BABES-BOLYAI UNIVERSITY
FACULTY OF GEOGRAPHY
„AIR AND WATER" ASSOCIATION

The 5th Edition of the International Conference

AIR AND WATER – COMPONENTS OF THE ENVIRONMENT

FIELD TRIP GUIDE

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The route: Cluj-Zalău-Crasna-Vârşolţ Lake-Zalău-Porolissum (Roman castrum)-Jibou-Gâlgău Almaşului-Hida-Sânmihaiu Almaşului-Cluj (fig.1)
Total distance: ~ 250 km
Duration: ~ 12 ore (departure at 08.00; arrival at 20.00)

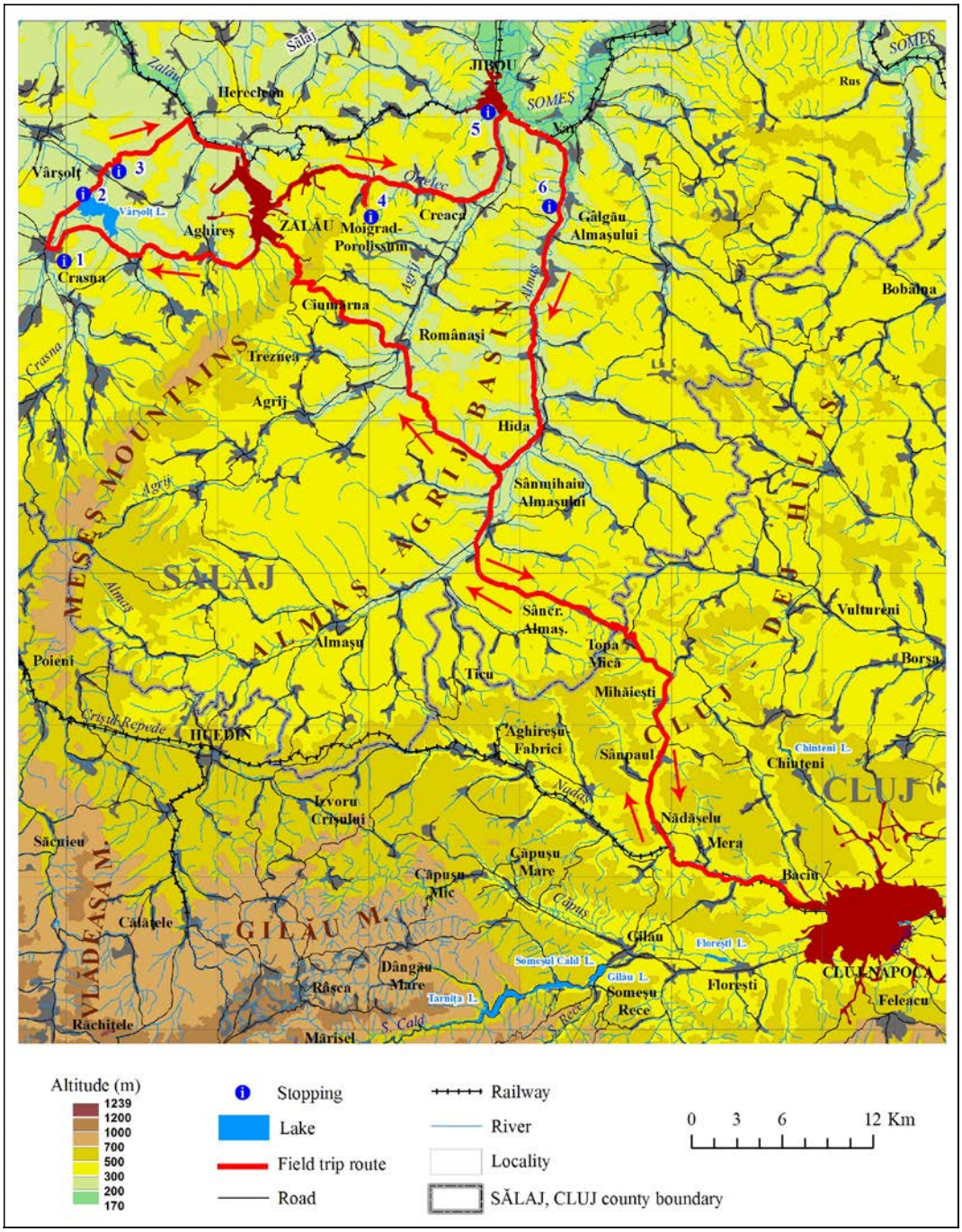

Fig. 1. Field trip route

The route of the field trip will be mostly across Sălaj County. During this trip, we will have the opportunity to cross many geographical units: the Transylvanian Depression (Someşan Tableland and Almaş-Agrij Basin), a little part of the Western Carpathians (Meseş Mountains) and the Western Hills (Silvania Hills).

We leave Cluj-Napoca city following the European Road no. 81 (E81, the road to Zalău). In the beginning, the road goes parallel with the railway no. 300 (Cluj-Napoca - Oradea) and follows the upward stream of Nadăş Valley, which is a tributary of Someşul Mic. Nadăş River flows into the Someş at Cluj-Napoca. ***Nadăş Corridor*** is the southern limit of Cluj and Dej Hills, part of **Someşan Tableland**. The corridor is characterized by a clear asymmetry having a typical cuesta slope on the left side, developed mainly because of the Eocene limestones, and a structural platform on the right side. Near Cluj-Napoca, the cuesta becomes less evident and a glacis is developed, favoring the presence of large orchards, especially apple trees, most of them disappeared nowadays (Pop, 2001).

After Topa Mica village and the watershed between Someşul Mic and Almaş catchment areas, we enter Sălaj County, in ***Almaş-Agrij Basin*** respectively. It is a part of the Someşan Tableland, and of the western limit of the Transylvanian Depression. The two tributaries of Someş, Almaş and Agrij, flow generally towards NE and have developed asymetrical valley corridors, with cuesta slopes on the right side (Pop, 2001). The greatest part of the basin is located at 200-400 m height, but isolated areas higher than 450 m may be seen only on the watershed between the two valleys. Terraces (7 levels) are present especially on the left side of Almaş and Agrij and can be correlated with those of Someş River. One should remark the structural landforms (cuestas, structural platforms), developed on the Eocene-Oligocene limestones and sandstones, which alternate with softer rocks (sands and clays). This kind of morphology is present on the monocline structure between Meseş Mountains and Someşan Tableland (Pop, 2001). Climatically, Almaş-Agrij Basin is characterized by a mean annual temperature of 8.5°C and mean multiannual precipitation of 600 mm. The area has been inhabited continuously since ancient times, as attested by the numerous traces of the Dacian and Roman period. There is a great number of wooden churches built during the 17th and 18th centuries. Nowadays, the area is still densely inhabited, but small and middle-sized villages are predominant. Larger settlements are located along the two main valleys: Sânmihaiu Almaşului and Hida on Almaş, Agrij and Românaşi on Agrij, respectively. Regarding land use, grasslands and hayfields are predominant, followed by orchards (plum trees and apple trees). The arable lands are mainly located along the valleys.

After passing through Romanasi, the road starts to climb on ***Meseş Mountains***, mainly made of crystalline schists. They have the shape of an elongated ridge, oriented from South-West to North-East. The maximum altitude of the road is 716 m (Pop, 2003).

After crossing Meseş Mountains, we enter **Zalău** city which has about 63,000 inhabitans. We are already in **Silvania Hills**, to which ***Zalău Basin*** belongs. It is a small basin at the springs of Zalău River, formed in Pannonian deposits (Pop, 2005).

We follow the road westwards and cross ***Bădăcin-Aghireş Hills***, then we enter ***Şimleu Basin***. Crasna municipality is located in the North-East of this basin. Şimleu Basin is drained by the upper Barcău and Crasna rivers and belongs to the gulf-type basins, which are specific for the West side of the Apuseni Mountains (Pop, 2005). The basement of the basin is made of crystalline schists on top of which lay Badenian, Sarmatian, Pannonnian and Quaternary deposits. The morphology of the basin is complex, and heights range between 500 m (at the contact with Meseş and Plopiş Mountains) and less than 200 m (190 m on Barcău, at Ip). One may identify three levels: piedmont level, terraces level and flood plain level. In such a flood plain, where Meseşeni Valley flows into Crasna, 500 m upstream from Vârşolţ village, Vârşolţ Reservoir was planned and built.

Crasna Hydrometrical Station (stop 1). The station began measuring in 1964 on the homonymous river. It is located 22.4 km downstream from the spring of the river and it is an important control point of the river upstream of Vârşolţ small basin and Şimleu Silvaniei town. The catchment area tributary to this station has 211 km^2 and an average height of 422 m. The basin has a torrential character, which derives from its almost round shape leading to a quick concentration of maximal discharge flow based on heavy showers (although the multiannual mean is only 637.8 mm) and due to the basement formed by clays and marls with a fast superficial drainage (Şerban et al., 2010).

Vârşolţ Reservoir (stop 2). The dam of Vârşolţ lake was built of heterogeneous local materials (mainly clays and alluvia) and is protected by the upstream edge with stones fixed on a sand bed. The lenght of the dam is 2160 m, the width is 14 m at the dam base and 5 m at the top of the dam (fig. 2).

Fig. 2. The dam of Vârşolţ Reservoir.

The dam was built between 1976 and 1979. Between 1994 and 1997, works were performed for „ The Increase of Security of Vârşolţ Resrvoir”. The lake belongs to the Someş-Tisa Branch of the „Romanian Water” National Administration, having its headquarters in Cluj-Napoca. At the end of the building period, in 1979, the total water volume storage of the lake was 47,800,000 m^3. Afterwards, the silting process began, more intense at the begining and then slower, so that in 2002, the total water volume was 39,388,000 m^3 (Şerban et al, 2009). The main functions of Vârşolţ Reservoir are: to supply water to Zalău and Şimleu Silvaniei towns (Qmax 530 l/s, increased to 750 l/s after the execution of Barcău - Vârşolţ Reservoir derivation); to slow down the flood waves; to assure a discharge of 50l/s downstream from the reservoir; to capitalize the fishing potential (in a natural regime of development) for fishing as a sporting activity.

From Vârşolţ Lake we follow the road to ENE (**stop 3**) and reach Zalău Valley, which we follow up to Zalău. In Zalău, there is a weather station and the values of the mean annual temperature is 9.9°C and of the precipitation is 640.8 mm. In Zalău there is also a branch of the Faculty of Geography of the BBU Cluj-Napoca, specialized in Tourism Geography.

From Zalău, our route continues towards East, to Jibou town, along the northern limit of Meseş Mountains, up to the junction to Moigrad village. The horst of Meseş Mountains is limited by several fault lines of which the most significant one is Moigrad fault (Pop, 2000). In the area, there are igneous rocks, represented by Laramic rhyolites, Neogene microdiorites and andesites, which give the morphology of Moigrad Hill (514 m). We leave the main road and go towards South to Moigrad. Then, after a climb, we reach the Roman camp of Porolisssum, located on Pomăt Hill, at the north-eastern end of Meseş Mountains.

Fig. 3. The Roman camp of Porolissum – the main gate.

Porolissum Roman camp (stop 4). Historical evidence indicates that Porolissum camp was built as a military station during the Roman war against the Dacians in 105-106 AD (figure 3). It seems that the name of the camp comes from the Dacian name of *Porolisson* mentioned by Ptolemy. After Dacia was conquered by the Roman emperor Trajan, Porolissum became the capital city of Dacia Porolissensis (124 d.C.). The importance of the settlement is due to its location at the limit of Roman territories with the terrritory of free Dacian, who lived in the nowadays north-western and western Romania. The huge number of military troops, lead also to a high number of inhabitants, especially after the city became a *municipium* under the emperor Septimius Severus (193-211 AD). At that time, the total population (soldiers and civilians) could reach 20,000-25,000 inhabitants (Fodorean and Irimus, 2009). Porolissum is one of the best preserved archeological sites in Romania (like Ulpia Traiana Sarmisegetuza). Because of its position on the border with Dacia, the city was protected against *barbaricum* by defence walls, earth walls and towers (fig. 3). The archeological investigations led to the discovery of an important building that served as a custom point, the great *amphiteatrum castrense* destroyed by time and rebuilt of stone during Antonius Pius, in 157 AD, as well as the two castra with stone walls. Also, some temples of gods were researched here together with an aerial apeduct coming from Meseş, a large cemetery (incineration and burial graves), the thermal baths, and a number of civil and public buildings. Many inscriptions, coins, fibulae were also discovered by archaeologists.

From Porolissum, we go back to the main road from Zalău to Jibou, following downstream the Ortelec valley, a tributary of Agrij River. In about 15 minutes we get to **Jibou** town, the third largest town in Sălaj County, with a population of almost 12,000 inhabitants. The town is located in **Someş Corridor**, in an area of local susbsidence, a bit downstream from the confluences of Almaş and Agrij valleys with the Someş.

„Vasile Fati" Botanical Garden of Jibou (stop 5). With a total area of 25 ha, the garden is located in the north-western part of the town, on the second terrace of Someş River.

Fig. 4. „Vasile Fati" Botanical Garden of Jibou (the greenhouses).

The garden capitalizes the remains of the old park around the medieval castle, which was the residence of the Wesselényi, then Teleky family. Oficially, the botanical garden opened up in October 1968 and its first manager was the Biology teacher Vasile Fati. Now it is administrated by the the Biological Research Center in Jibou and is subordinated directly to the Ministry of National Education. The botanical garden is organized in many sectors, each of them gathering plants using different criteria: systematic, genetic, phytogeogaphic, ecological and decorative classification (Bodea, Coman, 2009). Inside the garden, there are a few greenhouses (fig. 4), an aquarium, a little zoo and a wonderful Japanese garden. The plant collections of the garden include more than 5000 taxons from all over the world. At the beginning of 2002, the herbarium (with 1,500 sheets of spontaneous and cultivated species), the botanical museum and the scientific library were organized.

The route of the field trip goes along the Someş Corridor for a few kilometers East and then we turn South, following Almaş Valley upstream. Actually we came back to ***Almaş-Agrij Basin***, which we left before climbing the ridge of Meses and going down to Zalău. Six kilometeres before the mouth of Almaş into the Someş, we arrive in **Gâlgău Almaşului**, where we shall visit ***the Dragons' Garden*** natural reserve. It is a geological and landscape protected area.

Dragons' Garden natural reserve (stop 6). Dragons' Garden geomorphosite covers a total area of about 3 ha and is developed in a monocline area, specific to Almaş-Agrij Basin and Someşan Tableland respectively. More precisely, the Dragons' Garden is located on the left side of Incheieturi River (a left side tributary of Almaş River), on a

slope which in fact is a structural platform. The area became a geological and landscape reserve in 2000 because of its exceptional residual rocks (fig. 5).

Fig. 5. The Dragons' Garden

The deposits of Lower Miocene and upper Oligocene are almost identical - micro-conglomerates, quartzite sandstones, mild to moderate cemented sands - which are placed over older clays and marls. Selective erosion has shaped the geological formations, resulting in a fragmented pyramid shaped structural front, with columns, needles etc (fig. 6).

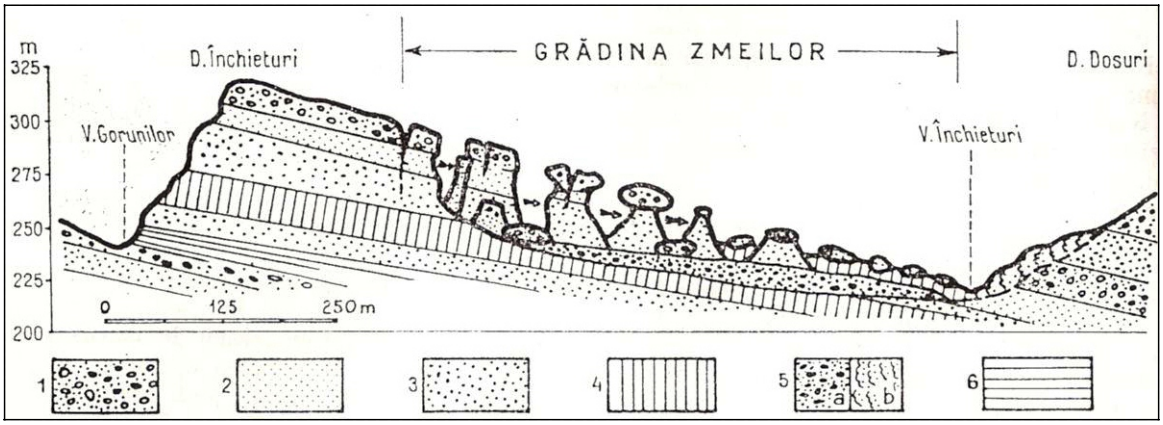

Fig. 6. Geomorphological cross-section in the Dragons' Garden. 1, Microconglomerates; 2, Weakly cemented sandstones; 3,Moderately cemented sandstones; 4,Red clays; 5, Modified deposits: a, sands and gravel with accumulations of artesian aquifers; b, mixed materials as a result of landslides; 6, Marls (according to Irimuş et al., 2009).

The front has a length of about 600 m, a relative height of 15-25 m and an absolute height of 285-310 m (Irimuş and al., 2009). Stronger erosion of the lower layers has undermined the slope, causing landslides and collapses, which exceeded the power and transport capacity of Incheieturi River. At the beginning, the slope was shaped predominantly by areolar processes. Later, there was a tendency to organize a linear network, along the alignment of cracks and faults of the material or cemented layers of microconglomerates and sandstones. Due to the removal of the sand and gravel, these

cracks and diaclases were enlarged but also deepened. Thus, in a short time, they turned into deep cracks and crevices, isolating the blocks of sandstones and microconglomerates and accelerating the gullying processes. Once they reached the marl and clay layers at the base, this led to the wetting and leaching of these deposits, but also to the sliding of rock blocks towards Incheieturi riverbed (fig. 6).

Prismatic columns, pyramides, towers, needles, cyclopean walls have evolved under the control of climatic and hydrological factors, combined with anthropogenic factors. Thus, the processes of weathering, runoff, oxidation, hydration, rolling, sliding, led to the residual morphology one sees today, which is more and more attractive for tourists and raise a special interest among geographers.

As the Dragons' Garden is the final attraction of our field trip, we shall go back to the Almaş valley, which we follow upstream, passing through Bălan, Hida and Sânmihaiu Almaşului, where we meet the E 81 road. Then, along the ***Nadăş Corridor***, we go back to ***Cluj-Napoca***.

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