX-th century and the first part of our century, research has continued within the Doctoral Schools of the Romanian Academy or within the universities that took again and developed the research according to the actual requirements.

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