

## 3.13.10. CONCLUSIONS ON THE HYDROGEOLOGICAL CONDITIONS OF THE APUSENI MOUNTAINS

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Carbonate deposits in Apuseni Mountains are mainly developed in Pădurea Craiului (330 km<sup>2</sup>), Bihor Vlădeasa (236 km<sup>2</sup>), Codru Moma (165 km<sup>2</sup>) and Trascău (87 km<sup>2</sup>) mountains, in Poieni Plateau (45.5 km<sup>2</sup>) and the Rapolt crystalline outcrop (25.8 km<sup>2</sup>). They are mainly represented by sedimentary limestones and dolomites, and those metamorphic correspondents do not exceed 10% of the total surface of their location.

Carbonate deposits in Apuseni Mountains are engaged in complex, overthrust and intensely tectonized structures, which led to a high degree of fragmentation for carbonate rocks. Those deposits are mainly developed on areas part of Bihor Unit and the System of Codru Nappes from Northern Apuseni, as well as nappes of Bedeleu, Fundoaia and Râmetea in Southern Apuseni.

In Bihor Unit, carbonate deposits consisting of limestones and dolomites reach their maximal development, with 3 large carbonate series separated by impermeable deposits: a Triassic carbonate series (1500 m), a Jurassic-Lower Aptian series (200-550 m), and a Upper Aptian carbonate series (60-350 m). Those deposits reach their maximum extension in Pădurea Craiului and Bihor Mountains.

Carbonate successions in tectonic units Codru Nappes System is mainly developed in Codru Moma Mountains and the Western side of Vlădeasa massive and Bihor Mountains.

South of Arieșul Mic, between Câmpeni and Avram Iancu, an area of 88 km<sup>2</sup> expands on Poieni Plateau, partially shaped by crystalline limestones of Baia de Arieș Nappe (45.5 km<sup>2</sup>).

The most Southern carbonate deposits in Apuseni Mountains are in Geoagiu-Rapolt area, North of Mureș river. They come up in the geological structure of the Rapolt crystalline outcrop, are represented by crystalline limestones and dolomites and are structurally part of Getic Nappe.

In the main context of the karst in Romania, Apuseni Mountains are characterized both by a high density of karstic areas, as well as by a truly diverse and beautiful scenery. The genesis of the karst is

connected to the raise of the Bihor carbonate platform in upper Triassic, at the end of Jurassic and mainly the current era started in Paleogene. The karst of the second generation is better known, based on bauxite exploitation works.

In Apuseni Mountains 181 tracer markings were done so far, 122 of them being carried out by the author, on his own or together with other researchers, and 59 by other scientific explorers, especially in the Institute of Speology "Emil Racoviță". The longest drainage of 11.55 km was noticed between Pestișel stream and Aștileu spring.

Dynamic resources of underground waters in karstic areas of Apuseni Mountains, equivalent to multiannual average debits cumulated for karstic springs (supplies classified with debits over 1 l/s, systematically monitored, and sources measured in expeditions or simply assessed) have the following data: Pădurea Craiului Mountains – 5.24 m<sup>3</sup>/s, Bihor Vlădeasa Mountains (except Valea Seacă area) – 3.75 m<sup>3</sup>/s, Codru Moma Mountains – 2.10 m<sup>3</sup>/s, Poieni Plateau – 0.79 m<sup>3</sup>/s, Trascău Mountains – 0.91 m<sup>3</sup>/s and Rapolt crystalline limestones outcrop – 0.102 m<sup>3</sup>/s. The summed value of those supplies reaches 12.90 m<sup>3</sup>/s and was calculated as an average for an interval between 1978-1998.

The water of karstic springs in Apuseni Mountains is practically unusable as drinking water. The karst water intakes in Aștileu (Munții Pădurea Craiului) and other several modest catchments such as Bear's cave (Moneasa, Codru Moma Mountains), Izvorul Crișului spring (Nucet, Bihor Mountains), Feredeșu spring (Sohodol, Poieni Plateau) and that Râmetea (Munții Trascău) do not exceed together a mean of 300 l/s. The explanation may be that most of the supplies are far from main localities, as they feed with drinking water from surface supplies or aquifer accumulations located in intermountain depressions. At the same time, we have to point that the water of most karstic sources turns unclear when the debits raise, and their usage implies intake stations with decantation reservoirs and filtering and treatment expensive components.

## Acknowledgement

The current work is a synthesis of hydrogeological research done by the author in the S.C. Prospecțiuni S.A. for hydrogeological research of the karst in Apuseni Mountains. The operation of this programme started in 1970 was possible with the constant support of Dan I. Slăvoacă and Mircea U. Feru, heads of Hydrogeology Department.

Geologists Josefina and Sever Bordea and Gheorghe Mantea clarified many of the issues I have persistently addressed in the last 30 years, and the geological maps done by them are the source of many hydrogeological maps in this work.

Hydrologists Coca and Gheorghe Hoțoleanu, exceptional practitioners and people of rare modesty, have gradually introduced myself in the rigorous aspects of their profession.

The staff of Moneasa Hydrological Station managed by Francisc Palfy over 20 years and later by Monica and Csaba Bondar, as well as the staff of Beiuș Hydrological Station managed by Vasile Feșnic, warmly accepted me, and their suggestions were truly useful.

The complex hydrogeological research in Apuseni Mountains were highlighted by the cooperation with the tracers group managed by Emilian Gașpar, a well-known specialist with major contributions in tracer tests research.

Professor I. Pop in Baia Mare and his students participated to many tracer labellings.

The meetings with Iosif Viehman, started with a visit of Scărișoara glacier and Vântului Cave in 1979 and his love for Apuseni Mountains were constant benchmarks for understanding the beauty of those mountains.

The present study relies on hydro-meteorological data provided by temporary stations successively located in karst massifs in Apuseni Mountains. Observations taken by honest persons, such as Florin Steflea in Moneasa and Avram Negrea in Gârda de Sus, are part of it.

The visit of caves in the company of speleologists was went together with lots of debates about the evolution of karst drainage and the chance of making each speleologist's dream come true, the discovery of a large cave. Ghiță Brijan and Gaby Halasi are two of them.

During my work in the field, I have enjoyed the hospitality and generosity of host families I lived with. Groza-Ziegler in Moneasa, Emilian Man and Aurel Cuc in Finiș, Ionel Sturz in Bratca, Rafila Pașca in Ghețar, Mircea Gligor and Petrică Gligor in Alba Iulia are just a few.

While working on hydrogeological research, my wife and colleague, Nicolle, has constantly supported me, often proving her patience and great understanding.

I see this paper as a collective work, the result of cooperation with all these wonderful people mentioned above, and many others. It aims to be a humble homage and warm thank to them.