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EXOKARST PROCESSES AND FORMS AND AGRICULTURAL ARRANGEMENTS IN PLOPIŞ MOUNTAINS

CORINA BOGDAN[1], IOAN-AUREL IRIMUŞ[1]

ABSTRACT. – Exokarst Processes and Forms and Agricultural Arrangements in Plopiş Mountains. The crystalline basement of Silvania Mountains and in particular of the Plopiş Mountains was brought to surface due to a "strike-slip type" tectonics (I. Balintoni, C. Balica, 2013) in the shape of *homoclinal structures* deposited in the Tertiary sedimentary cover of the Apusenides. Plopiş Mountains are a real *lithological synthesis*, because their structure consists of magmatic, metamorphic and sedimentary rocks and they represent an integration, cooperation and interaction between inorganic minerals and organic minerals. Plopiş Mountains cover the largest part of Silvania Mountains. The dominant note of the landscape in Plopiş Mountains is the high degree of erosion as a result of the close connection between *rock type* and the landscape imposed by the *Tertiary dynamics of the Tisia-Dacia microplate*. Therefore, the *rock type* is a key factor in the characterization of landforms. The lytotypes related to Plopiş Mountains conditioned the development of the karst landscape, which, according to endokarst and exokarst processes, created favorable conditions for the development of edaphic and biogeographic resources as the basis for agricultural, forest and pastoral arrangements in Plopiş Mountains.

Keywords: *strike-slip type tectonics, homoclinal structures, lithological synthesis, endokarst and exokarst processes, ecological reconversion, forest and pastoral arrangements.*

1. INTRODUCTION

Plopiş Mountains, also known as *Rez Mountains (de Aramă - Copper)* or *Şes* in the specialized literature, are the western part of Silvania Mountains. The toponym *Şes* ("Plain") *Mountains* is justified by the fact that a significant part of Plopiş Mountains has the form of a "plain" especially in Şinteu area. The toponym *Rez* refers to two areas of compact forest: Răzu Mare and Răzu Mic, from which

[1] *Babeş-Bolyai University, Doctoral School of Geography, 5-7 Clinicilor Street, Cluj-Napoca, Romania, e-mails: bogdan.corina@ymail.com; aurel.irimus@ubbcluj.ro.*

the toponym *Rez* was derived, which means copper and which led to the name Copper Mountains (*Geografia României*, 1987). Plopiş Mountains have a uniform, unitary and leveled landscape, especially in the central parts, which represent a *large plateau* between Şerani, Făgetu, Valea Târnei, Şinteu and Socet (see fig. 2).

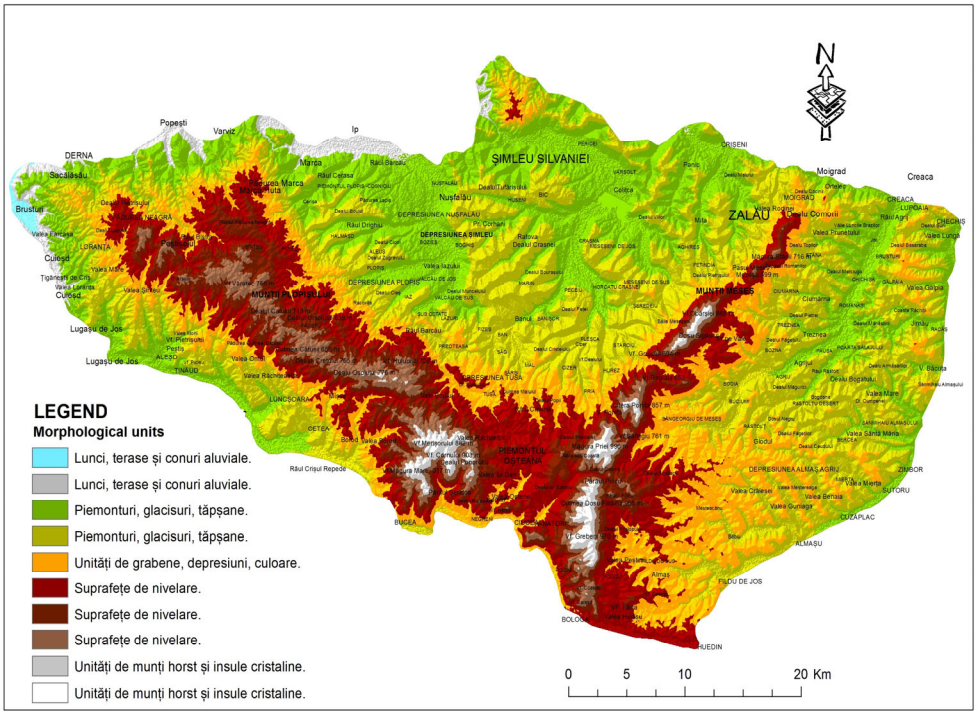

Fig. 1. Silvania Mountains, physical map (*source: the author*)

From the point of view of location, Plopiş Mountains share a border with Barcău Valley and Oradea – Borod Corridor to the West, which separates Plopiş Mountains and Crişana Hills, represented in this sector by *Plopiş Hills* (Bistra Hills, Derna Hills, Oradea Hills, Lugaş Hills), Barcău Valley and Toglaciu Hills to the North, which separates them from Silvania Hills, Şimleu Basin to the East and Crişul Repede to the South, which separates them from Pădurea Craiului Mountains. They are deeply fragmented by the tributaries of Crişul Repede and Barcău and have an asymmetric configuration on well individualized morphogenetic levels descending toward Şimleului Basin (see fig. 8). Between the neighboring mountains and the basin area, both in the western and the eastern part, a transitional strip is interposed, consisting of *morphological associations* of glacis-piedmont type and *shoreline-piedmont platform* in various stages of evolution.

The morphogenetic stages of landscape formation in Plopiş Mountains were complex and influenced by the structure of rocks. Thus, the efficiency of erosion processes was conditioned by *chemical and physical characteristics* of rocks, which have imposed the sector morphoselection in the Silvania Mountains. The *morphoselection* is conditioned by *tectonic, climatic and morphological factors*, variable in time and space. Through the *collaboration and interaction* of these factors along the contact surface, in this case the Silvania sublayer, subject to the modelling action of external factors, the landscape of Silvania Mountains is an *expression of the mobilization state of the sublayer*, at a given point in time and in a certain space (I. Mac, 1980). The stratified rocks in Silvania Mountains have different degrees of erodibility due to the orientation of these layers in relation to others.

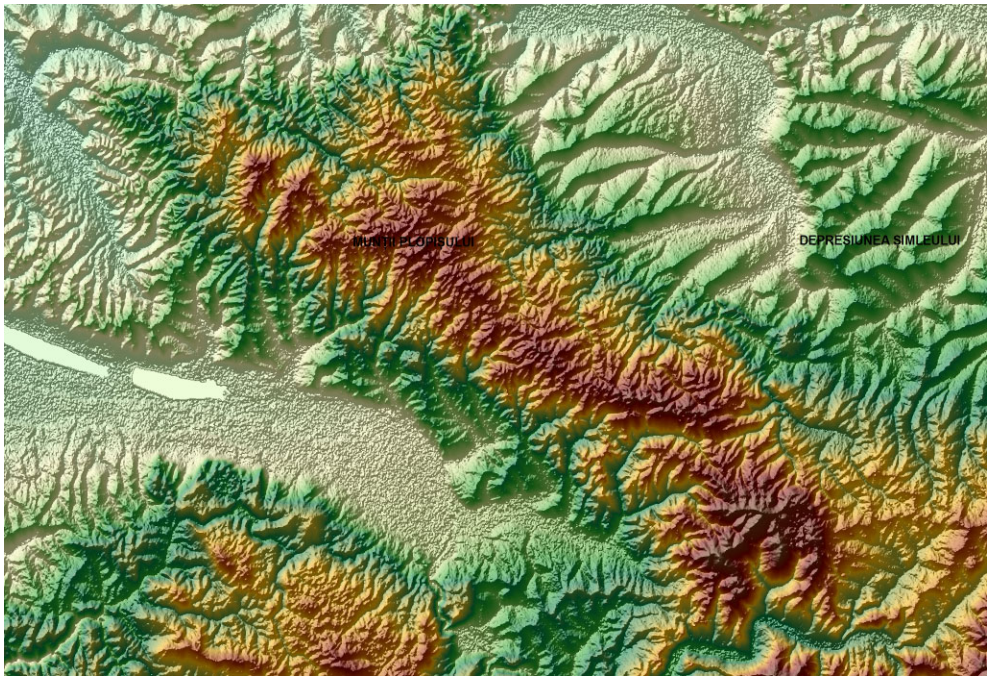

Fig. 2. DEM model of Plopiş Mountains and surrounding areas (*source: the author*)

The role of structure in the morphosculptural modeling of Silvania landscape is important because of the *layering of rocks*, *the degree of fracturing* (induced by water loss in the sedimentary rocks and the cooling in the case of magmatic rocks), *the cleavage* and *the presence of the areas of schistuosity* (specific to metamorphic rocks which contain lamellar–shaped minerals due to the efforts to which the rock was submitted during the phases of deformation). (I.A. Irimuş, C. Bogdan, 2017). We

also mention that the *rock's response to differentiated shaping* in Silvania Mountains was a diverse and complex due to the following types of landscape, influenced by the lytotypes in the Silvania area: crystalline and metamorphic rock landscape, karst landscape, sandstone and conglomerate landscape, marl and clay landscape, periglacial landscape and anthropogenic landscape. Within this article, we will focus on the *karst landscape* and the agricultural arrangement from a pastoral and forest point of view in Plopiş Mountains.

2. MATERIALS AND METHODS

In what concerns the materials, the methodology and the techniques used for outlining the crionival processes and their effects on the types of agricultural use of Silvania land, we took into account the topographic and geological databases, while we used the geomorphological mapping as technique. In this respect, we transposed to the topographic map the morphology of these contemporary geomorphological processes as a reflex of a complex interaction between the crystalline sublayer, the sedimentary cover and the internal and external geodynamic agents. The geomorphological map was created using a methodology of the geomorphology school from Italy. Thus, using the related topographic and geological base, both the lithology of the sublayer and the main endogenous and exogenous processes, specific to Plopiş Mountains, were mapped and represented from a cartographic point of view. The main difference lies in the fact that on the final geomorphological map, the topographic base, which confirms the dynamics and the evolution of processes in the Silvania Mountains, is also visible. The methods and the techniques involved the cartographic method and the GIS analysis. In this article, we outlined five parts: introduction, materials and methods, the regional tectonic evolution and the geodynamic setting, the karst landscape of Plopiş Mountains, the resources and the forms of agricultural arrangements.

3. THE REGIONAL TECTONIC EVOLUTION AND THE GEODYNAMIC SETTING

Plopiş Mountains have the shape of a *crystalline Mesozoic peninsula* whose landscape is imposed by the sector dynamics of these systems of faults, which created favorable conditions for the intensive processing of the crystalline sublayer. The morphodynamic processes in Plopiş Mountains are conditioned by the *tectonic fragmentation in a horst-graben system*. Plopiş Mountains are delineated as a *supposed horst*, *homoclinal structure* or *rift shoulder*, bounded by faults with Carpathian direction (NW-SE) and faults with Pannonian direction

(NE-SW), to which we add secondary faults (N-S or W-E direction). Plopiş Mountains are differentiated from other units of Silvania Mountains by the *structure of the crystalline basement*, which spreads over very large areas in the central parts of the range and represents the most important area of the *Hercynian crystalline*.

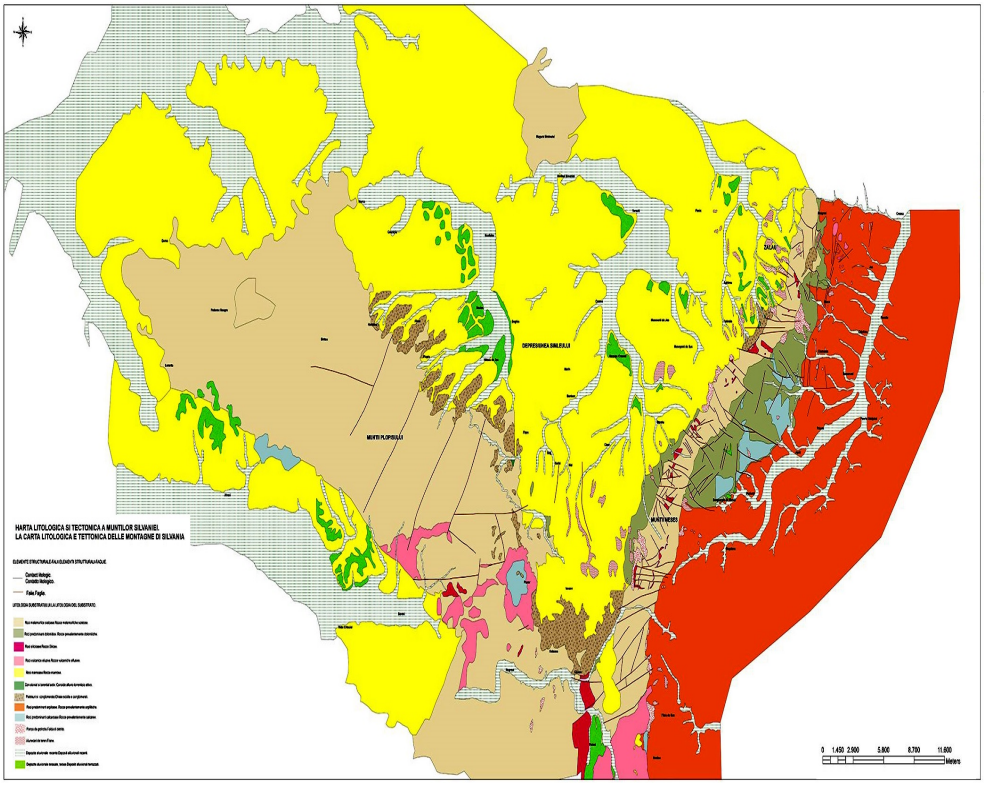

Fig. 3. The lithological and tectonic map of the Silvania Mountains (*source: the author*)

As in Meseş Mountains, in the southeastern part of the Plopiş Mountains there is a strong *tectonic fragmentation* outlined due to various *lithological units* which are constituted as a real petrographic synthesis supported by *magmatic rocks* (rhyolites in Vlădeasa), *metamorphic rocks* (mica-schists belonging to the complex of quartzofeldspathic rocks, quartz mica-schists, para-amphibolite rocks, ortoamphibolite rocks, nodular gneisses, paragneisses with muscovite and biotite of the Late Precambrian age) and *sedimentary rocks* (the Gosau Formation of Senonian age - conglomerates, sandstones, marls and limestones) (see fig. 3). The tectonic units related to this sector are represented by the *Bihor Autochtonous* – made of the crystalline basement (mica-schists of Precambrian age) and the Mesozoic

cover (conglomerates and limestones), to which the *Gosau Formation* is added, while Paleogene magmatic rocks are interbedded. The reflex in geomorphology of these systems of faults on both sides of the Plopiş Range and their tectonic basement is the formation on the old shore line of Central Paratethys, especially on the northern side, of *a shoreline platform* made of piedmontal deposits (fig. 8).

The karst landscape in Silvania Mountains is the result of collaboration and integration between sedimentary cycles and episodes of transgression and regression from the Alpine Tethys, the Pannonian Sea, specific to the carbonaceous platform stage of the Tisia Craton. The basinal evolution of the Tisia Craton during the Ladinian, Senonian, Danian, Palaeocene and Badenian had a significant contribution to the completion of the karstic landscape in Silvania Mountains. The Ladenian was important due to the deposits of *ashen-grey dolomitic limestone* (fig. 4) with calcite

Fig. 4. Ashen-grey dolomitic limestone with calcite venules of Ladinian age in Plopiş Mountains (*source: the author*)

venules, and of *black limestones with fractures* (fig. 5) with calcite venules, of Guttenstein limestone type, widespread on the western and eastern slopes of Meseş and in the southern sector of Plopiş Mountains. The endokarst and exokarst phenomena in the Silvania area are connected to the Paleogene carbonaceous formations (Eocene and Oligocene), in the north-western part of Someşan Plateau.

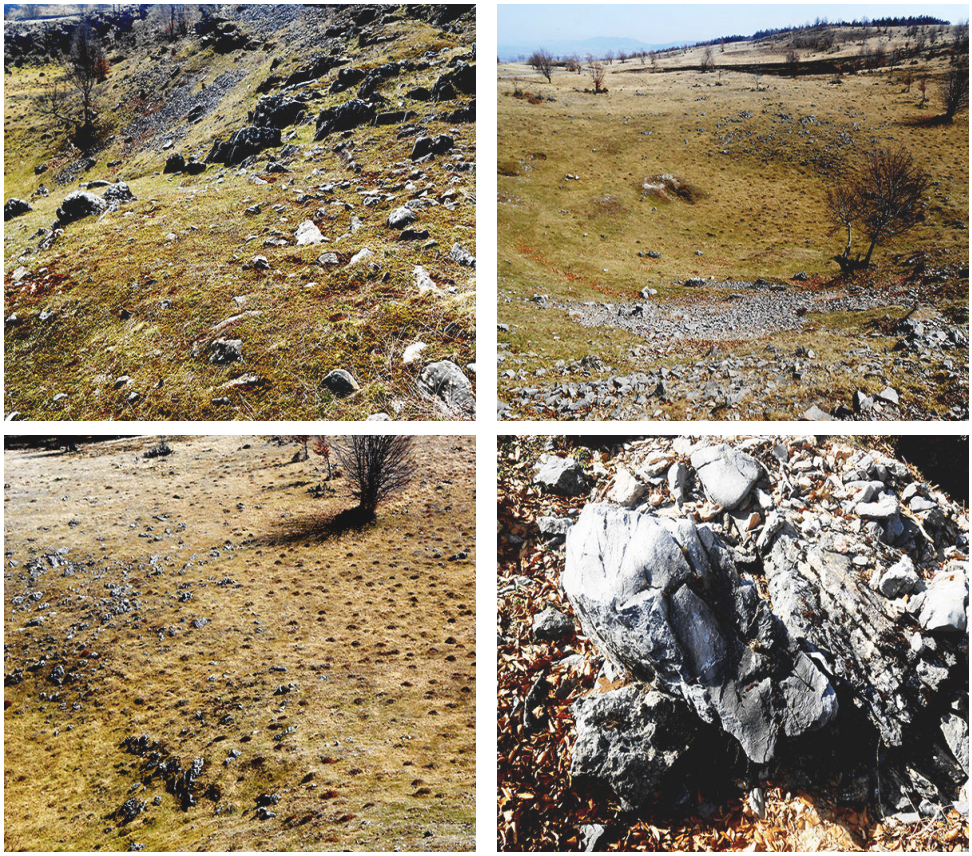

Fig. 5. Karst landscape in Plopiş Mountains: dolines within the Ponor karst plateau (upper row) and limestone with fissures (bottom row)

During the Neogene (Badenian), the unstable areas of the Şimleu Basin basement were the subject of intense sedimentation processes, thus *reefs of Leitha limestone type* were formed in the marine environment, identified at Pria, near Meseş, and Coşei, near Măgura Hăghişei. During the Sarmatian, near the Oştena Piedmont area, a *reef facies* was deposited, represented by limestones with Serpula, bryozoans,

mollusks, foraminifera and algae. They were deposited during the Lower Volhinian due to a littoral zone close to the shore, brackish waters and warm temperatures, in other words, a biotope with real *limestone reefs* (bryozoans, worms, mollusks, foraminifera and calcareous algae), which developed on the hard sublayer of crystalline schists, in areas close to the shore and on the islands and crystalline summits, which were near the water surface. *The karst on the Miocene rocks* near Ragu Valley (Stârci) is linked to the existence of unstable areas within Şimleu Basin, which favored the emergence of several depositional facies (Clichici, 1973).

The Mesozoic sedimentary processes in Plopiş Mountains did not take place in the current expansion area, thus there are two hypotheses: in Late Triassic and Jurassic, Plopiş Mountains functioned as a horst only in a subaerial regime, although further South the Jurassic series is complete in Pădurea Craiului Mountains (a dry land located North of Bihor platform is mentioned in the geological literature); during the upper Triassic and Jurassic, the alternation of lifting and lowering on fault lines from the northern platform of Tethys is due to Eo-Cimmerian and Neo-Cimmerian phases, followed in the middle Cretaceous by the Austrian phase that determined the removal of the sediments of this age through erosion.

Fig. 6. Calcareous facies on the northern edge of Plopiş Mountains represented by Sarmatian limestones (*source: the author*)

The *calcareous facies* on the northern edge of *Plopiş Mountains,* in Halmăjd (fig. 6) has Sarmatian limestones (Păucă, 1954), in the form of patches, placed directly on the crystalline schists in the upper parts of the hill slopes, often forming real *garlands of calcareous islands*. The size of these patches is not particularly

large; it ranges from a few tens of m^2 to 1000 m^2. The thickness of these limestones is variable. Their limits vary between 2-3 m and about 15 m. The calcareous patches are at the same levels on the hill slopes or summits. As indicated by Păucă (1954), these limestones appeared on *higher islands or crystalline summits*, while detritus deposits (sands and marls) were formed in the outside ditches. Clearly, the present limestone patches are only testimonies of a *calcareous area*, *marking the southern shore of the Şimleu Gulf during the lower Volhinian*. The shapes, the emergence, the lithological aspect (compact, white-grey) as well as the fauna indicate *the origin of these reef limestones* (fig. 7).

Fig. 7. Calcareous facies with reef origin in Ponor karst plateau (*source: the author*)

Such limestone formations are frequently found in the Euxinic basin and the Pannonian one. The reef limestones sometimes become oolitic limestones, which bordered the reef and which, with the increase in water depth, became in turn white calcareous sandstones, sands, calcareous conglomerates, and more rarely whitish marls. The geological positions as well as the lithological composition of these deposits indicate the reef origin.

4. THE KARST LANDSCAPE IN PLOPIŞ MOUNTAINS

The karst geomorphology in Plopiş Mountains is due to a *karst on Triassic rocks* because of the existence of dolomite deposits (dolomites, limestones, salt and plaster) (fig. 3), which created favorable conditions for the development of such landscape. In Plopiş Mountains, the karst landscape is mainly found in

the calcareous plateau named Platoul Negrenilor or Platoul Ponor, as it is also known in the specialized literature, area where complex tectonic, lithological and structural units overlap, according to local geological data. *The karst on Triassic rocks* within the **Ponor karst Plateau**, in the south-eastern part of Plopiş Mountains, is located at an altitude of 750-800 m and represents the area of departure of a radial drainage network. The area is relatively small and has a rich karst landscape represented by endokarst and exokarst forms (N. Meszaros, 1957, 1997). It shares a limit with Borod Valley to the West, which collects its waters from under the peak of Măgura Mare (917 m), Şerani Valley to NW, Bou Valley to the North, the Răchite Valley to NE, which has its headwater in Dealul Mare, Criş Valley to the South and Dormir Valley to the East. The highest peaks in Plopiş Mountains are in this sector, Măgura Mare (917 m) and Cornu Peak (906 m), separated by Secătura Valley, tributary of Negrea River, to which one also adds Merişorul Peak (882 m), supported by black stratified limestones, dolomites, sandstones, conglomerates and siliceous sandstones of Campilian-Anisian age.

East of Făgădău Valley and Măgura Mare, there is a large structural surface and also Negrea River springs from below this peak, and is then collected by Crişul Repede at Bucea, where a very active torrential erosion is noticed, in the shape of detritus cones, active due to the heterogeneous lithological sublayer, supported by volcanic rocks (Dâmbu Roşu) and calcareous rocks (Măgura Mare Peak). NE of Cornu Peak, there are mostly calcareous rocks (the *Crişul Repede Formation* integrates in its structure Bucea limestones and inferior dolomites) over which *Bucea blackish limestones with Dadocrinus and Glomospira* are deposited. Based on this, the suggestive karst landscape on Ponorul Negrenilor or Negreni Plateau has developed, rich in endokarst and exokarst forms. Along Şoimu Valley there are stratified white dolomites, dark-colored limestones, arranged in plates, and marmoreal limestones. The *dolines* are widespread and are subject to dissolving processes associated with erosion and other processes, resulted in the shaping of distinctive karst morphology in the Silvania area. This happened because the limestones and the dolomites are the only category of karstifiable rocks, on which, in addition to landforms created under the current geomorphoclimatic conditions, *karst complexes* were preserved, belonging to different evolutionary stages, even from the Mesozoic. The underground karst is represented by small caves and sink holes. On the outskirts of the limestone area, at the contact with impermeable rocks, karst springs are encountered: Izbucul Mare from Izvorul Topliţei, Izbucul Mic from Răchite Valley and Izbucul Negrenilor. Barcău River flows from a northern karst spring, on a thick travertin area, the karst spring waters forming a picturesque waterfall with a height of 10 m. A second karst spring, masked by a detritus mass, supplies water to Negrea Valley, a tributary of

Crişul Repede. Ponorul Negrenilor is a suspended synclinal, whose underground drainage is carried out in two opposite directions (toward Barcău and Criş), due to an eruptive transverse lamella, which has the role of watershed. Much smaller, but still a calcareous structural witness, is the cone-shaped peak of Picleu, in the area of Negreni.

Calcareous rock bodies in Plopiş Mountains were identified in the dolines within the Ponor karst Plateau in the south-eastern part. The limestones have different ages, but the Mesozoic limestones prevail, which, unlike the crystalline limestones (where the karstification is weaker), they are thick and intensively fissured, fact which allows an adequate water circulation that shapes endokarst and exokarst landforms. The analysis of the geomorphological map indicates the presence of dolines within the karst of Ponor Plateau: *Dealul Călin, Preoteasa, Dealul Osoi, Tusa, Ponor, Dealu Arsura and Dealul Ursoi,* in the south-eastern part of Plopiş Mountains (fig. 9). The Badenian and Sarmatian limestones on the southern border of Şimleu Basin (Tusa – Sâg area) have the shape of some erosion witnesses that rarely exceed 1 km^2. In what concerns the Şimleu Basin, the eastern sector of reef limestone is at Tusa.

Other limestone areas in this region are Dobra Hill, Dumbrava Hill, north of Tusa, on Peşterii runlet, where Litothamnium limestones appear. It is interesting that the Sarmatian limestone deposits on this runlet represent the only case in the region in which reef limestone is not in direct contact with the crystalline basement. In the area of Peşterii runlet, the local geology refers to the existence of a crystalline area with the *function of submerged island* (Late Badenian, Sarmatian), bounded by the deeper areas, which favored the accumulation of a *calcareous reef facies*. These limestones seem to be positioned over the crystalline formations of the basement, they only appear at the top of slopes and rarely exceed a thickness of 20 m. This calcareous reef facies allowed the development of exokarst forms, such as dolines, which do not exceed 15 -20 m in diameter, dry valleys and paleo-sinkholes.

During the *morphotectonic evolution* of Silvania Mountains, *an intense fragmentation of the calcareous areas* and a rapid evolution of the structural landscape took place (fig. 8), which prevented the emergence of major underground drainage, allowing the formation of notable karst networks. The exokarst in Silvania Mountains is a result of the Pliocene-Quaternary morphogenetic evolution, represented by a wide variety of forms: *karrens, doline fields, uvalas, poljes, lithological contact basins and doline valleys or valleys with dolines.*

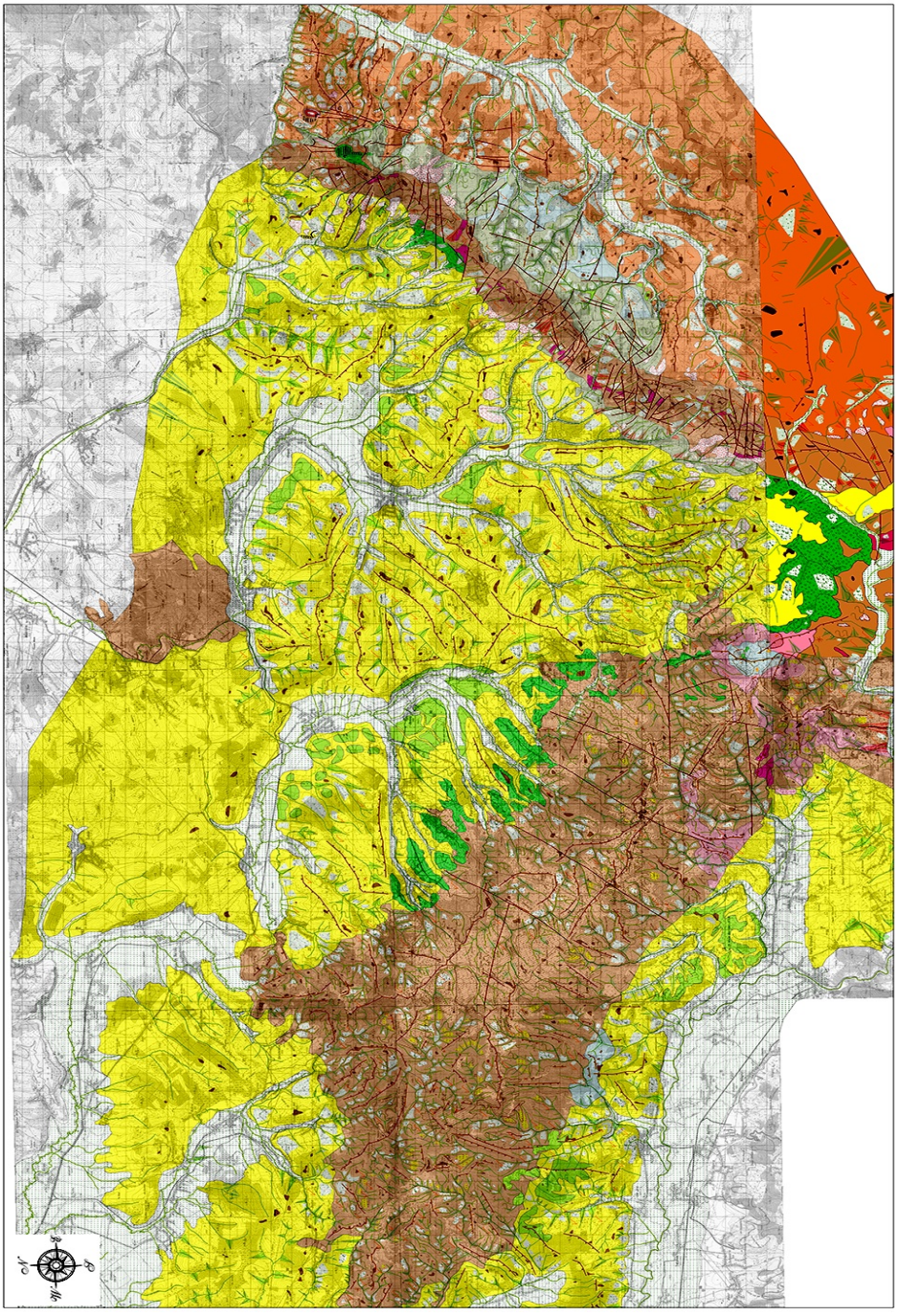

Fig. 8. The geological and geomorphological maps of Silvania Mountains and their legend (*source: the author*)

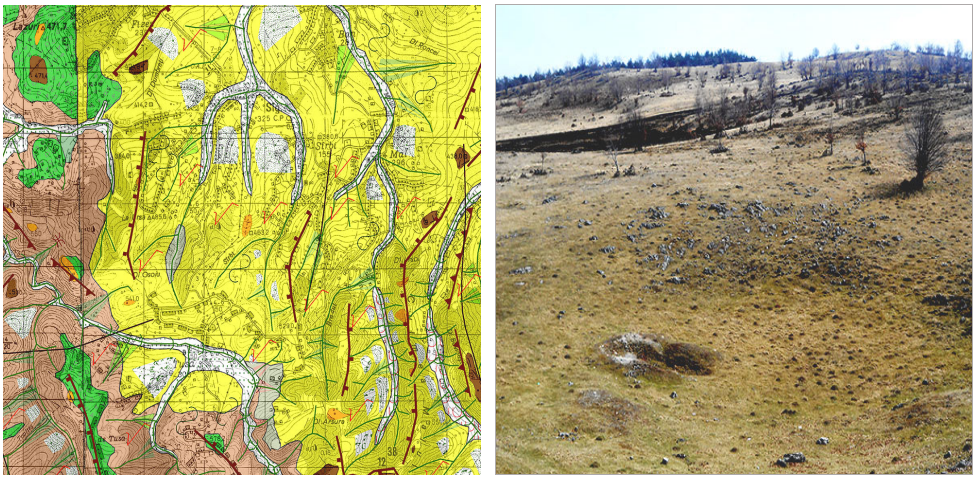

Fig. 9. Dolines within the Ponor karst plateau (*source: the author*)

As noticed from the analysis of the geomorphological map, these patches of *limestones and dolomites* represent the testimonies of the existence of this continuous calcareous limestone area, which marked the southern shore of Şimleu Gulf. The shape, the appearance and the white grey colour of these limestones indicate their reef origin, another attribute of the Hercynian chains of Central and Eastern Europe, where Silvania Mountains should be integrated by future geological and geomorphological research.

5. RESOURCES IN PLOPIŞ MOUNTAINS AND THE FORMS OF AGRICULTURAL ARRANGEMENT

Silvania Mountains and in particular Plopiş Mountains overlap the heterogeneous geological sublayer of the ancient Tisia craton, characterized by a peculiar *morpholithological and morphostructural* complexity. The formation of useful minerals in Silvania Mountains was linked to the basin stage of the Tisia Craton and to the variety of *source areas* related to this basin. Plopiş Mountains are characterized by the variety of natural resources, plants and animals that provide an integrated support in terms of human activities. These resources are capitalized and there are agricultural arrangements of different types, as well as forest and pastoral arrangements. From the point of view of typology, we distinguished the following categories of resources: *non-renewable* (minerals and fossil fuels); *renewable* (water, air, soil, flora and wild fauna); *permanent* (solar power, wind power, geothermal power).

5.1. Soil resources

In Plopiş Mountains, *cambisols and argiluvisols*, specific to the low mountains, prevail. With regard to the use of soil on *categories of use* in 2015 as the *primary base for agricultural development* in Plopiş Mountains, according to data provided by *Sălaj Office of Pedological and Agrochemical Studies* (*table 1*), we can notice an increase in the land covered by orchards, meadows and arable lands and a decrease in pasture lands and vineyards. The main geomorphological processes affecting the soil quality are represented by *water and wind erosion* (which causes the loss of fertile soil layer on the surface, the land deformation, clogging and sedimentation); *compaction*; *landslides*; *excess water*; *the low amount of organic matter and nutrients in the soil*; *salinization*; *acidification*; *pollution*.

The linear and areolar erosion is by far the most important factor in land degradation. Among the various forms of erosion, the most widespread is the *surface discharge*, having so severe consequences that the land can no longer be used from an agricultural point of view, so it must be removed from the agricultural circuit. At the level of Sălaj County, according to data provided by the *National Administration of Land Improvements, Someş-Tisa Branch*, the following phenomena were reported concerning the agricultural surface: strong surface erosion (10,375 ha), in depth erosion (4 657 ha), the modification of the geochemical composition (159 ha), landslides (8 343 ha), geological erosion (356 ha), bank erosion (109 ha), excessive humidity (8 961 ha), valueless vegetation (2 342), totaling an area of 35 700 ha. According to the *National Administration of Land Improvements Someş-Tisa Branch,* at the end of 2015, the area for land improvements of Sălaj County was 133,484 ha, structured as follows: *control of soil erosion* (119,161 ha, which represent 64% of the development potential) and *drainage* (14,323 ha, 56% of the development potential).

Table 1. The distribution of lands according to their use in Sălaj County, between 2011 and 2015 (*source: Sălaj Office of Pedological and Agrochemical Studies*)

No.	Year	Category of use					Agricultural lands total
		Arable lands	Grasslands	Meadows	Vineyards	Orchards	
1.	2011	120,588	74,672	36,781	2,500	4,425	**238,966**
2.	2012	120,586	74,671	36,780	2,500	4,425	**238,962**
3.	2013	120,428	74,521	36,604	2,533	4,827	**238,913**
4.	2014	120,428	74,521	36,604	2,533	4,827	**238,913**
5.	2015	120,559	74,340	36,659	2,529	4,863	**238,950**

Most of the agricultural lands (62%) have the incline between 6-14º and are covered by vineyards and orchards. 15% of lands have the incline under 6°, being used for grain crops and last but not least the pastoral arrangements specific to central summits of Plopiş Mountains, which have the form of some large plateaus.

5.2. Climate resources

Due to their position, Silvania Mountains are located in the temperate continental climate area, representative for the western and northwestern areas of Romania. The effects of the southern or southwestern circulation are felt through higher temperatures and rainfall in proportion of over 15%, as a result of warm air from the south-west, characteristic to north Mediterranean cyclone activity, in its movement towards north. The influence of climate is equally felt in the characteristics of flora and fauna. It can favor or restrict the anthropogenic activity. Particularly, it fosters the agricultural activity, through favorable periods for certain cereal and technical crops, fruit-growing, vegetable growing, farming (Josan, 2009).

Table 2. Average annual temperature, rainfall and winds in the Silvania Mountains, between 2011 and 2015 (*source: the National Administration of Meteorology*)

Year	Annual average temperature (°C)	Monthly rainfall (l/m^2)	Wind - main direction (m/s)
2011	10.5	389.6	NW/2.1
2012	11.2	568.7	NW/2.2
2013	11.2	693.4	NW/2.3
2014	12.4	649.3	SE/2.1
2015	11.7	626.1	SE.1.9

Between 2011 and 2015, the annual average air temperature in Silvania Mountains increased from 10.5°C to 11.7°C, influencing the dynamics of the Silvania ecosystems. Higher average annual precipitation amounts (800-900 mm and even exceeding 900 mm) were recorded in Meseş and Plopiş Mountains as a result of their higher altitudes as opposed to the surrounding regions and to their exposure to the Western circulation.

Between 2011 and 2015, the annual rainfall amount recorded oscillations with a rising trend from 389.6 l/m ^{2} to 626.1 l/m^2. The integration between the climate and the active surface in the Plopiş Mountains resulted in the formation of complex and elementary topoclimates depending on the characteristics of the active surface (altitude, aspect, slope, expressed in terms of the amount of received caloric energy, the duration of sunlight brightness and local air currents).

The topoclimate of Plopiş Mountains is imposed by their low height (less than 1000) and their position in front of the oceanic air masses (Josan, 2009). The climate of Plopiş Mountains is influenced by western air masses; therefore higher rainfall is recorded (700-900 mm/year) with average annual temperatures of 6-8º C in the central part and 8-9º C on the outskirts. In January, the values are between 2-4ºC while in July they are maintained around 16-19ºC. The integration between climate, landscape and human activity in the area of Plopiş Mountains led to permanent settlements of the "shelter" type on the cols between the main summits (Socet, Huta Voivozi, Valea Târnei, Şinteu, Făgetu, Şerani), favored by the moderate climate. The practicing of animal husbandry, as a pastoral development, attests the integrator character of the climate and of its influence, with a double purpose: *supporting landforms shaping* and last but not least the *development of human activities*.

5.3. Water resources

The hydrographic network of Silvania Mountains has a divergent character and was forced to adapt to tectonic structures in this area, draining from West towards East in the case of Crişul Repede and Barcău, near Plopiş Mountains. The *asymmetry* of major hydrographic basins is due to tectonic causes to which the network adapted (sinking movements, in the central part of Şimleu Basin, lifting movements in Plopiş Mountains, Măgura Şimleului and especially in Meseş Mountains).

5.4. Biogeographical resources

The pastoral and forest development in Plopiş Mountains is mainly based on edaphic and biogeographical resources. The types of habitat in Silvania area and in particular in Plopiş Mountains correspond to the characteristics of the continental biogeographical region: *forests*, *meadows* and *shrubs*, as well as *vegetation adapted to caves*, *waters*, *peats* and *marshes*. As regards the *distribution and composition of flora*, in Silvania area, a vertical zonality is noticed; the predominant landscape is given by the *interplay between the areas covered by woodland* (oak, beech, mixed forest) and the secondary and derivate meadows or agricultural land. The main share in Silvania Mounatins is held by *meadows and farmland* as a result of the introduction of crops in clearings by population in ancient times and of the deforestation of beech and common oak forests.

Fig. 10. Vegetal formations of meadow type in the Plopiş Mountains, Negreni Plateau sector (*source: the author*)

In Plopiş Mountains, the *coniferous forests*, in mixture with the *broadleaf forests*, cover large areas on Barcău Valley, Iaz Valley, Valea Mare and Marca – Huta, where the coniferous forests, represented by *spruce* (*Pices abies*), are accompanied by *broadleaf forests*, including *beech*, *hornbeam* (*Carpinus betulus*), ash (*Fraximus excelsior*) and sycamore maple (*Acer pseudoplatanus*). The beech sublayer, of *Fagus Silvatica,* is encountered in Plopiş Mountains.

Fig. 11. Deforestation of large areas in Plopiş Mountains (Negreni Plateau sector)

The current demands of wood as *main resource of the forest* are on a constant increase, leading to conflicting reports between the anthropogenic exploitation of this resource and the capacity of regeneration of overexploited forest ecosystems, marked by deep unbalances which can trigger geomorphological processes, controlled by this vegetal association (landslides, soil erosion and ravination). Against environmental reconversion schemes, the cleared areas in Silvania Mountains were replanted with varieties of deciduous trees (durmast) and coniferous trees (spruce, fir, pine). As a consequence of the massive deforestations in the land of Silvania, the forest area decreased from about 40% of the whole area of Silvania territory (fig. 11), in the 16th century, to 28% in the 19th century, to 26 % in 1970 and 22 % today (Josan, 2009). To the mentioned causes, one may add *the agricultural overproduction crisis* in 1873, when the exploitation of agricultural land was very poor, and the wood from forests was exploited in order to achieve the necessary revenues. The interaction between the anthropogenic factor and the forest ecosystem led to the creation of integrated forms of *runways and forest roads type* (road or rail tracks), such as railways for the transportation of timber between Nuşfalău and Valea Iazului (18.8 km), between 1926-1928 and on Boului, Starvinului and Blidarului valleys (48 km), built between 1927-1933. After the depletion of timber, railways were no longer used. The deforestation produced some modifications in the demographic structure, through the colonization of specialized workforce, comprised mostly of Slovaks in Plopiş Mountains. Due to the same circumstances, the *rural settlements of copse type appeared*. Their emergence was linked to the fact that people cleared the forests, then built their homes, and an eloquent example in this respect is the village of Marca-Huta.

In Plopiş Mountains, the forest on smooth surfaces (erosion platforms) were gradually replaced by pastures, therefore *sheep grazing* during summer was extended and *shelters* appeared as rudimentary forms of pastoral arrangement. The replacement of forests by agricultural lands reduced their hydrologic function, with serious consequences on the flow of the superficial water into rivers, which was then reflected in the frequent floods of Barcău. The forest roads, some of them temporary, fostered water erosion and led to the unbalance of the versants and the triggering of some specific slope processes (Irimuş, 2016). Due to its features, the forest has a high ecological value, it protects the soil, influences the local climate and the hydric regime, controls the cycle of the nutritious elements between the soil and the flora, constitutes the habitat of numerous varieties of plant and animal species, protects the human settlements and also has a production value through the wood, exploited alongside other forest products (according to the Environmental Protection Agency of Sălaj, 2012). Forests in Silvania area are in close connection to landforms, thus limiting the erosion processes and the

landslides and affecting the climate, the vicinity of the forest and the evolution of forest soils. *The habitats of meadow and brushwood* type are mainly encountered in the hilly area of Silvania (fig. 10), on the site of the former forest of beech and durmast and along the valleys of the main rivers crossing the area. They are used as pastures and meadows consisting of mesophillic herbs (*Agrostis tenuis*, *Festuca rubra*, *Lolium perenne*, *Nardus stricta*, clover and dicotyledonous species). The fauna in Plopiş Mountains is sporadically represented by elements specific to the *Carpathians* (Carpathian stag, birch cock, bear, lynx). The cynegetic fauna instead is well represented by: boar (*Sus scrofa*), roe deer (*Capreolus capreolus*), Carphatian deer, bears, rabbits, badgers (*Meles meles*), squirrels (*Sciurus vulgaris*), wolves (*Canis lupus*), lynx, pheasants (*Phesianus colchicus*).

5.5. Forms of agricultural arrangement in the Plopiş Mountains

In Plopiş Mountains, the existing edaphic and biogeographical resources are mainly used for the forestry and pastoral arrangements.

5.5.1. Forest arrangements

The forest arrangements in Plopiş Mountains include the totality of the forests and the areas for afforestation, serving the needs of crops, production or forestry administration, the ponds, the riverbeds of the runlets near Plopiş, areas for forestry use and non-productive areas. All of these are part of the forestry development since 1st January 1990 or included in it later. From a legal point of view, they constitute, regardless of the nature of the property, the *National Forest Fund*: *the forests*; *areas in process of regeneration* and the *plantations* established for forestry purposes; *land used for afforestation* (degraded land and treeless land, in compliance with the law to be treed); *areas serving the needs of crops* (plant nurseries, plant crops); *areas that serve the needs of forestry production* (osiers, Christmas trees, ornamental trees and bushes and fruit trees); *areas that serve the needs of the forestry administration* (lands for ensuring game food and producing forage, temporarily used by the forestry staff); *areas covered by buildings and related fields* (administrative offices, cottages, pheasantry, trout farms, farmers, roads and forest paths for transport, industrial spaces, other technical facilities for the forestry sector); ponds, runlet riverbeds, as well as non-productive lands included in forestry development; wooded pasture with a consistency ≥ 0.4, calculated only for the actual area covered by forest vegetation. With regard to forest arrangements in Plopiş Mountains, the problems of regeneration of natural brushes require special attention from the part of foresters, because they constitute a small percentage, but they shelter rare plants, including species listed in the Red Book.

Fig. 12. Forest habitat in Plopiş Mountains

If one looks at the way in which the area covered by the *forest fund* in Sălaj County evolved during the last 5 years, one notices an increase of the *forest fund* from 95,847 ha, in 2010, to 95,876 ha at the end of 2015, but there is still a deficit in relation to taking possession of some lands, in particular degraded lands that need new forest plantations. Worth mentioning is the fact that in the case of the property structure of the National Forest Fund, at the level of Romania, the areas covered by state forests, under the *administration of R.A. Romsilva (Romanian National Forest Administration)*, continued to decrease from 4.3 million ha at the end of 2005 to 2.3 million ha in the following period. In Sălaj County, there was a significant change in the percentage ratio of private forest areas at the expense of those owned by the state, with the emergence of normative acts regulating the property regime. In particular under the Law no. 247/2005, large areas of forest were given back to their owners. From the point of view of the structure on forestry groups (coniferous-deciduous), the forest fund in Sălaj County consists of: *coniferous species* (6905 ha, 7%), *deciduous species* (87,778 ha, 92%) and other lands (1183 ha, 1%) (Environmental Protection Agency of Sălaj County, 2015). In order to ensure a sustainable forest management, a key factor is their regeneration. In this respect, between 2011 and 2015, by means of afforestation campaigns, the regeneration of forest areas was carried out as follows: *total regeneration*, *artificial regeneration* (afforestation) and *natural regeneration*, with a higher share of the *total regeneration* (141 ha and 107 ha), followed by *natural regeneration* (43 ha and 76 ha).

In order to keep the genepools of these brushes, it is recommended to use the natural regeneration. The forest fosters water infiltration into soil, maintains a favorable water regime for the soil, prevents or reduces the intensity of torrential phenomena and avalanches, with all the negative effects on the environment and the overall economy. Due to the leaves, the forest vegetation contributes to the purification of the atmosphere (reducing dust, smoke, toxic gases and microbes) and consumes at the same time a huge amount of carbon dioxide, continually renewing the oxygen stock. Another essential aspect is the landscape and recreational role of the forest, which, due to its aesthetics, is constituted as a haven and source of rejuvenation for the human population, affected by the technical progress and the industrial development (Environmental Protection Agency of Sălaj County, 2015). A natural risk that has to be taken into consideration within the forest ecosystems is represented by *forest fires* which depend on many factors, the most important of which would be: weather, vegetation (e.g. the amount and the type of vegetation), topography, forest management and other socio-economic factors.

Between 2011 and 2015, in Sălaj County, there were 11 forest fires recorded. They were small and affected a total area of 18 ha. The climate change has negative effects on forests through changes in the composition of brushes, the drying of brushes and trees, the exponential development of pathogens and the decline of biodiversity. The problems of sustainable forest management can be successfully solved only if the appropriate forest policies are promoted in order to meet the new requirements. In the *forestry policy* of the state, the primary forest function is the protection of the environment and the ecological balance. The *Forest Code* and other laws ban the reduction of the forest fund area, and cutting down trees is allowed only within the limits set by the forest arrangements. The sustainable forest management means the use of forests and wooded lands in a manner and at a pace which allow the maintenance of biological diversity, productivity, regeneration capacity, vitality and capacity to carry out, now and in the future, their ecological, economic and social functions, useful at local, national and global level, without prejudice to other ecosystems.

5.5.2. Pastoral arrangements

The pastoral arrangement represent the "documentation which includes technical, organizational and economic measures necessary for the improvements and exploitation of grasslands" referred to in the "Detailed rules for the application of the provisions of the Emergency Ordinance No. 34/2013 regarding the organization, management and exploitation of permanent grasslands". In Plopiș Mountains, the *grasslands* are frequent and near the human settlements as landscapes transformed as a result of deforestation in favor of agriculture. The forests became *fields*

with secondary grasslands, with tickle grass (*Agrostis tenuis*) or *arable land.* Plopiş Mountains represent a *Site of Community Importance*, by order of the Ministry of Environment and Forestry No. 2387 from 2011 for the modification of the Order of the Ministry of Environment and Sustainable Development No. 1964/ 13.12.2008, concerning the establishment of the system of protected natural areas and of Sites of Community Importance, as an integral part of the European ecological network Natura 2000 in Romania. In Sălaj County, five Sites of Community Importance were established with a combined area of 45,474 ha (Peştera Măgurici, Racâş-Hida, Tusa-Barcău, Lozna, Muntele Şeş or Plopiş). *The Şes or Plopiş* Mountain (ROSCI 0322) cover an area of 34,880 ha and is located across the territory of the following communes: *Halmăşd, Marca, Plopiş, Sâg, Valcăul de Jos* as well as communes in Bihor and Cluj counties.

The following *types of habitats* are to be mentioned*: Watercourses from the plain area to the mountainous level,* with *Ranunculion fluitantis* and Callitricho-Batrachion vegetation code – 3260; code – 3270 – *Rivers with muddy banks with Chenopodion rubri* p.p. and *Bidention* p.p vegetation; code - 40A0 – *peri-pannonian subcontinental shrubs*; code - 6240* - *subpanonnian steppic meadows*; code - 6430- *Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels*; code – 6510 *Lowland hay meadows* (*Alopecurus pratensis, Sanguisorba officinalis*); code - 7120 - *Degraded raised bogs still capable of natural regeneration;* code – 8210 - *Calcareous rocky slopes with chasmophytic vegetation;* code - 8220 - *Siliceous rocky slopes with chasmophytic vegetation;* code - 9110 - *Luzulo-Fagetum beech forests;* code - 9130 - *Asperulo-Fagetum beech forests,* code -9150 - *Medio-European limestone beech forests of the Cephalanthero-Fagion;* cod - 9170 - *Galio-Carpinetum oak-hornbeam forests,* code - 91E0 - Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, *Alnion incanae*, *Salicion albae*); code - 91M0 - *Pannonian-Balkanic turkey oak- sessile oak forests;* cod - 91Y0 - *Dacian oak & hornbeam forests.*

The second Site of Community Importance in the territory of Plopiş Mountains is *Tusa-Barcău* (ROSCI 0257), which covers an area of 13 ha, situated in the territory of the commune of Sâg, near the village of Tusa. The site includes a Community habitat of Asperulo-Fagetum beech forests (code 9130), to which one should add its fauna and landscape character, as the karst springs of Barcău River are located here. The natural qualities of the Land Fund constitute the fundamental premise of agricultural activities and in particular of the pastoral arrangements. The degradation of characteristics and functions of soils in Plopiş Mountains, as well as their bioproductive capacity, led to restrictions of their use, determined either by natural factors (climate, landforms, soil characteristics) or anthropogenic, agricultural and industrial actions. The main restrictions regarding *soil quality* in Sălaj County and in Plopiş Mountains are: the average annual temperature,

the average annual rainfall, the gleyzation of soils, the stagnogleyzation of soils, the salinization/ alkalinization of soil, the texture of soils, the degree of pollution, the slope, the landslides, the groundwater depth, the flooding through overflow, the total porosity, the calcium carbonate content, the soil reaction, the edaphic volume, the hummus, the excess moisture at the surface. In order to prevent the decrease of soil productivity due to chemisation, it is recommended to use an association of mineral fertilizers with organic ones or the alternation of their administration, so that organic fertilizers are administered at least once every 3-4 years. Both *natural* (low altitude grasslands, subpanonnian steppic grasslands) and *secondary* grasslands (resulting from the massive deforestation) in the communes within Plopiş Mountains can be included in the category of "pastoral arrangements" depending on the landform on which they are located, their position on the slope, the shape, the altitude and the exposure of the slope (C. Bârliba, 2011).

Fig. 13. Free pasturage in Silvania Mountains (*source: the author*)

Karst landforms are important from this point of view, because they favor a chasmophytic vegetation that finds the best growth conditions on the rocks across the calcareous slopes of Negreni Plateau and the northern parts of Plopiş Mountains. Obviously, the assessments of their grazing capacity, as well as the optimal livestock, are important. Animal waste is used since the earliest times to increase fertility, but the improper use, the uncontrolled storage or discharge of these products can produce negative effects on the soil and implicitly on the quality of these grasslands. Due to the high variability of elements contained, animal waste can lead to unbalances of micro- and macro-elements in the soil structure and can contaminate the groundwater and surface waters. Each grassland must have a driveway; we mention here the existence

of some runways and forest roads in Plopiş Mountains, which still need restoration works. In the activity of pastoral arrangement, the livestock (sheep and cattle) is important, as well as the drinking sources and places. The best water sources are the natural ones (the river of Barcău and its tributaries from the mountain region of Plopiş, its waterhead, the wells), because the quality of animal origin products is highly influenced by the water quantity and quality. The pastoral activity implies more workforce for the *improvement of grasslands* (A. Lăpuşan, K. Niedermaier, 1975) and for their exploitation (harvesting hay, animal care) and can be a valid alternative of *ecological* reconversion of the area after the end of mining and massive deforestation activities. The cowherd or the shepherd has a special role within the pastoral activity; this is the reason why he needs proper living conditions in the form of zoo-pastoral buildings, sheepfolds, stables, summer camps, storehouses, and special-purpose shelters.

The grazing methods are classified into two categories: *free grazing* (continuous or irrational, which involves directing the herd on particular modifiable route, intensive and in front grazing within the two parcels) and *rational grazing* (rotational grazing, which requires the establishment of the number of parcels in which the grassland is divided, their area and the length of time the animals stay there). Both methods have variations for the intensive and extensive exploitation. The delineation of parcels is carried out by natural landforms (rivers, valleys), the woody vegetation (borders, clumps of trees), roads, conventional signs, fixed and electric fences. The limit of parcels in Plopiş Mountains consists of hedges of broad-leaved trees. The advantages of the rational system are numerous: the time spent by animals on a given territory is limited, the production of grassland increases, as the plants have time to grow again; the removal of selective grazing and will force animals to consume all of the valuable species; the uniform use of the whole area of grazing; the possibility of grassland improvement works including fertilization and irrigation; higher production of animal meat and milk. The works to increase soil fertility involve the use of chemical fertilizers (nitrogen and potassium fertilization), organic matter (farmyard manure) and mixed. The works of annual and long-term improvement of grasslands involve weed control, destruction of anthills and leveling, removal of stones, gnarls, overseeding and removal of excessive humidity (draining through open channels, drains and biological ways). The technical works and installations related to grassland are those enclosures in the form of fences needed to better exploit the grassy carpet. The rules of use and management of grasslands are included in the "pastoral arrangement" in the form of "pastoral investigation" which must be concise and use accessible language with regard to the timing of work on the pasture in accordance with the legislation in force.

6. CONCLUSIONS

The lytotypes related to Plopiş Mountains, conditioned by the carbonaceous platform stage of the Tisia Craton, allowed the development of a *karst landscape on Triassic rocks,* placed directly on crystalline schists in the form of *garlands of calcareous islands* in the shape of dolomitic rocks which were submitted to an intense fragmentation together with a rapid evolution that prevented major underground drainage which allowed the formation of an important karst network. The exokarst in Plopiş Mountains is a result of the Pliocene-Quaternary morphogenetic evolution, represented by a wide variety of forms: *karrens, doline fields, uvalas, poljes, lithological contact basins and valleys with dolines.* According to the endokarst and exokarst processes, these forms created favorable conditions for the development of edaphic and biogeographic resources as the basis for agricultural, forest and pastoral land use in Plopiş Mountains.

The formation of useful minerals in Plopiş Mountains was linked to the basin stage of Tisia Craton and to the variety of *source areas* related to this basin, either non-renewable or renewable (water, air, soil, flora and wild fauna), which are important for permanent and agricultural arrangements. In Plopiş Mountains, *cambisols and argiluvisols* prevail, on which develop numerous habitats, specific to the continental biogeographic region: *forests*, *meadows* and *shrubs*, as well as habitats related to *caves*, *waters*, *peats* and *marshes* as the basis for agricultural and pastoral arrangements. The forest arrangements in Plopiş Mountains integrate the totality of forests (coniferous and deciduous species) and other lands that require sustainable management allowing the maintenance of biological diversity, productivity, regeneration capacity. Natural regrowth is preferred rather than the artificial one as a result of their many ecological, economic and social functions. In the *forestry policy* of the Romanian state, the primary forest function is the protection of the environment and the ecological balance.

Both *natural* (low altitude grasslands, subpanonnian steppic grasslands) and *secondary* grasslands (resulting from the massive deforestation in Plopiş Mountains, in places where grasslands are now found) in the communes within Plopiş Mountains can be included in the category of "pastoral arrangements" depending on the landform on which they are located, their position on the slope, the shape, the altitude and the aspect of the slope. The pastoral activity implies more workforce for the *improvement of grasslands* and for their *exploitation* (harvesting hay, animal care) and may be a valid alternative including the *ecological* reconversion of the area after the end of mining and massive deforestation activities. The pastoral arrangements are a valid alternative for the promotion of sustainable economic development in these areas, based on a type of agriculture in agreement with the regeneration capacity of the Silvania ecosystems.

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SPATIAL PLANNING OF MĂRULUI VALLEY BASIN DEPENDING ON RELIEF PARTICULARITIES

VIOLETA-ELENA RETEGAN[1], EMANUEL-CRISTIAN ADOREAN[2]

ABSTRACT. – Spatial Planning of Mărului Valley Basin Depending on Relief Particularities. Mărului Valley is a left tributary of Someşul Mic River that crosses the Cluj Hills along about 17 km, creating a drainage basin of 75 km^2. The Mărului stream flows NW-SE and confluences with the collector river in Iclod village. It is an asymmetrical valley of cuesta type (Savu, 1963), carved in Miocene deposits (Ciupagea et al., 1970). The morphology of the hillside-valley system bears the imprint of Pleistocene periglacial modelling, on which the post-glacial Holocene shaping is creeping over. The physiognomy of the five settlements in the study area attests the adjustment of their functions to the relief specificity. Being peripherally located towards the convergence axis Cluj-Dej, the study area presents a raised obscurity from the development point of view (PATR, 2004). With the purpose to remove the relative isolation to which the mentioned localities belong, this research aims at creating a model of territorial planning focused on the relief particularities, being able at the same time to answer some of the most important residents' current necessities, such as access to communication networks and quality services (social, medical, economic, leisure), coupled with high well-being standards.

Keywords: *spatial planning, landslides, soil erosion, geomorphological risk, agriculture.*

1. INTRODUCTION

The left hillside arrangement of the Someşul Mic Valley between Cluj-Napoca and Dej was largely made up before 1990. The Cluj Land Development Agency provided toward consultation 15 projects of execution. In this way it was found out that some basins, such as Mărului Valley, Orman Valley, Băiţa Valley, Buneşti Valley have not benefited yet of territorial systematization works, unlike the neighbouring river basins. The existing projects focused mainly on

[1] *"Babeş-Bolyai" University of Cluj-Napoca, Faculty of Geography, e-mail: violetaretegan@yahoo.it*
[2] *"Babeş-Bolyai" University of Cluj-Napoca, Faculty of Geography, e-mail: adorean.ec@gmail.com*

soil erosion works, drainage and flood prevention. The probable reason for which these basins have never been arranged before is that, in comparison with other left tributaries of Someşul Mic, the frequency of the recent and contemporary geomorphological processes of the hillside-valley system is lower. Although the number of inhabitants of the five localities along Mărului Valley has known a continuous downtrend, an adequate spatial planning is undoubtedly necessary at least for two reasons, both related to Romania's European Union membership. The first reason aims at bringing all administrative-territorial units, including the villages, at a minimum community level of service provision. The second one derives from the union policy concerning the long-term development of the rural areas in Romania through predominantly agricultural activities, guided and supported by qualified entities such as the Agency for Payments and Intervention in Agriculture (APIA). The land management control factors are multiple, but the main factor that guides the purpose of the spatial planning remains the relief itself. Considering this fact, we intended through this research to answer a series of questions, as follows: Does the relief have an active role in the territorial shaping of the commune? Is the geomorphological risk a factor to take into consideration when constructing new buildings? Should the dwellers, the local authorities and the possible investors pay attention to it?

The framework of the present paper is divided into three parts. In the first section the methodology and the data collection are presented. Next, in the second part, a brief physical-geographical characterization of the study area is highlighted, while the last part emphasizes the results and discussions, plus the conclusions of the research.

2. METHODS AND DATA

The data collection consisted of fieldwork in all five villages that took place during April and May 2016 through which observations and groundwater level measurements in 31 different wells of Aluniş commune were performed. In addition, a semi-structured interview was conducted with the Mayor of the commune, Mr. Mihai Sav. Furthermore, a part of the data was obtained from the Cluj Land Development Agency, Transylvania North Regional Meteorological Centre (climate data), and also data published by the National Statistics Institute, specifically demographical data.

The methodology consists of two distinct categories. On the one hand, the geomorphological part includes a physical-geographical analysis of the study area and the creation of the geomorphological risk map, whereas the spatial planning segment contains a demographical reasoning, as well as the land suitability analysis for new buildings, on the other hand. It is relevant to mention that all the maps were created by using GIS software.

The land suitability for new buildings indicator takes into consideration four fundamental factors, as follows: the slope, the hypsometry, the categories of land use and the distance routes towards the communication paths, respectively. The first step was the conversion of the land use categories into raster format. Further, the four raster images subsequently obtained were reclassified in five distinct classes (from 5 - highest favourability to 1 - minimum favourability). In the end, the four raster images were multiplied and thus the land suitability map for new buildings was generated, the obtained results being reclassified into the five standard classes of favourability - unfavourable, less favourable, medium favourable, favourable and very favourable.

The geomorphological risk was calculated by using the formula developed by Bessis (1984, cited by Haidu, 2000, and by Mureșan and Surdeanu, 2004).

$$Risk = Probability \times Consequences$$

$$R = \Sigma 1 \ldots nP \times C$$

where,

R= risk
P= probability
C=consequences

$$P=F/n$$

where,

P=probability
F=frequency of an event
n=total number of events
C=consequences of the event
Po=number of affected population

The risk factors analysed were the landslides and the soil erosion. The occurrence probability of the events with a valence of risk was calculated on a scale from 0 to 1. The probability classes were established as follows:

0 to 0.20 very low probability - Class 1
0.21 to 0.40 low probability - Class 2
0.41 to 0.60 average probability - Class 3
0.61 to 0.80 high probability - Class 4
0,81- 1 very high probability - Class 5

$$C=T \times Po \times S$$

where,

S = affected surface.

The time received two values: T = 1, if it is not important in the evolution of the risk factor and T = 2, if it is important in the evolution of the phenomenon. The population received three values: Po = 1 in uninhabited areas; Po = 2, for areas with sparse population; Po = 3, for permanently inhabited areas. The affected surface received three values: S = 1, when the consequences are felt near the generator factor; S = 2, when the consequences are felt at regional level; S = 3, if the consequences are felt inside and outside the region as well.

The control factors analysed were: the slope, the aspect, the depth of fragmentation, the drainage density, the land use and the soils, all presented in table 1. The control factors were adjusted, obtaining in this way five classes in all the cases. For each class of each factor the specific risk was calculated, the risk of each control factor being obtained by summing up the five values of risk for each class. The total risk was calculated by using *Spatial Analyst Tools->Map Algebra-> Raster Calculator.*

$$R=P\times T\times Po\times S$$

Table 1. Weight of control factors in the calculation of the geomorphological risk

Control factor	Partial risk value	Weight in total risk (%)
Slope	91	17
Aspect	72	13
Depth of fragmentation	120	22
Drainage density	120	22
Land use	80	14
Soils	66	12

3. PHYSICAL-GEOGRAPHICAL CHARACTERIZATION OF THE STUDY AREA

Mărului Valley is a left tributary of Someşul Mic river, flowing NW-SE and meeting the collector river in Iclod, its main tributary being Ghirolt, on the left side. Located in the northern part of the Cluj County, 75% of its area covers the territory of Aluniș commune – composed by five villages, as follows: Aluniș, Corneni, Ghirolt, Pruneni and Vale - while the remaining 25% belong to Iclod commune (see fig. 1). If Iclod commune has a greater development level due to its position onto a European road traffic axis (E60), Aluniș commune requires more attention and a more intensified focus of the specialists.

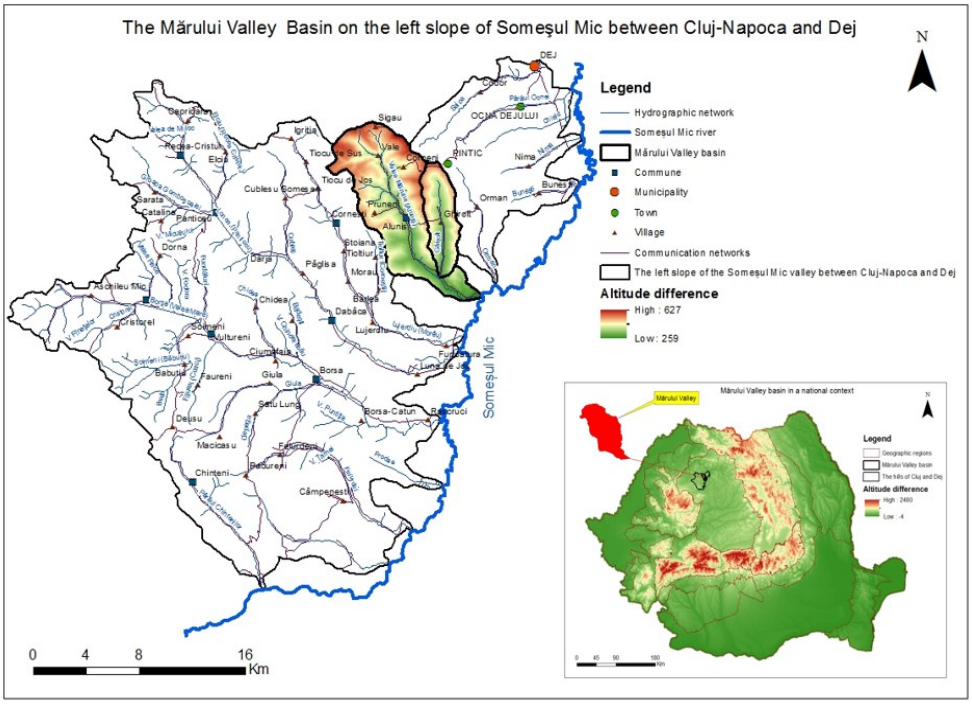

Fig. 1. Mărului Valley - territorial contextualization

3.1. Geological composition

The geological composition of rocks of different roughness and permeability is specific for Cluj and Dej Hills, which fosters the installation of surface erosion, deep erosion and mass movements surface slopes. From the lower Miocene (Burdigalian) is kept the Dej tuff alternating with layers of marl (Ciupagea et al., 1970). In the Middle Miocene are deposited layers of Hida (parts of the 'Helvetian' stage), composed by conglomerate, sandstone and marl clay (Anca Suciu, 2001). The upper Miocene (Tortonian) layers predominate at surface and consist of clay, sandstone coal, marl and shale tuffs – e.g. Iclod tuff (Meszaros, 1991; Falk Isabela, 2007), while Quaternary sands and gravels are found in the bottom third of the Mărului Valley (see fig. 2).

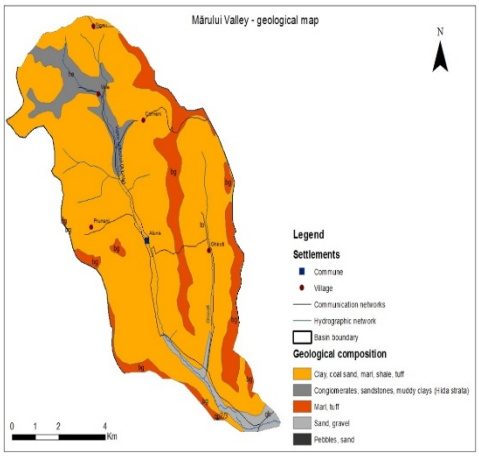

Fig. 2. Mărului Valley – Geological map

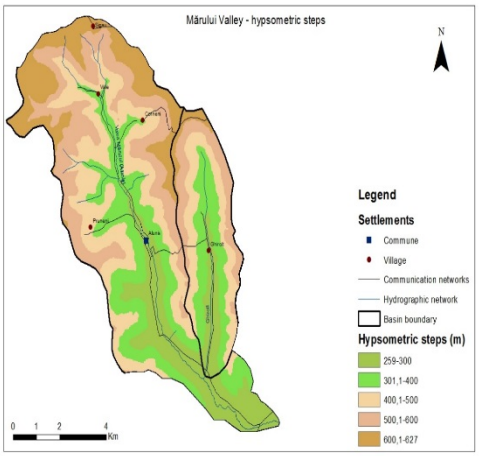

Fig. 3. Mărului Valley – Elevation map

3.2. Morphology

According to Savu (1963), Mărului Valley is a subsequent valley for the most of its part, but also oblique and mixed at the same time. It flows NW-SE, between Măguriţa Peak, at 627 meters altitude and the confluence of Mărului Valley with Someşul Mic in Iclod, at 259 meters, there is a difference in altitude of 368 meters (fig. 3). The valley is asymmetric because of the differential erosion of the Mărului stream and its tributary, Ghirolt. The cuesta fronts are placed on Dej tuffs and are oriented S, SW and W, marked into relief by structural steps. On Dej tuffs, portions of the ancient erosion platform of the Someşul Mic river were preserved, arranged on two levels: the lower one, at an altitude between 450-550 m (Mihăilescu, 1963, 1967) - Ghirolt Hill, 496 m, Ciuhat Hill, 507 m, La Poiene Hill, 524 m, and another one higher in elevation, between 550-650 m – Şigău Hill, 603 m, Măguriţa Hill, 626 m. The tuff roughness and its position highlight critical slopes between 6-17º and 17-32º, prone to erosion processes and land mass displacement (fig. 4). The obverses of the cuestas were formed on the alternations of inclined/monoclinal Tortonian layers. These hillsides have higher dimensions, but belong to the category of highly susceptible to erosion processes (6-17º).

The average slope of the valley in the longitudinal profile is 21.6 ‰. The slope in the springs sector, from the hydrographic slope to the village of Vale (404 m absolute altitude), is very high, of 74.3 ‰. The 223 meters difference is recorded at just 3 km of valley length, resulting in a remarkable relief energy.

One notices the sharp narrowing of the valley, upstream from Aluniș village, due to the deepening of the stream in toughest Helvetian deposits (particularly sandstones and conglomerates). The valley has an aspect of gorge, upstream from Aluniș village and in many sectors within the villages of Vale, Corneni and Pruneni. The tributaries of Mărului Valley create quite narrow depression basins in the source area. The gorge sectors are characterized by sharp slopes between 17-32º, favouring especially the bank erosion.

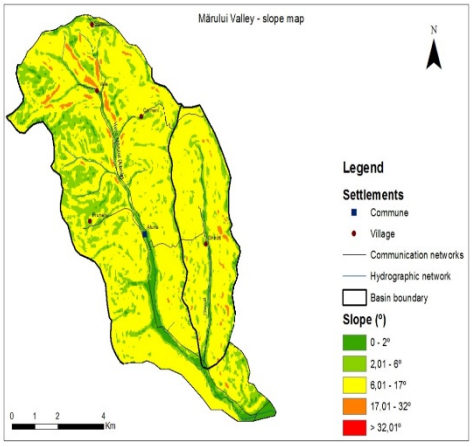

Fig. 4. Mărului Valley – Slopes

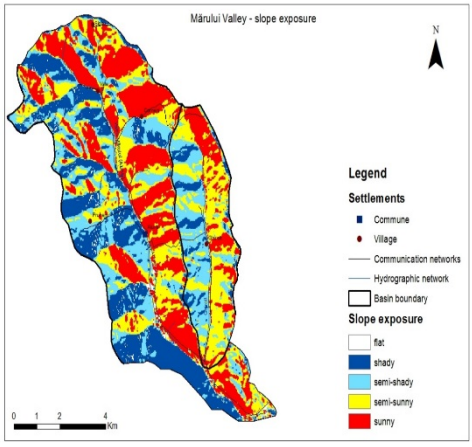

Fig. 5. Mărului Valley – Slope aspect

Towards the entrance to Aluniș from the Vale village, the valley is already widening. Its slope is reduced to 10.3 ‰, the difference in height between the village of Vale and the confluence with Someşul Mic is 145 m, spread along 14 km. Under these conditions, Mărul River does not have the capacity to transport entirely outside the basin the deposits from the slopes, thus the stream creates a wide meander way, where most of the transported materials are deposited. The floodplains and the watersheds are horizontal and quasi-horizontal (0-2º) and favour the seasonal flooding of the land and the alteration crust formation through weathering processes. The glacises link the flatted lands and the sloping lands, having gentle slopes, between 2-6º. There are situations in which the glacises are parasitized by the material originated from alluvial cones torrents or colluvial deposits of landslides (Surdeanu and Goțiu, 2008).

3.3. Hydrology and hydrogeology

As a result of the groundwater level measurement, it was observed that the phreatic waters are close to the surface. The aquifer was intercepted at depths between 1.80-5.40 m. Its position favours the movement of the superficial deposits onto the hillside, in the form of their reestablishment process creep or of their submission in the form of landslides.

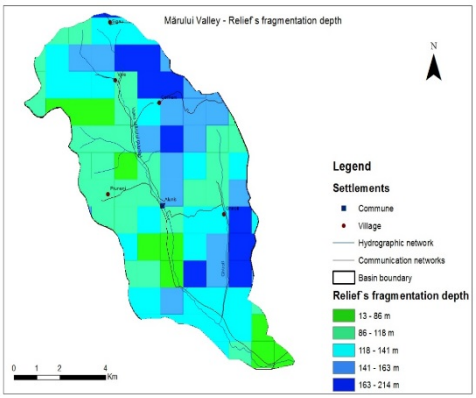

Fig. 6. Mărului Valley - Relief's fragmentation depth

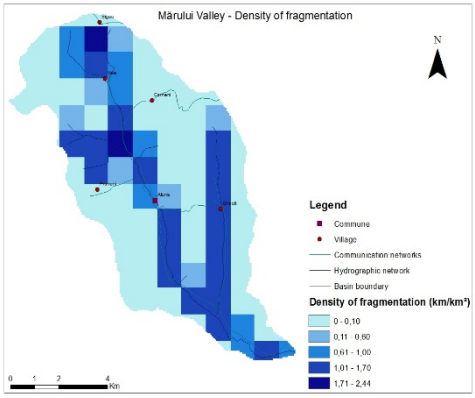

Fig. 7. Mărului Valley – Density of fragmentation

3.4. Climate

The small size of the Mărului Valley Basin, and not its diversity, dictates the uniformity of the weather phenomena in the entire area. The average annual temperature is 8.3º C, with negative temperatures in December, January and February. The average annual rainfall has the value of 566.5 mm. This value matches up the Mărului Basin in the sub-humid areas, where the rainfall exceeds the evapotranspiration only between November and April, and the hydrological regime of the soil is periodically percolative (Dîrja and Budiu, 2006).

According to the results of the *Angot index* calculation, the hillsides susceptibility to erosion and landslides is higher in the rainy months (generally April, June, July, September), while during the other months of the year the probability of triggering the slope processes is lower. The climatic characteristics along with the soil types draw the categories of the land use, given that it is a rural area. If the Mărului Valley fits an overall extensively mixed arrangement profile (PATR Nord-Vest, 2004), the organization details of this territory will be given by the geomorphology.

3.5. Land use

The land use map (see fig. 8) and the fieldwork demonstrated that in the territory of Aluniș commune about half (50%) of the area is covered by agricultural lands, specific to this region of Transylvania. The agriculture is the main occupation of the inhabitants, but the production potential of the agricultural land is not used to its maximum capacity. Currently, the agriculture is practiced only in subsistence or rarely semi-subsistence systems. The main agricultural products encountered in this area are cereals (maize, wheat, barley) and vegetables (potatoes, beans, peas and so on). The fruit growing, the brandy production or even the viticulture are important related agricultural activities, but they are practiced only in reduced/ small systems.

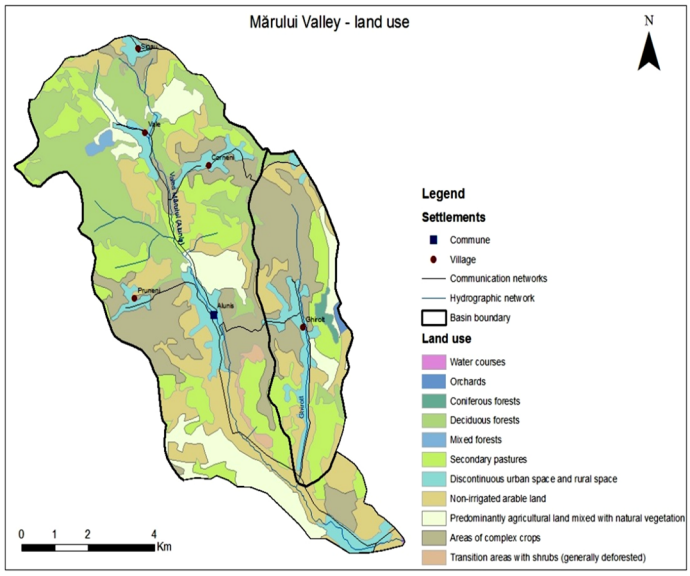

Fig. 8. Mărului Valley – Land use

The river meadow is covered by vegetable gardens and hoeing weeds. The glacises and the first terrace of the meadow are covered by hoeing weed crops, sometimes alternating with cereals and fodder crops (Lucerne/alfalfa). These mixed cultures extend outside the village, on the lower half of the hillsides. The following is a portion of land used for hay, raising up on two-thirds of the hillside. The crops normally are irrigated, but even so the practiced agriculture type is the subsistence one. The forestry covers about 20% of the territory, less than 1% is deciduous forest planted between 1970-1980 in the areas presenting landslides. The upper third of the hillsides is commonly used for pasture resulted from deforestation in the previous centuries and the watersheds were used as well for this purpose. The built-up area covers about 10% of the territory, while the inhabitants´ lifestyle is a traditional one for most of the people with few differences and restructures compared to the period before 1990.

4. RESULTS AND DISCUSSIONS

4.1. Demographical trends

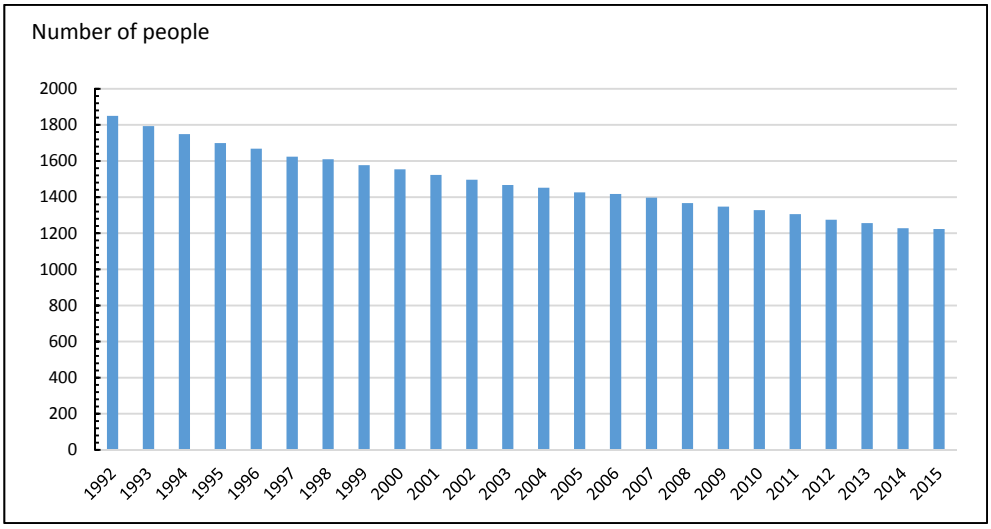

Fig. 9. Population's numerical evolution between 1992-2015

Besides the natural conditions, the man has had a vital contribution to the arrangement of this area since ancient times. Between 1992-2015, the population of the commune has decreased steadily from 1850 inhabitants in 1992 to 1496 in 2002, 1306 residents in 2011, and 1223 inhabitants in 2015, respectively. The causes that produced this phenomenon are easily deductible, such as: deindustrialization after 1990, external migrations in search for a job, adopting a modern demographic behaviour, women's empowerment and so forth. In parallel with the present population evolution at national level, the population of this area recorded a significant decrease over the last years, more than 600 people in less than 25 years (see fig. 9). Using the formula of the population growth rate developed by Thomas Robert Malthus in the 19th century, it was found that if the population evolution of these five villages would have the same trajectory in the future, it will come around to 1092 inhabitants by 2020 and only 831 inhabitants in 2030. This is also evidenced by the population structure by age and gender in 2015, which attests an aged population, that is, a regressive type of population evolution (see fig. 10).

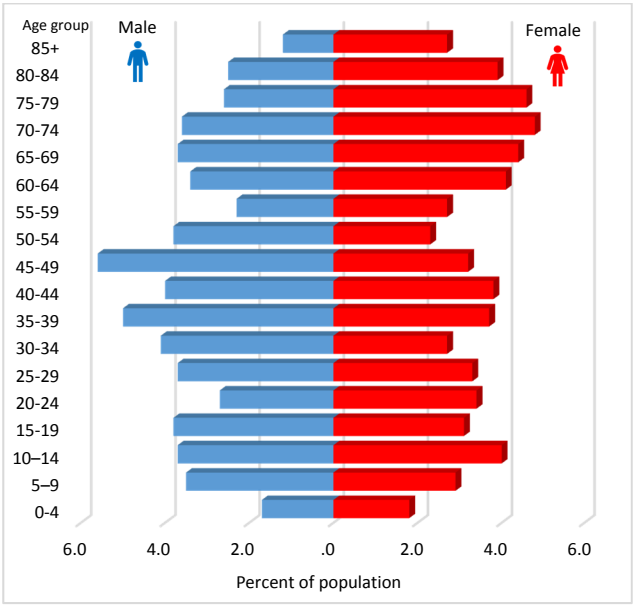

Fig. 10. Age pyramid at 1st of July 2015

The monthly evolution of the unemployed people between 2010-2015 shows a considerable decrease from 58 unemployed inhabitants in January 2010 to 14 unemployed residents in January 2015. In December of 2010 there were 38 unemployed inhabitants while in December 2015 there were only seven. Instead, the evolution of the number of employees in Aluniş commune, excepting those working in agriculture, oscillates between 1991 and 2015, mainly because of the population's downward evolution and the national economic restructuring that were felt in the commune. Thus, in 1991 there were 95 people employed, in 2003 only 22 employees, while in 2014 the number of employed inhabitants increased to 46 people. Another important aspect of the demographical structure is the increasing number of young residents from this area who completed higher education cycles in the recent years, nevertheless it is unknown whether they will continue to live in this area, considering that the upcoming perspectives they would take advantages of the local development level are rather uncertain and unattractive.

4.2. Existing situation

The local authorities' efforts have resulted in an increased orientation towards the remediation of infrastructure problems, which, in their opinion, were the biggest impediment for the economic expansion of the commune. Thus, since 2002 the local authorities started to attract and absorb grants from the county, national or European budgets. According to the semi-structured interview conducted with the mayor of the commune Mr. Mihai Sav, the biggest investment in the last decade is considered the introduction of the water supply networks through the SAPARD programme - *Special Accession Programme for Agriculture and Rural Development*, worth 1 million Euro, totalling 22 km of distribution networks and 10 km of culverts/adductions, plus two pumping water storage stations,

but also the connection to the sewerage system, through the EAFRD programme - European Agricultural Fund for Rural Development, worth 2.5 million Euro, the network length totalling 18.5 km and, in addition to this, a wastewater treatment plant was constructed. These two major projects implemented are enriched by the construction of the Tourist Information Centre in Aluniș, through the measure *3.1.3. "Encouragement of tourist activities"*, but also by the construction of a series of amenities, such as sport halls in Aluniș and Ghirolt, a children playground in Ghirolt, the rehabilitation of the schools, culture houses and churches in all the villages, all of them through the measure 3.2.2 *"Basic services and village renewal in rural areas"* from the National Rural Development Plan, 2007-2013.

The ongoing and upcoming projects aim at asphalting all the streets in Aluniș (EU funds), the connection to the sewerage network in Aluniș and Ghirolt (local funds) and the connection to the water supply of the other three villages - Corneni, Pruneni and Vale (local funds).

With the opening of borders for non-reimbursable European funds, several residents of the commune applied for agricultural projects, exclusively in Aluniș and Ghirolt. The main measures through which they managed the funds attraction and absorption were the measures 1.4.1 *Supporting semi-subsistence agricultural holdings undergoing restructuring* and 1.1.2 – *Setting up of young farmers,* both as parts of the National Rural Development Plan 2007-2013 and 2014-2020 versions. It must be added that many of the locals who emigrated abroad early at the beginning of the 21st century, came back and invested in private housing reconstruction.

4.3. Risks and prospects

The geomorphological risk mapping analysis revealed the following aspects: the very low risk land covers 0.08% of the area, while the low risk - 10.18% of the whole. Basically, these are sectors of meadow and partly flat watersheds amongst the main valley tributaries. No restrictions on the location of new buildings in these areas are required. The medium-risk areas represent 71.07% of the total surface and are less suitable for new buildings. These predominantly overlap onto the hillsides with slopes between 6^0-17^0. On these slopes, one notices the existence of several areas affected by ravination after their use as pasture or agricultural land. The depth erosion extinction can be stopped by transforming the respective sectors into orchards grasslands composed by plants consisting of a well-developed root system, taking into consideration that it absorbs excess moisture from the ground and restores the disturbed structure thereof. The areas with high geomorphological risk represent 18.10%, and those with very high risk, 0.57% of the catchment area.

They are inserted on the fronts of cuesta which mark the watershed between Mărului Valley and the neighbouring valleys, onto slopes with gradients between 17^0 and 32^0. Thus the preservation of the existing forests and the afforestation of the sectors with reactivated landslides on these slopes is required.

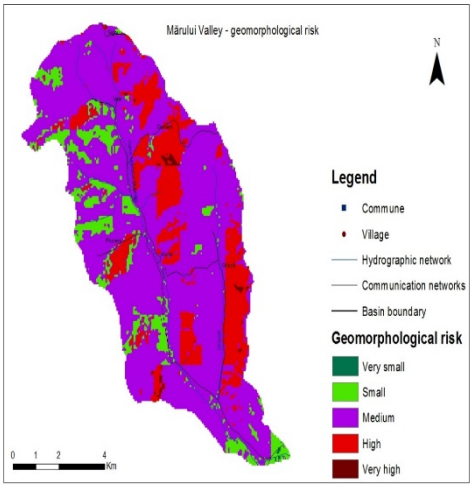

Fig. 11. Geomorphological risk map

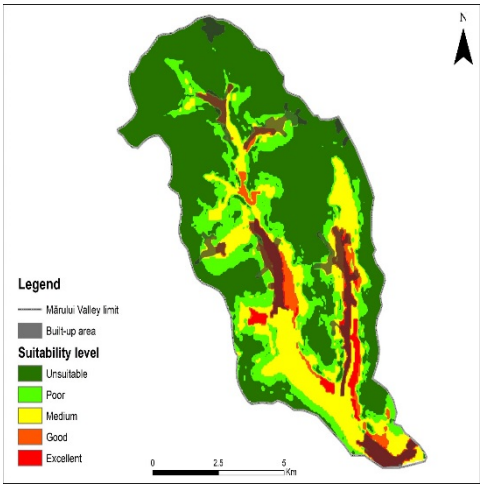

Fig. 12. Land Suitability map

This spatial planning of Mărului Valley Basin according to morphology embraces two categories of principles. On the one side, the scale time is gradually prevailing in both risk assessment and in proposing planning solutions. The cyclical time scale is less relevant in this case, given the limited duration of human life. While stationary type phenomena are resorbed, their effects are integrated into the dynamic evolution of the considered system (Schumm and Lichty, 1965). On the other side, the general principles of spatial planning (Bădescu, 1972, apud Surd et al., 2005) are based on the existence of an element of stability represented by the relief. The following principles are noteworthy in this regard: a) the land economy principle, b) the principle of structural and functional stability of the territory, and c) the principle of optimal space-maximum yield. The other elements evaluated on the human life scale have a random character (climate change, population fluctuation, crops structure, capital insertion and so on), thus the relief could be considered the territorial component which defines the general direction of arrangement, the other factors printing lower taxonomic peculiarities.

Secondly, the land suitability analysis for new buildings construction (fig. 12) highlights the importance of the relief in the spatial planning context, expressing the land favourability degree of the placement of new buildings.

Thereupon, the most favourable areas for the location of new buildings in the studied territory are underlined over the communication paths or along the main valley or the secondary ones collected by the main valley. Overlapping the built-up area of the settlements with the areas of restrictiveness and favourability, one may notice that the buildings are largely located in areas with high favourability, but also normal or medium favourability. However, there are some buildings located over unfavourable or less favourable lands.

4.4. Proposals

First, the development of the study area has been achieved so far with difficulties due to the lack of accessibility, as it does not have direct access to major European or national communication routes. There are some resources, yet inappropriately used – the landscape, the forestry, the pastures, the meadows, the construction materials (especially tuff), the agricultural land, as well as a number of

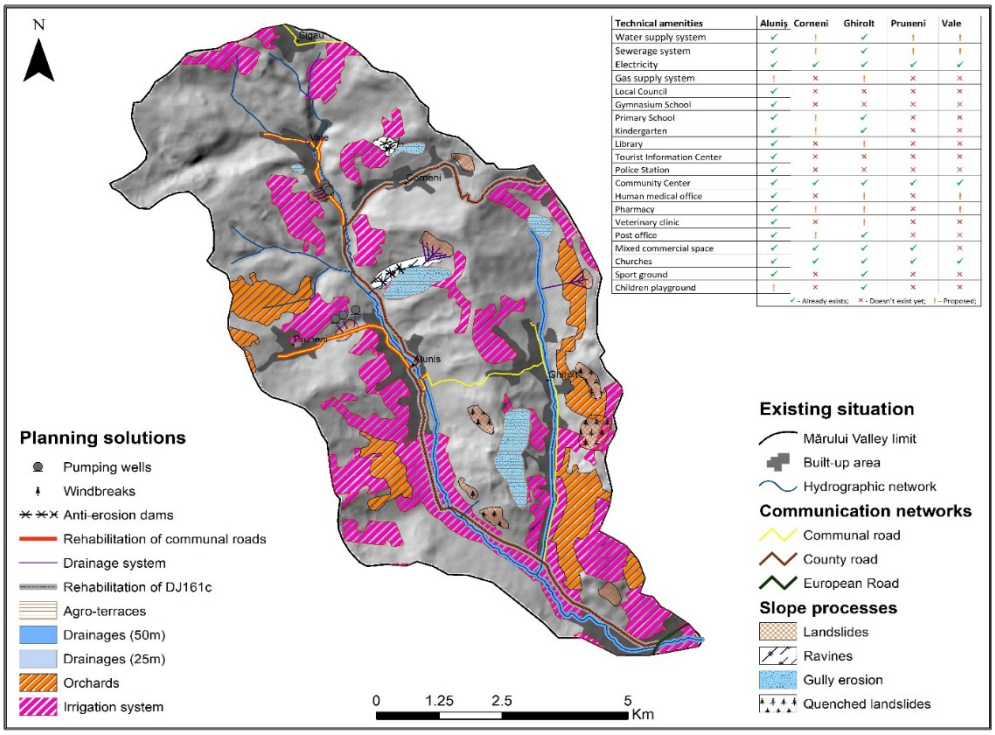

Fig. 13. Mărului Valley - Existing situation and proposals

heritage buildings, such as the Protestant churches in Aluniș and Ghirolt, both dating from the 17th century, the wooden church „Înălţarea Sfintei Cruci" in Pruneni dating from the 18th century and the Schirling mansion in Corneni with a real architectural value, built up between the 17th and the 19th centuries, or even the local traditions and customs. However, the limited resources in conjunction with the poor technical infrastructure, often blurred the upward trend of the commune. Consequently, the infrastructure of the commune, as the local authorities pointed out too, is the main driving force that could bring the desired development, since it would attract investors, new residents and tourists. In this way, to increase the efficiency of the project team responsible for writing projects and attracting funds becomes an indispensable condition, in parallel with the necessity of a strict local development strategy.

Secondly, the works of soil erosion, drainage of the wet areas with excessive moisture, irrigation of some areas, arrangement of the pastures and fertilization of the farmland, as well as the joint agricultural farms of the stakeholders would lead to a significant increase in crop production and livestock, therefore an overall economic development.

Thirdly, the tourism sector represents an unequalled resource that could be exploited. The rural tourism and the ecotourism are increasingly more important at European level as well as at global level. The high degree of conservation of this area creates opportunities for the local communities to better perform in this field, perhaps in conjunction with the neighbouring communes.

5. CONCLUSIONS

The most significant community amenities started to appear in 2002 by attracting and absorbing grants from the county, national or European budgets by the local authorities. The ongoing projects rely more on European funds than on the local budget, but face difficulties in achieving the desired results due to the poor efficiency of the project writing team. Mărului Valley morphology largely displays medium and low risk areas, but there are also significant areas which present high geomorphological risks, requiring in this way a set of specific planning methods for the degraded land. The agriculture, along with the tourism sector, remains a sustainable development perspective of the commune in terms of spatial planning, aiming to reintroduce into the agricultural circuit a series of degraded surfaces, to stabilise the affected land by active landslides and to introduce certain means of increasing agricultural production. The farmers play an important role in stimulating an improved

territorial arrangement as they have succeeded to attract and absorb European funds through specific measures from the National Rural Development Plan, 2007-2013 and 2014-2020, but their total number is still low.

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LAND USE CHANGES IN POST-SOCIALIST ROMANIA. CASE STUDY: BISTRIȚA VALLEY, NEAMȚ COUNTY

ELENA-MANUELA BÎRSĂNUC[1]

ABSTRACT. – Land Use Changes in Post-Socialist Romania. Case Study: Bistriţa Valley, Neamţ County. Land use and vegetation density are by far a major feature of post-socialist Romania. Free access to Landsat imagery archive makes it possible to track these changes in time and link them to their causes and other factors that facilitated the changing process, like political shifts, social trends and economic decisions. After 1989, the Romanian forests entered the restitution period marked by three laws (1991, 2000 and 2005) which has inevitably led to major changes in land usage by modifying the ownership and power of decision. Using tools like vegetation indexes and supervised classifications, the analysis is focused on highlighting the link between socio-political decisions and their impact on land use by analyzing the rural area of Bistriţa Valley, Neamţ County through the years of 1985-2017. Therefore, the study demonstrates the connection of institutional decisions to the natural environment, it explains the reasons behind land use changes and also formulates future perspectives for forest recovery process in this area.

Keywords: *land use change, forest disturbances, Landsat, image classification, land ownership*.

1. INTRODUCTION

1.1. Background

From the perspective of ecosystem services and their role in human settlements and well-being, forest has a great impact especially in the populated areas. This impact can be either positive, when the presence of forests is consistent enough to participate in climate regulation, watershed protection, having also recreational purposes (GLP, 2005; Millennium Ecosystem Assessment, M.A.,

[1] *"Babeş-Bolyai" University of Cluj-Napoca, Faculty of Geography, e-mail: elena.birsanuc@ubbcluj.ro*

2005), or, on the other hand, the absence of forest-cover lands results in low carbon sequestration, deterioration of biodiversity and landslides (IPCC, 2000). Therefore, analyzing the changes in the percent of the surfaces covered by forests is not only beneficial, but also essential for a better management of the environment that can lead to a better decision making process advantageous for both human beings and ecosystems. Once human settlements have interfered with natural areas, every decision made in any of the political, economic, social spheres has a direct or indirect impact on the environment. Being aware of this indestructible link makes it possible for governments to better manage and protect the impact they should have or not have on natural surroundings.

The change in land use as an effect of forest restitution in post-socialist Romania between 1985 and 2010 was analyzed by Patrick Griffiths et al. (2011) for the Transylvanian Basin and the Southern Carpathians. Processing and analyzing the annual time series of Landsat images, the authors concluded that with each of the three restitution laws (1991, 2000, 2005) the percent of forest disturbances increased by more than 30%. Therefore, the study demonstrated a direct natural consequence of the radical changes of the political regime.

Another study of the forest changes in the Carpathian ecoregion in 1985-2010 was conducted by Patrick Griffiths et al. (2013), focusing this time on the Eastern Europe forest recovery. The results indicate a great dynamism of the forests cover (especially affecting coniferous and mixed forests) during the institutional and socio-economic changes caused by the fall of socialism in Poland, the Czech Republic and Romania.

The recovery of forest-cover lands in 1985-2012 is mentioned by P. V. Potapov et al. (2014). Their study, besides showing the increasing loss of forest in Eastern Europe after the 1980s, it also reveals how many of these areas entered a recovery stage. The process has been demonstrated to be rather fast and only "12% of the areas of forest loss prior to 1995 had not yet recovered by 2012".

Frequently used in the analysis of change detection, John G. Lyon et al. (1998) mention the vegetation indices. Thus, studying the State of Chiapas, Mexico, the authors managed to group the indices in three categories, but more importantly demonstrated that the frequently used NDVI is least affected by topographic factors, showing its utility and cataloguing it by giving the best vegetation change detection results.

1.2. Objectives

Regarding Romania, the link between political shifts and forest ownership and management became even more obvious with the fall of socialism. If prior to 1948, most forests were managed by communities and forms of communal

ownership (50%), and the rest were either owned by the state (28%) or were private lands (23%) (Ioraş and Abrudan, 2006), between 1948 and 1989 most of the lands covered by forests were directly owned by the state. With the fall of socialism, the decision was to start the restitution process through three laws: in 1991, 2000 and 2005. After all the three laws have passed, the Romanian forests would be 70% owned by non-state forest owners (Ioraş and Abrudan, 2006; Lawrence, 2009; Lawrence and Szabo, 2005).

Consequently, the political and economic decisions resulted in new rates of the spatial patterns of forest cover. Moreover, the political shift alongside with the APIA grants (Agency for Payments and Intervention for Agriculture) for farmers and meadow owners led to a major land use change in the rural areas of Romania.

The main goal of this study is to analyze the land use changes and their impact on forests in the rural areas of the mountain sector of Bistriţa Valley in Neamţ County, Romania. Thanks to the Landsat imagery archive, a temporal analysis is possible and also makes it easier to track the consequences of the three forest restitution laws. Aiming to help the local and national administration, the results can have a great impact on forest management and land use systems, if the following research questions are being answered:

-What is the impact and the consequences of the three restitution laws on forests in Bistriţa Valley?

-Are there some main reasons for land use changes in this area?

-What are the future perspectives for this rural area from a social and natural point of view?

2. STUDY AREA AND DATA

The study area for this study is located in the Eastern Carpathians, along Bistriţa Valley, from the border of Neamţ and Suceava Counties down to Izvoru Muntelui (Bicaz) Reservoir. This area includes over 30 villages, the protected area of Ceahlău Massif and the man-made Bicaz Reservoir. The presence of Stânişoara and Bistriţa Mountains (peaking at 1530m and 1791m respectively) makes it possible for the area to be covered by extensive surfaces of forests. Also, being a rural area, the main source of profit for the local population comes out from logging trees, agriculture and farming by exploting the meadows. Consequently, these main occupations of the locals imply high physical capacities that, since the migration of the youths to urban centers and the aging of the remaining population, have been reduced drastically.

Regarding the analyzed data, the Landsat images have been downloaded from the Earth Explorer United States Geological Survey (USGS) portal. The study is based on imagery archive from 1985 to 2017 of Landsat 1-3 MSS (path/row/197-198/207), Landsat 4-5 TM (path/row/183/027) and Landsat 7 ETM+ (path/row/183-184/207). The images have been selected from August-September to show the greatest extension of vegetation covered areas, but due to the extensive presence of clouds, some images were replaced with others from springtime.

3. METHODOLOGY

3.1. Pre-processing and image compositing

Once the images were downloaded, each of them has been reprojected to the Stereo70 projection. The SLC-off error was corrected though Focal Analysis for the Landsat 7 ETM+ images from after 2003. Adjustments for the contrast and haze reduction have also been made to better illustrate the differences between vegetation covered lands and those with other types of land use. The initial analysis was applied on the 5-4-2 band combination which best illustrated the above mentioned.

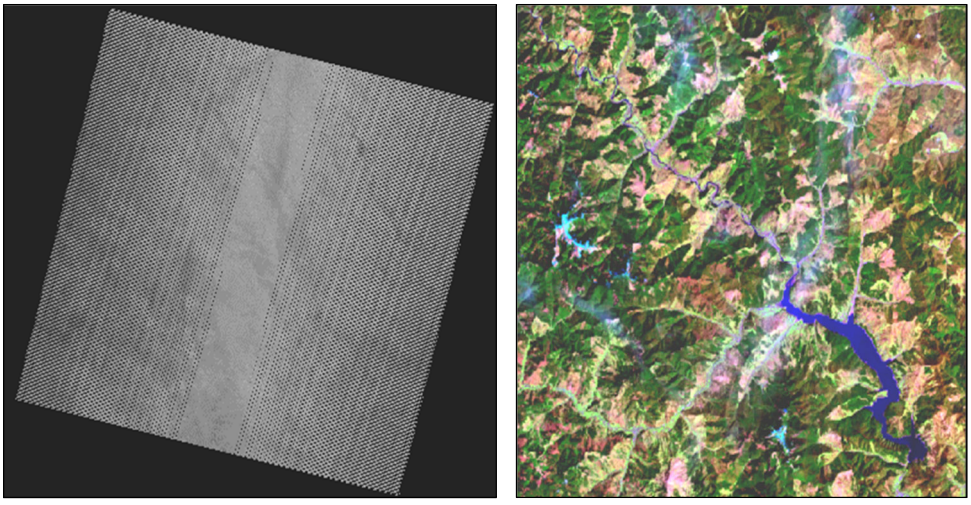
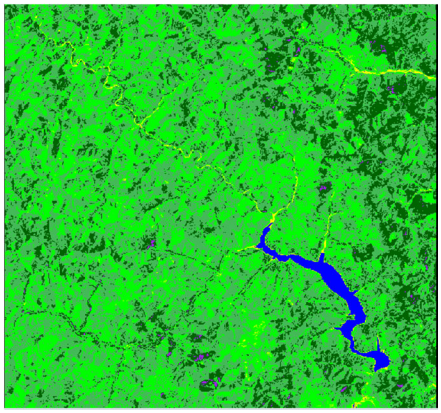
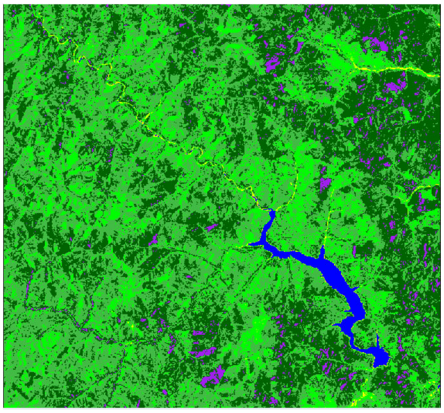


Fig. 1. Example of Landsat ETM+ image with SLC-off corrected and contrast adjustments (5-4-2 band combination)

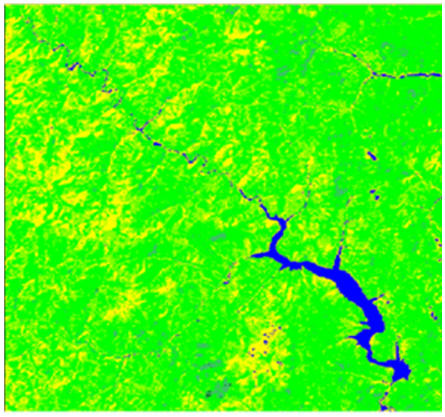
L4-5 TM 1985



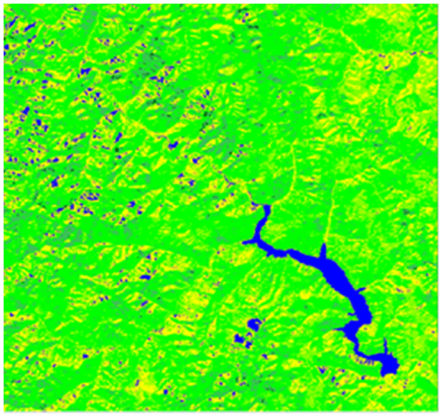
L4-5 TM 1993



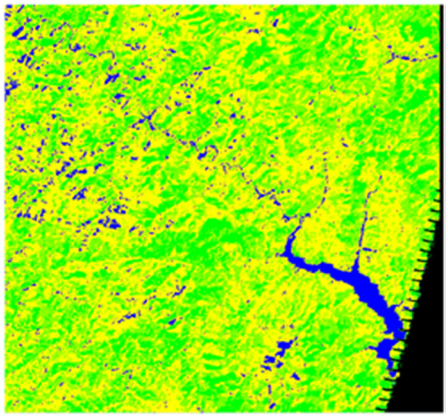
L7 ETM+ 2005

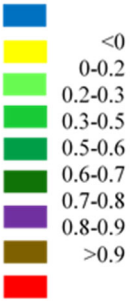


L4-5 TM 2010



L7 ETM+ 2017





After all the corrections have been made, the Normalized Difference Vegetation Index (NDVI) has been applied and the images classified based on the values obtained, resulting 9 classes: below 0 for the absence of vegetation, 0-0.2, 0.2-0.3, 0.3-0.5, for different states of incipient vegetation, 0.5-0.6, 0.6-0.7 for moderate vegetation density and 0.7-0.8, 0.8-0.9 and higher than 0.9 for high vegetation density levels.

At a first glance, it is easy to say there is an obvious decrease in vegetation density, especially after 1993, mostly in the values higher than 0.5 of the NDVI processing. However, there is a slight increase of the values higher than 0.8 between 1985 and 1993. This can be exxplained by the transition period that came with the fall of socialism in 1989 and the beginning of the restitution process in 1991. Due to the political changes, the forests were less exploited belonging neither to the state nor to private owners.

To better illustrate this diminution of high vegetation density values, three areas have been selected as samples. The selected areas are either close to the villages, or easily accessible for the local population in order to exemplify the degree of human intervation in forest cover change. Since the higher density values are those that dropped the most, the samples were taken from the post NDVI processing images with values higher than 0.5. The results below demonstrate the negative impact the local community had on high density vegetation levels mostly through their economic activities involving forests and meadows.

3.2. Supervised classifications

Regarding the supervised classifications, seven classes have been identified, consisting of: hydrography, settlements, agricultural fields, meadows, rockery, coniferous forests and deciduous forests. Therefore, the first step of the supervised classification was to assign the image pixels to one of the seven classes. Of course, another 2-3 steps of corrections were needed, based on the personal knowledge of the area. The resulting images demonstrate the link between forest covered land and meadows and agricultural lands. The connection is given by the replacement of forest with meadows and lucerne crops especially after 2000. Before that, there is an expansion of agricultural lands in 1985-1993, which where slowly replaced by lucerne crops.

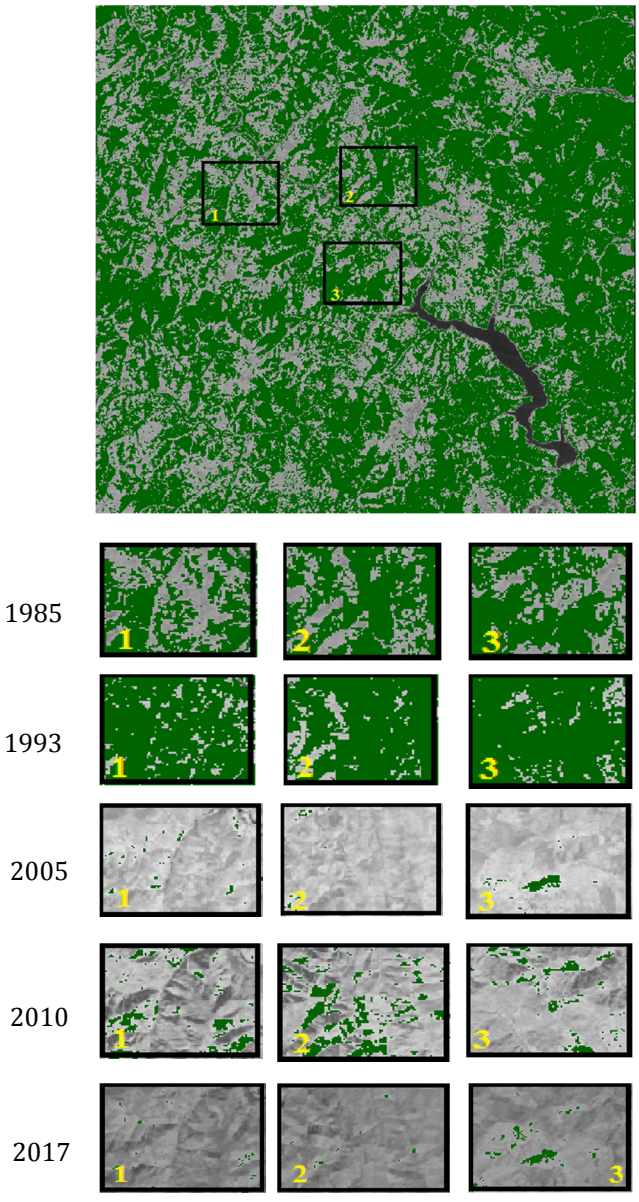
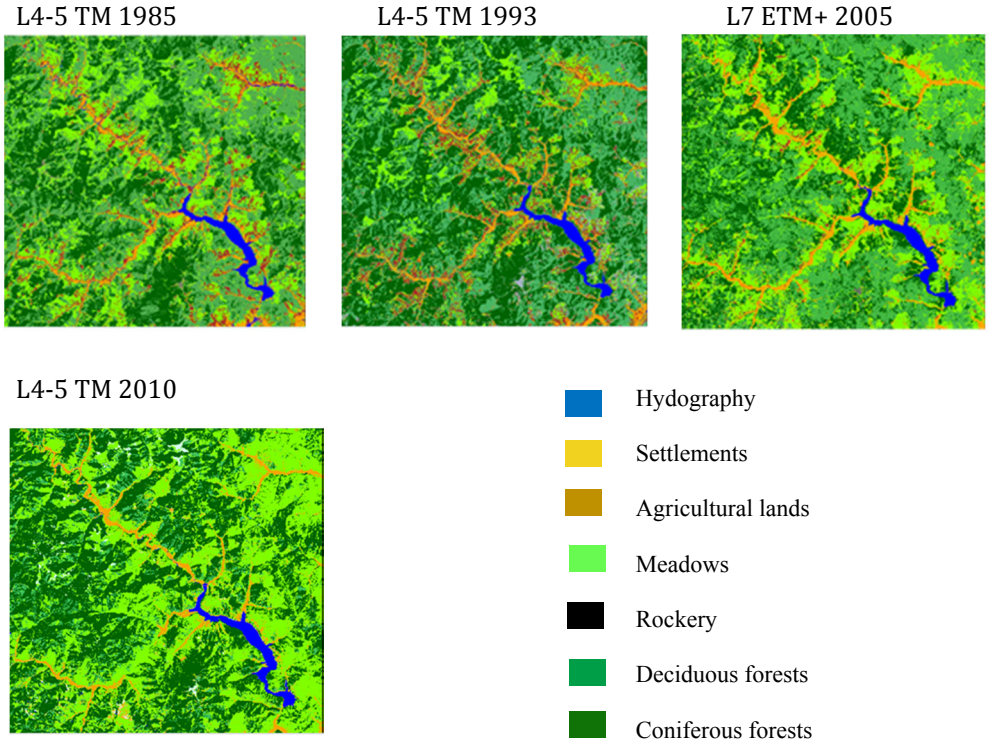


Fig. 2. Samples taken for the higher than 0.5 NDVI values (1985)



This stage of the analysis is excluding the year of 2017 because, after several attempts to classify the pixels, the results were not conclusive, based on the personal knowledge of the area. The results of the analyzed four years show an increse of the locals' interest towards agriculture (corn fields, production of potatoes and other vegetables) between 1985 and 1993, followed by a sudden switch to lucerne crops and exploitation of meadows located in higher areas, replacing the forests. The entire process can be explained by the increse in APIA grants for the maintenance of the meadows.

3.3. Change detection

Due to the drastical changes over the years, a simple analysis of the resulting images has already led to some conclusions. However, the database analysis by making a connection between the number of pixels and the area they cover are the best argument for highlighting the decrease in high vegetation density over the years.

First of all, the analysis was based on extracting the areas covered by the pixels belonging to the classes that resulted after the NDVI processing. The resulting database in table 1 illustrated in the graph below (fig. 3) better shows the decrease of forest covered lands. This chart makes it easier to see that there is a mirrored evolution between 1985 and 2017. It also demonstrates the statements made above about the slight increase in vegetation density between 1985 and 1993, and the abrupt decrease after that.

Table 1. NDVI change detection database (pixels/surfaces)

Year	NDVI	1985		1993		2005		2010		2017	
Value		No. Pixels	Area (km²)	No. Pixels	Area (km²)	No. Pixels	Area (km²)	No. Pixels	Area (km²)	No. Pixels	Area (km²)
1	<0	20639	18.57	23802	21.42	35889	32.3	88003	79.20	88439	79.59
2	0-0.2	7213	6.49	4572	4.11	164018	147.61	184162	165.74	622872	560.58
3	0.2-0.3	12160	10.94	4878	4.39	429570	386.61	301491	271.34	571689	514.52
4	0.3-0.5	538844	484.95	304562	274.1	617754	555.97	837138	753.42	283774	255.39
5	0.5-0.6	672534	605.28	621485	559.33	314487	283.03	133670	120.30	82	0.07
6	0.6-0.7	303968	273.57	548385	493.54	468	0.42	14801	13.32	0	0.00
7	0.7-0.8	10474	9.42	57378	51.64	0	0.00	13	0.01	0	0.00
8	0.8-0.9	7	0.006	0	0.00	0	0.00	0	0.00	0	0.00
9	>9	5	0.004	0	0.00	0	0.00	0	0.00	0	0.00

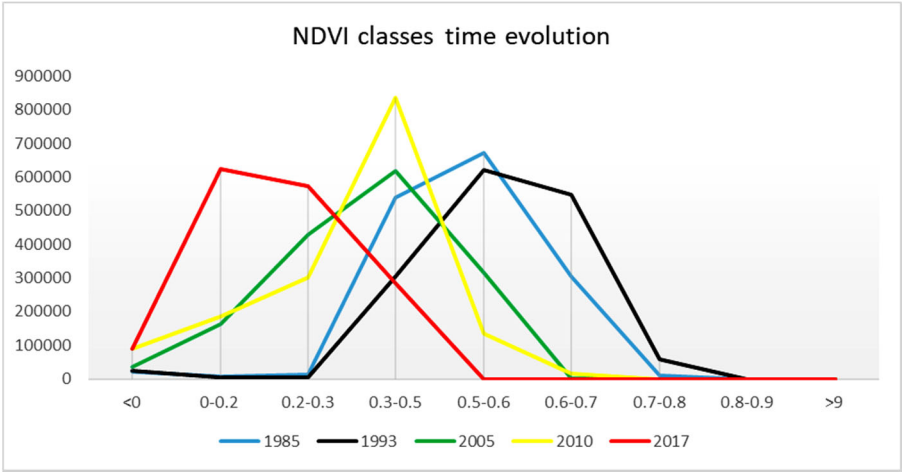


Fig. 3. NDVI change detection chart

The same analysis methodology was applied to the supervised classification resulting images. Therefore, as shown in the chart below (fig. 4), there is a slight increase in the class of settlements and a normal stagnation of hydrography and rockery classes. Regarding vegetation, the class of coniferous forests registrates the biggest oscillations, with an increase in 1993 and a decrease that comes after. The interesting fact is that after 2005, the coniferous forests have become denser which, by anticipating the conclusions, demonstrates the lack of interest in the higher areas for local population who tend to transfer their meadows closer to their settlements, and therefore the forest enters a process of slow natural regeneration. On the other hand, the deciduous forests have registered a constantly slow decrease due to logging and exploitational activities.

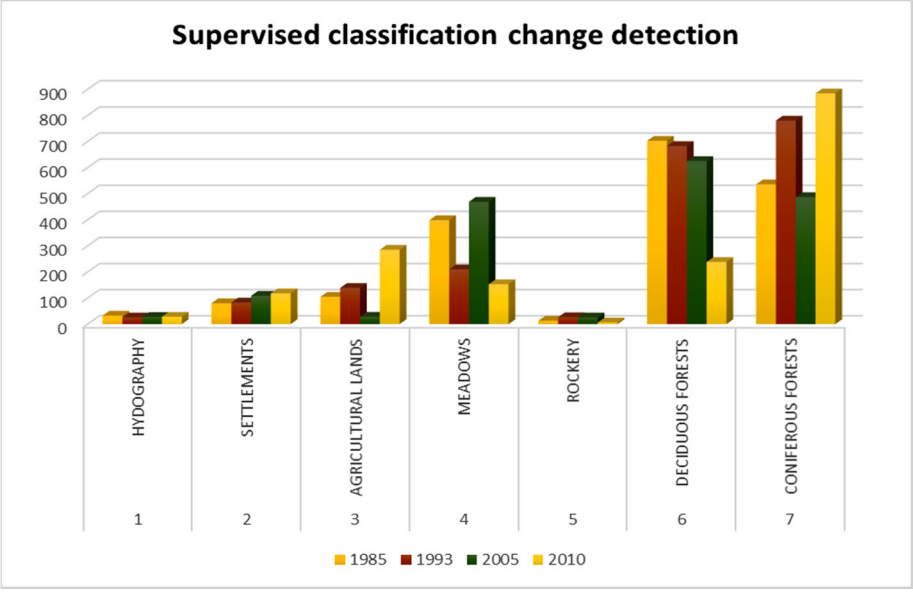


Fig. 4. Supervised classification change detection chart

Table 2. Supervised classification change detection database (pixels/surface)

Year	CLASSES	1985		1993		2005		2010	
Value		No. Pixels	Area (km²)	No. Pixels	Area (km²)	No. Pixels	Area (km²)	No. Pixels	Area (km²)
1	HYDOGRAPHY	36213	32.59	28325	25.49	30402	27.36	31409	28.26
2	SETTLEMENTS	88949	80.05	154069	82.6	120650	108.58	131008	117.90
3	AGRICULTURAL LANDS	116373	104.73	91778	138.66	31523	28.37	31687	285.12

Year	CLASSES	1985		1993		2005		2010	
Value		No. Pixels	Area (km²)	No. Pixels	Area (km²)	No. Pixels	Area (km²)	No. Pixels	Area (km²)
4	MEADOWS	442642	398.37	29383	209.96	520709	468.63	169616	152.65
5	ROCKERY	14256	12.83	233289	26.44	28605	25.74	6910	6.21
6	DECIDUOUS FORESTS	780741	702.66	758285	682.45	693931	624.538	2644607	238.14
7	CONIFEROUS FORESTS	595110	535.59	866539	779.88	541030	486.92	982357	884.12

Both the table and the chart above suggest a strong link between the evolution of meadows and that of the agricultural lands. Accordingly, for the year of 2005, if there is a decrease in the column of agricultural lands, in the same year the meadows extended. On the other side, regarding the year of 2010, the connection between the two remains, but it is inverted. Therefore, while the meadows covered less surface, the agricultural lands extended.

3.4. Field validation results

The analysis is validated comparing the database results that suggest the replacement of forests with meadows in the proximity of settlements to the reality in the field. In fig. 5 there are a few examples of this tendency. The process of aging of the local population forces them to leave the higher areas in the mountains, and move their meadows closer to their settlements. It is easy to anticipate that, thanks to this transition from higher to lower areas, makes it possible for the natural forest recovery process to step in and eventually lead towards a growth in forest covered lands.

The results and their motives can be a little fuzzy without a timeline of the events. First, the aging process of the local population is triggered by the youths moving to urban areas. Therefore, the level of energy to continue the work of maintenance and exploitation of meadows and forests deacreses. The natural consequence is for the locals to retreat from the areas situated at a higher altitude and replace them with those located near their settlements. That is why currently the lands at higher altitudes enter a slow regenerating state.

Secondly, for a while, the APIA grants given to farmers and agricultural workers for maintaining their meadows were profitable enough to put in the work of keeping the lands clean. Together with the aging population and the decreasing energy levels, these grants were no longer profitable enough. Local families reduced their properties and farms, and chose to buy more and produce less. The direct consequence is the same: the beginning of the natural reforestation process.

Thirdly, since 1989 and the fall of socialism, three laws have been implemented regarding property restitution, in 1991, 2000 and 2005. The first law explains the growth in vegetation density between 1985 and 1993 shown in fig. 5. Since this was a period of transition for forest covered lands from state owenership to private owners, the logging and exploitation stagnated a few years. The second and third laws (2000 and 2005) were followed by a massive decrease in vegetation density due to the fact that forest exploitation has become and still is one of the main sources of profit for the local population.

Lastly, the timeline has been drawn: the young population left this rural area, the workforce got lower and lower, the meadows were transferred near the settlements, the market prices for vegetables made their production unprofitable, the agricultural lands were replaced by lucerne crops by giving up a big part of the meadows, so these lands are no longer under maintenance and the natural process of vegetation recovery has space to evolve.

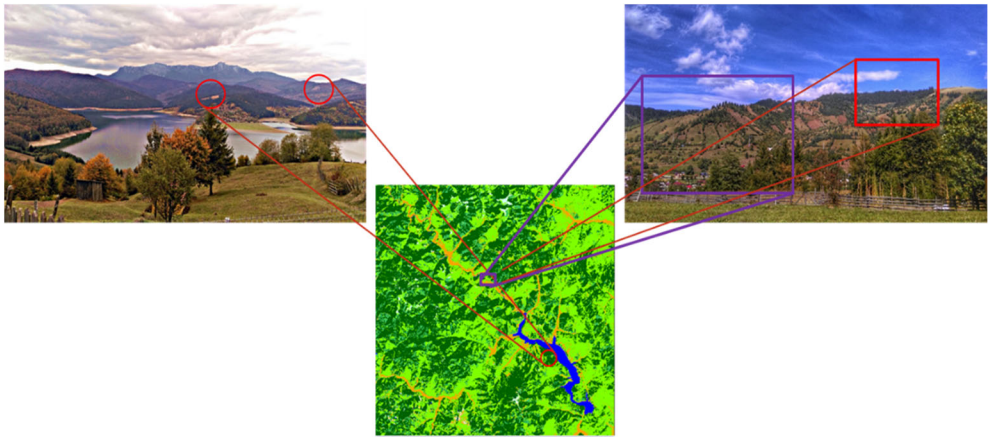


Fig. 5. Field validation of the resulting database

4. CONCLUSIONS

The high utility of open source Landsat imagery archives has been proved once again by making it possible to draw a distinct and certain link between political decisions and social shifts, and the fluctuations of vegetation density, change detection of land use and forest covered lands. Along Bistriţa Valley in Neamţ County, Romania, the local population is still characterized by a high average age, depopulation, making it impossible to put in the same amount of work and energy into properly maintain or exploit the meadows and

forests. However, if one was to ask a local their opinion on deforestation in the area, the answer would be: "There is more forest today than in my childhood" (local 49 years old man).

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TREE-FRUIT CROPS IN CLUJ-NAPOCA – ARE THERE ANY VIABLE PERSPECTIVES FOR PERMACULTURE?

COSMINA-DANIELA URSU[1], GABRIELA MOȚCO[2]

ABSTRACT. – Tree-Fruit Crops in Cluj-Napoca – Are There Any Viable Perspectives for Permaculture? Ever since the communist period, fruit farming has been a significant economic activity in many areas of Romania. The hills of Cluj and Feleac were renowned for their significantly productive orchards. Once with the change in the political regime, the large agricultural holdings were divided and reorganized. Orchards were now administered by private land-owners, whose diverse judgment brought up several changes in the land use. Thus, some orchards were abandoned, others were grubbed up to clear the land for constructions, while, in some of the best cases, orchards were rehabilitated to meet the current quality standards. Our study aimed to analyze how the land used for tree-fruit crops would be better managed by adding up the benefits of permaculture. Methodologically, cartographic reconstructions were carried out based on topographic maps from the 1950s, military shooting range maps and recent orthophoto maps. Also, a sociological survey was carried out to determine the perception of people about the need to still have traditional orchards. Due to the large extension of degraded orchard areas, it has been found that the optimal solution to increase their viability is to encourage farm holders to practice permaculture, instead of removing large portions of farm land from production and use it for construction purposes.

Keywords*: metropolitan area, urban farms, orchards, Cluj-Napoca*.

1. INTRODUCTION

Often defined as a set of rules on gardening techniques, permaculture has also been assigned other meanings, such as: art, design, philosophy and a way of living. The purpose of permaculture is to create viable systems that would provide for the human needs, yet replicating the model of natural ecosystems. The practice of permaculture is not exclusive, in the sense that it can be adapted

[1] *Babeș-Bolyai University, Faculty of Geography, 5-7 Clinicilor Street, Cluj-Napoca, Romania, e-mail: ursucosmina@yahoo.com.*
[2] *Babeș-Bolyai University, Faculty of Geography, 5-7 Clinicilor Street, Cluj-Napoca, Romania.*

to the specificities of any area at any time, being only conditioned by the broad comprehension of the area and by a detailed study on the mechanisms, relationships and processes governing the proper functioning of the system (Harland, 2013).

Permaculture can be practiced both in urban areas (apartments, courtyards, parks, gardens) as well as in suburban and rural areas, farms and large-scale farming lands (Harland, 2013).

The principles of permaculture have been applied ever since the ancient times. For example, the Egyptian people, who benefited from an important source of water in the Nile Delta, used to practice organic farming, strictly based on the features of the land. The wetlands were cultivated with certain plant species, while the more arid areas were cultivated with other species of plants, adapted to this type of environment (Krebsbach, 2017).

The principles of permaculture were illustrated and explained by Smith (1929) and Yeomans (1964). Other authors, such as Brand and Fukuoka, have tested ecological methods of practicing agriculture with no use of mechanized means ("the Fukuoka Method", "the natural way of farming" or "do-nothing farming").

It was not until 1978 that the Australians Mollison and Holmgreen applied for and received the patent for the concept of permaculture and even issued a few principles for it. Bill Mollison defined permaculture as "a philosophy of working with, rather than against nature; of protracted and thoughtful observation rather than protracted and thoughtless labor; and of looking at plants and animals in all their functions, rather than treating any area as a single project system."

Another author bringing special contributions to the permaculture field is Holzer, who, through the works: *The rebel farmer* (2002) and *Sepp Holzer's Permaculture: A Practical Guide to Small-Scale, Integrative Farming and Gardening* (2011) and by his personal example, has promoted the cultivation of plants adapted to harsh climatic and field conditions, such as: vegetables in fertile soil areas, mushrooms in wetlands, various fruit trees that would endure increasingly harsh conditions. He even constructed fish ponds, catching water from swamp areas. The test site was Lungau, Salzburg. At present, there are courses, trainings and also international farms where permaculture is practiced. Courses are organized by permaculture associations from European states (France, Italy, Germany, Finland, Great Britain) but also from extra-European countries (India, Thailand, Indonesia, Sri Lanka, Australia, USA). As for examples, we mention here: the Ridgedale farm in northern Sweden (it supports trainings and seminars in addition to agricultural production), Du Bec Hellouin farm in France, Aranya Permaculture Farm in India, Fair Harvest in Southwestern Australia, Numbi Valley Permaculture Farm in South Africa, etc.

The principles of permaculture respond to some tangible objectives, namely: natural environment protection, sustainable use of existing resources by the current generations and ethical distribution and limitation of resource consumption (Mollison and Holmgreen, 1978). Among the 12 principles of permaculture we note the following: observing how natural mechanisms act, capturing renewable energy, recycling, encouraging cropping diversity instead of monocultures, increased attention to peripheral environments, and continuous adaptation to change (Baci, 2010). Among the benefits of permaculture, we reveal the following: lower agriculture costs, less waste amounts, use of natural protectors such as insects, birds and plants to keep pests away, more optimal land use zoning, improved soil fertility.

Permaculture is suitable both in urban areas (on rooftops and facades of buildings, in apartments and gardens, and on balconies) and in large open spaces, where, besides plant crops, livestock can be grown and ponds can be set up.

As a relatively new concept, launched in the last 3-4 years in Romania, permaculture seems to have valid chances of development proved by real initiatives in Cluj, Bucharest and Braşov and of individual practitioners in rural areas. In addition, training courses such as the "Permaculture Design Certificate (PDC) Course" are organized by permaculture associations, free of charge or for a fee, which help farmers become attested permaculture practitioners.

When it comes to tree-fruit farming, permaculture integrates the orchard holistically, meaning that trees do not grow isolated from other ecosystems, but as a component of the natural scenery (Mollison, 1981). Besides providing food for both humans and animals, orchards have an ecological role, too. They maintain air moisture and alleviate wind effects. Tree pruning practice is not encouraged by permaculture because it weakens the tree elasticity and makes them prone to diseases. In order to provide wind protection for the fruit trees, windbreaks are planted or earth berms are built. Other techniques include planting wild fruit trees that would enhance the pollination of fruit tree crops and whose fruit could be used to make jam and medicinal juices (Holzer, 2011).

Although an old agricultural practice in Romania, fruit farming is currently predominantly subsistent, farmers owning small orchards, thus producing just enough to cover their own needs. Classical tree care techniques and insecticides are applied, thus farms produce below the expected. Producers are encouraged to take action for the revitalization of fruit farming under the National Rural Development Programme. Actions are funded under sub-measure 4.1a – Investments in fruit holdings and sub-measure 4.2a – Processing of agricultural products.

The main objective of this study is to analyze the tree-fruit farms in Cluj-Napoca and its immediate neighborhood in correlation with the implementation of permaculture principles. We described the theoretical framework, we presented

the working methodology, we elaborated the space-time analysis of the tree-fruit farms in Cluj-Napoca, followed by the analysis of the current state of the fruit farms in Cluj metropolitan area. We then tried to investigate on the perception of local actors regarding the viability of the fruit farms and the support of the fruit growing practices by complying with the principles of permaculture.

2. MATERIALS AND METHODS

2.1. Study area

The main reason for choosing the city of Cluj-Napoca as the study area for the proposed research theme is that tree-fruit farming has been one of the highly productive traditional agricultural activities practiced here even since the coomunist period. This location shows a number of factors conducive to the development of fruit farming: hilly area, illuvial clay soils and moderate climate. In addition to these reasons, we should not disregard the ecological function of orchards, which provide space for the creation of natural microclimates and natural ecosystems, ensure the increase of oxygen level, enhance the stabilization of slopes and protect soil against surface erosion. On the other hand, for the population, the orchard brings extra green space, provides recreational spaces and encourages social relationships. Economically, in this case, we note the reduced distance to the markets, which also determines low transportation costs. Fresh, unprocessed fruit products could be directed to more than 300,000 city inhabitants for consumption, and in case of surplus, to other localities.

In order to cover the entire market at the county level, we extended the study area, including the metropolitan area of Cluj-Napoca, as well. The metropolitan area was established in 2008 and consists of the city of Cluj-Napoca and 17 other neighbouring communes. Setting up the Metropolitan Area of Cluj-Napoca, was based on several objectives of which we mention: development of road accessibility, modernization and extension of technical networks, increase of economic competitiveness through the relocation of population with university degree (Association for Intercommunity Development – Cluj Metropolitan Area, 2017).

In the case of Cluj-Napoca, orchards used to cover approximately 1883 ha during their expansion period, predominantly located in the northern part of the city, but also in the southern area, the plots being quite extensive and compact.

To reveal the current situation of the tree-fruit growing farms, three case studies were chosen to be analyzed: Sfântu Gheorghe Farm, Steluţa Farm and the Horticultural Research Center of Cluj-Napoca. For each of the 3 case studies, data provided by the maps were supplemented by the results of the sociological survey, which was applied to grasp the perception of local factors on the evolution and future of urban tree-fruit growing activities.

2.2. Data collection and processing

For the space-time reconstruction of the fruit growing areas in Cluj-Napoca municipality and reveal the current state of the existing farms, first we needed to obtain some cartographic and sociological data.

In the case of spatial data, the sources used were the following: military shooting range maps – scale 1:25,000 (1952), topographic maps – scale 1:25,000 (1968-1984), orthophoto maps – scale 1:5,000 (2005), data provided by the Agency for Payments and Intervention in Agriculture of Cluj-Napoca (2017). Based on these cartographic materials, the processed data was mapped (fig. 1).

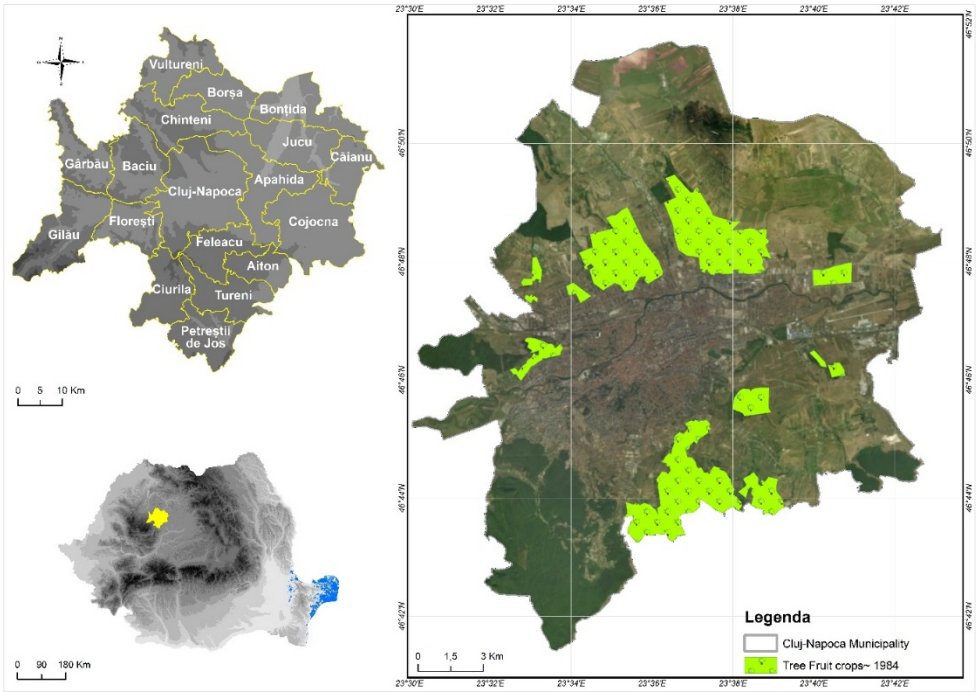


Fig. 1. Spatial distribution of tree-fruit crops in Cluj-Napoca Municipality

We learned about the opinion of local stakeholders regarding the viability of pomology and urban tree-fruit farms by applying semi-structured interviews in the spring of 2017 to people who are working at or used to be employed by the analyzed farms. The questions targeted two time intervals. On the one hand, questions addressed the issue referring to the communist period, asking for

information on the main fruit trees cultivated, maintenance techniques applied, necessary human resources, quantities collected annually, destination and profitability of the fruit production for that period. On the other hand, as regards the post-socialist transition period, the information sought was focused on the actual state of orchards, their usefulness and the profitability of their activity. All three respondents, as in one interviewee/case study, were over 40 years old. They looked at fruit farms as a form of optimal land use, beyond a personal income source.

Methodologically, the research also involved reading specialized literature on the analyzed topic and field documentation in order to observe the current state of exploitation of the tree-fruit farms.

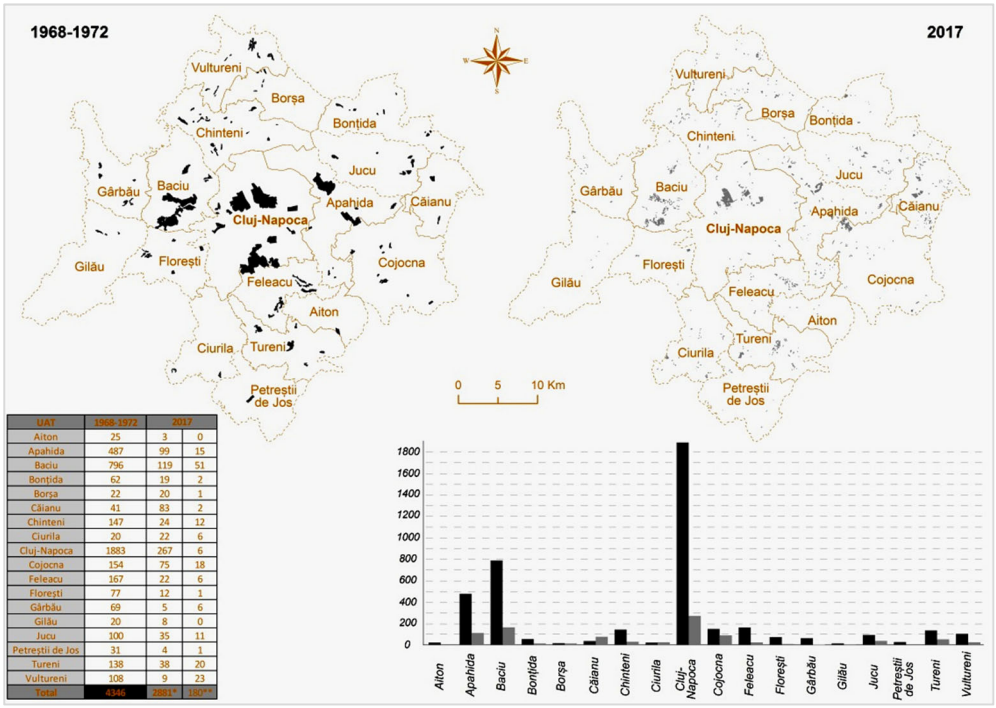
3. RESULTS AND DISCUSSION

3.1. Space-time analysis on tree-fruit crops in Cluj-Napoca

First, we analyzed the spatial distribution of fruit farms with reference to the socialist period. The fruit growing plots were vectorized by using the topographic map of Romania, on a scale of 1:25,000. The second reference period was the year 2017 and the data source was represented by the Agency for Payments and Intervention in Agriculture of Cluj-Napoca (fig. 2).

During the socialist period, the tree-fruit growing farms were mainly located in the hilly area of the city (Viilor Hill, Lomb Hill, Sfântu Gheorghe Hill in the North and Feleacu Hill in the South). According to some sources, pomology has been practiced since the beginning of the 20th century as a replacement of a previous traditional practice (which was vine plantations, according to the first Habsburg topographic survey between 1763-1787): "Especially the part of the city facing northeast is nicely displayed, the upper half of the slopes being filled with houses surrounded by fruit trees. It is the land on which, besides the walls of the fortified city, the vineyards of private holders (individuals) were planted even from the 14th century, which nowadays are crossed by streets bordered by large gardens with mansions in their midst" (Lazăr, 1923).

In the post-socialist period, orchard plots were considerably reduced as a result of massive land fragmentation. The interest for real estate development became visible, against the interest for continuing the fruit growing tradition. In the northern part of the city there are still some functional orchards, while in the southern part of the municipality, they are almost non-existent.



UAT	1968-1972	2017	
Aiton	25	3	0
Apahida	487	99	15
Baciu	796	119	51
Bonțida	62	19	2
Borșa	22	20	1
Căianu	41	83	2
Chinteni	147	24	12
Ciurila	20	22	6
Cluj-Napoca	1883	267	6
Cojocna	154	75	18
Feleacu	167	22	6
Florești	77	12	1
Gârbău	69	5	6
Gilău	20	8	0
Jucu	100	35	11
Petrești de Jos	31	4	1
Tureni	138	38	20
Vultureni	108	9	23
Total	4346	2881*	180**

Fig. 2. Space-time analysis on tree-fruit crops in Cluj Metropolitan Area

The largest and most extensive tree-fruit crops were developed in the socialist period, unlike today, when we note a massive reduction of orchards (down to 1,500 ha). We can also deduce the considerable extension of the orchards in the city of Cluj-Napoca. Even though we note the extensive decrease in the size of orchard areas, Cluj-Napoca still holds the position of a main fruit growing centre for Cluj metropolitan area, followed by the communes of Apahida and Baciu.

In the table and graph we reveal the tree-fruit growing plots in every locality of the metropolitan area of Cluj, in the period of 1968-1972, and in 2017. According to data provided by APIA (2017), traditional orchards are not very well individualized spatially, and they cover very little land. In fact, we note that these areas are officially declared as meadows or pastures (meaning that the former traditional orchards are extensively used for other purposes). Another unfortunate conclusion is that orchards are affected by irreversible degradation, which proves the inclination of owners to use their land for construction purposes.

Data reveal that about 1,883 hectares of orchard land were recorded in Cluj-Napoca area during the socialist period, while now there are only 267 ha; in other words, about 85% of orchards have disappeared. The commune of Baciu registered 796 hectares of orchards, which is currently reduced to 119 ha. Ranked third among the administrative units under study, due to the highly extended orchard plots (up to 487 ha) recorded in the socialist period, Apahida commune currently records less than 100 ha of orchard land. The other localities also recorded drastic cuts in the fruit growing areas after the fall of the communist regime. To sum up, after 1990 the orchard land has decreased from 4,346 ha to only 2,881 ha, plus 180 ha of land declared as having other uses. Currently, only about 66% of the former orchard land is registered in Cluj Metropolitan Area.

3.2. Diagnostic analysis of Cluj tree-fruit growing farms

According to the information provided by the interviewees and collected from field observations, fruit growing in Cluj-Napoca has undergone severe changes since the 1990s. Some of the remaining orchards are almost completely damaged and not cared, some of trees being already dry, buried in weeds and affected by pests (fig. 3). In other cases, the land use was changed on large areas due to growing population and increase in housing demand. Many buildings have been built, both for residential use or other uses (i.e. car repair and servicing workshops). On the other hand, favoured by the investments of several entrepreneurs, some of the orchards were less affected by decline and recorded a reactivation of the old tree-fruit crop.

Fig. 3. Details on the preservation status of the plots within Sfântu Gheorghe tree-fruit farm, Cluj-Napoca

The fruit growing plots in Cluj-Napoca were mapped based on four reference years: 1952, 1984, 2005 and 2017 (fig. 4). We can note that in 1952 orchards were still at an early stage of development, distributed predominantly to the north and west of the city, and afterwards being substantially developed in the south, mainly during the communist period. Beginning with 2005 orchards have been affected by land fragmentation. Not properly cared, orchards in the northern part of the city were sold as construction land. In the southern part, some of the orchards belonging to the Horticultural Research Centre of Cluj-Napoca were given back to the former owners, while the rest of them, still in the ownership of the Centre, could not be cared anymore due to the lack of funds and staff.

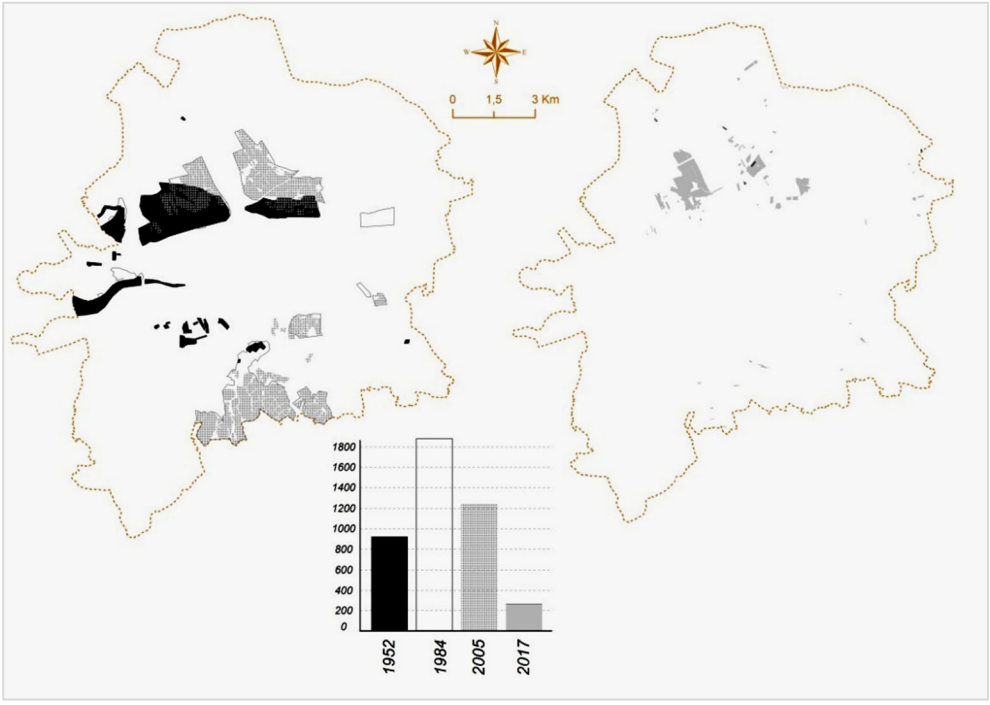


Fig. 4. Analysis on the current status of tree-fruit growing farms in Cluj-Napoca City

In order to illustrate the current status of fruit farming, we employed data provided by APIA related to the extent of functional orchards and of the extensive orchards that were declared pastures and meadows, yet in a small share. Results showed that the only functional fruit farms are those located in the northern part of the city. Tree-fruit growing has then survived in this area due to the interest of some entrepreneurs who have rehabilitated the old plantations, invested and successfully continued tree-fruit farming.

The interviews supplemented the array of information on the progress of fruit growing in Cluj-Napoca, especially since the interviewees have been or are still active in the field.

Sfântu Gheorghe Farm was our first case study. The respondent was a former employee and team leader (53 years old, male). According to his statements, fruit growing was a thriving activity in the communist period, and it was practiced on hundreds, even thousands of hectares. Dealu Morii, Steluța and Feleacu were some other known fruit growing farms. The fruit crops included apple trees (90%), plum trees (5-10%), cherry trees (very low shares). There were 30 permanent employees who were involved in the spring work; most of them came from villages in Bistrița-Năsăud County, namely: Agrieș, Târlișua and Borleasa. However, during harvesting, hundreds of people were seasonally hired. They were either military (who were provided accommodation) or pupils who participated in fruit picking until school started. In the period 1990-1998, farms were highly productive, meaning that a single farm would produce between 100-200 tonnes of apples. Fruit were mainly exported at juice factories located in Carei and Bistrița. There was also a refrigerated warehouse where high-quality apples were kept. Each of the farms was equipped with automatic machines, tractors, offices, fruit sorting warehouses, workshops and accommodation facilities for workers. As for maintenance techniques, they used to practice plowing, tree pruning and spraying. Usually, after harvesting they spread manure, brought from the dairy farms in exchange for hay.

After 2000, the farm went through the process of privatization. Machines were sold, buildings were rented for various uses, namely dog shelters, car workshops, paint shops, cardboard collection centers, PVC double-glazing windows producing centers. Workers were laid off and they professionally retrained. The former orchards were grubbed up and the land was used for constructions. The respondent believes that orchards in this area can no longer be revived due to massive land fragmentation, stakeholders' lack of interest in fruit growing and the increased attention to real estate development.

Steluța Farm represented our second case study. The interviewed person was an agricultural engineer (40 years old, male). During the communist period, Steluța Farm represented a State Agricultural Enterprise, as did Dealul Morii and Sfântu Gheorghe farms. The tree-fruit crops consisted mainly of cherry trees, but also of apple and plum trees. The regime of the working staff was similar to the one described in the case of Sfântu Gheorghe Farm. They had permanent employees (technicians, tractor drivers, engineers) and temporarily hired fruit-picking workers during harvesting. They were people coming from other counties, namely Bistrița-Năsăud and Maramureș. Both natural and chemical fertilizers were applied, and production was quite significant (5-6 cherry trucks were exported).

After 2000, all fruit growing areas were claimed by the descendants of the former owners (approximately 2,200 hectares); hence, only 200 hectares remained in the ownership of the State Land Agency. In 2011, the fruit crops on Steluța Hill (approximately 100 ha) were given to the Roman Catholic Parish, and Steluța Company has leased the land for 40 years. The orchard was cleansed, new cherry trees were planted, and innovation systems, supported by the European funds were implemented, such as: drip fertilizers, anti-hail nets, tree supports. Pollination is supported by over 300 hives set up in the vicinity of the orchard. The cherry yields 8 tonnes/ha, and the apple 30 tonnes/ha, but production greatly depends on the climate, as well. Fruits are distributed on the local markets of Cluj and hypermarkets, but they are also exported to Russia. There are 6-7 people permanently employed, and during harvesting, other 150 people from other counties are temporarily hired while receiving meal and accommodation. We believe that for the moment, the farm has real development prospects.

For the last case study, represented by the Horticultural Research Station of Cluj-Napoca, the person interviewed was a former technician (over 70 years old, female). Since its opening in 1953, the research centre has started shy, with an orchard area of only 4 hectares, and then they expanded over the entire Hill of Feleacu (about 1,000 hectares of orchard). In addition to the greenhouses, where flowers were grown and various experiments were carried out, the orchard was cultivated with apple, pear, cherry, sour cherry trees including fruit shrubs. In fact, various varieties of fruit trees were developed here. There were 250 permanent employees, namely researchers and technicians, who were professionally trained in this research centre and about 1,000 seasonal employees during spring works and harvesting. Besides the traditional working techniques (plowing, cutting, spraying, application of organic fertilizer), soil analyses were carried out periodically to observe the potential deficiencies in nutrients and supplement with chemical fertilizers, if needed. Thousands of tonnes of fruit were produced, which were directed for export to Germany, to the canning factory in Dej, the juice factory in Zalău, and the wine factory to produce fruit spirit drinks.

After the year 2000, the land was returned to the former owners. Thus, only 175 ha of orchard still remained functional, out of over 1,200 ha available at the beginning. No wages have been paid, so many of the employees resigned, currently only five to six people being employed. Since 2015, the horticultural research centre has been taken over by the University of Agricultural Sciences and Veterinary Medicine and they hope to identify some solutions to revive it. Currently, the orchard is no longer productive; only the fruit shrub lab is still operational. When asked about profitability, the interviewee said: "The centre will be cost-efficient only after 3-4 years [...] until then, until it starts moving, until some plantations are set up ... [...] we revive, we regenerate [...] it would be good to succeed [...]".

4. CONCLUSIONS

Following the analysis of the three case studies, we can state that tree-fruit farming is an economic activity that can bring substantial income. However, we must optimally manage the natural potential and some stakeholders are needed to advocate for the benefits of fruit products on the local market. Spatially, all three tree-fruit growing farms in Cluj-Napoca are located close to the markets. Much more, the fruit products from Steluța Farm are already to be found in the local supermarkets in the full picking season.

In terms of human resources, even though fruit growing activity does not require a large number of permanent employees, still numerous workers are needed during harvesting, thus giving the opportunity to unqualified people to earn additional income.

Furthermore, the implementation of the Law no. 150/2016 that stipulates and encourages the selling of at least 51% of domestic products on the local markets stands for another argument to practice and support tree-fruit farming.

There are active measures provided by the National Plan for Rural Development 2014-2020 under which a variety of actions are financially supported, namely for the rehabilitation of the matured orchards, setting up micro-farms or other facilities for production/distribution. There are over 300 million Euros allocated only for fruit growing activities. It is however necessary to encourage and advise individuals to make the necessary steps to benefit from these financial opportunities.

On the other hand, permaculture comes with several solutions to obtain a consistent and healthy fruit production, as follows:

- cultivate different tree species so as to ripen at different times, to ensure diversity and sustainability in case economic changes should occur;
- maintain a small distance between trees;
- maintain a low height of the trees to facilitate harvesting and nutrients to reach the fruit as quickly as possible, resulting in high-quality production;
- sow support plants (alfalfa, chamomile, cress, clover, peppermint) for soil loosening, moisture maintenance, attraction of beneficial, pest control insects;
- integrate mini-ponds to attract species of frogs and birds to exterminate pests;
- include bee hives that would contribute to pollination;
- maintain soil fertility by providing an ecosystem favorable to earthworms and micro-organisms;
- spray with fungicides and bio insecticides (obtained by macerating and fermenting of certain plants) to replace harmful substances.

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CONTRIBUTIONS ON THE STUDY OF SETTLEMENTS IN THE UPPER BASIN OF CRIŞUL REPEDE RIVER

MĂDĂLIN-SEBASTIAN LUNG[1], GABRIELA-ALINA MUREŞAN[2]

ABSTRACT. – Contributions on the Study of Settlements in the Upper Basin of Crişul Repede River. The present study aimed to research the settlements in the upper basin of Crişul Repede River considering two factors. A first aspect focused on carrying out a settlement ranking based on the number of inhabitants (population size), while the second considered the first documented reference of the settlements. The two-folded research was performed by having as model the scientific literature in the field. In order to better understand the long-lasting and the continuity of habitation in the studied area, we used statistical data taken from the National Archaeological Record of Romania (RAN). We conclude that there is an increase in the number of small-size settlements throughout the 20th century and at the beginning of the 21st, at the expense of the medium-sized and large settlements. This points to a process of depopulation of the studied area. In spite of this process, we can emphasize the habitation continuity and settlement in the upper basin of Crişul Repede River.

Keywords*: settlements, Crişul Repede River, population size, first reference in documents.*

1. INTRODUCTION

The studies that focus on human settlements divide them into different categories, based on various criteria. The present study aims to analyse human settlements in the upper basin of Crişul Repede River taking into consideration two criteria: the population size and the date they were first mentioned in documents. Throughout the 20th century, people and settlements in the area have been impacted by the two world wars, and then by the socialist period. Because of these historical events, human settlements and population in the studied area have been influenced in a positive way – as new settlements have

[1] *Babeş-Bolyai University, Faculty of Geography, 400006, Cluj-Napoca; email:lungmadalin@yahoo.com*
[2] *Babeş-Bolyai University, Faculty of Geography, 400006, Cluj-Napoca; email: alina.muresan@ubbcluj.ro*

been established, but mainly negatively as the population decreased, which led to an increase in the number of the settlements with a small number of inhabitants. The upper basin of Crişul Repede River was inhabited even from prehistoric times, the first traces of human living being discovered in the caves of the karstic area belonging to Pădurea Craiului Mountains. These first clusters of population were followed by others throughout various historical periods (Neolithic, Eneolithic, Roman) – a demographic continuum.

Human settlements and population have been subjects of research and study for specialists due to the critical periods that are part of their history and mainly due to the methods employed in order to adapt to new historical and geographical circumstances (wars, epidemics, glaciations and climate changes). The first studies on human settlements in Romania that considered the habitat and demography date back from the socialist era. We have to emphasize mainly the ones of the 1970s (Popescu, 1972, Rusenescu, 1973, Niţu, 1978, Vofkori, 1979).

More recent studies on the settlement size and their first reference in documents have focused on mental spaces of the "land" or district" type, among other geographical units (Pavel and Barta, 2011, Darlaczi, 2014, Covaci, 2014, Chita, 2017).

The upper basin of Crişul Repede River spreads over two Romanian counties - Cluj and Bihor (fig. 1). The northern part of the basin overlaps Huedin Depression and Crişul Repede Floodplain, while the southern parts are towered by the mountain ranges of Vlădeasa and Pădurea Craiului Mountains. This area comprises 48 settlements at present, yet their number varied in time.

2. METHODOLOGY

The methods employed for the present study involved studying the existing research in the field (Horváth, 2008), which concluded in marking the limits of the basin on morphological grounds. After studying the existing research in the field (Suciu, 1967-1968), we gathered up data on the first reference in documents for each settlement in the area.

The following step was to mine for the statistical data on the population size of the settlements in the area. For this, we worked with the 1900 census, then with the 1930 census which dates back to the period between the two world wars. Then we used the data from the second census of the 21st century - namely the one in 2011. Once we had these statistical data, we started to create the database. The numerical data has been processed through Arc GIS 10.1, resulting maps which make up the ranking of the settlements based on population size. Charts have

also been created and analysed in order to emphasize the shares of each type of settlements considering the data from each census. The periods when the settlements have been first mentioned in documents (first reference in documents) have also been processed and a cartographic projection was generated comprising the date (the century) when each of the settlements has first been mentioned in documents. Two studies represented the model for the settlement ranking based on population size; they both date back to the end of the 20th century and the beginning of the 21st (Nicoară, 1998; Vert, 2001). In order to support the habitation and its continuity in the area, we employed data from the National Archaeological Record of Romania (RAN).

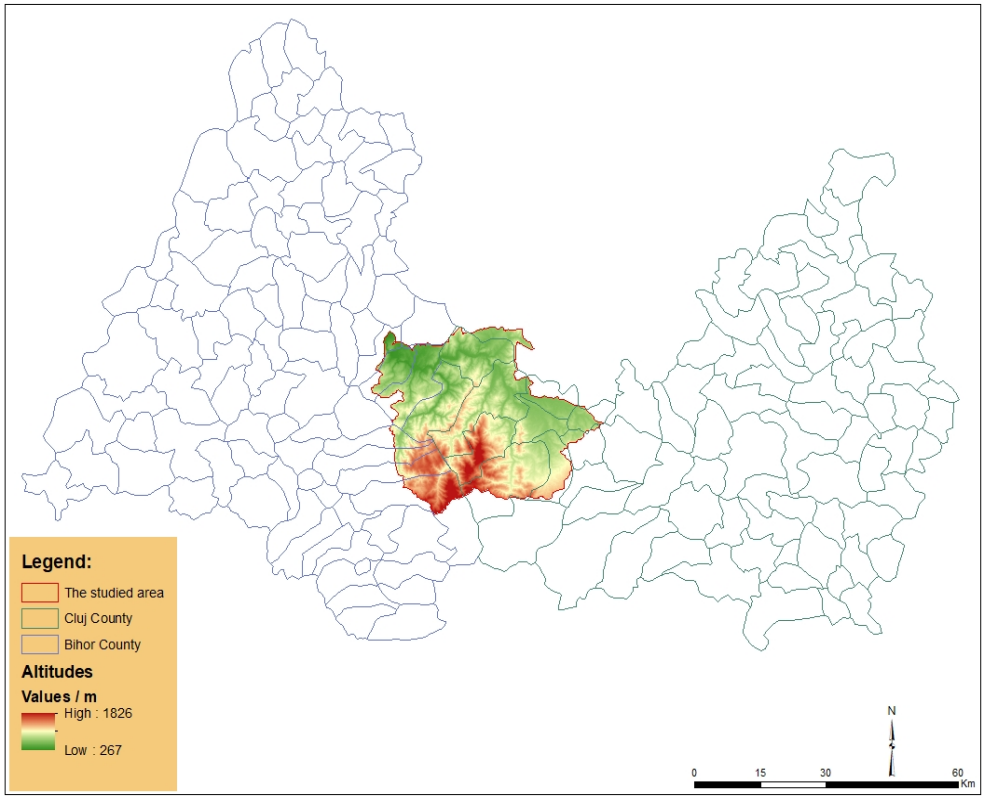

Fig. 1. Crişul Repede Upper Basin - location

3. SETTLEMENT RANKING BASED ON POPULATION SIZE (NUMBER OF INHABITANTS)

We studied the population size of the settlements in the area starting with the 19th century and considering the data in three censuses, 1900, 1930 and 2011. Four ranges of population size have been employed in order to classify the settlements based on the total number of inhabitants: under 500 inhabitants – small settlements; 501-1,500 inhabitants – medium-size settlements; 1,501- 4,000 inhabitants – large settlements and over 4,000 inhabitants – very large settlements.

In 1900, there were 42 settlements with a total population of 50,599 inhabitants in the upper basin of Crişul Repede River. The largest settlement – the only one to be part of the very large settlements group, with over 4,000 inhabitants, was Huedin with 5,313 inhabitants. Seven settlements had population under 500 inhabitants (Horlacea, Domoşu, Brăişoru, Finciu, Ciuleni, Şaula and Vânători – with a total of 2,761 inhabitants). 26 settlements had between 501-1,500 inhabitants, with a total of 23,446 inhabitants. The large settlements group (1,501- 4,000 inhabitants) included eight settlements (Bulz, Vadu Crişului, Delureni, Valea Drăganului, Răchiţele, Mărgău, Negreni and Văleni), with a total of 19,079 inhabitants (fig. 2).

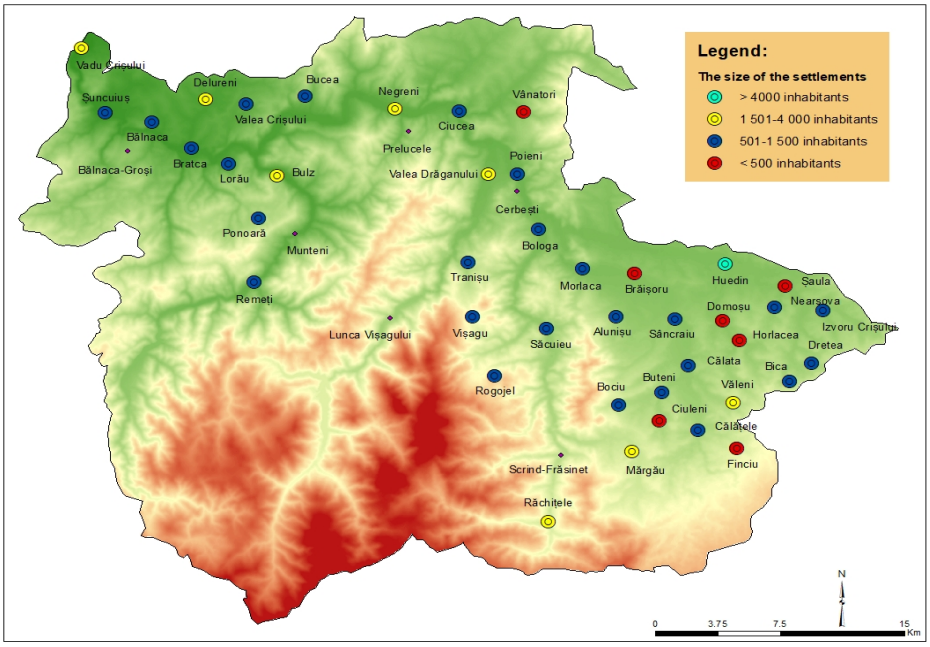

Fig. 2. Upper basin of Crişul Repede River - settlement ranking based on population size in 1900

Considering the share each group of settlements had at the 1900 census, the medium-size settlements (501-1,500 inhabitants) are on the top of the list with 62% (fig. 3). At great distance in this ranking, they are followed on the second place by the large settlements group (1,501-4,000 inhabitants) with 19%, while the settlements under 500 inhabitants are represented by a share of 17%. The smallest share, 2%, belongs to the very large settlements (over 4,000 inhabitants).

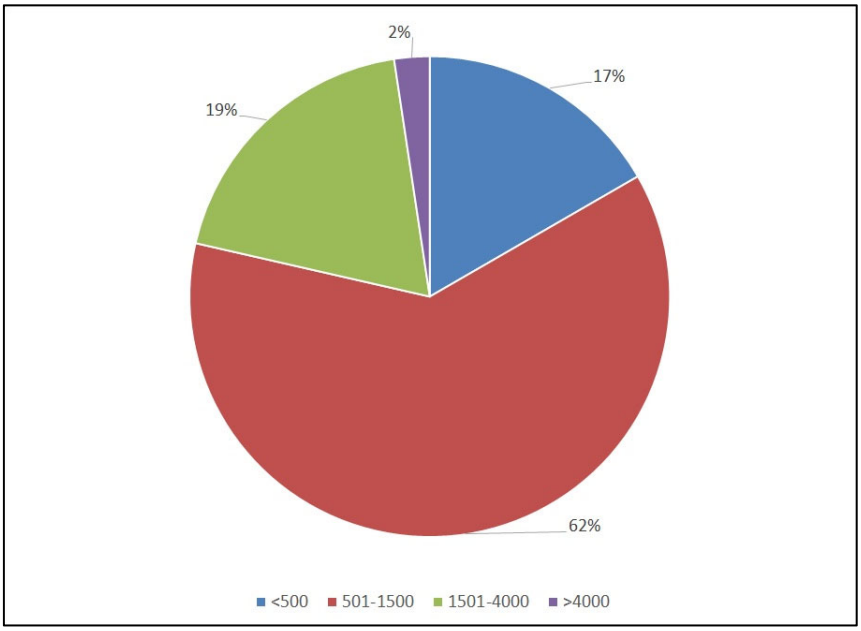

Fig. 3. Shares of types of settlements according to population size in 1900

At the 1930 census performed between the world wars, the number of settlements increased to 44, as two new settlements have been established: Scrind-Frăsinet and Lunca Vişagului. The population of the 44 settlements was 59,734 inhabitants, 9,132 more inhabitants than in 1900. The three decades passed from the 1900 census were marked by changes in population size, following World War I and the establishment of Hungarians in Huedin area. At the 1930 census, the first census between the world wars, the number of small settlements (under 500 inhabitants) was six (Finciu, Şaula, Bica, Domoşu, Horlacea, and Nearşova) with a total of 2,388 inhabitants, registering a decrease by 373 inhabitants as compared to the 1900 census. There were 24 medium-size settlements (501-1,500 inhabitants), with 20,788 inhabitants. The greatest increase in population number was registered in the case of large settlements, as they amounted to 13 settlements, compared to nine in 1900. Population number increased by 10,527

as compared to 1900, reaching 29,606 inhabitants. The share of the Hungarians in the area increased in the period between the two censuses, as no less than 53% of Huedin population was Hungarian in 1930, Romanians representing only 21%. At the same time, Sâncraiu and Izvoru Crişului were other two settlements where Hungarians had a majority. There were 57% Hungarians in Sâncraiu and 65% in Izvoru Crişului. Population in Sâncraiu increased by 3,037 inhabitants - namely fourfold - in the 30 years between censuses. This is the largest increase in population in the upper basin of Crişul Repede River throughout this period.

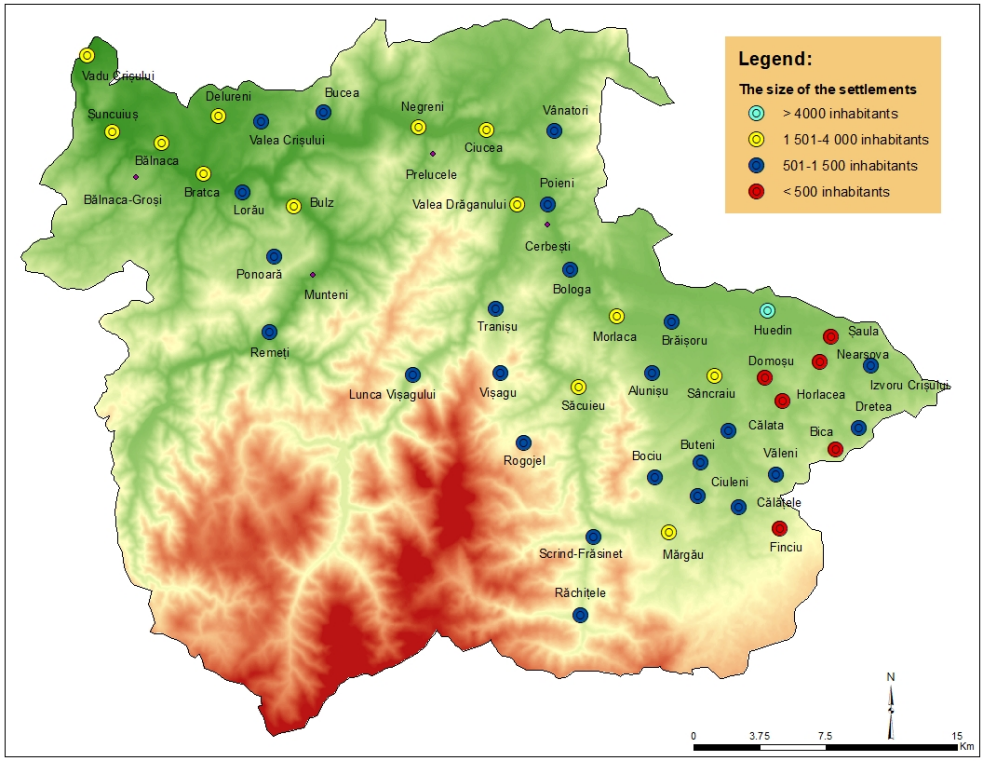

Fig. 4. Upper basin of Crişul Repede River – settlement ranking based on population size in 1930

Considering the share each group of settlements had at the 1930 census, one concludes that 54% of all the settlements are medium-sized, registering a decrease as compared to 1900; 30% are large settlements, registering an increase as compared to 1900 and 14% are small settlements, registering a decrease as compared to 1900. The share of the very large settlement group (over 4,000 inhabitants) was 2% - the same as in the case of the 1900 census.

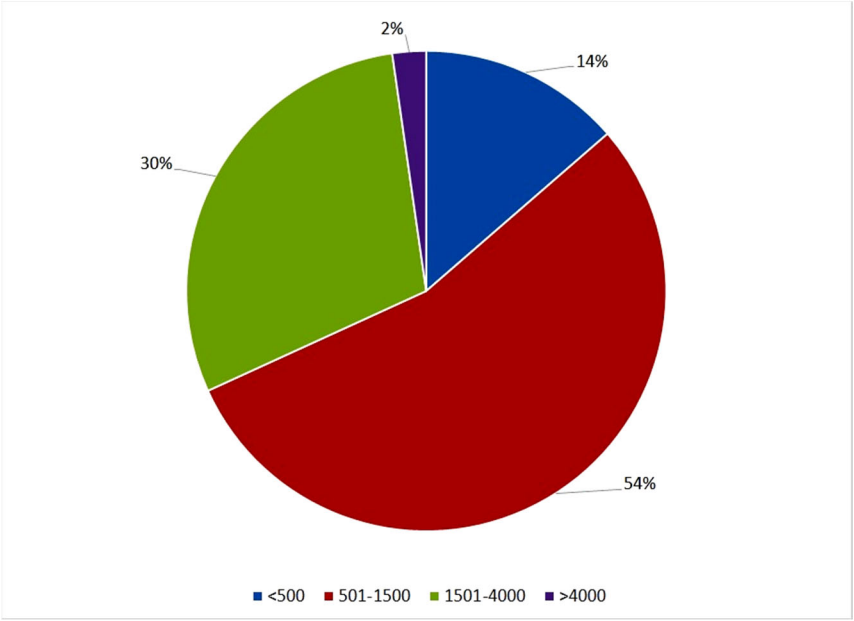

Fig. 5. Shares of types of settlements according to population size in 1930

The period following World War II was marked by changes in the settlement network of the upper basin of Crişul Repede River, as new settlements were established. The second census of the 21st century numbered 48 settlements, with a population of 38,110 inhabitants. Due to risk phenomena affecting mainly the population in rural areas, the number of inhabitants decreased by 21,624 as compared to 1930, which represents 36%.

Four new settlements (Munteni, Bălnaca-Groşi, Prelucele and Cerbeşti) were established around 1956. These were very small villages, of the hamlet type, which were established through the migration of population from the matrix village. The four settlements amounted to 845 inhabitants at the 2011 census, and Munteni was the largest one with 558 inhabitants. The following two villages had under 150 inhabitants each (135 inhabitants in Bălnaca-Groşi and 121 in Prelucele). The 2011 census registers Cerbeşti as the smallest settlement – only 31 inhabitants, while Huedin remains the only settlement with over 4,000 inhabitants. Huedin received town status in the 1960s – thus becoming the first and the only town in the upper basin of Crişul Repede River. If the 1930 census numbered more medium-sized settlements in the studied area, in 2011 there was a totally different situation: 25 out of the 48 settlements were small, seven of these with a population under 100 inhabitants (Dretea,

Bica, Brăişoru, Cerbeşti, Ciuleni, Buteni, Bociu – 508 inhabitants in total). The studied area is characterized by major dysfunctionalities, as it included seven settlements with a total population of 508 inhabitants, a number which represents little more than the amount specific for a small village. At the same time, the number of large settlements decreased from 13 – in 1930 – to only three – in 2011.

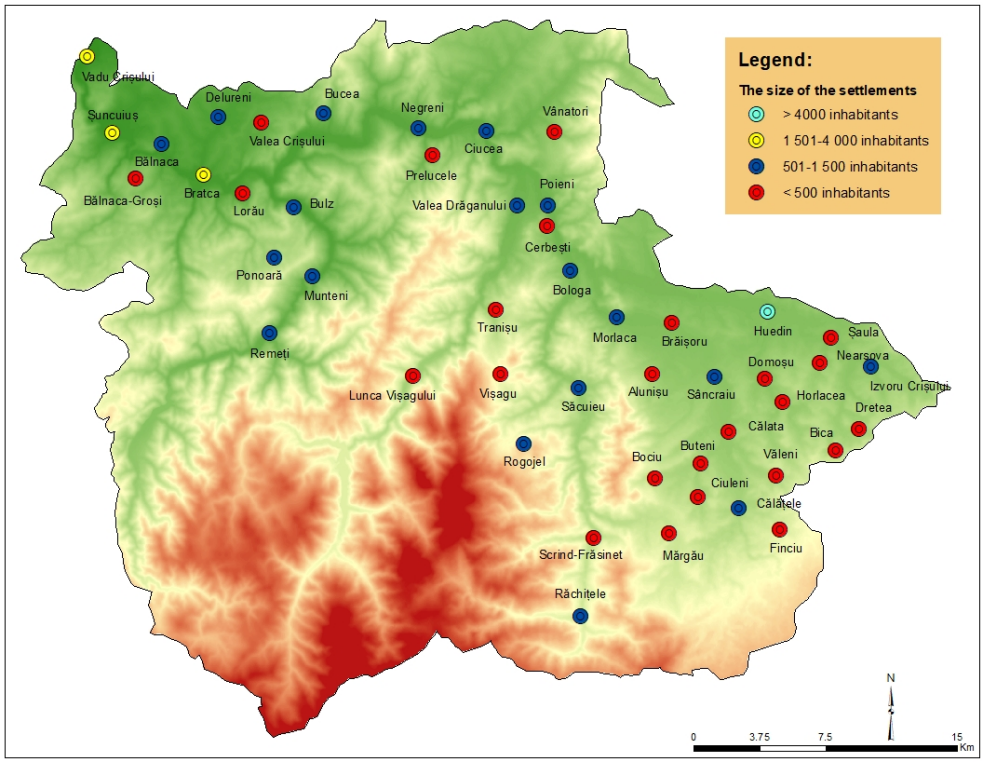

Fig. 6. Upper basin of Crişul Repede River - settlement ranking based on population size in 2011

The 2011 census brought about a different situation concerning the shares of the settlements according to population size as compared to the 1900 and the 1930 censuses. At the 2011 census, small settlements registered 52% - they formed the majority, due to the depopulation processes taking place in rural areas during the socialist period. After 1989, there were also other reasons for the population decrease. Starting with this year, population migrated towards towns and cities (internal migration) or to other countries (external migration), in order to find a more secure and better paid job. Following closely the small

settlements group, medium-size settlements account for 40% - they also registered a decline in the number of inhabitants. Large settlements account for 6%, the lowest figure in the entire studied time range. Huedin continues to be the largest settlement, with a population under 10,000, yet it has also experienced demographic risk phenomena, namely the migration of the young population due to the lack of jobs.

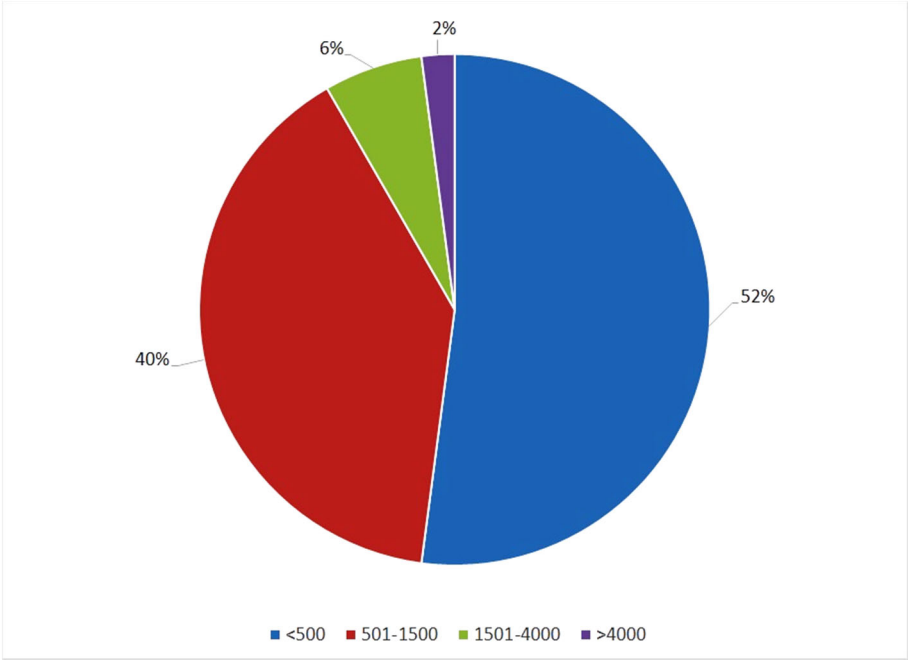

Fig. 7. Shares of types of settlements according to population size in 2011

4. SETTLEMENT RANKING BASED ON THE FIRST REFERENCE IN DOCUMENTS

The upper basin of Crişul Repede River has been inhabited since prehistoric times. Following archaeological research, traces of habitation have been discovered and they date back to various historical periods, starting with the Neolithic and going throughout the Roman period. The best known archaeological site within the studied area is the Roman fort located at Bologa. This was an important strategic location during the Roman period, as it aimed to keep out the invaders in Ciucea Pass. The fort was built in order to billet the Roman soldiers of the *Hispanorum* II Cohort which was meant to defend the borders of the Roman

Empire (Gudea, 1973). Thus, it blocked any attempt of invasion from the Barbarians. In order to consolidate the limes in Ciucea Pass, the Romans have built outposts in Poieni, Vânători and Negreni, yet they have not been preserved as well as the construction in Bologa did.

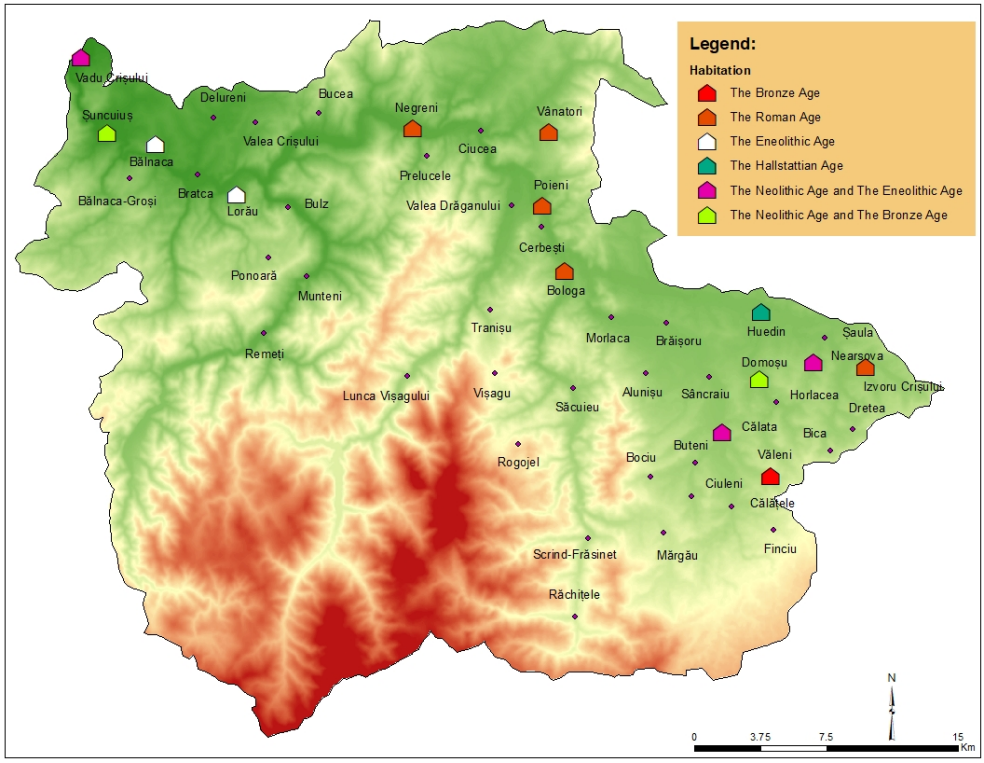

Fig. 8. The beginning of habitation in the upper basin of Crişul Repede River

The first references of these settlements in documents were in the 13th century, when eight settlements (Vadu Crişului, Şuncuiuş, Şaula, Izvoru Crişului, Dretea, Călata, Văleni and Buteni) were mentioned in documents (fig. 9). The next century registered eight new settlements in documents (Valea Crişului, Ciucea, Bologa, Huedin, Sâncraiu, Nearşova, Horlacea, and Bica). The largest number of settlements was registered in the 15th century, as 16 villages were first mentioned in documents (Bălnaca, Delureni, Bratca, Lorău, Bulz, Negreni, Valea Drăganului, Morlaca, Săcuieu, Alunişu, Domoşu, Bociu, Ciuleni, Călăţele, Finciu, and Mărgău). The 16th century was poor in new settlements as only two were mentioned (Poieni, Brăişoru). Other seven settlements were mentioned throughout

the 19th century (Bucea, Remeţi, Vânători, Tranişu, Vişagu, Rogojel and Răchiţele) and other seven were established during the 20th century (Bălnaca-Groşi, Ponoară, Munteni, Prelucele, Cerbeşti, Lunca Vişagului and Scrind-Frăsinet). The most recent ones are those mentioned after World War II, in 1954-1956.

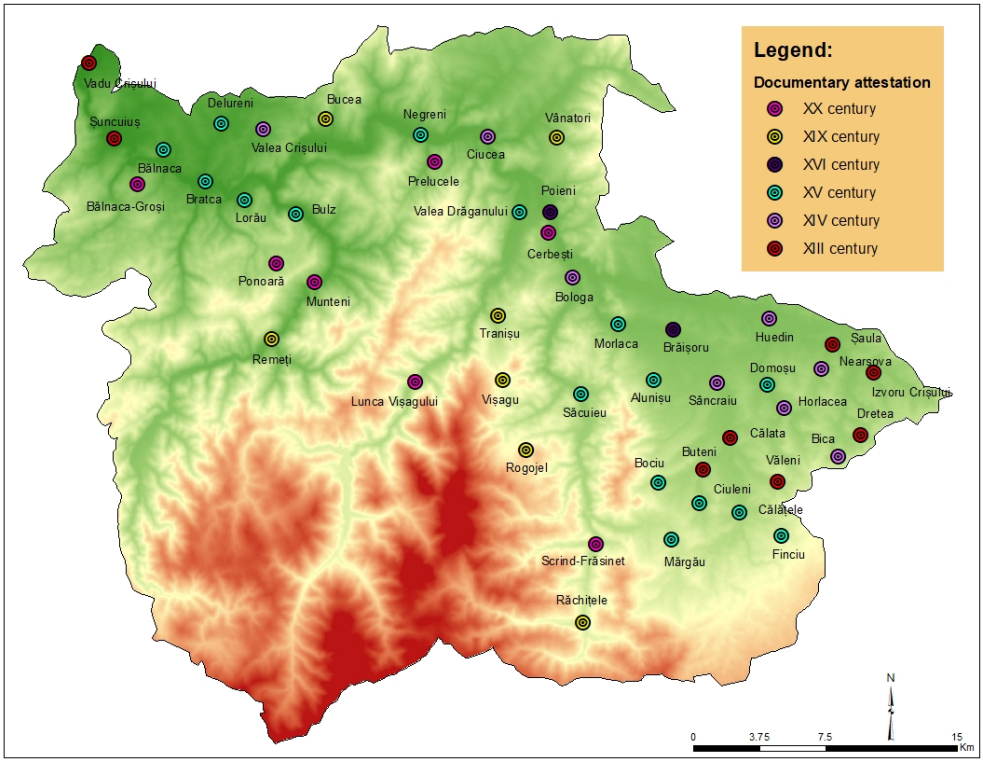

Fig. 9. Settlements of the upper basin of Crişul Repede River – first reference in documents

5. CONCLUSIONS

The population size of the settlements in the upper basin of Crişul Repede River was marked by continuous changes during the 20th century. If the previous century was characterized by a high number of large settlements, the 21st century was marked by their decrease. The settlements that form the majority are small-sized ones, as one can conclude by analysing the data from the most recent census, in 2011. Therefore, it results that the area is affected by

a process of depopulation of the rural space, which started in the socialist period and continued after 1990. The oldest settlement references in documents date back to the 13th century and the newest are from the 20th century. The largest number of settlement first references in documents was registered in the 15th century. The continuity of habitation in the area is due to the geographic location of the basin which has been inhabited since prehistoric times. There are habitation traces dating back to the Neolithic and continuing through the metal age, the Roman period, until the modern and contemporary periods. Even though population decreased in many villages and the number of small settlements increased, the studied area is characterized by the continuity of habitation. This was also due to other factors, for example the transport infrastructure, as the area is crossed by major roads which date back even to the Roman times.

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SCĂRIŞOARA ICE CAVE GEOMORPHOSITE – EVALUATION AND TOURIST CAPITALIZATION

IOAN-AUREL IRIMUŞ[1], PAULA-MINERVA CODREA[1], ANDREEA COSTEA[1]

ABSTRACT. – Scărişoara Ice Cave Geomorphosite – Evaluation and Tourist Capitalization. The present study assesses the attractiveness potential of karst forms which exist in Bihor Mountains, focusing on Scărişoara Ice Cave. This cave is considered by researchers as one of the most important tourist attractions in Romania, due to the accumulation of qualitative and quantitative factors, which contribute to its inclusion in the category of geomorphosites. In the scientific literature, the notion of "geomorphosite" refers to a landform or a geomorphological process which possesses multiple scientific, cultural, economic, scenic, historical and aesthetic values. All these values are the result of the researcher's subjective perception, acquired over time. The better known these values are, the more tourists are interested in the landform. This research was accomplished by applying specific research methods, which were acknowledged both at national and international level. The findings of the research highlight the special scenic value of the landform analyzed, as well as its high tourist attractiveness.

Keywords: *geomorphosite, Scărişoara Ice Cave, tourist potential, capitalization, Pralong Method*.

1. INTRODUCTION

Scărişoara Ice Cave was not discovered at a certain date, but the first papers which mentioned it date back to the 19th century. These works had a descriptive character, encompassing a wide range of subjects.

The first scientific investigations about Scărişoara Ice Cave were performed in the 19th century, when the cave was the subject of specialized studies conducted by the scientist Emil G. Racoviţă. Referring to his research, he stated: *"I think that I*

[1] *Babeş-Bolyai University, Doctoral School of Geography, 5-7 Clinicilor Street, Cluj-Napoca, Romania*

have demonstrated the great scientific interest which the Scărişoara Ice Cave shows. Apart from the deciphering passionate enigmas of the history of the glacier, many issues that concern all branches of natural sciences could be studied [...]". Over time, many investigations have been made by scientists from the Institute of Speleology, such as Mihai Şerban, Iosif Viehmann, Gheorghe Racoviţă, as well external collaborators like Răzvan Givulescu, Emil Pop, Ion Ciobanu, Liviu Blaga and many others.

The actuality of the present study is based on the high tourist capitalization of the landforms considered to be major attractions. A relevant example is represented by gemorphosites. To consider a landform as a geomorphosite, certain conditions have to be met. First, it is important that the form taken into account has special geomorphological characteristics. Secondly, it is important to have hydrographic and/or biogeographic features. Another defining aspect is the human perception of the form in question, as well as the assigned functions.

In this study, emphasis is placed on the interrelation between morphology and tourism from the point of view of the scenic capitalization of the geomorphosite, through its structural and functional analysis. This relationship is also illustrated by Muntele and Iaţu (2006): "*Terrain is the essential support in tourism arrangements, being also a basic element in creating the specific setting for each tourist attraction"*.

Scărişoara Ice Cave is located in the central part of Bihor Range, at an altitude of 1165 meters, being part of Scărişoara karst complex. The geological formations are represented by Mesozoic limestones which belong to the Bihor Autochthonous. According to some studies, it is considered that the specific rocks of the cave are ladder-age limestones. The surroundings of this tourist destination are defined by a series of isolated ranges and peaks which are separated by deposits or small karst basins such as Ocoale (Gh. Racoviţă, M. Şerban, I. Viehmann, B. Onac, 2003).

Scărişoara Ice Cave has the aspect of an aven with the diameter of about 48 meters and the depth of 50 meters. The entrance is in its western wall, through a 24 m high portal. It continues with the Great Hall, which shelters an ice block with a volume of about 75,000 m^3 and about 3,000 years of age. This room continues with the Small Reserve in the northern part and the Great Reserve in the southern part, which is considered the largest cave sector. The cave is composed of several sectors: Maxim Pop Gallery, Cathedral Hall, Coman Corridor. All these sectors lead to a total cave development of 700 m and a total area of approximately 5,500 m^2.

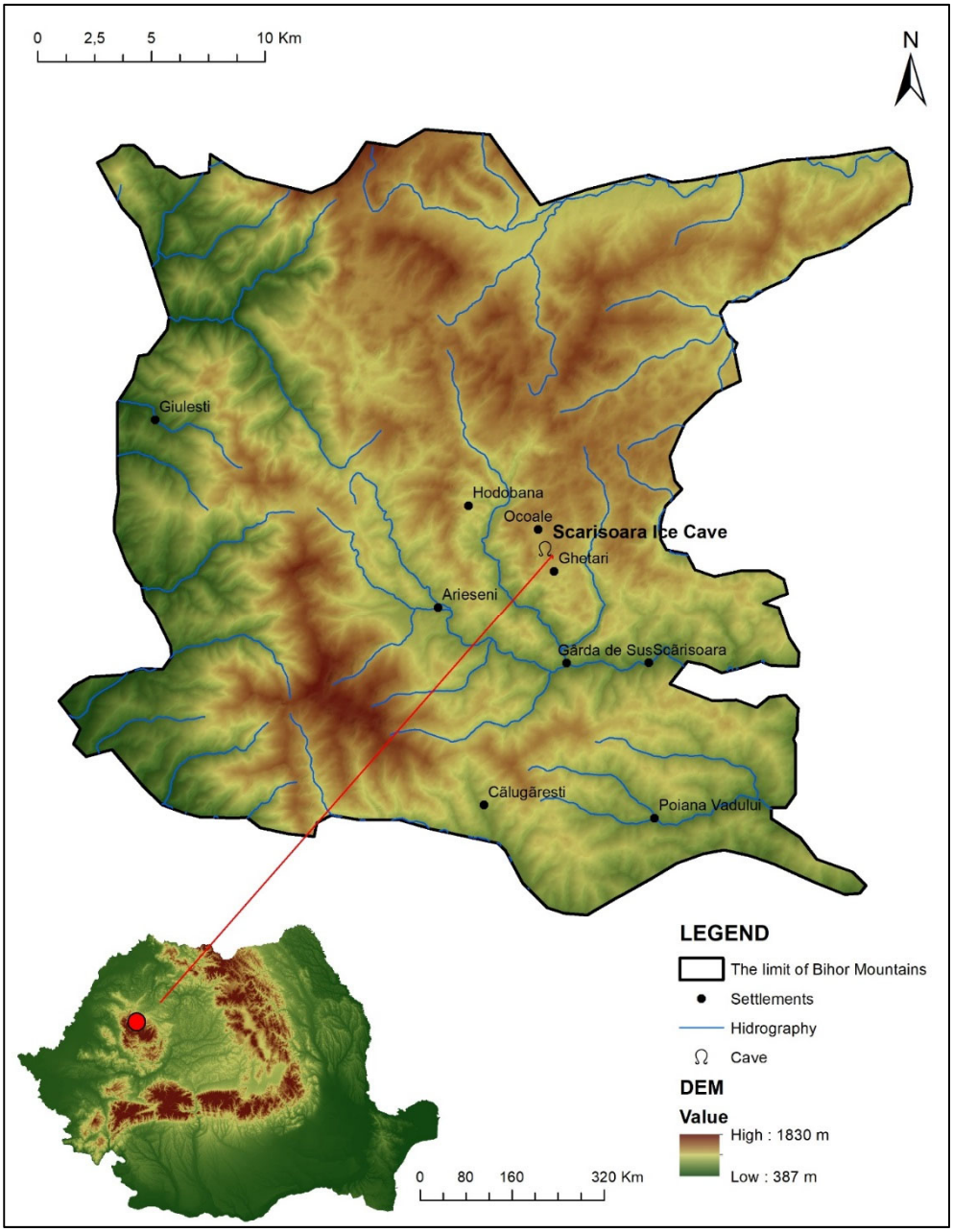

Fig. 1. Location of Scărişoara Ice Cave

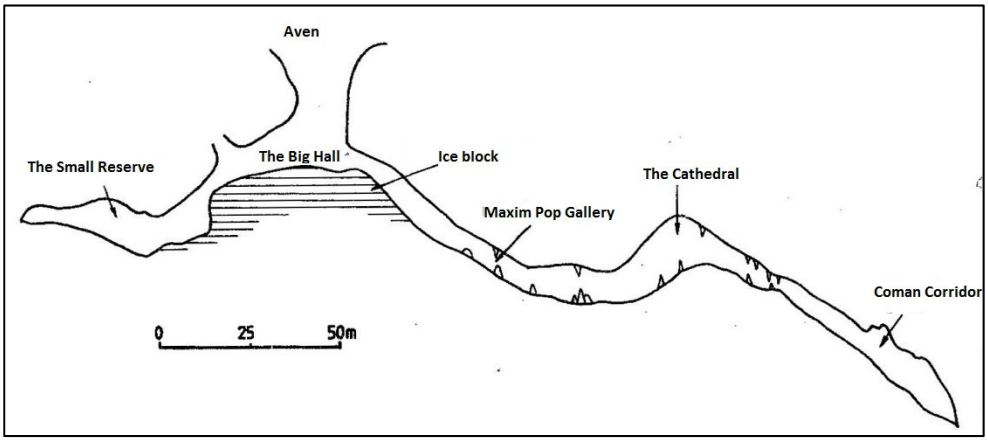

Fig. 2. Scărişoara Ice Cave (*section realized after Şerban M., and colab., 1948*)

2. METHODOLOGY

The methodology used in this research is based on the analysis of the site, by consulting specialized scientific papers. The main methods used to evaluate a geomorphosite have been identified, namely: Panizza Method, the method proposed by Coratza and Giusti, Pralong Method, Pereira's Method, Reynard's Method, the method proposed by Serrano and Truebla Gonzalez. Of all these, we have chosen to use the Pralong Method, as it is focused on the tourist capitalization of geomorphosites, which is attempted to be highlighted in this research.

The main characteristic of this method is the fact that the tourist value of the geomorphosites is calculated as the mean of the following values: scenic (Vsce), scientific (Vsci), cultural (Vcult) and economic (Veco). An important feature of this method is the fact that these values have equal weight when the tourist value is calculated.

The scenic value and the economic one are calculated as the mean of many factors. According to Panizza, the scenic value depends on the spectacularity and peculiarities of the geomorphosite. Thus, the factors considered are: the number of viewpoints, average distance to viewpoints, the area of the site, the elevation and the chromatic contrast. Different scales are used between the values assessed, between 0 and 1.

The economic value is based on the features that make possible the capitalization of the geomorphosite, such as: accessibility, natural risks, annual number of visitors, official level of protection, attraction. On the other hand, the scientific value is based on palaeogeographical interest, representativeness, area, rarity, integrity, ecological interest and is expressed by:

$$Vsci = (Sci1 + Sci2 + 0.5 * Sci3 + 0.5 * Sci4 + Sci5 + Sci6) / 5$$

In this formula, the values of Sci3 and Sci4 factors were halved, as they are closely related to the site area (Sce3).

The cultural value depends on the artistic events or traditions associated with the site: the presence of some customs, the representation of the site in art, historical and archeological relevance, religious relevance, art and cultural events. The formula of this value is:

$$Vcult = (Cult1 + 2 * Cult2 + Cult3 + Cult4 + Cult5) / 6$$

It can be observed that the Cult2 factor has an unequal weight, as it depends on the number of literary mentions.

Table 1. Criteria and scores used to assess the tourist value of a geomorphosite

SCENIC VSCE	Number of viewpoints (Vsce1)	1	6 or more
		0.75	4 or 5
		0.5	2 or 3
		0.25	1
		0	No viewpoints
	Average distance to viewpoints (m) (Vsce2)	1	More than 500
		0.75	Between 200 and 499
		0.5	Between 50 and 199
		0.25	Between 25 and 49
		0	No viewpoints
	Surface, related to other similar sites from the same area (Vsce3)	1	Very large
		0.75	Large
		0.5	Moderate
		0.25	Small
		0	Very small
	Elevation (Vsce4)	1	Very high
		0.75	High
		0.5	Moderate
		0.25	Low
		0	Very low
	Chromatic contrast (Vsce5)	1	Strong contrast
		0.75	Moderate contrast
		0.5	Very different colours
		0.25	Different colours
		0	Identical colours
SCIENTIFIC	Palaeogeographical interest (Vsci1)	1	Very high
		0.75	High
		0.5	Moderate
		0.25	Low
		0	No interest
	Representativeness (Vsci2)	1	Very high
		0.75	High
		0.5	Moderate
		0.25	Low
		0	No representativeness

VSCI	Area % (Vsci3)	1	More than 90,1
		0.75	Between 50,1 and 90
		0.5	Between 25,1 and 50
		0.25	Between 10,1 and 25
		0	Between 0,1 and 10
	Rarity (Vsci4)	1	Unique
		0.75	Between 1 and 2
		0.5	Between 3 and 4
		0.25	Between 5 and 7
		0	More than 7
	Integrity (Vsci5)	1	Intact
		0.75	Weakly deteriorated
		0.5	Deteriorated
		0.25	Very deteriorated
		0	Destroyed
	Ecological interest (Vsci6)	1	Very high
		0.75	High
		0.5	Moderate
		0.25	Low
		0	No interest
SOCIAL-ECONOMIC VECO	Accessibility (Veco1)	1	By a road of national importance
		0.75	By a road of regional importance
		0.5	By a road of local importance
		0.25	Less than 1 km of track
		0	More than 1 km of track
	Natural risks (Veco2)	1	No risk
		0.75	Controlled risk
		0.5	Partially controlled risk
		0.25	Not controlled risk
		0	Uncontrollable risk
	Annual number of visitors (Veco3)	1	More than 1 000 000
		0.75	Between 500 000 and 1 000 000
		0.5	Between 100 001 and 499 999
		0.25	Between 10 000 and 100 000
		0	Less than 10 000
	Official level of protection (Veco4)	1	No protection
		0.75	Limiting for 25% of the area
		0.5	Limiting for 50% of the area
		0.25	Limiting for 75% of the area
		0	Complete
	Attraction (Veco5)	1	International
		0.75	National
		0.5	Regional
		0.25	Local
		0	No attraction

CULTURAL VCULT	The presence of cultural customs (Vcult1)	1	Indicatory of customs
		0.75	Strongly linked to customs
		0.5	Moderately linked to customs
		0.25	Weakly linked to customs
		0	No link
	Number of representations in art (Vcult2)	1	More than 50
		0.75	Between 21 and 50
		0.5	Between 6 and 20
		0.25	Between 1 and 5
		0	Never represented
	Historical and archeological relevance (Vcult3)	1	Very high
		0.75	High
		0.5	Medium
		0.25	Weak
		0	No vestige
	Religious relevance (Vcult4)	1	Very high
		0.75	High
		0.5	Medium
		0.25	Weak
		0	No relevance
	Art and cultural events (Vcult5)	1	Occasional events: traditions, feasts etc.
		0.75	Occasional religious events, marriages etc.
		0.5	Occasional events due to the implementation of a program
		0.25	Random events
		0	No events

In the assessment of tourist value, we also determined the exploitation value (Vexp), which is based on the sum of the degree of exploitation (Vdeg) with the modality of exploitation (Vmod) of the values obtained previously. The degree of exploitation depends on the number of infrastructure, used area, seasonal occupancy, daily occupancy.

$$Vexp = Vdeg + V\,mod$$

Table 2. Criteria and scores used to assess the exploitation value of a geomorphosite

DEGREE OF EXPLOITATION	Used surface (ha) (Vdeg1)	1	More than 15
		0.75	Between 10 and 14
		0.5	Between 6 and 9
		0.25	Between 2 and 5
		0	Less than 1
	Number of infrastructure (Vdeg2)	1	More than 10
		0.75	Between 6 and 10
		0.5	Between 2 and 5
		0.25	1
		0	No infrastructure
	Seasonal occupancy (days) (Vdeg3)	1	Between 271 and 360
		0.75	Between 181 and 270
		0.5	Between 91 and 180
		0.25	Between 1 and 90
		0	No occupancy
	Daily occupancy (hours) (Vdeg4)	1	More than 9
		0.75	Between 6 and 9
		0.5	Between 3 and 5
		0.25	Less than 3
		0	No occupancy
MODALITY OF EXPLOITATION	Use of the scenic value (Vmod1)	1	Mass-media promotion and products
		0.75	Mass-media promotion and one product
		0.5	One support and some products
		0.25	One support and one product
		0	No promotion
	Use of the scientific value (Vmod2)	1	Scientific promotion and products
		0.75	Scientific promotion and one product
		0.5	One support and several products
		0.25	One support and one product
		0	No support and products
	Use of the cultural value (Vmod3)	1	Several means of promotion and products
		0.75	Several means of promotion and one product
		0.5	One support and several products
		0.25	One support and one product
		0	No promotion
	Use of the economic value (tourists) (Vmod4)	1	More than 100 000
		0.75	Between 20 001 and 100 000
		0.5	Between 5 001 and 20 000
		0.25	Less than 5 000
		0	No tourists

The next stage of the research consisted in trips we made to enable the subjective assessment of the geomorphosite, according to the method mentioned. According to this, we went to the Scărișoara Ice Cave, which is located in the commune of Gârda de Sus, Alba County.

The last stage of the research was based on the direct observations we made in the previous stage. Thus, these allowed the validation of the initial hypothesis, following analysis and synthesis processes.

3. RESULTS AND DISCUSSIONS

Scărișoara Ice Cave is among the top tourist attractions of Romanian speleology. This is due to the accumulation of some structural and functional features of great importance, as well as to its geomorphosite quality. Thus, the first facilities made in the cave date back to the beginning of the 19th century, when some tourist-oriented literature mentioned the provision of wooden stairs at the entrance of the glacier. In 2001, the existing infrastructure was restored while lighting and electrification have been introduced in the cave. The most recent intervention was performed in 2012, when the lighting mode was replaced by a modern LED system.

Fig. 3. The infrastructure in the cave

In the following we will present the result of the evaluation based on the geomorphosite evaluation table.

Table 3. Tourist capitalization of Scărişoara Ice Cave

	Vsce					Vsci						Veco					Vcult	Vtour
	0	0	0.5	0.75	1	0.75	1	0.75	1	0.75	0.75	0.25	0	0.25	0.25	1	0	
TOTAL	**0.56**					**0.82**						**0.43**					**0**	**0.45**

Using the Pralong Method, we obtained a tourist value of 0.45 for Scărişoara Ice Cave. Following the analysis of the table above, one can notice that the highest score belongs to the scientific value, which is due to the accumulation of several attributes. Thus, the cave is of great palaeogeographic interest, due to the fact that the ice block contained may suggest climate changes in the period between the Pleistocene and present. Moreover, the cave contains a rare fauna biotope composed of a small number of troglophilous or troglodyte species, belonging to only three taxonomic groups: araneides *(Nesticus racovitzai* and *Troglohyphantes racovitzai)*, springtails (*Oncopodura crassicornis, Onychiu-rus spp*. and *Tomocerus minor*) and Leptodirinae Coleoptera *(Pholeuon prosperinae glaciale)* (Gh. Racoviță, M. Şerban, I. Viehmann, B. Onac, 2003). The very high representativeness is due to the fact that the cave contains an ice block of remarkable size, which is the biggest one at national level and the second one in the south-east of Europe. The area of scientific interest of this tourist attraction has a percentage of 50-90% and the melting of a small quantity of snow and ice makes it just a little damaged.

Fig. 4. The ice block in the cave

The scenic value holds the second score of the total value due to the morphometric attributes of the cave. It has a strong chromatic contrast, due to the game of colors the ice creates in contrast to the karst forming the walls of the cave and the light that enters through the ceiling of the Great Hall and puts the color of the ice in a perfect light, eclipsing the whole cave.

Fig. 5. Strong chromatic contrast of the cave

The economic value has a weaker score because the only factor that reaches the maximum score (1) is defined by the attractiveness of the site, which is internationally well-known. Regarding the accessibility, the tourists are not able to reach the objective by car, so that a distance of less than 1 km has to be walked. This site has a risk that cannot be controlled, represented by the presence of a thick layer of snow above the cave, which could produce the collapse of the ceiling, as well as the possibility of flooding in case of torrential rainfalls. In order to preserve the ice in the cave, the access of tourists is limited to certain sectors. The cultural value has the score 0, since the cave does not have relevance regarding this aspect.

Table 4. The exploitation value of Scărişoara Ice Cave

	Vdeg				**Vmod**				**Vexp**
	0.25	0.5	0.75	0.75	1	0	0	0.75	
TOTAL	**2.25**				**1.75**				**4**

The total score of the exploitation value of Scărişoara Ice Cave is 4. In assessing this value, we analyzed the degree of exploitation associated to the tourism capitalization, and the modality of exploitation of the values previously calculated. Thus, from the perspective of the tourism capitalization, the tourism infrastructure is composed by three elements: access stairways, walkways and lighting. The cave is opened for the public 8 hours a day, between 181 and 270 days a year. Regarding the promotion of the values taken into account for assessing the modality of exploitation, it is obvious that the scenic value is strongly promoted, while the scientific value has the lowest score, because there are no products to promote it.

As a result of the analysis, one remarks that there is a need to optimize the tourist activities related to the cave. Thus, in order to preserve the ice block and the site as a whole, it would be better to allow visitors in the period October-April. Besides, in the period May-September, access should be restricted, allowing visitors only in specific time intervals, preferably in the morning and afternoon. In this way, the anthropogenic impact would be minimized.

Despite the fact that the infrastructure is well developed, as recent improvements have been made regarding both the access roads to the cave and the site itself, there is a need for diversifying the promotion of the cave. Although there is a good scenic promotion for the moment, there should be also a promotion targeted on the specific scientific features of the cave.

4. CONCLUSION

In conclusion, Scărişoara Ice Cave is a representative geomorphosite in Bihor Mountains because of its special morphological and morphometric attributes. These aspects contribute at placing this site in the top of national tourist objectives.

The present study was based on the specific geomorphosite inventory methodology, in this case the Pralong Method. This implied the analysis of certain defining aspects, which were quantified by assigning values between 0 and 1.

By capitalizing the aesthetic, scientific, socio-economic and cultural values of the analyzed objective for tourism purposes, the region could be developed. However, we must consider the fact that the economic interests must not endanger the preservation of the site, which must be exploited from a sustainable perspective.

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TWO DECADES OF GEOGRAPHICAL HIGHER EDUCATION IN BAIA MARE (1998-2018)

GEORGE-BOGDAN TOFAN[1]

ABSTRACT. – Two Decades of Geographical Higher Education in Baia Mare (1998-2018). This paper aims to emphasize the history of the geographical tertiary education system in the Baia Mare Municipality (1998-2018), looking into *„the transformations"* of the Geography specialisation, specifically the evolution of enrolled students and graduates, the annual staff dynamics, as well as a synthesis of its educational and scientific achievements, ending with a presentation of its infrastructure. The 1998-1999 academic year corresponds with the accreditation of the first two specialisations of the Baia Mare Branch, one of them being ***History-Geography***, long-term studies (4 years) in Romanian, part of the ***Faculty of Human-Christian Sciences***, from ***„Vasile Goldiș" University Arad***. The purpose of said specialisation was to provide competent teachers for the schools of Maramureș and the surrounding counties, preparing seven series of graduates (25 in 2002 and 40 in 2008), a total number of 601 students, reaching its peak (126) in 2004-2005. The fall of 2005 is the first significant moment in the history of Baia Mare Geography, as the ***Faculty of Natural Sciences*** was established and the History-Geography specialisation was transformed into ***the Geography Section***, short-term day studies (3 years). It did not last long however, having only one series of graduates (12 in 2008 of a total of 18 enrolled students in 2005-2006). A year later, a new change occured, when a new specialisation was established, named ***Geography of Tourism***, still operating to this day. In its 12 years of existence, it was first part of the ***Faculty of Nature Sciences, Engineering and Informatics*** (2011), ***Biology, Ecology and Geography Department***, then part of the ***Faculty of Economic Sciences, Informatics and Engineering***, without its own departament. It is currently part of the Engineering and Informatics Department. Of the total ***1,770 students***, who studied one of the three geographical specialisations during 1998-2018, the number of graduates (between 2002-2018) was ***447*** (25.2%), ***256*** studying Geography of Tourism (57.2%), ***179*** History-Geography (40%) and ***12*** Geography (2.8%). In terms of length, long-term studies (History-Geography) holds 44.8% (793 students) of the 1,770 students, while short-term studies (Geography, Geography of Tourism) reaches 55.2% (977 students, 43 at Geography and 934 at Geography of Tourism). The second major

[1] *„Vasile Goldiș" Western University of Arad, Faculty of Economic Sciences, Engineering and Informatics, Departament of Engineering and Informatics, Baia Mare, 5 Culturii Street, Romania, email: bogdan.tofan@uvvg.ro*

component that the paper aims to present is the educational and scientific staff, by carefully presenting the achievements for each member of „Vasile Goldiş" University of Arad.

***Keywords**: private tertiary education, History-Geography, Geography, Geography of Tourism, Baia Mare*

1. INTRODUCTION

The new social and political situation of Romania after 1990 created favourable premises for the rebirth of an old desiderate of the Arad intellectual elite, to recreate an academic institutional system of learning.

Thus, on the 12th of March 1990, a memo was drafted, demanding the creation of a private tertiary education establishment in Arad, which came to be known as ***"Vasile Goldiş University"***. The signatories were ***Aurel Ardelean*** and ***Alexandru Roz***, professors at *"Moise Nicoară" High School* in Arad, who sent their document to the *Provisional National Union Council*, as well as to the President of Romania, Ion Iliescu. A group of intellectuals backed this effort as well, with a massive support form the high school community of Arad, who longed for an academic environment that could bolster their creative potential (M. Grec, 2015).

On the *26th of April 1990*, a contract was signed, stipulating the establishment of an association in Arad, named ***„Vasile Goldiş Western University"***, whose aim was to create medical, judicial and other types of professionals. This date is now considered the foundation of the university. The beginnings of this institution were difficult times, partly due to a lack of proper legislation regarding private education. The festivities took place on the 15th of October 1990, when the university hosted only two faculties (***Law*** and ***Marketing, Management and Information Science***). The following years saw the introduction of four more: ***Faculty of Dentistry*** and ***College of Technical Dentistry*** (1991); ***General Medicine*** (1993); ***Physical Education and Sports*** (1993), ***Human-Christian Sciences*** and ***the Pedagogical University College*** (1994). The continuous efforts to enlarge the educational offer, as well as the push towards the improvement of scientific activities, led to the creation of the first two branches in 1997, one in ***Satu Mare*** while the other in ***Baia Mare***. Their study programmes were provided under the guidance of the profile faculties of „Vasile Goldiş" Western University of Arad.

The new branch in Baia Mare did not have its own headquarters that could host any educational activities (lecture halls, laboratories, etc). For that reason, it was hosted by „Gheorghe Şincai" National College of Baia Mare, for the first two years of its existence, and was only later moved to a building owned by the Maramureş County Centre of Planning, where it still operates to this day. Another important aspect is that its first two specializations were certified by the *National Academic Evaluation and Accreditation Council,* during the 1998-1999 academic year (***History-Geography*** and ***Journalism-English Language and Literature***), part of the ***Human-Christian Sciences Faculty*** (4 years of study).

2. EVOLUTION OF GEOGRAPHICAL SPECIALIZATIONS

Taking into account the need for primary and secondary learning personnel in Maramureş and the adjacent counties, the ***History-Geography chair*** was created, with four years of study, eventually forming seven classes, with admissions in 1998, 1999, 2000, 2001, 2002, 2003, and 2004. Its first graduation took place in 2002, followed by 2003, 2004, 2005, 2006, 2007 and 2008. The History-Geography chair of Baia Mare branch had a relatively small group of teachers and instructors, the Geography classes being prepared by associate professors from Cluj-Napoca.

The plan of the first year of studies included five subjects for History (World History, Ancient History of Romania, Historiography, History of Ancient Religions, Paleography) and four subjects for Geography (General Geography, Meteorology-Climatology, Hydrology-Oceanography, Cartography-Topography).

For the second year of studies, the plan contained the following: Universal Middle History, Middle History of Romania, History of Byzantium, General Prehistory, Ancillary Historical Sciences, and Archeology; four subjects for Physical Geography (General Geology, Geomorphology, Biogeography, Pedogeography), then two Human Geography subjects (Settlement and Population Geography, Political and Social Geography), and one Regional Geography subject (Geography of Continents - Europe).

The third year of studies comprised the following courses and seminars: Modern History, Modern History of Romania, History of the Church, Geology of Romania, Environmental Geography, Physical Geography of Romania, Economic Geography, Geography of Continents (Africa, North America and Latin America) and Geoinformatics.

Fourth year students attended the following: Contemporary Universal History, Contemporary History of Romania, History of the Orthodox Church and of Christian Spirituality, Geographical Theory and Methodology, Geography of Tourism, Regional Geography of Romania, Geographical Space Organisation.

Table 1. Number of students attending History-Geography, Faculty of Humanist-Christian Studies, Baia Mare Branch, 1998-2005

University year	Specialisation	First year	Second year	Third year	Fourth year	Total
1998-1999	History-Geography	36	-	-	-	**36**
1998-2000	History-Geography	21	27	-	-	**48**
2000-2001	History-Geography	30	23	26	-	**79**
2001-2002	History-Geography	24	31	22	25	**102**
2002-2003	History-Geography	34	23	30	22	**109**
2003-2004	History-Geography	18	29	25	29	**101**
2004-2005	History-Geography	59	14	29	24	**126**
Total		**222**	**147**	**132**	**100**	**601**

Besides the previously mentioned subjects, there are some ancillary ones such as: School Psychology (first year), Pedagogy (second year), Methods of Teaching History and Geography (third year), Sociology of Education (third year), Applied Informatics, Logic and Axiological Education (first year). Furthermore, until the third year of studies, the curricula included foreign languages as well, such as French and English, and a series of "special languages", like Latin and Old Slavic.

Being a specialisation focused on preparing primary and secondary school teachers, it also included pedagogical apprenticeship, for History, from the third year of studies onwards, and for Geography, during the fourth year. Likewise, as other specialisations across the country, for each year of study there were two weeks of summer schooling (one for History and one for Geography), with different subjects, organised by the coordinator *Iosif Covaci*.

Due to constant requests, the board decided to introduce a full-time, long-term istory-Geography specialisation inHistory-Geography specialisation in Satu Mare, for the 2004-2005 school year, which comprised of a total of 21 students in its first year. These students were supervised and taught by the professors from the History-Geography Department of Baia Mare, and by others from other centers. The penury of professors, among others, caused the dissolution of the specialisation, which only had one generation of graduates (16), in 2007-2008.

Table 2. The evolution of the number of enrolled students and graduates of the History-Geography specialisation, Baia Mare Branch, 1998-2008

Specialisation	Enrolled students							Graduates						
	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008
History-Geography	36	21	30	24	34	18	59	25	19	28	22	29	16	40

The 2005-2006 academic year was a major turning point in the evolution of geographical specialisations, as after the implementation of the *Bologna Convention*, "Vasile Goldiş" University of Arad introduced a new, complex and integrative structure named ***Faculty of Natural Sciences***. Consequently, the History-Geography Department was replaced by the autonomous ***Geography*** (180 transferable credits), providing solely the first cycle of short term studies (3 years). At the same time, the aims of the university were changed from mostly educational to practical-applicative, providing a solid base for high interest fields of study such as: environmental protection, water management, tourism resources and land cartography. Following this change, the second, third and fourth years of the History-Geography specialisation were transferred to the ***Faculty of Human, Political and Administrative Studies***. The specialisation was terminated in 2008, after seven generations of graduates (25 in 2002 and 40 in 2008).

Several other changes arose in the contents of the curricula, with new added subjects such as: Physical and Human Geography, Photogrammetry (alongside Cartography and Topography), Regional Geography, Geographical Toponymy, Geographical Landscape (first year of study); Urban and Rural Geography, Global Changes of the Environment, Topoclimatology, Human Geography of Romania, GIS and Remote Sensing, Methods and Techniques of Geographical Data Processing (second year); Geography of Hazards and Risks, Applied Geography, Ecotourism, Territorial Systems and Planning, Water Management and Quality, Territorial Organisation and Planning (third year). During this period, "Vasile Goldiş" University of Arad hired *professor Ioan Mac* (after he retired from the Faculty of Geography belonging to "Babeş-Bolyai" University of Cluj-Napoca), thus becoming an associate professor and Vice-Rector (2005-2008). He has brought a continuous stream of new teachers since 2003, three of them being PhD applicants under his guidance. The new department was unfortunately discontinued, having only one group of 12 graduates in 2008 (out of total of 18 enrolled students for the 2005-2006 school year).

Table 3. The evolution of the number of enrolled students and graduates of the Geography and Geography of Tourism, Baia Mare Branch, 2005-2014

Specialisation	Enrolled students							Graduates						
	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
Geography	18	-	-	-	-	-	-	12	-	-	-	-	-	-
Geography of Tourism	-	50	45	30	40	33	40	-	37	35	25	30	25	32

The close connections with the Faculty of Geography belonging to „Babeș-Bolyai" University of Cluj-Napoca, corroborated with changes that took place, the fewer years of study, as well as the ever increasing number of enrolled students, created a new change in the specialisation structure. The most important one is the creation of the department of ***Geography of Tourism*** in 2006-2007, in Baia Mare.

The curriculum of this department, first year of studies, included the following mandatory courses: General Geography, Regional Geography of Romania, General Geography of Tourism, Tourism Potential of Earth's Topography, Hydroclimatic Potential and its Tourism Capitalization, Commercial Law and Legislation in Tourism, Statistics, Tourism and Tourism Enterprise Economics, Finances and Credits, Culture and Civilization.

Table 4. Evolution of enrolled students and graduates of Tourism Geography, Baia Mare Branch, 2012-2018

Specialisation	Enrolled students						Graduates			
	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2014-2015	2015-2016	2016-2017	2017-2018
Geography of Tourism	33	31	25	22	17	19	27	14	18	13[1]

For the second year students, the data for the 2007-2008 academic year shows a two-part plan, one composed of *mandatory courses* (Tourism Geography in Romania, International Tourism, Tourism Research, Ecotourism and Sustainable Development, GIS and Digital Cartography, Analysis Methods and Techniques in Tourism Geography, Architecture in Tourism, Tourism Marketing, Tourism Services, Touristic Management). The second one comprised *optional courses* (Ethnography and Toponymy, Tourism in the EU).

The study plan for the third year (2008-2009) had the following *mandatory disciplines*: Tourist Regions, Tourism Planning, Geography of Tourist Flows, Rural Tourism, Tourism and the Environment, Communication and Image in Tourism, Bookkeeping in Tourism, Creation and Merchandising of Tourism Products, Management of Development Projects, Current Tourism Practices; *optional courses* included Territorial Models, Tourism Policies and Strategies, and Natural Protected Areas and their Tourism Capitalization.

[1] Approximate number of graduates, as the current study was submitted before the final examinations.

Table 5. Number of students between 2005 and 2018, Geography specialisation, „Vasile Goldiş" Western University of Arad, Baia Mare Branch

Academic year	Specialisation	First year	Second year	Third year	Fourth year	Total
Long term studies						
2005-2006	History-Geography	-	47	14	29	**90**
2006-2007	History-Geography	-	-	44	14	**58**
2007-2008	History-Geography	-	-	-	44	**44**
Short term studies						
2005-2006	Geography	18	-	-	-	**18**
2006-2007	Geography	-	12	-	-	**12**
2007-2008	Geography	-	-	13	-	**13**
2006-2007	Geography of Tourism	50	-	-	-	**50**
2007-2008	Geography of Tourism	45	37	-	-	**82**
2008-2009	Geography of Tourism	30	38	36	-	**104**
2009-2010	Geography of Tourism	40	27	38	-	**105**
2010-2011	Geography of Tourism	33	35	25	-	**93**
2011-2012	Geography of Tourism	40	31	32	-	**103**
2012-2013	Geography of Tourism	33	35	29	-	**97**
2013-2014	Geography of Tourism	31	23	33	-	**87**
2014-2015	Geography of Tourism	25	19	27	-	**71**
2015-2016	Geography of Tourism	22	17	15	-	**54**
2016-2017	Geography of Tourism	17	12	17	-	**46**
2017-2018	Geography of Tourism	19	11	12	-	**42**
Total		**403**	**344**	**335**	**87**	**1169**

Following the Government's Decision no. 966/29 September 2011 and the Decision of "Vasile Goldiş" Western University of Arad Board nr. 105/06 October 2011, the Faculty of Natural Sciences, the Faculty of Engineering and the Faculty of Informatics were merged, thus creating a new entity, ***The Faculty of Natural Sciences, Engineering and Informatics***, with three departments. Geography of Tourism was included in the ***Biology, Ecology and Geography Department***. Four years later, during the 2015-2016 academic year, as some study programmes were sidelined or terminated, a new decision was made, this time to unite it with *the Faculty of Economic Sciences*. The newly formed structure was ***the Faculty of Economic Sciences, Informatics and Engineering.*** Geography, no longer an individual department, was included in *Engineering and Informatics.*

During its 12 years, the *Tourism Geography Specialisation* (2006-2018), alongside the already mentioned courses, had other, more diverse classes, including: Biogeography, Geography of Soils, Population Geography, World Economic Geography, Cultural Geography, Political Geography, Rural Geography and Rural Tourism, Organisation and Management of Touristic Enterprises, Balneology, Guiding Techniques, Policies in Tourism and Sustainable Development, Organisation of Tourism Space, Geography of Services, as well as a practical course for writing theses.

During all this period, there were also a series of rotations of all the courses for all three years of study. Of course, the students also had the possibility to study one international language (choosing either French or English). Moreover, they had a mandatory practical course (12 days), as well as a week-long field trip. Student numbers reached a peak during the 2007-2008 school year, when, from a total of 139 students, 59% were attending Geography of Tourism - first and second years, 31.6% History-Geography, fourth year, and 9.4% Geography, third year. The evolution of the number of Geography graduates was therefore erratic, registering significant increases alongside decreases during periods of institutional change. Moreover, new problems emerged in 2011-2012, like massive reductions in secondary school graduates, and a decrease in baccalaureate graduates, in particular, which caused further decline.

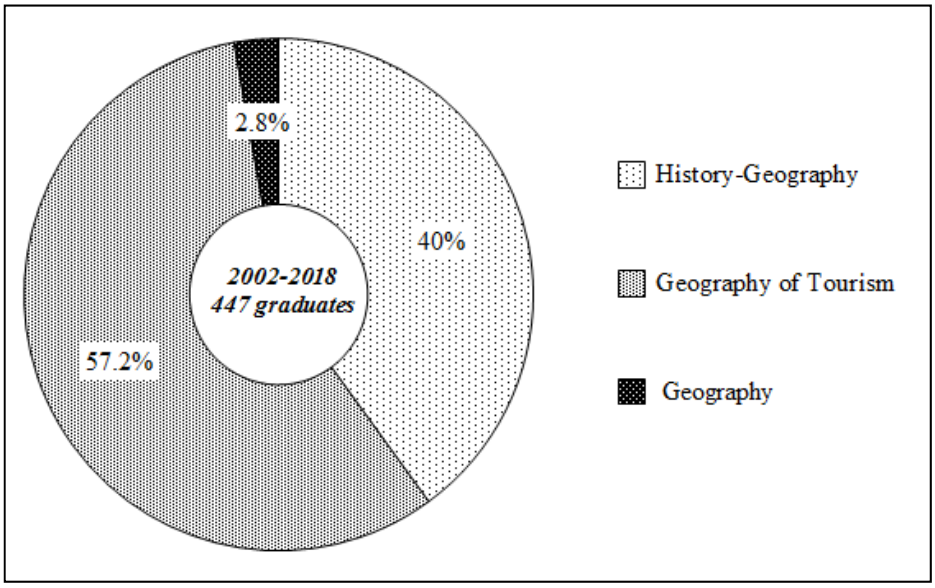

Fig. 1. Distribution of graduates from the three geographical specialisations between 2002 and 2018.

3. EDUCATIONAL STAFF IN THE FIELD OF GEOGRAPHY

The university staff working at the Geography Department of the Baia Mare Branch was a small one, composed mostly of visiting professors, who had been working at the Faculty of Geography in Cluj-Napoca. Thus, in 1998-1999, when *History-Geography* was established, the faculty comprised ***six tutors***: *prof. Ioan Mac, PhD* (1998-2008)[2]*, assoc. prof. Victor Buz, PhD* (1998-2005)*, assoc. prof. Dănuț Petrea, PhD* (1998-2004), *assoc. prof. Florin Dumescu, PhD*, the only one holding tenure at that time (1998-present), *lecturer Iosif Covaci* (1998-2004) and *research assistant Nicolaie Hodor* (1998-2002).

In the next couple of years, the staff grew by three educators, all from Cluj-Napoca: *prof. Nicolae Raboca, PhD* (1999-2011), *prof. Virgil Gârbacea, PhD* (1999-2008) and *research assistant Vasile Zotic* (2000-2003).

Since 2002 the process of hiring new personnel has continued, mostly for determinate periods of time, either due to the fact that many were in different stages of their doctoral studies or taught in secondary or primary schools. These were the following: research assistant Vasile Cureleac, PhD (2002-2003), *lecturer* Ileana Vasilescu (2003-2011), lect. Cornel Faur (2003-present), tenure since 2016, lect. Dan Ioan Bogdan (2005-present), tenure since 2009, lect. Iulius Eduard *Keller* (2005-2006), lect. Radu Spânu, PhD (2006-2008), lect. Oana Antonia Pop, PhD (2010-2011) and research assistant Daniel Nicuşor Sanislai (2010-present), tenure since 2011 and promoted to lecturer in 2016. Other visiting professors include Octavian Mândruț, PhD (2011-present) and Constantin Vert, PhD (2012-present) from Timişoara, as well as two tenure holders since 2014, one from Bucureşti, *lect. Paul Răzvan Şerban, PhD* (2013-present), and one from Cluj-Napoca*, lect. George-Bogdan Tofan, PhD* (2014-present).

As one can see in this brief presentation, the *Geography of Tourism* specialisation has currently ***six tenured instructors***, one of them teaching geographical sciences to economic specialisations (*prof. Florin Dumescu, PhD*), and ***two visiting***, the overseer being *lect. Cornel Faur, PhD*.

4. COMPENDIUM OF SCIENTIFIC RESEARCH AND STUDIES

Since the geographical university research and studies of Baia Mare developed mostly with the help of the staff from the Faculty of Geography in Cluj-Napoca, we will try to present several aspects regarding the educational

[2] Within parantheses, the period spent as faculty member at "Vasile Goldiş" Western University of Arad, Baia Mare Branch.

and research achievements (books, courses and guides, different studies, articles and papers) of the professors that contributed to the development of geographical studies within Baia Mare Branch. First and foremost, the books, lectures and guides by I. Mac, V. Gârbacea and N. Raboca, known to thousands of students who studied Geography in Cluj-Napoca, which were eventually passed on to the students of Baia Mare university branch. Furthermore, the following table will give us a glimpse of the doctoral theses of the professors who taught generations of students at „Vasile Goldiş" Western University of Arad, Baia Mare Branch. It includes the title of the thesis, the scientific coordinator, year of enrollment, year of defense and year of publication.

At a glance, the table reveals that four professors (I. Mac, V. Gârbacea, N. Raboca, V. Buz), who introduced Geography in Baia Mare, have been disciples of the renowned *prof. Tiberiu Morariu, PhD*. Seven others (F. Dumescu, D. Petrea, R. Spânu, N. Hodor, C. Faur, Ileana Vasilescu, and D. I. Bogdan) were coordinated by *prof. Ioan Mac, PhD*. Many other colleagues completed their theses under the guidance of reputable teachers: O. Mândruţ (*prof. Grigore Posea, PhD*), C. Vert (*prof. Ion Velcea, PhD*), V. Zotic and I. Covaci (*prof. Vasile Surd, PhD*), I. Keller (*prof. Ionel Haidu, PhD*), D. N. Sanislai and Oana Antonia Pop (*prof. Victor Sorocovschi, PhD*), P. R. Şerban (*prof. Ioan Ianoş, PhD*) and G. B. Tofan (*prof. Nicolae Ciangă, PhD*).

Table 6. Scientific research and doctoral theses of the educational staff from the Geography Department, Baia Mare Branch

Crt. no.	PhD Candidates	Title of the Doctor's Degree Theses	Scientific coordinator	Year of enrollment	Year of defense	Year of publication
1	Gârbacea Virgil	Bistriţa Hills. Geomorphological study	Prof. Tiberiu Morariu, PhD	1953	1957	2015
2	Mac Ioan	The Transylvanian Subcarpathians between Mureş and Olt. Geomorphological study	Prof. Tiberiu Morariu, PhD	1963	1969	1972
3	Mândruţ Octavian	Subcarpathian topography between Argeş and Argeşel. Geomorphological study	Prof. Grigore Posea, PhD	1971	1993	2002
4	Raboca Nicolae	Secaşe Plateau. Geomorphological study with focus on slopes and soil	Prof. Tiberiu Morariu, PhD	1975	1980	1995

Crt. no.	PhD Candidates	Title of the Doctor's Degree Theses	Scientific coordinator	Year of enrollment	Year of defense	Year of publication
5	Buz Victor	Codru-Moma Mountains. Physical-geographical study	Prof. Tiberiu Morariu, PhD	*[3]	1980	-
6	Dumescu Florin[4]	The underground waters of the central part of the Western Plain. Hydroecological study	Prof. Ioan Mac, PhD	1990	1994	1996
7	Petrea Dănuţ	The substance, energy and information thresholds in geomorphological systems	Prof. Ioan Mac, PhD	1990	1997	1998
8	Spânu Radu Călin	Synergy in territorial systems. Case study: Apuseni Mountains	Prof. Ioan Mac, PhD	1990	1998	-
8	Hodor Nicolaie	Igniş-Gutâi Mountains. Geomorphological study	Prof. Ioan Mac, PhD	1993	2002	-
9	Vert Constantin	Types of rural landscapes in Banat	Prof. IonVelcea, PhD	1994	1999	2001
10	Zotic Vasile	Geographical space organisation in the Mureş Corridor, between Sebeş and Deva	Prof. Vasile Surd, PhD	1995	2001	2007
11	Cureleac Vasile[5]	The Ukrainian diaspora of Maramureş. Ethnogeographical study	Prof. Fedir Zastavnyi, PhD	1995	2000	2001
11	Covaci Iosif	Organisation of rural space near Baia Mare	Prof. Vasile Surd, PhD	1999	2005	-
12	Faur Victor-Cornel	Oaş Mountains. Geomorphological study	Prof. Ioan Mac, PhD	2001	2007	2011
13	Vasilescu Ileana	Integrated heritage study. Maramureş Depression	Prof. Ioan Mac, PhD	2002	2008	-
14	Bogdan Ioan	Geographical epistemology	Prof. Ioan Mac, PhD	2004	2010	2013
15	Keller Iulius Eduard	GIS assesssment and simulation of water flows during situations of risk. Application on Baia Mare	Prof. Ionel Haidu, PhD	2004	2008	-
15	Sanislai Daniel Nicuşor	Risks induced by water excess in Someş Plain	Prof. Victor Sorocovschi, PhD	2005	2015	-

[3] Lack of data.

[4] Transferred from prof. Petru Tudoran, PhD, who passed away in January 1994.

[5] Thesis defended in Ukrainian at the Faculty of Geography of *„Ivan Franko" National University,* Lviv, Ukraine.

Crt. no.	PhD Candidates	Title of the Doctor's Degree Theses	Scientific coordinator	Year of enrollment	Year of defense	Year of publication
16	Pop Oana-Antonia	Study of liquid flows in Tur catchment area	Prof. Victor Sorocovschi, PhD	2006	2010	2012
17	Şerban Paul Răzvan	Mechanisms of enhancing spatial complexity in disadvantaged social-economic environments	Prof. Ioan Ianoş, PhD	2009	2012	-
18	Tofan George-Bogdan	Small depressions, factors and components of the humanisation of the Central Group of the Eastern Carpathians. Case study: the Northern area of the Drăgoiasa-Glodu-Bilbor-Secu-Corbu-Tulgheş depressions	Prof. Nicolae Ciangă, PhD	2009	2012	2013

As many professors from Cluj-Napoca gradually retired from teaching and scientific activities, the need to create and publish new guidebooks for students became increasingly vital. The following list contains some of the more recently published works at *„Vasile Goldiş" University Press* of Arad.

1. Ardelean, A., Mânduţ, O. (2012), *Geography of the environment*, „Vasile Goldiş" University Press, Arad.
2. Mândruţ, O. (2011), *Regional Geography. Regional Geography of Romania*, „Vasile Goldiş" University Press, Arad.
3. Mândruţ, O. (2012), *General physical and human geography*, „Vasile Goldiş" University Press, Arad.
4. Mândruţ, O. (2012), *Cartography*, „Vasile Goldiş" University Press, Arad.
5. Mândruţ, O. (2012), *Methods and techniques of analysing geographical data*, „Vasile Goldiş" University Press, Arad.
6. Mândruţ, O. (2012), *Geography of the EU*, „Vasile Goldiş" University Press, Arad.
7. Mândruţ, O., Faur, C. (2012), *Population geography*, „Vasile Goldiş" University Press, Arad.
8. Mândruţ, O., Bogdan, D. I. (2012), *World Economic Geography*, „Vasile Goldiş" University Press, Arad.
9. Mândruţ, O. (2015), *Romania. Regional geomorphology,* „Vasile Goldiş" University Press, Arad.

Without lingering on the scientific research of our esteemed professors from Cluj-Napoca (I. Mac, V. Gârbacea, N. Raboca), whose work has been well known, we would like to emphasize the endeavours of the newly tenured staff who currently work in Baia Mare.

Studies, articles and papers on relief and topography have been center stage for more than a decade, starting with a series of practical-applicative endeavours presenting the magmatic and volcanic activity cycles in Oaş Mountains, as well as applicative geomorphological research, interchain valleys, etc, which eventually led to an integrated geomorphological study of Oaş Mountains and a PhD thesis, by C. Faur, published in 2011 at the Northern University Publishing House, Baia Mare.

Another major component of Physical Geography, *Hydrology,* has been carefully studied and researched, for instance in D. N. Sanislai's doctoral thesis (2015), which covers the issue of water excess-induced risks in Someş Plain. The thesis came with a series of articles which focused on: hydric balance sheets and average annual flow on plains, hydrological warnings - crucial in flood management - and the hydrological risk map for the area, flood induced risks between 1979 and 2004, etc.

The characteristic features of *Environmental Geography*, with focus on Hydrology, were captured in a hydroecological study of the underground water systems located in the central part of the Western Plain, finished in 1994 and published in 1996, at „Vasile Goldiş" Publishing House. It was imagined as a doctoral thesis as well, by the former dean of the Faculty of Economic Sciences - „Vasile Goldiş" Western University Arad, prof. F. Dumescu, PhD. He published similar papers and articles, with the following main topics: resource geography and environmental economics, with papers published at different houses, in revised or addended editions, in 1998, 2002 and 2006; environmental impact assessment, laws and norms for environmental protection (book published in 1999 at „Servo-Sat" Arad), economic activities in natural protected areas, etc.

The second largest branch of Geography was researched by two scientists, one being G. B. Tofan (2012), with his thesis on the human component of a less studied geographical space - small innermountain depressions. His case study area is located in the northern part of the central area of the Eastern Carpathians (Drăgoiasa-Glodu-Bilbor-Secu-Borsec-Corbu-Tulgheş), and the study was later published at Cluj University Press.

The same investigator conducted two more Human Geography studies, in 2014 and 2015, one focused on the Mureş Corridor, published at the same house, and one (postdoctoral study) focused on *Electoral Geography*, entitled *Ethnicity, religion and electoral behaviour in Harghita, Covasna and Mureş Counties. Geographical study* (*2008-2014*), published at „Casa Cărţii de Ştiinţă", Cluj-Napoca. Other themes touched

by the author in his articles include: the numerical evolution of the population in the Drăgoiasa-Tulgheș depressions, geodemographic and economic disparities in the Drăgoiasa-Tulgheș depressions, aspects regarding settlement typology in small mountain depressions, the geodemographic and habitat characteristics of the Mureș Defile, gender and age group structures in Covasna, Harghita and Mureș counties, the professional structure of Romania etc.

The doctoral thesis defended in 2012, by P. R. Șerban, from Bucharest, still unpublished, is also an economic geographical study. Other valuable works focused on the evolution of spatial complexity in Romania, spatial organisation elements in Southern Bucovina, the role of agriculture in Romania's trade, causes and effects of commercial policies, role of international trade in the territorial development of the North-West Development Region, the human potential of the settlements from the Romanian Danube Valley – working population, ethnic structure etc.

One must also consider the recent studies on *Theoretical Geography*, culminating in a PhD thesis from 2010, written by D. I. Bogdan, published as *Epistemological endeavours into Geography*, "Vasile Goldiș" University Press, Arad.

Ever since 2006, as the Baia Mare branch was experiencing massive changes, all the scientific staff have begun publishing studies on *Geography of Tourism*, with emphasis on: the rehabilitation and tourism remodelling of Borsec resort, tourism potential and organisation in Mureș Defile, tourism flows in Borsec, the zoogeographical potential of the Drăgoiasa-Tulgheș depression alignment, current aspects regarding the accommodation infrastructure in Harghita, Maramureș and Mureș counties, the tourism infrastructure of the Romanian seaside, the geographical-tourism map of Borsec etc (G. B. Tofan); the tourism alternative, manner of capitalising the natural and man-made potential of Maramureș County and Tourism, an ever-expanding economic activity (C. Faur); tourism in Oaș Land - potential and future (D. N. Sanislai), as well as several unpublished student guides and courses: *International tourism, Tourism - active factor in the globalisation process, Tourism policies* etc (D. I. Bogdan).

In 2014, "Vasile Goldiș" Western University began running an annual publication entitled ***Baia Mare University Paradigms***, with N. Iuga, PhD, tenured professor of the branch, as its chief editor. This scientific journal publishes papers from different fields, including Geography. The Department of Engineering and Informatics, which currently encompasses Geography of Tourism, publishes its own journal - ***Studia Universitatis „Vasile Goldiș" Arad, Engineering and Agritourism Series***, with a national **B +** index, as well as an international index.

The third year of the History-Geography specialisation saw its first scientific conference in Baia Mare. It was the second edition of the *Rural Space and Regional Development* Conference, between the 26th and the 30th of September 2001. This meeting was organised by the Faculty of Geography from Cluj-Napoca,

specifically by *prof. V. Surd*, in partnership with „Vasile Goldiş" Western University of Arad, bringing together many specialists from Romania and abroad. Their papers were later published (2003) in a compendium at Studia Publishing House, Cluj-Napoca.

On the 27th and the 28th of May 2005, professor *I. Mac* directly coordinated the first symposium on *"Territorial Science and Development"*, with 46 guests, from the organising university and Cluj-Napoca, some being PhD students coordinated by professor Mac. All papers were published in a volume at Risoprint Publishing in Cluj-Napoca. The reputation of this symposium steadily increased year after year, reaching its 14th edition in 2018.

In 2011 (between the 3rd and the 5th of June), the Annual Conference of the Romanian Geographical Society took place, its main theme being *Geography and Human Society*, organised by the president of the Maramureş branch, *prof. Ileana Vasilescu, PhD*, in partnership with the School Inspectorate of Maramureş County and "Vasile Goldiş" Western University, Baia Mare Branch. The five sessions comprised 109 papers, mostly by Geography school teachers, as well as by young researchers from Bucharest, Cluj-Napoca, Iaşi, Oradea, Târgovişte, Târgu Mureş, Baia Mare etc. There were other, smaller scientific meetings, which focused on *Regional development, geographical space and the regionalisation process; Assessment and capitalisation of tourism in Maramureş* and *Geographical epistemology*, coordinated by professor O. Mândruţ.

Furthermore, since 1990, there has been an annual scientific session - *„Arad Academic Days"*, including a section dedicated to Geography and had a different theme every year.

5. THE MATERIAL BASE OF BAIA MARE GEOGRAPHICAL SCHOOL

As previously mentioned, the first two years (1998-1999) saw this young university extension operating in a building owned by *"Gheorghe Şincai"* National College, paying a certain amount of money as rent. However, in autumn 1999, the branch moved to a larger, more central space, one that would provide proper conditions for education and research. The building was once occupied by the Maramureş County Planning Center, but in 2002 it was purchased by „Vasile Goldiş" Western University. The infrastructure of the university branch has two components: spaces for courses and seminars, as well as reading rooms, and its library (including books, studies, plans etc).

The branch is located on 5 Culturii Street, in a structure composed of: ***Building A***, six stories high, with seven lecture halls, with a capacity between 30 and 40 seats. The fourth floor houses three rooms for the Geography of Tourism specialisation (room 401, Human Geography; room 402, Physical Geography, and room 403, Applied Tourism).

Fig. 2. Headquarters of „Vasile Goldiș" University Arad,
Baia Mare Branch, 5 Culturii Street.

The library is located here as well, alongside two reading rooms, while the fifth floor has three multimedia labs, with 60 computers. There is also a room for equipment storage. ***Building B*** has four levels and contains *"Dorel Chereches" Amphitheater* (120 seats), a center for scientific research, meeting room and the secretariat, while ***Building C*** hosts the *"Aris" Grand Hall* (160 seats), *"Vasile Goldiș" lecture hall* (60 seats), a teachers lounge, the archives and the garages, adding to a total surface area of 3,800 square meters.

The second component is represented by the massive library of the university branch, located on the fourth floor, with a total number of 10,882 books and studies, 1,002 of which filed under Geography.

6. CONCLUSIONS

During its two decades of existence (1998-2018), the geographical tertiary education system of Baia Mare experienced an interesting evolution, with the following high points:

- accreditation of three geographical specialisations: *History-Geography* (1998-2005), *Geography* (2005-2007) and *Geography of Tourism* (2006-present);

- in terms of the number of enrolled students in each specialisation, Geography of Tourism has the highest enrollment percentage (52.8% of total of 1770 students), peaking at *105 students* in 2009-2010 and hitting its *lowest number* in 2017-2018 (42 students) (values for the entire three-year cycle), followed by History-Geography (44.8%) and Geography (2.4%);

- the dynamic of the number of enrolled students and graduates is as follows: 222 enrolled students in the first year of study and 179 graduates in History-Geography; 18 enrolled students and 12 graduates in Geography; 385 students and 256 de graduates in Geography of Tourism;

- the main student catchment areas are: Baia Mare, Satu Mare, Baia Sprie, Borşa, Târgu Lăpuş, Ocna Şugatag, Satulung, Valea Chioarului etc;

- in terms of professional insertion, a large segment of History-Geography and Geography graduates are employed as primary and secondary school teachers, while some are working at the „*Romanian Waters" National Administration - Maramureş Water Administration*; others found jobs at different levels of government or in private cartography, topography and land survey companies; many Tourism graduates work in hotels or travel agencies, in Romania or abroad;

- there are currently *six tenured instructors* (F. Dumescu, who mostly teaches Geography for students of Economic Sciences, C. Faur, D. I. Bogdan,. D. N. Sanislai, P. R. Şerban and G. B. Tofan) and *two visiting professors* (O. Mândruţ and C. Vert); they focus on the academic fields of *Physical Geography* (Geomorphology, Hydrology, Environmental Sciences), as well as on those of *Human Geography* (Population and Settlement Geography, Geography of Tourism, Political Geography); some concentrated their efforts on *didactics* (O. Mândruţ), publishing school books, university courses, atlases, compendiums and methodological guides etc.

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BUSINESS DISCOURSE STUDIES IN THE 'NEW' AND 'FAST' CAPITALISM: APPROACHES AND INVESTIGATION METHODS

SILVIA BLANCA IRIMIEA[1]

ABSTRACT. – Business Discourse Studies in 'New' and 'Fast' Capitalism: Approaches and Investigation Methods. The complex and changing linguistic context cannot be confined or constrained to a single approach or theory. It is, thus, the purpose of the present article to argue in favour of the fluidity, flexibility, dynamic and variable background against which new tenets for business discourse have emerged. To build a case for the present evolution of research in *business* d*iscourse studies,* the present article examines such issues as the blurred lines between business discourse and other sub-branches (such as workplace discourse, institutional discourse, organizational discourse, etc.), the diverging sociological underpinnings of these studies and the methods used in the related research in an attempt to highlight the difficult and sinuous development of business discourse research. The paper seeks to underline the variability of the approaches and the research methods proposed by six discourse analysts in their writings, while pointing out their consensual basis. The discussed articles are: Norman Fairclough (2004) 'Critical Discourse Analysis in Researching Language in the New Capitalism: Overdetermination, Transdisciplinarity, and Textual Analysis'; Iedema, R. and Scheeres, H. (2009) 'Organisational discourse analysis'; Francesca Bargiela-Chiappini and Catherine Nickerson (2002) 'Business discourse: old debates, new horizons'*;* Daniushina, V. Yulia (2010) 'Business linguistics and business discourse'.

Keywords: *business discourse, texturing, discourse dialectics, affect-based discourse practices, business linguistics.*

1. INTRODUCTION

Discourse studies have known an upsurge in the 1990s, when, from the range of specialized languages, some distinct branches, such as professional discourse, workplace discourse, organizational discourse and institutional discourse

[1] "*Babeș-Bolyai" University, Faculty of Geography, Center for Tourism Training, 400006 Cluj-Napoca, Romania, s_irimiea@yahoo.com*

emerged and developed. Very quickly, each form of discourse attracted its supporters, who tried to define, set disciplinary boundaries, find characteristics and suitable research methods for the new areas of inquiry. All these areas created a background for ongoing debates about the methodological approaches that could characterize each field, while each has been permanently and substantively challenged by a plethora of changes and innovations that have major implications for organizations, employees and their use of language. The changes refer to new technologies, new products, product lines, services, which, in turn, affect organizational behavior, managerial, professional and occupational tasks, the individual and his relation to other employees. The proponents of organizational discourse have discussed these changes in terms of a rise in 'knowledge work' (Drucker 1993) or work that centres on the production, sharing and use of data and information in an informationalized and globalized economy.

In addition, these research grounds have developed from their corresponding communication areas (professional communication, organizational communication, institutional communication, etc.), but, at the same time, have preserved their close kinship with related discipline areas, such as special or *specialized languages, English for specific purposes,* etc.

The 1990s have also heralded a new turn in discourse investigations, as scholarship mobilized their efforts to understand the social underpinnings of discourse, its creation and use in society. Discourse analysts have thus oriented their investigations towards individuals, identities, social practices, communities of practice (such as workplaces, institutions, organizations), the relationships among members of given communities in an attempt to find out how discourse shapes all these social processes and reversibly, how they impact on language use. Within this sociolinguistic context, Critical Discourse Analysis and Systemic Functional Linguistics took to research in this direction. Following these premises and within this context, discourse analysts looked for the right sociological theories to anchor their linguistic assumptions in. Critical discourse analysts, represented by Fairclough (2004) embraced Bourdieu's structuralist theory and applied it to discourse analysis.

Another remarkable phenomenon, which continues to influence the production and use of discourse is *hybridization*. Hybridization has been a linguistic phenomenon for a long time, also noticed in the production of texts and in text functions. Fairclough notes that text properties 'hybridize discourses in constituting discourses', that they 'hybridize genres in constituting genres and hybridize styles (in the sense of ways of being, i.e. identities, in their language aspect) in constituting styles'(2004: 112).

Fairclough (2004) speaks about 'interdiscursivity', while Meurer (2004) proposes the notion of 'intercontextuality', notions which point to a *fluid, flexible, dynamic* and highly *variable* linguistic context/environment which cannot be confined or constrained to a single discourse sample, approach or theory. It is, thus, the purpose of the present article to argue in favour of the fluid, flexibile, dynamic and variable background against which new discourses are generated and new tenets for business discourse have emerged. To build a case for the present evolution of research in *business* d*iscourse studies,* the present article examines such issues as the blurred lines between business discourse and other sub-branches (such as workplace discourse, institutional discourse, organizational discourse, etc.), the diverging sociological underpinnings of these studies and the methods used in the related research, and, finally, to highlight the difficult and sinuous development of business discourse research. The paper seeks to underline the variability of the approaches and research methods proposed by analysts while hinting for a consensual, joint perspective on the issue (Bargiela-Chiappini, Nickerson, 2002). To prove these points, the present paper discusses four articles on business discourse: Norman Fairclough's *Critical Discourse Analysis in Researching Language in the New Capitalism*: *Overdetermination, Transdisciplinarity, and Textual Analysis* (2004), Rick Iedema and Hermine Scheeres's *Organisational discourse analysis (*2009), Francesca Bargiela-Chiappini and Catherine Nickerson's *Business discourse: old debates, new horizons* (2002) and Yulia V. Daniushina's article *Business linguistics and business discourse* (2010). At the same time, the article seeks to reconcile divergences and convergences.

2. BACKGROUND

In their study, Drew and Heritage (1997) set out some criteria by which they distinguished workplace discourse from other forms of discourse occurring in other settings. In order to isolate the criteria they compared 'institutional discourse' with casual or ordinary conversations. The identified features include: (1) a perceivable 'goal orientation', where at least one participant is oriented towards achieving a goal, a task, or a purpose in relation to an institution; (2) 'constraints on allowable contributions', by which it is meant that the discourse must be appropriate to a particular situation in an institutional setting; (3) the use of 'inferential frameworks', that is the use of 'frameworks' to interpret discourses; (4) asymmetry (Heritage, 1997) in the use of discourse, a feature which indicates that the distribution of power and knowledge among the participants in interactions is unequal and that one of the participants will be in control, given the institutional status or position (for example, this is the case of interactions between professionals and lay people, such as doctor-patient interactions); (5) institutional discourse reflects and negotiates identities.

Koester (2010) agrees that beside 'workplace discourse' there are other related terms used by researchers, such as 'institutional discourse', 'professional discourse' and 'business discourse'. He tries to shed some light on the use of the terms and sets out to differentiate them. Koester admits that both 'workplace discourse' and 'institutional discourse' are rather general terms and that they are 'often used interchangeably in the literature' (2010: 18). According to Drew and Heritage (1992: 3) institutional talk is task oriented, where 'at least one participant represents a formal organization'. According to Koester, interactional talk can also stand for a workplace discourse.

On the other hand, compared to 'workplace discourse' and 'institutional discourse', both 'professional discourse' and 'business discourse' seem to be more specific. While workplace discourse seems to cross 'all areas of occupational settings, only some of these involve business discourse' (Koester, 2010: 18). This comparison makes workplace discourse a higher category of discourse than its 'business' alternative. Koester (Idem.) defines *business discourse* as 'a specific kind of workplace discourse occurring in the commercial sector'. Business discourse was defined by Bargiela-Chiappi (2007: 3) as 'a social action in business contexts' which embraces 'how people communicate using talk and writing in commercial organizations'. Assumingly, there are two approaches to what is termed 'business discourse': a narrower approach views it as company-to-company communication or communication between suppliers and customers, which, in turn, would be materialized in commercial correspondence and business negotiation. According to Koester, 'the broader view would include company internal communication as part of business discourse. Interactions between colleagues in private sector organizations have a great deal in common with interactions among co-workers in white collar workplaces in the public or semi-public sector'(2010: 18-19). Most of the researches and corpora regarding business discourse are based on recordings of company internal meetings, on job interviews and office talk.

Although institutional discourse is often used for workplace discourse and the separating features seem rather vague, Sarangi and Roberts (1999: 15-19) propose a clarification of the term 'institutional discourse' as compared to 'professional discourse' (Gunnarson, 2009). They suggest that the definitions of the two concepts derive very easily from the everyday meaning that the terms 'professional' and 'institutional' are used for. 'Professional' refers to 'a member of a vocational group' who possesses certain skills and knowledge that enable him to perform the job activities and duties. Thus, 'professional discourse' is a discourse constructed by professionals who have duties and responsibilities. In contrast, an 'institution' is associated with 'systems, regulations and the exercise of authority' (Koester, 2010), consequently, 'institutional discourse' is made up by genres constructed, to control activities and how they are carried out.

The divergent views on the discourses that can be brought under the broad category of discourse have been continued by analysts in divergent directions. In the next subsection we shall discuss four views which stand for four diverging directions in the investigation of busienss discourse. The first perspective is Fairclough's (2004), an interdiscursive-bound reflective and conceptual analysis anchored in the dialectics of discourse aimed at revealing the sociological underpinnings of the use of discourse amid the new era called by him 'New capitalism'.

The second view is based on a different investigation carried out by Iedema and Scheeres (2009), who have approached the economic and social changes and their impact on the workers, on their workplace activity and on their own self-development. They propose new ways of understanding and exploring the employees' experiences and the new practices they are exposed to. They notice that *emotion* and *knowledge* express the employees' conduct as resulting from existing discourse practices (2009). Going out from the changes brought about by the 21st century, Iedema and Scheers discuss the implications they bear on discourse research in business. The view that discourse practices are more affect based indicates that researchers should focus on how business is conducted, on the experiences of those involved, on how the changes affect people or employees and how they evolve.

The third study deals with the call for a new multi-disciplinary research and multi-method research paradigm for business discourse put forward by Bargiela-Chiappini and Nickerson (2002). They trace the development of business discourse as lying in the overarching field of business communication and recognize the contribution of sociolinguistics in the study of discourse.

The fourth stance discussed in the present paper is I. L. Daniushina's (2010) proposal to push 'business linguistics' as a new branch of applied linguistics into scholarly use. In her article, 'Daniushina builds her argument on the origins of business communication/discourse, on the vast research focused on business discourse, on its evolution, as well as on the methods that can be used for further explorations.

Despite the differences that distinguish the four articles, they all reflect present tendencies that characterize business discourse investigations in the first decade and the beginning of the second decade of the 21st century. In this respect, the present paper seeks to show the divergence of views and research directions, which instead of pursuing the same directions in-depth or clarifying some underlying concepts, open up and propose new directions for research. Would then, in this changing world threatened by permanent shifts, the call for a collaborative research that brings together organizational communication, critical discourse analysis, organizational ethnography and sociolinguistics be possible?

3. CHALLENGES OF BUSINESS DISCOURSE IN THE 'NEW' AND 'FAST' CAPITALISM' AND PROPOSED METHODS FOR ITS INVESTIGATION

3.1. Fairclough's 'new capitalism' approach and his methods of investigating discourse (2004)

Anchored in the Critical Discourse Analysis tradition, Norman Fairclough (*Critical Discourse Analysis in Researching Language in the New Capitalism*: *Overdetermination, Transdisciplinarity, and Textual Analysis*, 2004) takes a broader outlook on world events and defines the new era as 'new capitalism', a label he uses to refer to 'the most recent of a historical series of radical restructurings through which capitalism has maintained its fundamental continuity' (Jessop 2000). The designations assigned to the new world define it from different research angles. Fairclough became one of the most influential proponents of business and organizational discourse analysis writing on social and organizational change in the late 1980s. He linked discursive change to these changes, while insisting on the trends in business-employee relationships.

Fairclough continued his investigations into the socioeconomic changes by means of language. In the first decade of the 21st century, while focusing on the role of language in expressing these social and economic changes, Fairclough (2004) also states that discourse analysis can provide insightful contributions to understanding the transformations of the new capitalism. Fairclough and the group of social researchers claim that the new economic order is discourse-driven. He further suggestes that 'it is not only text and interactional analysis that discourse analysts can bring to social research on the new capitalism, it is also the theorization of the dialectics of discourse' (2004:105). Fairclough uses Jessop's (2000) dialectical 'changes in the networking of social practices' which contribute to restructuring and rescaling of discourse, of 'orders of discourse' in general. He defines the 'restructuring of orders of discourse' as a 'matter of shifting relations, i.e. changes in networking, between the discourse elements of different (networks of) social practices' (2004:105). To explain the process of restructuring of orders of discourse, Fairclough provides the example of the process by which the language of management 'has colonialized public institutions and organizations such as universities', insisting that the process involves a 'colonization/appropriation dialectic', which relies on 'diverse ways in which the discourses are received, appropriated and recontextualized in different locales, and the ultimately unpredictable outcomes of this process'(2004:105). By 'the re-scaling of orders of discourse' Fairclough means 'the changes in the networking of discourse elements of social practices on different scales of social organization-global, regional, national and local' and illustrates the process through the

permeability of local social practices in countries across the world to dominant discourses which are spread and disseminated through international or global organizations, such as the International Monetary Fund (IMF) and the World Bank. Given these prerequisites, Fairclough states that 'Working the above account of the transformation of capitalism into a dialectical theory of discourse provides a theoretical framework for researching the global penetrative power of the "new planetary vulgate", which Bourdieu and Wacquant (2001) allude to, as well as its limits'(Idem.)

Indeed, Bourdieu and Wacquant (2001:3) speak about a 'new planetary vulgate', which they view as a 'vocabulary ("globalization", "flexibility", "governance", "employability", "exclusion" and so forth), which is endowed with the "performative power" to bring into being the very realities it claims to describe'. Starting from such assumptions, Fairclough pursues a sociological approach to discourse addressing several questions to the research community:

> 'How does this discourse come to be internalized (Harvey, 1996) in social practices, and under what conditions does it construct and reconstruct (rather than merely construe) social practices including their non-discoursal elements? How does it come to be enacted in ways of acting and interacting, e.g. organizational routines and procedures including genres, and inculcated in the ways of being, i.e. the identities of social agents? How does it come to be materialized in the 'hardware' of institutions and organizations? Researching this crucial issue requires detailed investigation of organizational and institutional change on a comparative basis, such as the study of Salskov-Iversen et al. (2000) of the contrastive colonization/appropriation of the new "public management" discourse by local authorities in Britain and Mexico, but working with the sort of dialectical theory of discourse I sketch out below.'(2004:105).

Fairclough applies his views to Tony Blair's text/discourse analysis. In order to show the social underpinnings of social and political discourses in the new capitalism he undertakes an analysis of the dialectics of discourse, an interdiscursive analysis of Tony Blair's 'Foreword' to a UK Department of Trade and Industry White Paper, 'Our Competitive Future: Building the Knowledge Economy' text in the CDA tradition. His analysis turns out as an extremely complex one which valorizes a few of Fairclough's concepts. Fairclough uses the concept of *texturing* and *retexturing* to focus on the way in which the global and the national and the relationship between them are constructed. To this end, Blair is 'writing about, and texturing, a relationship between the modern world' (more specifically the "new global economy" […] and Britain' (2004:106). While analyzing the representation of both global and national space-times relationships, Fairclough insists on the relationship between the semantic use of elements and their grammatical realization.

Yet another highlight of Fairclough's analysis is his use of the notion of *interdiscursivity* (2004). He shows how different equivalent words, 'which come from different discourses that are historically associated with different domains of social life', such as education and learning, crafts and trades, and art, are textured or retextured into new discourses. While creating new discourses, some differences between prior discourses are 'subverted', so that this 'subversion of the difference between prior discourses is constitutive in the making of a new discourse' (Faircough, 2004: 111). Fairclough assumes that 'at some level of analysis, the relations textured by texts constitute discourses in relation to (and potentially, in subversive relation to) other discourses' and argues that the relations of equivalence in a text, 'hybridize discourses in constituting discourses' (Idem.). Fairclough further states that 'This is only one aspect of other, more general processes: they hybridize genres in constituting genres and hybridize styles (in the sense of ways of being, i.e. identities, in their language aspect) in constituting styles' and that 'This is an aspect of the multifunctional character of texts'. Consequently, Fairclough admits that the simultaneous representational, actional and identificatory functions of texts expressed or mediated by their linguistic features, are present 'interdiscursively' at the level of discourses, genres and styles. Furthermore, in CDA, he opinionates, 'interdiscursive analysis of texts is the mediating level of analysis which is crucial to integrating social and linguistic analyses', a remark he made earlier in his research (Fairclough 1992; Chouliaraki and Fairclough, 1999).

Without pursuing Fairclough's views and analyses of the dialectics of discourse further, we contend to having pointed out a few of his instantiations of these theories which are opening up new areas of sociolinguistic investigation.

3.2. The rise of 'knowledge work' and affect-driven business discourse in the 'fast' capitalism (Iedema and Scheeres, 2009)

Other scholars have turned to cognition-related aspects of language behavior. In their article titled *Organisational discourse analysis (*2009) Iedema and Scheeres focused their attention on knowledge creation and have noticed that it has become a phenomenon which leads to faster rates of organizational development and production redesign, which, in turn, stimulated by new technology, results in new knowledge creation. They have termed this development 'fast capitalism' to show 'the rapidity with which these dynamics are played out'. Iedema and Scheeres (2009: 81) have approached these changes and their impact on the workers, on their workplace activity and on their own self-development, admitting that 'the impact on workers is that they spend more effort and time

rethinking work processes and on building relationships. They quote Barley and Kunda (2001:77), who suggest that 'even factory workers are said to require interpersonal and decision-making skills previously reserved only for managers'(Idem.).

This is the framework for a new organizational discourse which relies on the contribution of employees rather than on that of the decision makers or managers. Second, this change has resulted in a considerable emphasis placed on the emotional skills of employees at work. This sociolinguistic pursuit has revealed that such new business practices can produce two effects: on the one hand, they may boost personal achievement and pride, but, on the other, they can generate stress, frustration, anxiety, etc. because of the emotional consequences linked with producing benefits for other people (Iedema and Scheers, 2004). Iedema and Scheers hold the view that workers are expected to 'invent new ways of being, doing and saying as part of how they work together' (2009:87). Ignoring the shortcomings of such an approach, Iedema and Scheers propose new ways of understanding and exploring the employees' experiences and the new practices they are exposed to. They suggest that *emotion* and *knowledge* express the employees' conduct as subservient to existing discourse practices and hence reflect 'reactive and cumulative behaviours, not innovative and self-motivating ones', while affect 'helps broaden our appreciation of human vitality, creativity and interestedness (Matssumi 2002; Thrift 2004a)'. Affect also 'shifts our attention to the unusual and the unexpected, whether that manifests as creativity, innovation, surprise, excitement or intensity.'(2009:87)

Going out from these assumptions, Iedema and Scheers discuss the implications they bear on discourse research in business. The view that discourse practices are more *affect based* indicates that researchers should focus on how business is conducted, the experiences of those involved, on how the changes affect people or employees and how they evolve (2009).

Iedema and Scheers (2009) also admit that, if, in the past, researchers used an analytical approach based on the collection of pieces of textual evidence and on theory-oriented conclusions 'from a distance', this approach proves insufficient and one-sided for the research of the complexities of the world, as they are 'not sensitive to local complexities' and 'insufficiently informative for non-discourse analysts'. Consequently, they consider that 'combining discourse analytic methods with ethnography will afford more immediate feedback, exchange and interpersonal relationships, much of which is affection-based'. They suggest that 'a discourse ethnographic approach is therefore potentially productive of alternative realities, as a result of the relationships it creates and works with' (Iedema et al. 2006a).

Such an approach has implications to teaching and training. Thus, the traditional teaching paradigm which sought to train the personnel into adopting the conventional models of communication or complying with rules and principles and acting upon established emotional frames and cognitive schemas should be replaced by new ways of teaching the worker deal with workplace challenges that require 'inspiration, enthusiasm and intensity of participation' (Iedema and Scheeres, 2009: 89). Considering these shifts, Iedema and Scheeres conclude that teaching must necessarily focus of teaching adaptation strategies to change, 'teaching change is teaching affect' (Idem.) They further explain that this 'means that curricula, in focusing on emerging discourses and practices, need also to address the personal implications for workers of these developments' and continue that

> 'Education, teaching and learning in contemporary business are therefore not about enabling employees to settle on new if rather different identities. Instead, what emerging pedagogic methods need to encompass is how employees can be enabled to distance themselves from identity per se through recognition that identity cannot be "natural and necessary". This, in turn, involves reconfiguring who people consider themselves to be, and accepting that what they do with ease is no longer a legitimation for who to be, how to speak, or how to do their work' (Idem.).

3.3. The call for a new multi-disciplinary research and multi-method research paradigm for business discourse (Bargiela-Chiappini and Nickerson, 2002)

The first decade of the 21 century stimulated both a clarification and a look back at the evolution of business discourse studies. In this respect, Bargiela-Chiappini and Nickerson (2002) provide a convincing definition and an account of business discourse. According to them business discourse is 'a web of negotiated textualisations, constructed by social actors as they go about their daily activities in pursuit of organizational and personal goals.' Thus, they conclude that it is 'language in action'. Bargiela-Chiappini and Nickerson recognize that sociolinguistics has stepped in to investigate the relationship between practice and social theory, in a similar way in which they themselves proposed the 'integration of social constructionism and structuration theory in the discourse-based interpretation of business writing' (2002:2). They review the field of 'business communication', the overarching field which is the host of business discourse, and agree that its development is heavily indebted to United States

researchers, who tried to set disciplinary boundaries to the field and define its status. They note that 'in some quarters, the strong vocational orientation of business communication as a "practical science" is defended, but contrasted with management communication and English composition (Reinsch, 1996:35)' (Idem). Other researchers and practitioners settled the controversy over the disciplinary boundaries to business communication by assigning to it an equal status alongside management, corporate and organizational communication, each of which, they admit, deserve a 'distinctive emphasis' (2002:2). Bargiela-Chiappini and Nickerson (2002:2), quoting Rivers (1994) further recognize a third position that accepts the view that business communication has been focused on 'the written mode and the proliferation of topics and borrowings from many disciplines'. While taking a look at the European continent, Bargiela-Chiappini and Nickerson (2002) quote the scholars who addressed business communication, i.e. Yli-Yokipii, 1994; Chares, 1996; Charles and Charles, 1999, etc. However, a significant opinion expressed by Bargiela-Chiappini and Nickerson (2002) is that beside the two traditional schools (North American and European) which discuss the present and future of business communication and business discourse, a third contribution should be coming from less heard voices representing other countries.

In spite of the lack of explicit focus on business discourse and its more general integration into the wider web of business communication, Bargiela-Chiappini and Nickerson (2002) acknowledge the place held by business discourse: 'The label of "business communication" seems to us best understood as an overarching category encompassing the whole field of communication studies in business settings, therefore, subsuming organizational and management communication, and *discourse* approaches (Murphy, 1998; see also Rogers, 2001)'(Idem). They stress the need to re-order related disciplines, a re-ordering which must not be regarded as a the limitation or 'rejection of the valuable individual contributions that each can make to an improved understanding of the nature and role of communication in professional and corporate settings,' but rather as an acknowledgement of the complexities and interrelated nature' of the discipline (Idem.). Hence they call for a 'dialog and possible cross-fertilization between disciplines', a *convergence* of studies that may contribute to a redefinition of status and boundaries.

While insisting on a multi-disciplinary approach to business communication, they also propose a new methodological shift, a shift from the less efficient quantitative research method to a more qualitative approach, such as the *interpretative ethnography* approach advocated by Smart (1998). Bargiela-Chiappini and Nickerson (2002:3) opinionate that 'this would enable the discipline to overcome an earlier criticism of being micro-analytical and skill-oriented,

and it would open it up to insights from the "feeding disciplines" such as rhetoric, sociology, psychology and linguistics, as well as to an appreciation of the influence of situational and contextual factors (Shaw, 1993)'. They admit that the methodological approaches used in the 1990s, including conversation analysis, pragmatics, corpus linguistics, genre analysis, rhetorical analysis, social constructionism, etc. represent a good start for a move on to other, more appropriate ones. With this end in view, they recommend a *multi-disciplinary* investigation of business discourse, stating that 'business discourse must progress towards "partnership research", a method shared by researchers working in related disciplines. In support of the proposed 'partnership approach' they argue that it 'offers the opportunity to work towards a certain degree of methodological and theoretical consolidation or convergence, without which interdisciplinarity will remain elusive'(Idem.). They call for a collaborative research that brings together organizational communication (Jablin and Putman, 2001), critical discourse analysis (Wodak and Meyer, 2001), organizational ethnography (Weber, 2001) and sociolinguistics (Coupland et al, 2001). They place discourse in contrast to 'professional language', which originated from LSP or ESP, arguing that business discourse represents an attempt to 'recontextualize' discourse within the framework of related disciplines, between praxis and social theory, and reconcile specific investigation methods (Bargiela-Chiappini and Nickerson, 2002).

On the basis of these prerequisites, Bargiela-Chiappini and Nickerson propose a model that 'incorporates insights from genre and discourse analysis, intercultural communication and organizational theory into a context-sensitive analytical framework for the study of discourse in corporate settings' (2002:5). Their framework combines three hierarchical analytical levels (a *macro* level representing national and regional cultures and generic discourses, a *meso* level standing for the organizational culture, business type etc. responsible for shaping up generic discourses, and a *micro* or *interactional level*, where socio-psychological profiles and interactional preferences are expressed through pragma-linguistic features). The authors explain that the approach to business discourse applied 'aims to be: (1) *integrated* in its multi-level ordering of expandable interplay factors, and (2) *integrative* in its projected outcomes, which include dialogue between research and teaching/training needs, and between theoretical advances and practical applications'(2002:6). The breadth of the framework, which incorporates the elements that the authors consider relevant, reflects the 'embeddedness' of business discourse in a 'wider context than the immediate one surrounding the specific interaction' and 'sensitiveness to other factors such as corporate culture, multilingual communication, organizational power and control, etc.'(Idem.)

At the same time, Bargiela-Chiappini and Nickerson (2002:5) remark the sociological aspects embedded in the use of discourse:

> 'the social nature of language at work is exemplified in business writing practices, both as processes and as products. Writing in business contexts is often, generically speaking, *hybrid*, in that many texts display signs of *intertextuality* and *interdiscursivity,* collective, in that texts are often the products of a multiple authorship process; structure-dependent and structure-shaping, in that writing always takes place in a cultural and historic context by which it is influenced and which, in turn, it influences'. (1999a:18) (our Italics)

3.4. Business linguistics and business discourse (Daniushina, 2010)

Some authors went further with their insights proposing new linguistic paths for the investigation of business discourse. Daniushina (2010) recommends that a new branch of Applied Linguistics be established, *Business Linguistics*, which she describes as 'a multidisciplinary synergic field for researching the use of language and communication in business'(2010:241). Daniushina argues that, in the age of high technological progress, scholars interact more substantively, crossing borders and giving rise to fertilized disciplines which appear in the zones of contact between sciences. She states that these emerging disciplines can improve interdisciplinary interaction. Daniushina (2010) gives some examples of the proliferation of cross-border disciplines that arose in, what she cautiously calls, the 'study of languages', thereby naming: medialinguistics (Dobrosklonskaya, 2008; Wyss, 2008), political linguistics (Bell, 1975, Zatusevski, 2001: Ellis, 2004; Chudinov, 2008; Political linguistics Conference, 2009), judicial (or legal or forensic) linguistics (Nerhot, 1991; Kniffka, 1996, Gibbons, 2003; Olson, 2004; Mattia, 2006) and ethno-linguistics (Kindlell and Lewis, 2000). To the range of emerging disciplines we add Irimiea's (2005) launching the sub-brunch of *vocational linguistics*, based on the rise of vocational disciplines and EU training programmes. Daniushina continues the list of developing disciplines naming environment linguistics (Wang, 2008), medical linguistics (Bruzzi, 2006; Aronson, 2007), military linguistics (Kruzel, 2008) and sports linguistics (Soccerlingua, 2005, Sports linguistics, 2007). The simple deploy of these disciplines recently pushed into the general study of discourse studies shows that they mushroomed in the close neighborhood of *special* or *specialized languages*. Heading from these assumptions, Daniushina sustains that *business* 'is no less important a sphere of human activity', a sphere which concerns everyone. In order to sustain her point of view, Daniushina (2010) puts forward the following arguments:

first, she points out that the 'sublanguages of business and business communication have their specific properties which require specific linguistic examination. Second, business texts possess distinctive features and perform different functions. The specific characteristics associated with business are: 'communicative, pragmatic, lexical, syntactical, textual, compositional, visual-graphic, normative, genre-stylistic, etc.

Once Daniushina has proven that the features of business discourse are different from those of other sublanguages, she sets out to find adequate research methods and a 'scientific apparatus'(2010). Since any discipline should provide a definition, Daniushina describes business linguistics as 'a field that explores the specific functioning of language in a business context, investigates the use of language resources in business activities, and studies verbal and para-verbal aspects of business communication'(2010:241). According to Daniushina, it relies on a *multidisciplinary approach* and a wide spectrum of areas, which include:

- business discourse, organizational, corporate and managerial communication;
- oral, written and technically mediated communication in business, its typology and genre classification;
- professional sublanguages of business sectors (those of banking, trading, accounting, manufacturing, administration, etc.);
- languages of advertising and marketing, public relations;
- lingua-pragmatics in a business context and business rhetoric;
- documentation (document) linguistics: business correspondence and drafting contracts;
- instructional and academic language of business, economics and management, etc;
- business lexicography;
- language of the business media;
- intercultural business communication (including teaching/learning foreign languages for business purposes, as well as language in the workplace in multinationals and language assessment).'(2010: 242)

Daniushina establishes the origin of business linguistics in the interplay of sociolinguistics, psycholinguistics, text linguistics, functional styles, pragmatics, discourse studies, cognitive and communication theory, theory of organization, organizational psychology, and organizational communication, management studies, and applied research of teaching and learning LSP. On the other hand, it will interact with media linguistics, judicial linguistics, political linguistics,

etc. One of the main concerns of business linguistics would be to develop theories and practical methods of teaching and learning foreign languages for business purposes. The subject of business linguistics, according to Daniushina, should be 'the study of language functioning in business and the linguistic component of business communication' (Idem.).

While the *methodology* can easily be determined to be relying on the 'traditional methods of discourse and text *analysis* and, conversation analysis, empirical-descriptive and comparative techniques, cognitive, pragmatic and genre-style analysis, etc.' (Idem.), the terminology and the scientific apparatus 'are still under construction'. However, she agrees that terminology and the scientific apparatus 'could be built on the basis of those of the above-mentioned sister disciplines' (Idem.).

Daniushina considers that establishing the new territory of *business discourse* is a legitimate proposal that follows the development of several disciplines in the western business culture focused on the study of business discourse and the business sublanguage (Idem.) in the 1980s. At the same time, Eastern Europe and the countries of the so-called 'emerging economies' have also been exposed to technological development, to the demands of new business, of new relationships and new business ideologies. Daniushina winds up her case for the acceptance and adoption of the new discipline as a research discipline arguing: 'its time to introduce this concept and accept Business Linguistics as a full sub-discipline, a separate complex branch within the framework of Applied Linguistics' (2010: 243).

Business linguistics should centre around business discourse, which, according to Daniushina, was first mentioned, among others, by Johns (1986). Inspired by the concepts of discourse provided by vsn Dijk (2007), Fairclough (2001) and Wodak and Chilton (2005), Daniushina defines business discourse as 'the verbalization of business mentality, realized in the form of an open multitude of thematically correlated texts on a wide range of business issues, considered in a combination with their extra-linguistic contexts' (2010:244). The broad concept of business discourse integrates 'thematic subspecies', such as: economic discourse, corporate discourse, etc.

Daniushina (2010) states that business discourse in various forms has been studied widely by a plethora of researchers, who carried out investigations into: organizational communication and business discourse, the culture of corporate discourse, transactional and communication models, stylistic and semantic aspects of business communication in the form of genre analysis of written business discourse such as business correspondence (Louhiala-Salmien, 2002; Garzone, 2005; Gotti and Gillaerts, 2005; Gimenez, 2006), while the semantics of business English was investigated by Nelson (2006). At the same time, intercultural business

discourse and communication in many national languages were discussed by L. Beamer, I. Varner, M.Al-Ali, E. Lavric, L. Yeung and others. Varner (2000), for example, presented the theoretical model of intercultural communication, Kameda (2005) compares English and Japanese business communication, Ponchini (2004) deals with discursive strategies for multicultural business meetings, etc. By far, the most comprehensive treatment of business discourse is that undertaken by Bargiela-Chiappini et al. in *Business Discourse* (2007).

Daniushina warns that, if business discourse would be functionally sub-classified into types of discourse, they would be 'often transitional and mutually overlapping with other discursive fields'(Idem.). The list of sub-categories would include: training and academic business discourse (performing an educational function), ritual-public business discourse (based on meetings, reports, speeches, presentations, PR and advertising materials- with an argumentative-persuasive function), document business discourse (internal and external correspondence, corporate documents, regulations and charters of companies, articles of incorporation- mainly written discourse, with a regulative function), the discourse of business media (performing an informative-polemic function), the discourse of professional business communication (mainly oral, and which includes: negotiations, client –professional interactions, peer interactions, performing an instrumental-persuasive function).

Business discourse should include not only the traditional forms (written and oral), but should embrace the emerging web-type discourse, with its new technical and linguistic features.

Despite the vast amount of writings on business discourse, most of them were aimed at providing students and practitioners with means and techniques that could enhance a better understanding and use of the principles of effective communication. Hence, they combined descriptive and prescriptive purposes.

According to Daniushina, researchers may use a wide range of data or material, nevertheless, adapted to the research purpose. They may include experimental, simulated materials, authentic materials or their combination. Insofar as the methods of investigation are concerned, Daniushina suggests that 'a combination of quantitative and qualitative analysis techniques is most typical, including methods of corpus linguistics with statistical data processing', but also admits that 'case studies' are also well represented especially when 'combined with critical analysis' such as in the case of Livesey's (2002) writings on corporate discourse.

All in all, after having discussed the evolution of business studies, mostly centred on business discourse and communication studies, and providing sound reasons for the acceptance of business linguistics as a legitimate subfield of Applied Linguistics, Daniushina (2010) proposes its 'de jure' acceptance.

4. DIVERGENCE VERSUS CONVERGENCE

Without doubt, business discourse studies have come a long way since business discourse was first mentioned in scholarly writings in the 1980s. The recognition of business discourse as a research area has attracted many linguists in search for more challenging and less investigated areas in the vicinity of ESP, EFL, etc., but within the welcoming and prosperous field of applied linguistics.

Business discourse mushroomed in the close neighbourhood of other communication-related sub-branches of applied linguistics, such as 'professional discourse", 'institutional discourse', and gradually came to be defined as a sustainable area of linguistic pursuit. Throughout its identity-creating process, linguists tried to identify its disciplinary boundaries and status, find or import appropriate research methods and, finally, anchor it in valid communication or sociopolitical theories. In this respect, business discourse followed in the footsteps of applied linguistic studies.

The growth to maturity of business discourse as well as the emphasis placed on the field is also proven by the increasing number of associations and research traditions that have emerged in the last decades. (for example, the Association for Business Communication, the European Association for Business Communication, the International Association of Business communicators, American Communication Society, Global Association of Women in Communication, etc.). In addition, the number of publications and books written on the subject have amounted to a significant figure. These prerequisites underline the importance of business discourse as part of communication studies and as a promising area of research and study.

In the first decade of the 21st century researchers of business discourse have tried to broaden and deepen the research focused on business discourse. However, instead of putting light on some debated concepts and theories or clarifying the identities of related discourses (such as professional discourse, institutional discourse, business discourse, workplace discourse), researchers looked out for new directions in which they could take discourse. One way ahead was to explore discourse in close connection with its social underpinnings (Fairclough, 2004; Bargiela-Chaippini and Nickerson, 2002). Another way was to establish *business linguistics* as a subfield of applied linguistics (Daniushina, 2010).

One reason to account for the divergence of business discourse studies is the bewildering and unprecedented complexity of the global landscape as it has been shaped by substantive changes. If in many other fields, scholars have recognized that professionalization and specialization should be the answers to the rapidly changing society, the four views on the development of business

discourse outlined in the present paper stay proof of the same need to move on, either by exploring new linguistic territories (Daniushina, 2010) or by adopting a social-bound inside looking perspective that can explicate the dialectical relationship between social practices, social theories, identities, relationships, and their linguistic instantiation (Fairclough, 2004).

Thus, the divergence of business discourse studies should rather be understood as a recognition of the complexities and, at the same time, interrelated nature of the discipline (Idem.) positioned within a troubled and changing economic and political context.

On the other hand, the four perspectives also show some visible similarities. Both Fairclough (2004) and Bargiela-Chiappini and Nickerson (2002:5) use the concept of 'texturing', 'textualization' to account for the way in which new discourses are created. Fairclough demonstrates how different equivalent words are textured or retextured in the Blair text, whereas in the 2002 article Bargiela-Chiappini and Nickerson (2002:5) hint at textualization without, however, properly applying it to any specific text.

Similarly, both Fairclough and Bargiela-Chiappini and Nickerson (2002:5) valorize the concept of 'interdiscursivity', i.e. the way in which different words that belong to different discourses are textured into new discourses. Again, while Fairclough's article is centred on demonstrating the applicability of the concept to text analyses, Bargiela-Chiappini and Nickerson (2002:5) use the term analytically.

A common feature that crosses all articles, and is retrievable from the discussed perspectives, is the 'multidisciplinary approach'. Beside Fairclough's perspective, which is deeply sociology-based, Bargiela-Chiappini and Nickerson (2002:5) recognize the contribution of social studies to discourse analysis, and Daniushina recognizes the interplay of business linguistics and sociolinguistics, without insisting on the sociological underpinnings of business discourse, or of discourse, in general. Despite Iedema and Scheeres's (2009) inclination towards sociological issues, which is made relevant in their concern for aspects involving the workers' identities and their interpersonal relationships and which shapes up their affect-based approach to business discourse, their approach moves in the direction of cognition and affect-related insights.

In respect of the methods used for the investigation of business discourse, all discussed linguists rely on qualitative and quantitative methods, but, on the other hand, each recommends particular methods. Fairclough's (2004) article reveals without doubt his preference for an *interdiscursive* approach based on social and linguistic analyses, Iedema and Scheeres (2009) prefer a combination of discourse analytic methods and ethnography-based methods, which might offer a more immediate feedback. Bargiela-Chiappini and Nickerson (2002) insist on a multidisciplinary approach and recommend a shift from a less efficient quantitative

research method to a more qualitative method, such as the interpretative ethnography approach in the line Smart (1998) proposed it. Daniushina (2010) opinionates that a combined approach based on both quantitative and qualitative methods should be used along with corpus linguistic and statistic data processing, critical analysis and case studies.

All in all, the presented orientations offer an evolving and inspiring research environment which seeks to adapt to the societal, economic, political and technological changes. Channeling research in one and the same direction is an impossible mission in the 'new' and 'fast' capitalist era, which is characterized through variety and diversity. Within this complex and permanently changing global context, Bargiela-Chiappini and Nickerson (2002:5) call for a 'dialog and possible cross-fertilization between disciplines', a *convergence* of studies and research methods that may contribute to a redefinition of the status and boundaries of many disciplines or subservient ones.

5. CONCLUSIONS

The paper sought to discuss some perspectives on *business discourse* in order to point out the diversity of approaches and research methods used or proposed for its investigation. The paper discussed four articles: Norman Fairclough's (*Critical Discourse Analysis in Researching Language in the New Capitalism*: *Overdetermination, Transdisciplinarity, and Textual Analysis* (2004), Rick Iedema and Hermine Scheeres's *Organisational discourse analysis* (2009), Francesca Bargiela-Chiappini and Catherine Nickerson's *Business discourse: old debates, new horizons* (2002) and Yulia V. Daniushina's article *Business linguistics and business discourse* (2010).

The present article set in a *fluid, flexible, dynamic* and highly *variable* linguistic context the four perspectives on business discourse while pointing out the different theories and the convergent issues that characterize them. The article suggests that the 21st century approaches cannot be confined or constrained to a single approach or theory but that they need to keep pace with the rapid changes and challenges of the 'new' and 'fast' capitalism. To build a case for the present evolution of research in *business* d*iscourse studies,* the present article examined the definitions of business discourse and other sub-branches (such as workplace discourse, institutional discourse, organizational discourse, etc.), the diverging sociological underpinnings of these studies and the methods used in the related research, to highlight the divergent development of business discourse research. The paper sought to underline the variability of the approaches and research methods proposed by analysts while tracing down a consensual, joint perspective on the issue.

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