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Editorial address:
Department of Social Geography and Regional Development Planning,
University of Debrecen
4032 Debrecen, Egyetem tér 1. Hungary
kozma.gabor@science.unideb.hu

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FOLK ARCHITECTURE IN BEIUŞ LAND

Ştefan BAIAS
PhD Student, Department of Geography, Tourism and Territorial Planning – CSAT, University of Oradea, Oradea, Romania, e-mail: baias_stefan@yahoo.com

Abstract: The Beiuş Land, that overlays the Beiuş Depression, preserves a major part of the Romanian people cultural heritage. Its association with the *land of the wood* is still consistent. In almost all localities within this area one can encounter architectural wooden creations of the craftsmen. Thus, four major programs of the folk architecture can be distinguished, namely: the peasant wooden dwelling, wooden household structures, rustic technique installations and wooden churches. The prospected elements have been examined by means of quantitative and qualitative analysis and according to local characteristics, resulting in relevant knowledge related with the territorial reality of these elements representative for the folk architecture of this area.

Key words: Beiuş Land, folk architecture, programs of folk architecture

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INTRODUCTION

The Beiuş Land is situated in Bihor County overlaying the Beiuş Depression and being sculptured and modelled by Crişul Negru river (Figure 1) and its tributaries (Berindei et al., 1977; Degău and Brânda, 2008; Filimon, 2012). Alongside other Romanian territories known as "land" (Berindei et al., 1977; Filimon, 2012; Ilieş et al., 2008, 2011; Josan, 2009; Petrea et al., 2011; Staşac and Herman, 2010) the Beiuş Land represents a spiritual space for the preservation of authentic values. For that matter, within this space with definite delimitations made by Filimon Luminiţa (2012), the folk architecture stands out through its unity, diversity and authenticity and it comprises four programs, namely: the peasant wooden dwelling, wooden household structures, rustic technique installations and wooden churches. One can say that these programs reflect the lifestyle and the perception on the world of the Romanian peasant, as pointed out by the authors Grigore Ionescu (1982) and Georgeta Stoica (1989). The construction of these edifices was highly dependent on the existence of raw materials – the wood was available within close vicinity and easy to obtain, the reason why this space is also refered to as the „*land of the wood*".

It should also be mentioned the fact that a part of these folk architecture creations lost their utility in time, but their artistic and scientific value prevails.

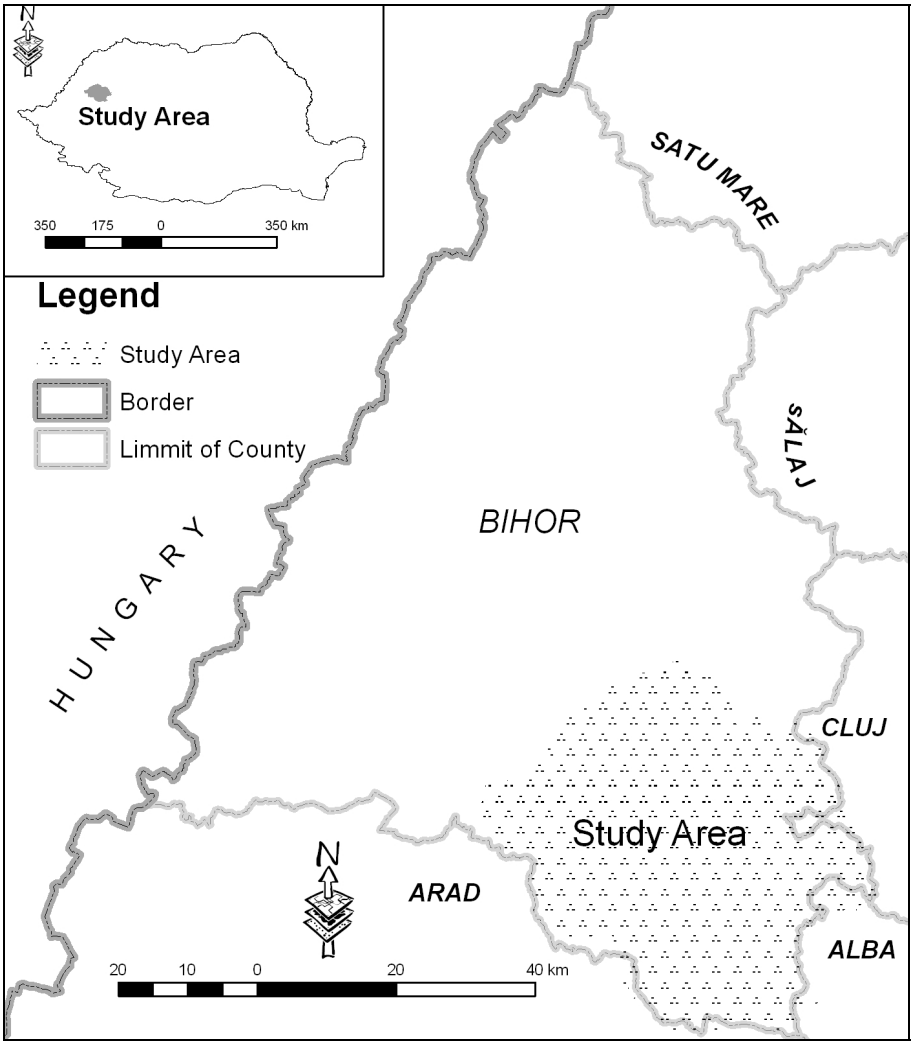

Figure 1 The geographic position of the area of study

Source: Limit of the Land after Filimon, 2012

METHODOLOGY

The information analyzed in this study derive from several domains like geography, architecture, history and from field research. The results were obtained by means of the following methods of geographical research: the bibliographic and cartographic research method – obtaining information from both Romanian and foreign literature (Cocean, 2005), followed by field research using appropriate techniques – observation and description (Armaş, 2006; Ianoş, 2000; Kothari, 2004; Veal, 2006); the historical method used for

dating the folk architectural programs; the analysis method – the data and information obtained will be processed specifically (Cocean, 2005), the cartographic method – transforming the information into cartographic representations using the GIS program (Clifford et al., 2010; Petrea, 2005) and synthesis – formulating the conclusions regarding the folk architecture within this space.

FOLK ARCHITECTURAL PROGRAMS

The folk architecture from Beiuş Land is represented by wood architecture, the cultural heritage passed on by previous generations. As for that, we can distinguish architectural wooden creations, like: the peasant wooden dwelling, wooden household structures, rustic technique installations and wooden churches, creations that have survived in a constantly changing society.

The peasant wooden dwelling and *the wooden household structures* are a point of reference for the rural space, indicators of the social and economic status of their owner within society. Although for a long period of time wood was the main raw material used for these constructions, presently wood can be combined with adobe and with stone. At the same time, there are cases where these constructions are restored and used as accommodation units. It is the case of the small hamlet of Runcuri, in the Roşia commune (Figure 2 and Figure 3).

Figure 2 Peasant wooden dwelling, restored and used as accommodation unit (Runcuri hamlet, Roşia commune)

Figure 3 Wooden household structure, restored and usde as accommodation unit (Runcuri hamlet, Roşia commune)

Wooden fencing plays an important role in drawing the boundaries between properties (households and churches) and the main road and neighbours. There are several types of wooden fences, namely: uncovered plank fence between posts, plank fence between posts covered with sheet metal, horizontal plank fence covered with shingle, round and thin fir beams fence, plank fence between posts on a concrete base (Figure 4), uncovered hardwood pencil pointed lath fence and lath fence between posts covered with sheet metal (Figure 5).

Figure 4 Plank fence between posts on a concrete base (Budureasa village)

Figure 5 Lath fence between posts covered with sheet metal (Budureasa village)

Wooden gates are another category of constructions representative of the folk architecture of Beiuş Land. Some of the preserved wooden gates are: gates of access into the household, churches and at the entry of a locality. These gates are made of hardwood and are supported by three-four posts; they comprise two entries (one for humans and teams and a separate one for animals) (Figure 7) and one entry (for humans, teams and animals). Also, the wooden gates are covered with lath, ceramic tile (Figure 6) and metal.

Figure 6 Wooden gate covered with ceramic tile (Tărcăiţa village)

Figure 7 Uncovered double wooden gate (Budureasa village)

Rustic technique installations (watermills, whirlpools, sawmills etc.) were the most advanced means of production in rural areas, not in Beiuş Land only, but all over the country. Presently, although their number has diminished drastically, these installations are still present in the cultural landscape of Beiuş. Thus, within the area of study, the most common rustic technique installations are the watermills, generally used by rural population for cereal grinding. The structure of these installations is made of different types of wooden beams and planks, serving as shelter for the grinding mechanism consisting of a pair of stones and sieves.

The mills' wheel is activated by the hydraulic power of the water, yet there are situations when the wheel is activated by electric energy – in certain times of the year when the water levels are low, one illustrative example would be the watermills of Remetea village, from Remetea commune.

Within the area of study, for the year 2012, seven watermills were identified (Table 1 and Figures 8 and 9), among which six watermills are functional and one nonfunctional watermill. For tourists interested in these rustic technique installations, which are usually located in extremely beautiful natural settings, a trip down Roșia Valley or Tărcăiței Valley is both recreational and instructive.

Table 1. Watermills from Beiuș Land, in 2012

Administrative territorial unit	Locality	Date	Observations
Bunteşti	Săud	1946	functional
Căbeşti	Căbeşti	XIX c.	functional
Remetea	Remetea	XIX c.	functional
		XIX c.	functional
Roşia	Roşia	end of XIX c.	functional
Tărcaia	Tărcaia	1910	functional
	Tărcăița	1935	nonfunctional

Source: Field data 2010-2013

Figure 8 Watermill in Roșia village, Roșia commune

Figure 9 Watermill in Căbeşti village, Căbeşti commune

Wooden churches represent another element of identity for the Beiuș Land, at the same time representing the expression of the folk architectural spirit and the testimony of the tumultuous past of the native orthodox population inhabiting this space (Filimon, 2012). Thus, within the area of study 28 wooden churches were identified, among which 25 churches are comprised in the national cultural heritage (Table 2 and Figures 13, 14, 15) and three wooden churches that are not registered as historic monuments (Table 3). The wooden churches are dated from the XVII-XX Century period, and the oldest wooden church is the "*Dormition of the Mother of God*" church from Totoreni village, Tărcaia commune.

Table 2 The typology of wooden churches– historic monuments from Beiuş Land according to roof type, their location within the village confines and liturgical activity

Administrative territorial unit	Village/ Church	Date	Location in the precincts of the village	Roof			Liturgical activity	
				Wood	Tile	Metal	Yes	No
Budureasa	Saca	1724	Central	X			X	
Bunteşti	Dumbrăvani	XVIII c	Central		X		X	
	Stânceşti	1750	Central-north	X				X
	Brădet	1733	Central			X	X	
Căbeşti	Goila	XVIII c.	North			X	X	
	Gurbeşti	1799,	North-west			X	X	
Câmpani	Fânaţe	1796	Central	X			X	
Drăgăneşti	Sebiş	XVIII c	At the village exit, westward	X				X
	Talpe	1731	South		X		X	
	Belejeni	XVII-XVIII c	At the village margin, north		X			X
Lazuri de Beiuş	Hinchiriş	XVIII c	Central		X			X
	Lazuri de Beiuş	XVIII c	Central	X				X
Pietroasa	Cociuba Mică	XVIII c.	Central		X			X
Pomezeu	Câmpani de Pomezeu	1834	Central			X		X
	Vălani de Pomezeu	1730	Central		X		X	
Răbăgani	Brăteşti	1718	At the village entry, north	X			X	
Remetea	Petreasa	1752	Between the two villages : east of şoimus and west of petreasa		X		X	
Rieni	Cucuceni	1730	Outside the vilage, east	X			X	
	Rieni	1754	West	X				X
	Valea de Jos	1738	North-east			X	X	
Şoimi	Şoimi	XVIII c	Central		X		X	
Tărcaia	Mierag	1756	Central	X			X	
	Tărcăiţa	1796	Central		X		X	
	Totoreni	1697	Outside the village, south-west		X			X
Vaşcău	Coleşti	XVIII c	Central			X		X

Source: Cucu & Ştefan, 1979; Godea and Cristache-Panait Ioana, 1978; Godea, 1981, 1996; [1])

[1] www.cimec.ro; http://www.cultura.abt.ro/Files/GenericFiles/LMI-2010.pdf; http://www.bihor.djc.ro/ ; http://www.biserici-din-lemn.bihor.ro/; http://www.biserici.episcopiaoradiei.ro/

Usually situated in higher central areas of the village, the churches display a series of characteristics: segmented rectangular plan (narthex, nave and apse), detached apse, shingle, ceramic brick or metal roof (Tables 2 and 3), short belfry and the presence of the ornamental ring placed between the arrow and the pyramidal roof (Godea, 1977; 1981). According to these characteristics, the wooden churches of Beiuş Land are similar to the wooden churches of Silvaniei Land (Baias, 2012). The wooden church in Totoreni has a porch on the southern side of the nave, a place where in the past the persons that didn't comply with the canons of the church would be judged. Their interior structure and painting are specific to the orthodox religion (Figure 10), while the external decoration features elements that augument the artistic value and originality: massive door frames, small windows, rope-like cordon that incloses the construction and the portal that stands out through the ingenuity of combining different elements of vegetal, animal and geometric nature (Figure 11). On the external walls were set up wooden crosses in the memory of those soldiers originating from the village that died on the battlefields during the two world wars (Figure 12). Furthermore, most of the wooden churches have liturgical activity.

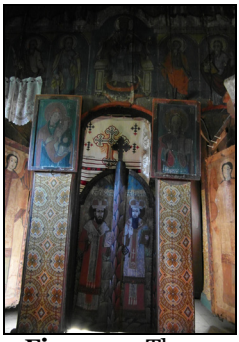

Figure 10 The painting on the wooden church iconostasis from Lazuri de Beiuş village

Figure 11 The portal of the wooden church from Cucuceni village

Figure 12 Wooden crosses set up on the walls of the wooden church from Sebiş village

Figure 13 Wooden church from Cucuceni village

Figure 14 Wooden church from Tărcăiţa village

Figure 15 Wooden church from Valea de Jos village

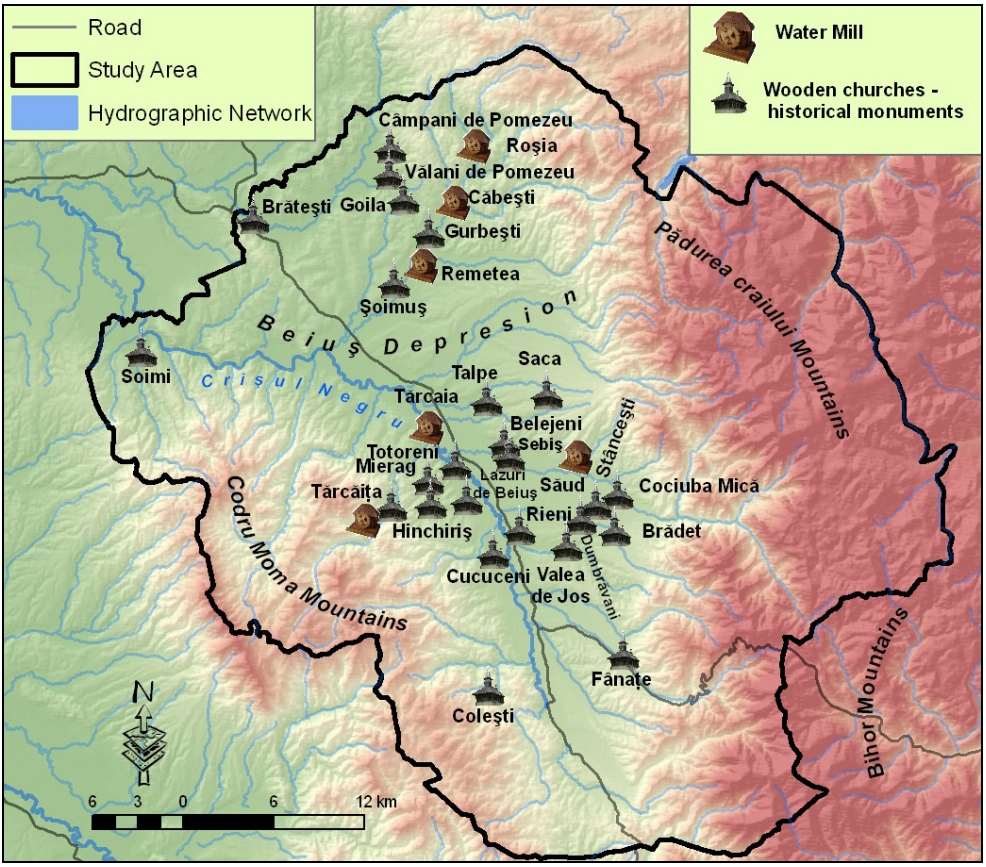

Figure 16 Location of the wooden churches - historical monuments and the traditional technical installations in the studied area

Table 3 The typology of wooden churches not registered on the list of historic monuments from Beiuş Land, according to roof type, their location within the village confines and liturgical activity

Administrative territorial unit	Village/ Church	Date	Location in the precincts of the village	Roof			Liturgical activity	
				Wood	Tile	Metal	Yes	No
Finiş	Huta Cloister	1927, completion in 1998	outside the village, southern part	X			X	
Roşia	Lazuri de Roşia	1779	central			X	X	
Şoimi	Dumbrăviţa de Codru	1820-1835	central			X	X	

Source: Field data; [2]

CONCLUSIONS

Together with other Romanian territories known as „*land*" (Zarand Land, Silvania Land, Chioar Land, Lăpuş Land, Maramureş Land), the Beiuş Land represents a spiritual space for the preservation of authentic values to which its inhabitants are very attached. Consequent to the analysis made on this exceptional etnographic space there were identified four programs specific to the folk architecture, namely: the peasant wooden dwelling, wooden household structures, rustic technique installations and wooden churches. The prospected elements were approached quantitatively (there were identified 28 wooden churches mostly with liturgical activity and seven watermills, six functional watermills and one nonfunctional watermill), qualitatively (the majority are well preserved) and according to local characteristics (architecture style, plan, construction materials, structure, interior and exterior design). It should be mentioned the fact that although a part of these architectural creations lost their utility, their artistic and scientific value is unquestionable, most of them having become touristic attractions. This aspect can constitute one of the advantages in the development of the touristic activities in this territory

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[2] http://www.biserici-din-lemn.bihor.ro/; http://www.biserici.episcopiaoradiei.ro/

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PETROŞANI DEPRESSION: THE DYNAMIC OF SOCIAL-ECONOMIC DISPARITIES AND PLANNING IN TERMS OF SUSTAINABLE DEVELOPMENT. ELEMENTS OF METHODOLOGICAL BACKGROUND

Raluca-Alexandra MIHUŢESCU
PhD student, Department of Geography, West University of Timişoara, Romania,
E-mail: raluca.mihutescu@yahoo.com

Abstract: The aim of this study is to achieve a methodological plan, essential to avoid unnecessary deviations which may occur in the process of research by channeling research into specific directions. The basis of the construction of methodological plan is to establish its goals and issues, and on this basis, setting the main objectives and working assumptions. To check the validity of the assumptions and goals are set to achieve some methods, data sources and general information that will be used in the design study. Announcement of results intended to reach in the end of the study is further verification of how the research was conducted according to objectives.

Key words: the aim study, study issues, research objectives, research stages and methods

* * * * * * *

INTRODUCTION

For developing of the study which refers to dynamic of social-economic disparities and planning in terms of sustainable development, in Petroşani Depression, is necessary to propose a methodology that aims to channel the research process for accurate directions to be avoided the unnecessary deviations from the purpose and study strategy which may occur throughout the research period.

The methodology is a set of paths, ways and methods of research, knowing and changing of the objective reality (Donisă, 1977). In other words, the methodology combines research strategies and techniques based on a theoretical foundation, by which the researcher acts upon reality, extracting and processing the factual material.

The starting point of methodological foundation of the study was to establish its aim and issues, followed by that on this basis, to establish the main objectives and assumptions. In order to verify the validity of the assumptions and to achieve the goals were set several methods, data sources and general information that will be used in the design study. Results that we want to reach in the end of the study is further verification on how the research was conducted according to objectives (Figure 1).

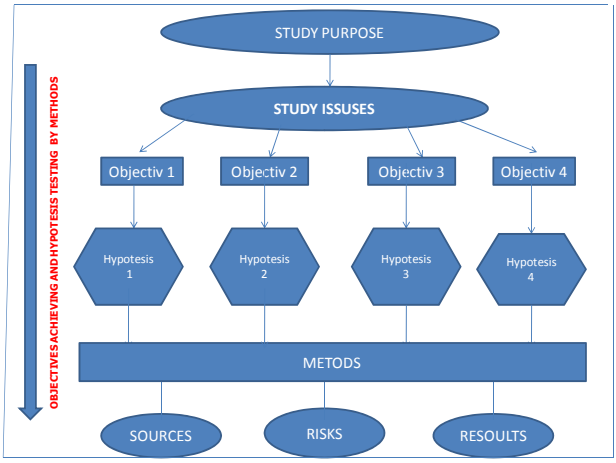

Figure 1 The general layout of the proposed methodology

ELEMENTS OF METHODOLOGICAL BACKGROUND

The Petrosani Depression is located in the south-west of Romania, namely in the south of Hunedoara county. In physical-geographical terms its limits are overlapping to the upper basin of Jiu river on the length of 45 km, and from administrative point of view, this micro-region belongs entirely to Hunedoara County and is limited in the west by Caraş-Severin County, in the south, in the east and northeast by Vâlcea and Alba counties, and in the north by the municipalities located in another county subdivision, namely Haţegului Depression (Figure 2).

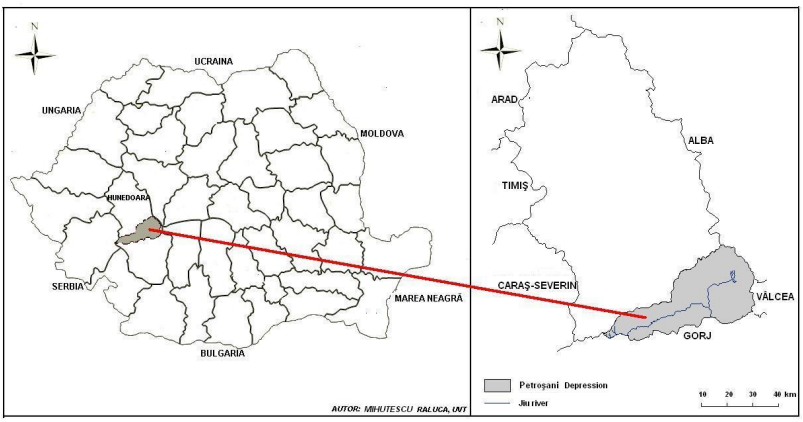

Figure 2 Geographical position of the Petroşani Depression

The Petroşani Depression was once the largest coalfield of our country which was characterized throughout the nineteenth and twentieth centuries by a major socio-economic

boom, but with national industrial restructuring has begun to decline suddenly, reaching a very poorly limit. Therefore, against the background of a vast and inadequate restructuring of mining activity, this monoindustrial micro-region began to be increasingly affected by the appearance of some visible inequalities in social and economic system (especially in terms of welfare and economic development of communities).

Also, over time, mining was the main factor which affected spatial organization of Petroşani Depression, land use was done in most part for this purpose, having to do so with a strong impact on natural factors, with serious consequences that are felt even today. For a proper and long term economic reconversion it is necessary that the development and planning of this micro-region to be done from now on from sustainable point of view.

Scientific purpose of a work is practically its overarching objective, which the researcher should have to its attention frequently so that should not deviate to other unnecessary directions in the research period. Based on the above desiderata, was outlined the scientific purpose of the work, namely: *identify of socio-economic disparities within Petroşani Depression and proposal of some sustainable development and planning directions to improve them in the future.*

Depending on the overall objective of the study and various conditioning (research instruments, sources, time availability) was established the methodology of this study, which is reflected in a particular work strategy. Study issues are the essential questions that the researcher ask himself in order to identify problems and aspects which he is proposing to study. By setting specific questions, we focused attention on finding response, avoiding thus unnecessary deviations from established scientific purpose.

Based on the overall purpose and above mentioned desiderata, were outlined three key questions that we are intended to find answers during the research progresses. These are:

1. What are the socio-economic inequalities in Petroşani Depression and which are contexts in which they arose?

2. To what extent are currently exploited the resources of Petroşani Depression?

3.Which are the most efficient sustainable development and planning ways of Petroşani Depression to reach a visible improvement of socio-economic disparities and achieving a coherent socio-economic cohesion in the future?

The issue represents the basic foundation established in setting clear objectives which we intend to achieve in the research and the basic foundation of setting of our working hypotheses. The hypotheses are assumptions or presumptions (according DEX) which the researcher establish in connection with the issue and determined that, at the end of the study can be considered to be valid or not. By checking the validity of the proposed assumptions the researcher acquires another targeting "engine" for his research in order to avoid unnecessary deviations.

In this study, based on the mentioned issues, were proposed four objectives and working hypotheses (Figure 3). The assumptions and objectives were founded on certain goals which are detailed below. The first of these relates to the uneven development due to looming gap in a certain territory.

According to regional science unequal development is based on the idea that each space should be characteristic of a certain level of development (spatial evolutions expressing thus their independence need) and the very nature of the relationship between space and regions which creates developing gaps; are made reference to governing mechanisms of the spatial structure and *it is considered that unequal development occurs in areas characterized by structures that allow this* (Ancuţa, 2008). On the grounds that the space of Petroşani Depression is characterized by elements that allow and even facilitate unequal

development, we consider that the economic restructuring and the need for reconversion and economic development are at least two of these elements.

It was established thus the first study hypotheses in which we argue that *due to economic restructuring and the need for reconversion and economic development in the Petroşani Depression emerged many inequalities between communities in terms of welfare and their economic development*. In this way it is inevitable the appearance of competitiveness between local communities regarding the need for reconversion and economic development. In order to propose effective means of improving the socio-economic disparities requires that these first should be identified and analyzed, this being the first research objective proposed to be achieved.

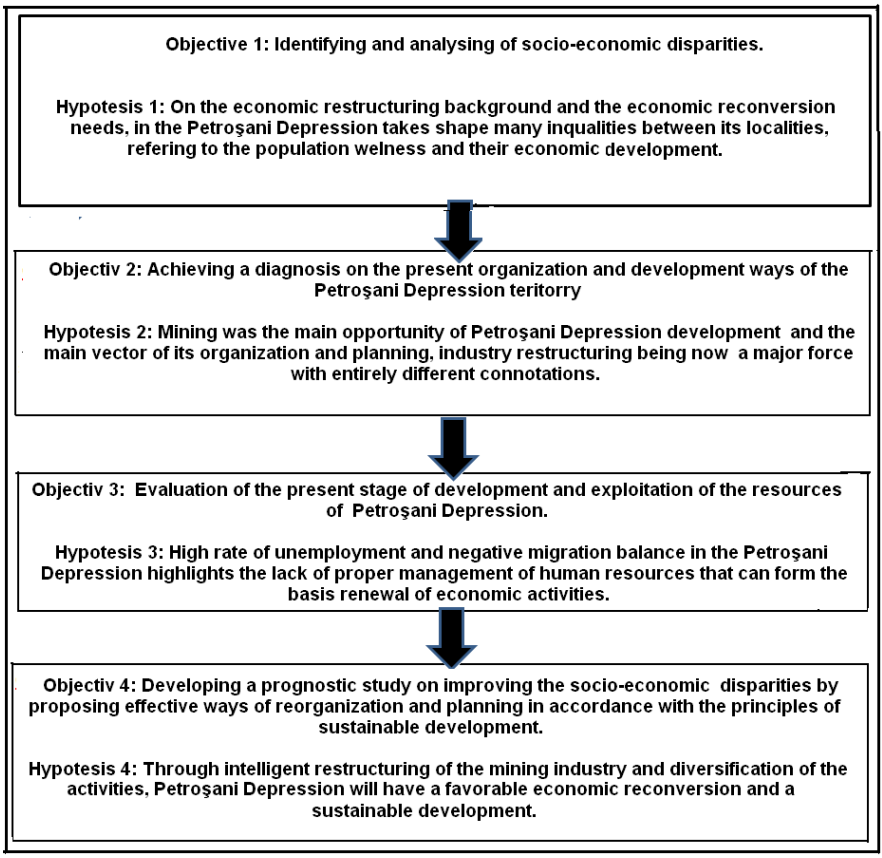

Figure 3 Study objectives and hypoteses

The Petroşani Depression territory was arranged and used mostly for mining activities, its strong footprint being visible felt even today by the existence of large areas occupied by buildings and mining premises, tailings produced by the coal exploitation and processing etc. If in the past, the mining development was the main factor of economic and social growth of this micro-region, in present, its currently restructuring, is a total opposite force, leading to poverty. By restructuring the mining industry, the current territory of Petroşani Depression is characterized by new ways of planning and organization.

On the background of these goals was born the second hypothesis of the study stating that *mining was the main development opportunity of Petroşani Depression and the main vector of its organization and planning, and restructuring the industry is now a major force with total opposite effects*. To check the validity of this hypothesis we propose to make a diagnosis on the organization and development of the present Petroşani Depression territory; this would be the second objective of the study. The development of a particular area is reflected in the management and use of the available resources. We refer here not only to its natural resources (the coal), but also human resources, without the recovery is often impossible and unnecessary other.

Thus, how the resources of Petroşani Depression are exploited is particularly important. In the context that the most important natural resources (the coal) are less harnessed and utilized exploitation of other natural resources is essential (such as ski areas, karst, etc.) and especially human resources. *High unemployment rate and negative migration balance of the Petroşani Depression highlights the lack of a proper management of human resources that can form the basis renewal of economic activities* (third hypothesis). Checking the validity of the third hypothesis involves assessing the current state of development and exploitation of the resources available in Petroşani Depression (third overall objective of the study). For a favorable economic conversion of the Petroşani Depression is essential to achieve an appropriate diversification of economic activities, meaning is not sufficient that the tourism activities are the only ones which are replacing the mining activities (as it tends in present).

Also, the restructuring process being an intelligent one requires a coherent economic thought which have as result the development and application of a systematic strategy. As said above, was issued also the fourth hypothesis of the study, namely: *through intelligent restructuring of the mining industry and diversification of the activities, Petroşani Depression will have a favorable economic reconversion and a sustainable development*. Finally, after making a prior diagnosis both in terms of socio-economic disparities and their characteristics and in terms of the organization and the current planning of analyzed territory and especially about the current state of development and of resources harnessing, we propose to develop a prognostic study.

By this we intend to propose some concrete measures need to be taken to improve the socio-economic disparities and effective ways of reorganizing and planning in accordance with the principles of sustainable development. This is the fourth general objective of the study and we consider to be the most important and the most under option not be done or to be done in the wrong manner. The research which will be carried out in this study are grouped into five main stages, namely: information stage, documentation, interpretation and analysis stage, synthesis stage, evaluation and proposal stage.

Information and documentation stage includes all data collection activities in the field of literature of the study area and data collection from various institutions, but also through direct field observations. Field activities will consist in comparing data from bibliographic sources and those obtained from the various institutions with reality on the ground. In interpretation and analysis stage will take place activities by which will be processed and interpreted the data and information obtained, due which will result various graphic and cartographic materials. Towards the end, the data and information obtained will be summarized, so that in the final stage of the study to be valuated in order to develop prognostic measures. For a coherent and efficient achievement of all these steps, an essential role would have methods, documentation and scientific analysis that we are able to mobilize during the research.

Method is the way (process or succession of processes) structured in an organized and systematic work, by which reaches to the knowledge of the study object (Armaş, 2006). Zlate (2000) gives a definition specifying the nature of researcher actions or steps: method defines the path, route, structure order or program that adjusts as intellectual practical actions to achieve a goal (Armaş, 2006)

For thesis elaboration, we reserve a primary role to geographical methods that are versatile, varied and complementary. Armaş (2006) classifies geographical research methods based on several criteria such as: specific relationships investigated (quantitative and qualitative methods), the nature of the relationship between researcher and subject investigated (direct methods and indirect methods), purpose (harvesting and processing , investigation and forecasting, research and application / implementation of results), where applicable (field, lab or office), their level of fitness (relative to the phenomenon under investigation, some methods can cover a wide range being used to study many phenomena, while others find their strict applicability) and their level of generality. One of the problems frequently encountered in the use of a method is the subjectivity of the researcher, which always need a continuous attention to maintain the objectivity.

Also Armaş (2006) states that for being objective the researcher should take into considerations several aspects, such as:

• clear formulation of the problems, on some precise and rigorous conceptual bases(daily experience teaches us that a well-formulated problem is half solved);

• clear formulation of the concepts, respectively, putting them into observable and measurable facts;

• various of complementary methods which should be used in the research;

• varying the conditions of application of methods;

• corroborating the results obtained by a method with the results by applying other methods, leading to a validation of both methods and the results obtained on their behalf;

• research lasting over time, and not sequentially; important is the past reconstruction, which is reflected in the present state of the investigated environment for issuing evolutionary predictions;

• correlation of quantitative research methods with qualitative research methods (quantification and statistical analysis of forms and geographical phenomena, followed by qualitative interpretation of the results).

The means (tools) are all research tools necessary for a certain scientific work in order to achieve the purpose of the study (Armaş, 2006). In developing the present methodology we took into account the fact that in order to achieve objectives and to check the validity of the assumptions, it is essential to propose general methods and sources, and identify risks and results that are intended to achieve by applying proposed methods.

Thus for checking the validity of the first hypothesis we proposed three specific objectives: identifying and analysis of demographic disparities - identity, education, employment of labor, etc. (1), identifying and analysis of the life quality of population disparities (2), identifying and analysis of the economic dynamics and mobility disparities (3).

To achieve each specific objective methods have been proposed and some basic sources and the risks posed by each method and expected results intended to be achieved - this is the basis for subsequent verification of how the research was conducted according to objectives (Table 1). In identifying risks, most meet for the questionnaire and interview method. We believe that the use of the questionnaire method, one of the biggest risks is the reluctance of people to complete questionnaires and for interview the most important risk is that we can meet difficulties in access to persons included in the sample.

Table 1 Methods and objectives proposed for Hypotesis 1 validility testing

Hypotesis	Objectives	Methods	Basic sources	Risks	Results
Hypotesis 1	1. identifying and analysis of demographic disparities (identity, education, the employment rate, etc.).	Statistiques	- County Statistical Department of Hunedoara	- incorrect data; - lack of data ;	-thematic maps, diagrams, cartograms, cartodiagrams
	2. identifying and analysis of the life quality of population disparities	Questionaire	- various population groups (samples)	- questions constructions errors - population reluctance in completing the ques-tionnaires - deter-mining of sample errors - inter-pretation of results errors	- diagrams, cartodiagrams
	3. identifying and analysis of the economic dynamics and mobility disparities	Statistical Interview	-County Statistical Department of Hunedoara - National Coal Company representatives of local municipalities -represen-tatives of local companies	- incorrect data - lack of data long time necessary - errors in terms of aking questions and regarding the answers - lack of standardi-zation in the formulation of questions, which limits comparability information - difficulties in access to persons included in the sample	-thematic maps, diagrams, synoptic and correlation tables -data and information which may supplement, confirm or disprove the official data

In order to verify the validity of hypothesis 2 were proposed following specific objectives: knowing changes in current land use, analyzing the impact of mining activities on

the natural environment and identifying and analyzing mutations in habitation space organization. Also, as the first hypothesis case was established methods to be used, along with some general sources, risks and results intended to be achieved (Table 2).

Table 2 Methods and objectives proposed for Hypotesis 2 validility testing

Hypothesis	Objectives	Methods	Basic sources	Risks	Results
Hypothesis 2	1. knowing changes in current land use	Cartographical	- general urban and regional plans - Corine Land Cover - field observations	- inaccuracy of sources	- land use map
	2. analysing the impact of mining activities on the natural environment	- Statistical - qualitative (field observation)	- Environmental Services and Ecological Programs within C.N.H - Environmental Protection Agency of Hunedoara -direct field observation	-incorrect data - lack of data - subjectivity in information interpreting	- photos, diagrams, - thematic maps
	3. identyfing and analysing changes in habitation spaces organization	- direct field observations - interviews	- direct field observation - interviews on local municipalities	- subjectivity in information interpreting	- photos - drawings and sketches of map

In the last stage of the study, the evaluation and proposal intends check the validity of assumptions 3 and 4. Evaluation of natural and human resources available in Petroşani Depression and degree of recovery will be realized through the calculation and interpretation of some sustainable development indicators. In this case, errors may occur during the calculation and interpretation, but we could face with the lack of necessary data and their calculation to (Table 3).

For the proposals on how efficient and sustainable planning and land reorganization, the risk is higher than in other cases because this last step is based on how the survey was carried out in the other stages, especially in the evaluation stage.

Table 3 Methods and objectives proposed for Hypothesis 3 and 4 validility testing

Hypothesis	Objective	Methods	Basic sources	Risks	Results
Hypothesis 3	1. evaluation of natural and antrophic resources and the degree of their capitalization	- Quantitative (calculation and interpretation of some sustainable development indicators)	- County Statistical Department of Hunedoara - National Coal Company - County Agency for Employment (AJOFM) etc.	- errors occurred during the compilation of data and interpretation of results	- thematic maps, diagrams
Hypotesis 4	1. reducing of socio-economic disparities prognosis 2. proposal of some efficient reorganization and planning teritorry measures, in terms of sustainable development principles	Ipotetico-deductive (prospective)	- County Statistical Department of Hunedoara, - National Coal Company - County Agency for Employment (AJOFM) etc.	- inaccurate estimates, due to insufficiently grounded assumptions	- developing of some strategic directions on sustainable development and planning of Petroşani Depression territory - Mapping on proposed territory planning

CONCLUSIONS

The aim of the methodological plan is the channeling of research process for specific directions by tracking and achieving the stage objectives and check the validity of assumptions. Would be avoided unnecessary deviations from the study purpose and strategy that may occur during the period of research. Results proposed that we want to reach in the end of the study is the basis of further verification of how the research was conducted according to objectives. This methodology is only what we propose, as essential directions, in the beginning of the study. On the advancement of research, it will get rich and adapted to different situations (favorable or unfavorable) that we face throughout the study period.

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FROM CARPATHIANS TO PINDUS. TRANSHUMANCE – A BRIDGE BETWEEN ROMANIANS AND AROMANIANS

Ionel Calin MICLE
PhD-student, Department of Geography, Tourism and Territorial Planning, University of Oradea, Romania, e-mail: calinvascau85@yahoo.com

Abstract: Grazing and farming were the main activities of this people from Carpathian to Pindus Mountains since the ancient Thracian-Dacians time until the early 20th century. If agriculture in the plains of Thessaly and Wallachia filled the bread basket of the Roman, Byzantine and then the Ottoman Empire, shepherding flocks, sometimes semi-nomadic was more than an economic activity, it was the bridge between Romanians in various provinces subjugated by foreign empires and, also a factor of cultural emancipation and preservation of values, traditions and Romanian identity.
In the current study we wish to highlight the role in the Romanian provinces that this noble activity, transhumance had over the centuries through space-time strength and size of the seasonal swing movements between mountain and plain, made on paths and ancient rules which ignored borders or possessions. We also propose a parallel analysis between Romanian pastors north of the Danube and Balkan Romanians, the Aromanians, to highlight the similarities and differences, and how this activity could have been the spark that lit the consciousness of identity and belonging of Aromanians to the block of Romanianism.

Key words: transhumance, Romanians, Aromanians, migration, similarities, identity

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INTRODUCTION

Grazing is not and it was not an exclusively Romanian activity, it can be found to all the old and sedentary peoples of Europe from the French to the Basques, Italians, Spanish, Albanians, Serbians and so on, however what is specifically Romanian, is its millennial continuity and the large territorial spread.

It goes without saying that the pastoral activity turned into transhumance when the livestock become sufficiently numerous so that the home areas could not provide its necessary food, what can't be inferred directly is the moment of the history when this happened and what were the factors that have triggered this massive movement of people and animals on a scale so large that came to constitute the subject of regulations between empires (Georgescu, 1925).

In addition to the activity itself, shepherds were the factors that contributed to keep the unity and the national consciousness in all the provinces inhabited by Romanians by preserving the language, toponymy, religion and traditional customs and transmitting them from generation to generation.

METHODOLOGY

This study is based on bibliographic study and on the research of documents from medieval times to interwar and recent times in which we found evidence of some foreign travelers about Romanian regions and about the countries in the Balkans inhabited by Aromanians, historical maps, studies about transhumance of some researchers from various fields from historical to linguistic or ethnography. It is also based on a field research made in the Mărginimea Sibiului and Brasov areas, two centers of radiation of this phenomenon from the Carpathians until Pannonian Plain, Silesia, Balkan Mountains to the Caucasus.

THE HISTORY OF SHEPHERDING AND TRANSHUMANCE AT ROMANIANS AND AROMANIANS

Regarding the age of shepherding, which developed in close connection with the agriculture, it seems that it dates from the time of the ancient Thracian-Dacian tribes, determined on the basis of archaeological discoveries and ancient inscriptions found in Dobrudja, related to the economic exchange between the Dacians and the Greek cities of the Black Sea coast. This occupation is also attested during the Roman occupation (Ghelase, 1971). The age of this activity is also proven by the fact that the old name of „*Vlach*", given both to Romanians and to Aromanians, became to be considered as equivalent to or synonymous with that of „*pastor*" (Capidan, 2010).

The shepherding continuity in Roman times is also proven by the fact that all important terms related to grazing and herd like „*wool*", „*sheep*" and „*whistle*" are of Latin origin (Meteş, 1925). In addition to these terms, seniority is attested by passages toponymy across the Danube[1] as "*sheep ford*" (Dragomir, 1938).

Simon Mehedinti (1943) reveals that even Traian's Column has pastoral scenes of the Dacians. He believes that the transhumance was first concentrated in the Transylvanian Plateau and only in safe historical periods it extended towards the periphery of Carpathians. As a core area of the birth of this phenomenon, he indicates Retezat Mountains as the oldest pastoral area of Romania. Also in his work, quoting Nicholas Bethlen Count of 1662, we find that most of the revenues of the Hungarian nobles were based on the Transylvanian shepherds.

Evidence for the medieval period are more numerous both for Romanians and Aromanians, Romanian transhumance related references appear especially in the Hungarian chronicles, which were trying to induce even the idea that Romanians are a people of nomadic shepherds that come from south of the Danube after the Hungarians, while about Aromanian pastors in the Balkans wrote the Byzantine chroniclers, who described them as a fickle nation of nomads and savages but recognizing their bravery and rebellious spirit (Capidan, 1927).

Transhumance had an important role in maintaining the unity of Romanian ethno-linguistic, and an important place in the Romanian popular creation. Many folk songs of pastoral life inspiration also appear in the oral tradition of Aromanians (Densuşianu, 1922).

According to written historical sources it seems that the most flourishing period of this phenomenon was at the end of the eighteenth century and the first half of the nineteenth century, a period that saw a great flowering of transhumance and related industries such as textile and dairy products and expanding trade and markets (Dragomir, 1938).

After 1920, transhumance knew a continuous decline because of the war period and because the shepeherds had to limitate their activity to the national territory but also because

[1] Such sheep fords were located at Bechet, Giurgiu, Oltenița, Călărași and Hârșova

the graze areas were taken out of the pastoral use and converted into cultivated land. The most difficult situation occurred in the first years of communist period when the flock were dramaticly reduced by the politics of forced collectivization.

The transhumance was even forbidden between 1952 and 1955, being again stimulated between 1965 and 1989, when the shepeherds used to be one of the few milionaires of Socialist Romania (Drăgănescu, 1998).

Nowadays, transhumance is an endangered activity because of the decline of wool price, the European agricultural policy, sometimes restrictive, requiring aberant standards, aging of rural population and the lack of interest from young people for such occupation, seen as difficult and considerated suitable just for old people (Figure 1).

Figure 1 Romanian shepherd and his flocks from Hateg region

Source: http://gazetavaii.ro/diverse/oieritul-meserie-pe-cale-de-disparitie/

TRANSHUMANCE'S CAUSES AND VECTORS

Transhumance has its origins in mountainous areas where environmental conditions and soil quality do not permit farming and also because the climatic conditions and slope inclination and fragmentation, so the only remaining viable economic activity remains shepherding.

At an inicial phase, in which livestock are small, they are grown locally on the village's estate. In a next phase, with the growing of livestock, when they can not be fed on pastures on the village's estate, the distance at which they arrive increase, this beeing the intermediate stage between a local shepherding and the transhumance, namely the swing between a summer and a winter grazing region, generating secondary establishments as târle (sort of huts) in the plain regions and mountain sheepfolds.

Transhumance was favored by the increasing demand for diary products supplied by sheepfold, the emergence of new markets, periods of relative peace and socio-political privileges and the exemption of some grazing fees abroad, especially in the Romanian Principalities (Dragomir, 1938).

Generally, transhumance routes followed the radial valleys system from the water castles of the Carpathians, the Balkans and Pindus Mountains in all directions.

Shepherds were the factors that contributed to the advancement of Romanian culture and Orthdox spirituality by many donations made everywhere they passed through, and come later to help the strengthening of Romanian element in the former Romanian provinces occupied by foreign powers, especially in Dobrogea (Meteș, 1925).

SIMILARITIES AND DIFFERENCES BETWEEN ROMANIAN AND AROMANIAN TRANSHUMANCE

Both branches of the north-Danubian Romanians (Daco-Romanians) and the south-Danubian Romanians (Aromanians) shows that they have practiced transhumance since antiquity, as attested by written sources and oral tradition and shepherd terms inherited by them from Latin.

The points of contact between the two branches of Romanian and Aromanian shepherds were Balkan Mountains and Tisza Plain, sometimes even Dobrudja.

The existence of nuclei of origin for both Romanian pastor branches, in Central Carpathian depressions and mountain area for Romanians (areas of Săcele, Braşov, Covasna and Vrancea) and Pind-Gramos Mountains for Aromanians (areas of Samarina, Vlahoclisura, Gramoște, Corcea, Veria, Grebena etc.).

Romanian shepherds from the area of Mărginimea Sibiului and Bran-Rucar-Săcele wintered mainly in the Danube meadow and marches in Dobrudja, sometimes directed toward Moldova and even to the Crimea, while Aroamanand were heading especially towards the Plain of Thessaly and Meglen Plain in Greece or Muzaquia Plane in Albania. For summer pastures, Romanians preferred the Carpathians, the Balkans or the Caucasus Mountains while Aromanians bound for Pindos Mountains, Epirus or Dinaric Mountains till Istria (Figure 2).

Fixed Dates for climbing and descended from the mountain, that coincided with the religious holidays of St. Demetrius and St. George. (Capidan, 2010). Type of organization and association between cattle owners, "the *celnic*" at Aromanian shepherds and the "the păcurar" at Romanians, had similar functions.

Both are suppliers of products for the Ottoman Empire and more than that, assured significant funds for treasury of Turkey, Austria and Principalities of transit taxes to taxes paid as rent for pastures of entire mountains because these pastors had huge herds. Ion Ionescu de la Brad mentions only Dobrogea in 1850 over a million sheep and Capidan gives us for the year 1936, the number of 150,000 sheeps only for the Aromanian common Gramoştea in Greece.

Occurrence of synergistic point routes like fairs, huts, tents - future villages and cities. It is well known that Mocanii from the Sibiu Surroundings founded permanent settlements in Wallachia and Dobrudja, where another time came with their flocks, they bought land and became large landowners and became sedentary there (Georgescu, 1925), as did the Aromanians, which have founded settlements in Thessaly plain, becoming farmers.

Another similarity is the existence of places and routes of transhumance kept from generation to generation, like trodden paths of history, some shared between the two branches such as the Balkan Mountains and the Tisza Plain.

The main difference between Romanians and Aromanians is that, at Romanians there was only transhumance, while at the Aromanians with transhumance nomadic pastoralism is also met (Figure 3).

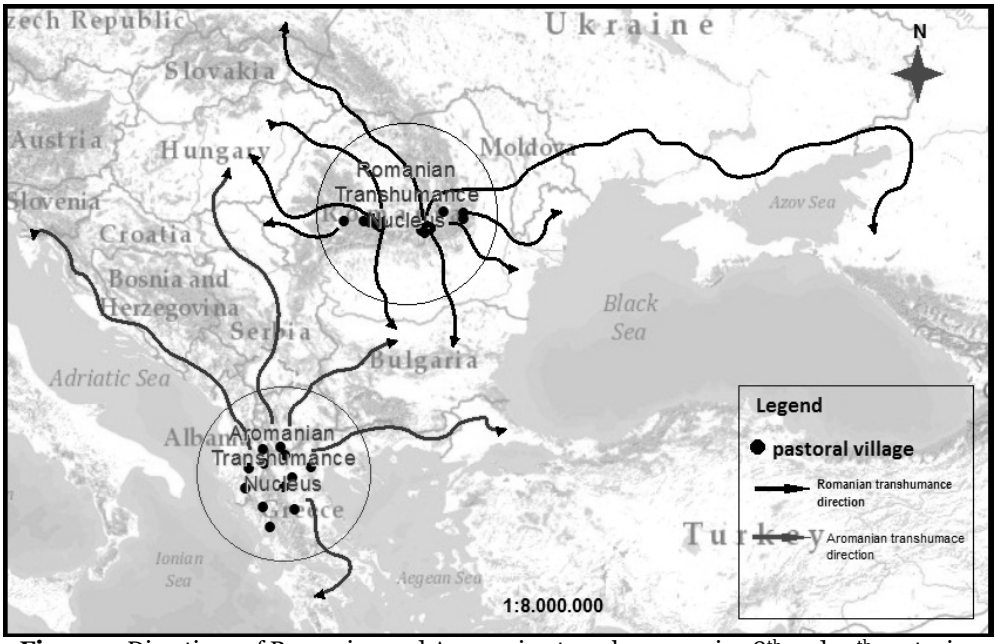

Figure 2 Directions of Romanian and Aromanian transhumance in 18th and 19th centuries

Source: Drăgănescu, 1998

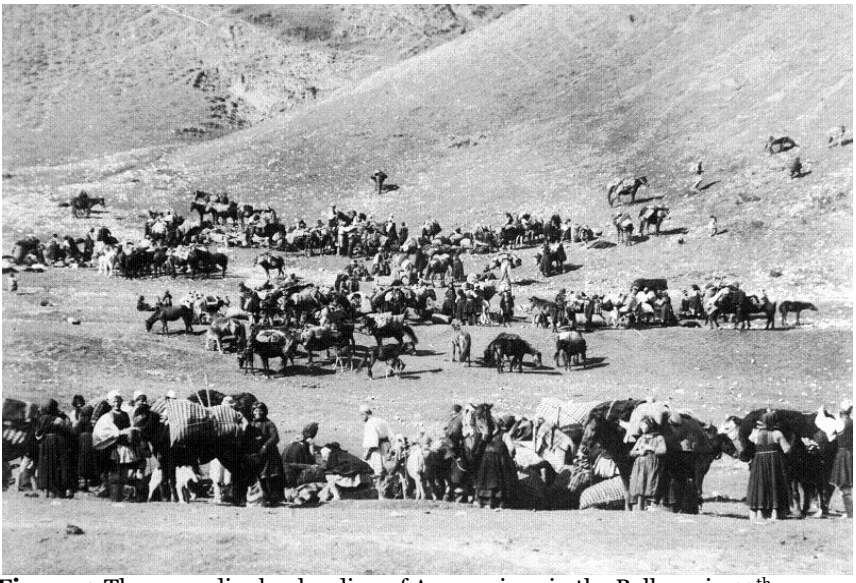

Figure 3 The nomadic shepherding of Aromanians in the Balkans in 19th cenrury

Source: http://www.proiectavdhela.ro/index.php?pag=media&id_prod=27

If in the Romanian's case, we have no historical evidence about nomadism, transhumance being the only shape, in the case of the Aromanians, especially the Farsherot branch; it looks like there was a predilection for nomadic life (Capidan, 1927).

Another difference is that in the case of Romanians, the main house was in lower regions and the secondary residence in the mountain area, while for Aromanians the main house was in the mountain and in the plain they were living in tents or in rented homes, this being called a reversed transhumance (Capidan, 2010).

Although the organization and association of owners of herds was almost identical between Romanians and Aromanians, however, in situations when products obtained from them had to be valued, the Romanian shepherds and sold more on their own or to intermediaries, while in the case of Aromanians, the sale was made directly and collective, never individual, following that the celnic gave to each owner the money according to the number of herds of animals that he had, thus obtaining a better price (Capidan, 2010).

CONCLUSIONS AND DEBATES

Community living material and spiritual traditions of the Romanians in all provinces inhabited by them, the territorial unity consciousness, language and aspirations steadfast in the path of ancient Dacia, formed by centuries of Ottoman rule, the lines of force which ensured the continuity of the Romanian people and therefore the ascendancy to fully achieve full unity state. (Duciu, 1995)

Although the Romanians and the Aromanians were separated by centuries of history and large geographic areas, the transhumance was the element that has maintained in the contatct between them, helping to keep alive the Aromanian consciousness identity that they belong to the great family of the Oriental Romanity.

In their pastoral journey, both Romanians and Aromanians, crossing different countries, coming in contact with all the people in this part of Europe, they spread the Romanian culture but also were a shift factor when they returned to their native lands, being influenced by other cultures too. This observation of new territories, allowed them to see what is offered and what is required on various markets, helping them to develop their business flair, so that the pastors began to focus on trade too, getting among the richest and influential people, many arriving to be dignitaries with important functions.

By keeping the unity of the Romanian language and culture, by their religiosity and donations to monasteries, churches and schools, transhumance pastors have been a key factor in the spreading of culture within the territories inhabited by Romanians and Aromanians, and saving this activity today, is more than an act of economic rescue of an ancestral activity, it is an act of saving the national cultural heritage.

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SPECIFIC ELEMENTS OF THE KARST RELIEF IN ANINA COAL MINING AREA

Laurenţiu ARTUGYAN
PhD Student, Department of Geography, West University of Timişoara, Romania, e-mail: lau_artugyan@yahoo.com

Abstract: Anina Coal Mining Area is defined by Vasile Sencu as the area which is surrounding Anina town and it may be exploited by mining activities and is located in the largest and most compact area of carbonate rocks in Romania, Reşiţa-Moldova Nouă Synclinorium. This paper tries to point out the most specific elements of the karst topography in Anina Coal Mining Area. A direct result of the complex physico-chemical processes is that the karst morphology displays the entire range of surface and underground karst features. Because Anina town is situated in a karstic area, groundwater is used for several years for water supply in Anina town. One of the biggest ecological problems in Anina town is represented by water circulation in karst terrains. I think that an integrate study of all these parts which compound karst topography may be a solution for a good environmental management.

Key words: karst terrains, geomorphology, groundwater, Anina, tourism

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INTRODUCTION

Anina Coal Mining Area is defined by Vasile Sencu (1977) as the area which is surrounding Anina town and it may be exploited by mining activities. This area is located in Banat Mountains, in the center of Aninei Mountains, a subunit from Banat Mountains. Anina Coal Mining Area is located in the largest and most compact area of carbonate rocks in Romania, meaning here Reşiţa-Moldova Nouă Synclinorium.

Reşiţa-Moldova Nouă Synclinorium is the place for classic getic sedimentary development and Anina is a town situated in the center of this basin. In this area are thick sedimentary deposits (Mutihac, Ionesi, 1974).

From the entire synclinorium area, only the Jurassic-Lower Cretaceous includes limestone deposits. The impact of physico-chemical processes may be seen mostly between 200 and 600 m altitude (Iurkiewicz et al., 1996).

This paper tries to point out the most specific elements of the karst topography in Anina Coal Mining Area, based on the first writings regarding this area and based on the personal observations and work as a consequence of many field applications in the study area during the last 4 years.

In the past this area was very important for the Romanian economy due to the coal reserves and because of this Vasile Sencu had made many studies in field of geology and hydrogoeology. Nowadays this area is a deprived area because in 2006 the mining activities

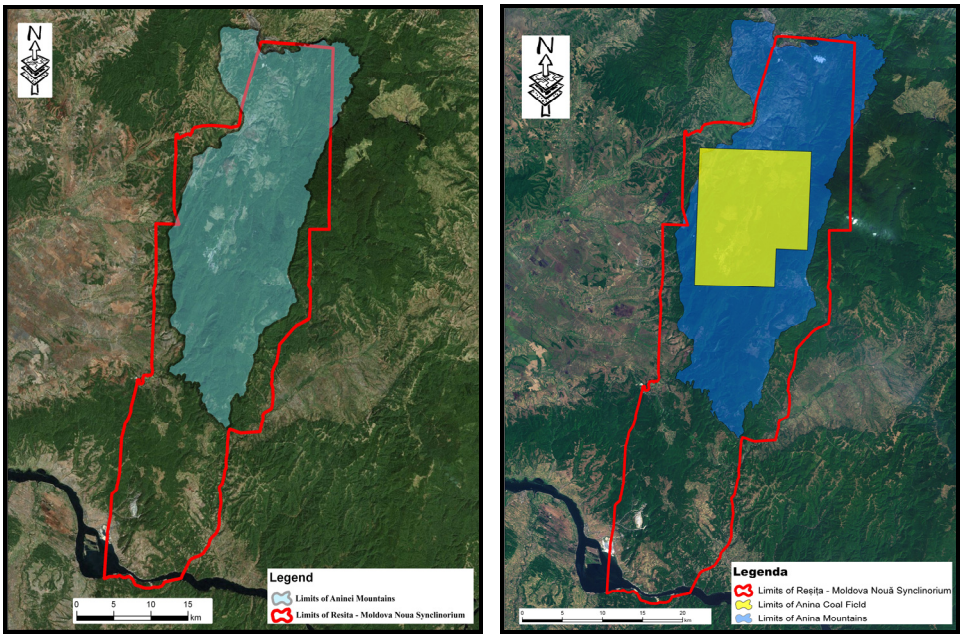
were stoped. And there are many problems regarding karst vulnerability due to the lack of ecological education.

Between 1955 and 1989, based on the coal resources, in Anina town came many settlers from the poorest regions of Romania in that period. After 1989, when economic restructuring started, Anina town was the scene of massive layoffs. Because of these, nowadays the town has the aspect of a town which was passing through a war. In this landscape of poor and seawage, the nature recovers its rights and it regains its territories (Satmari, 2007).

Anina town has nowadays many ecological problems as water pollution and subsidence caused by the waste-coal self-ignition process. Anina town is built over a heaps-land and this situation may represent a risk in the future (Satmari, 2010).

LOCATION AND LIMITS OF STUDY AREA

The study area of this paper is situated in the South-West of Romania, in Caraş-Severin County. It is located in Banat Mountains, more exactly in a subunit of Banat Mountains called Anina Mountains (Figure 1a), called after the town with the same name located in the center of this mountain area. Anina Coal Mining Area is located in the central part of Anina Mountains and it represents the area surrounding Anina town, an area which in the past was exploited by mining activities (Figure 1b). This area was delimitated by Vasile Sencu (1977) as a rectangle oriented N-S, with the narrower sides in the North and South.



a b

Figure 1 Location of Anina Mountains in Reșița-Moldova Nouă Synclinorium (a) (Artugyan, 2012)
Location of Anina Coal Mining Area in Reșița-Moldova Nouă Synclinorium (b)

Being a part of Anina Mountains, the study area is included in the most compact area of carbonate rocks, naming here Reşița-Moldova Nouă Synclinorium. Anina Mountains occupy 2 parts (from 3) of Reșița-Moldova Nouă Synclinorium, the Northern Compartment named Reșița-Anina and the Central Compartment called Anina-Nera (Orășeanu, Iurkiewicz, 2010).

This synclinorium presents many faults and fissures. The main direction for these faults and fissures is NNE-SSW. This direction imposes the main drainage direction. Besides, these fractures are separating the aquifers and are acting as boundaries between the main karst systems (Iurkiewicz et al., 1996).

KARST TERRAINS IN ANINA COAL MINING AREA

This zone of Reşiţa-Moldova Nouă Synclinorium belongs to the structural unit of Getic Nappe, as a large structural unit. The actual structural constitution of this karstic area is a result of the Hercynic and the Alpine tectonic cycles. The entire area has a NNE-SSW orientation and his main geomorphological characteristic is that there are long parallel ridges, separated by karstic plateaus or valleys (Bucur, 1997).

Based on a Digital Elevation Model with a resolution of 30 meters we were able to generate a general perspective of these plateaus separated by valleys (these valleys were obtained from the topographic maps scale 1:25000 using digitizing method) in ArcGIS 9.3 software, and in the middle of this area is located Anina town (Figure 2).

Sinkholes are the most present karstic feature in this area, but these features are very important from geomorphological perspective because it may represents vulnerable points in karst terrains and risks points for human activities. It is generally known that any construction near sinkholes may be a risk because of concerns of flooding, collapses or potential impact on groundwater (van Beynen, 2011).

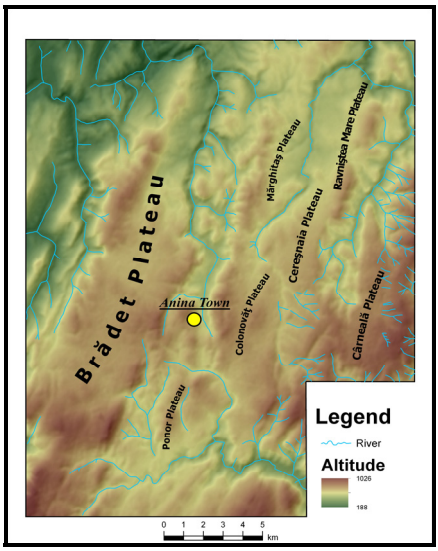


Figure 2 The general aspect of karstic plateaus separated by valleys in Anina Coal Mining Area

The Aninei Mountains limestone belongs to this large synclinorium. These mean that limestones are found at different stratigraphic levels, forming large surfaces of limestone. This synclinorium is formed by many bands of limestone, from different ages, that are repeating due to the longitudinal faults (Bleahu et. al, 1976).

Because of these plateaus separated by deep valleys, this karstic area is considered as representative for the type of karst plateaus and is given as example for this type of karstic regions These plateaus are areas with a high level of karstification processes (Onac, 2000).

Characteristic for these karstic plateaus are large areas of limestone, cut by erosion, separated by deep valleys, with gorges to reach local base level. Plateaus are at one side bounded by faults along which make contact with marginal depressions (Figure 3).

Figure 3 A specific karstic plateau and many sinkholes situated on this plateau

Source: Artugyan, 2011

A direct result of the complex physico-chemical processes is that the karst morphology displays the entire range of surface and underground karst features. These karstic landforms have many different evolution stages (Iurkiewicz et. al, 1996).

Speleological highlands are particularly interesting. Caves are found on these plateaus at the end of blind valleys, where water is lost. These features are large caves and potholes. All are representing "windows" to underground networks. There are fossil caves, which are witnesses of old drainage networks at levels above current hydrographic network (Bleahu et. al, 1976).

When we speak about karst topography we speak about certains conditions due to have karstic landforms and the main condition are permeable rocks as calcite and dolomite. These rocks are permeable and are the main element which is favorable for karstification.

Inside Anina Coal Mining Area are different types of limestone. Most significant differences arise from the fact that rock geochemistry is different from a type of limestone to another. Adrian Iurkiewicz et al. (1996) present analysis of 20 rock samples from this area, analysis made by Lazăr (1963). The results of these analysis shows that the Upper Plopa limestones have the largest carbonate contents (94.08-94.97% calcite, 4.92-3.86% dolomite, 0.64-0.37% impurities). The next type is Valea Aninei (*Anina Valley*) limestones, followed by Marila limestones, Gumpina limestones, Valea Minișului (*Minișului Valley*) limestones, and Brădet limestones (Iurkiewicz et. al, 1996).

EXOKARST

The main type of bedrock in Anina Coal Mining Area is carbonate rocks and based on this bedrock in this area are developed many karstic depressions. Due to the karstification processes the hydrographic network is disorganized. This specific of the hydrographic network is the cause of the occurrence of many endorheic areas (Figure 5a), most of them located on the karstic plateau.

The exokarstic landforms in this area are specific to karst topography: sinkholes, poljes, uvalas, karren fields, dry valleys, blind valleys, valleys of sinkholes, ponors. But the most reprezentative exokarstic and most numerous are the sinkholes (Figure 4, 5b). Vasile Sencu said that "this area is riddled with sinkholes", based on the large number of dolines that are present here (Sencu, 1977).

Figure 4 A sinkhole situated in Anina Coal Mining Area

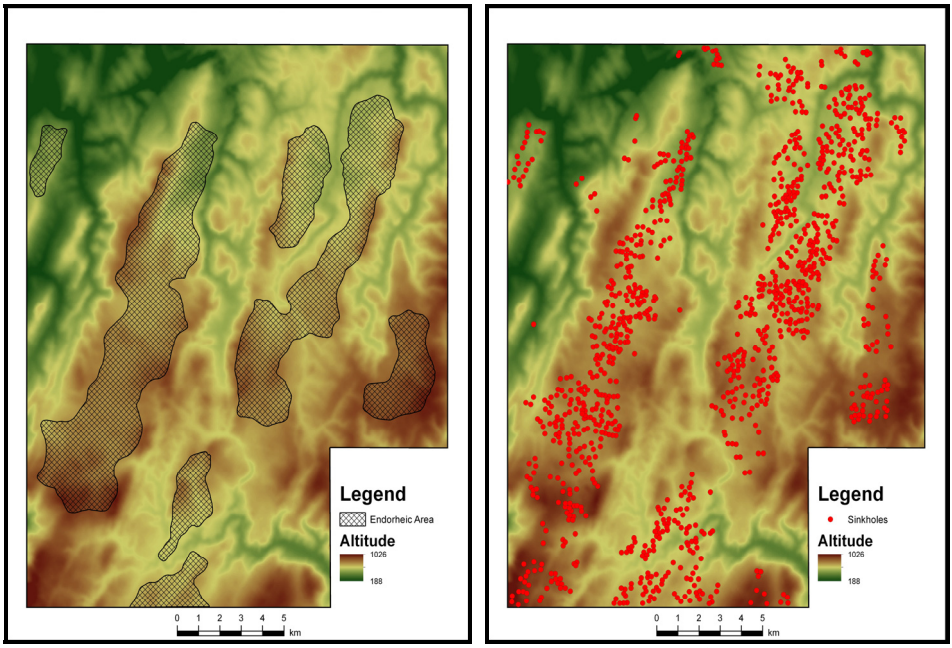
Source: Artugyan, 2009

These karstic depressions tend to develop nearby the old sinkholes because the hydrogeologic and topographic settings for the old ones are favorable for sinkhole development Because sinkholes are the place where water recharge to the karst aquifer, human waste from urban areas or animal manure in rural areas placed in this karstic depressions can be carried directly into the groundwater. (van Beynen, 2011).

These sinkholes are with circular and oval contour, and most of them were formed by collapse. Based on the large number of dolines present in this area, there are many sinkholes valleys which are formed by the union of these sinkholes. Most of these sinkholes valleys are located in Ravnița Mare Plateau. Other areas where these sinkholes valleys are present are Mărghitașul Mare Plateau and Brădet Polja.

Blind valleys are specific for Anina Coal Mining Area and together with caves are pointing out the sequence of karst catchments. These blind valleys are: Ponor Valley, Covăcia Valley, Uteriș Valley, Buhui Valley and Certej Valley (Sencu, 1977).

Dry valleys highlight former hydrographic network and are closely related to the geologic and tectonic direction in this area.



a **b**

Figure 5 The endorheic areas (a) and sinkholes (b) situated in Anina Coal Mining Area

ENDOKARST

In the Anina Coal Mining Area are many caves and there is one of the most important cave in Romania, naming here Buhui Cave. Buhui Cave is crossed by the longest underground river in Banat. There are other caves: Cuptoare Cave, Ponor Cave, Plopa Cave, Mărghitaş Cave and some other smaller caves. All this caves are very important sights for scientific activities and may be also important sights for touristic activities. Nowdays in these caves most of the touristic activities are unorganized activities and because of this most of them are vandalized.

Till 1959 in Anina Coal Mining Area were studied and mapped 7 caves. After 1959 caving research was sporadic, but starting from 1963 when in Anina was born a speleological association called *Stalagmitica Anina* caving became an important activity. The members of this association start from that year to study sistematically the caves from Anina Coal Mining Area. Based on this activity were discovered and mapped many caves (Sencu, 1963).

Aninei's Cave is located on the left side of Gârlişte Valley, near the rail Anina-Oraviţa, the first mountain rail in Romania (1856). The length of this cave is around 500 meters, with many galleries with a maze aspect (Sencu, 1963).

Galatiului Cave is situated on the right side of Gârlişte Gorges, at an altitude of 362 meters, in the place called *Galati*. It is a cave with 192 meters length, formed in stratified limestones and with intercalations of silex. The cave has three sections, it is a horizontal cave with two entrances (Figure 6) (Negrea et al., 1965).

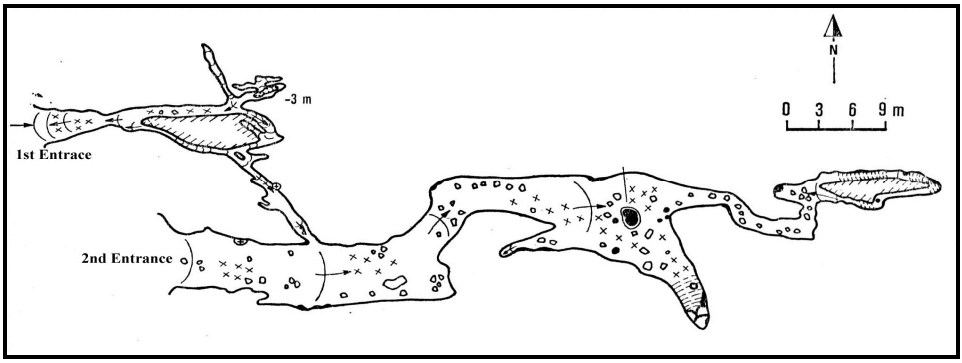


Figure 6 Galatiului Cave mapped by Negrea et al. (1965)

Source: modified after Bleahu et al., 1976

The Cave with water from Gârlișteș Gorges is located on the right side of Gârlișteș Valley. Its length is about 900 meters. Because it is an active cave there can be seen many consequences of physical and chemical erosion. Many cave's sections presents speleothemes (Cocean, 1995).

Mărghitaș Cave is situated on the right side of Buhui Valley with a length of 115 meters. This cave is downstream the Buhui Cave, near the creek Buhui which is crosses the Buhui Cave. This cave has in the final hall a lake (Sencu, 1963).

Cuptoare Cave is located under the road which is the way to Maial Chalet. This cave is situated at 125 meters from Şaua Cuptoare and it is a superior gallery of Buhui Cave, but in time the connection between these caves was closed by falling rocks. The cave has 135 meters length and it is formed by a corridor which that leads into 2 halls (Figure 7). The last hall is the most beautiful, having many speleothemes (Sencu, 1963).

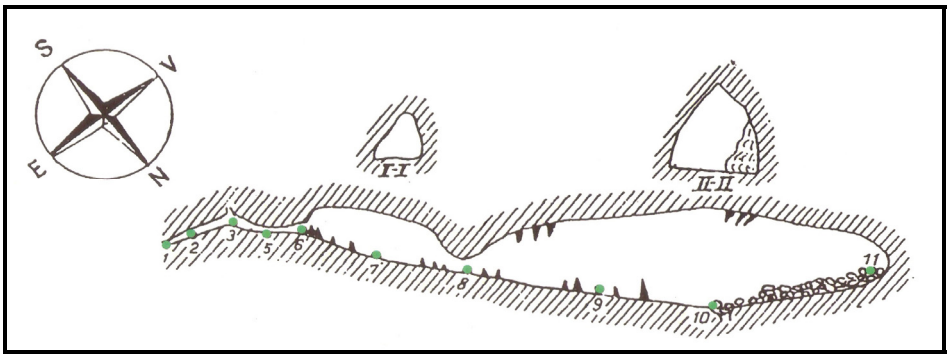


Figure 7 Cuptoare Cave mapped by Sencu et al. (1963)

Buhui Cave is the most important cave in Anina Coal Mining Area. We can say that Buhui Cave is the "star" of this karstic area, being the most interesting for scientist, cavers and tourists. The Buhui Cave is crossed by the omonim creek, being the longest underground river in Banat. At the Grota Buhui entrance, where Buhui creek is leaving outside from the cave was built a dam and a headrace channel for water supply for Anina.

Buhui Cave is located in the central part of Colonovăţ Plateau downstream the Buhui Lake. It was mapped for the first time in 1958. The acces in the cave it is possible through four entrances, listed in the flow direction: Certej entrance, the entrance through pothole, entrance through the sinkhole and the entrance Grota Buhui. Buhui Cave has different morphogenetic galleries, and 3 levels: the active level, semiactive levels and the fossil levels (Sencu, 1963).

Morii Cave is situated on the right side of Morii Valley and it has 340 meters length. This cave was also used for water supply for Anina town. This cave is crossed by a small creek which is losing in the final hall in a whirlpool (Sencu, 1963).

Ponor Cave is a cave in the South-West of Ponor Plateau with 265 meters length. It is formed on tectonic diaclase. This cave was in the past an active one. This aspect is proofed by some terraces and some others morphology elements. Nowadays this cave is a fossil one, with an evolution that lead to be clogged. The water thread which once crossed the Ponor Cave galleries is nowadays drained in another cave located in the South-West of Ponor Plateau, very near to Ponor Cave, called Plopa Cave (Sencu, 1964).

Plopa Cave has 710 meters length and its entrance is located in the left side of Miniş Creek, at the same level with the creek. At the entrance is lake, succeeded by other lakes. These are formed in stalagmitic dams and when is drought some of them are drying (Sencu, 1964).

Plopa Cave is a very important cave in Romania and also in Europe because after the year of 2000 in a gallery of this cave was found the oldest bone of the modern human in Europe dating back more than 40,000 years.

GROUNDWATER

In a karstic area the hydrographic network is disorganized and many rivers are disappearing in the underground. All around the world karstic water is used for water supply. Because Anina town is situated in the middle of a karstic area, groundwater is used for several years for water supply for the population in Anina town and also for industrial and mining activities in the past when these fields were operational.

The hydrokarstic systems in Anina Coal Mining Area contain three hydrological zones specific for these karstic area, based on the Vasile Sencu observations. These hydrological zones are: the aeration zone (which is located close to the surface), the permanent circulation zone (located under the aeration zone and above the low-water-level represented by the level of the karst intermittent springs and surface thalwegs) and the general junction zone (this zone is situated under the low-water-level of the ground-water, up to high depths) (Satmari, 2008).

Based on the karst topography, the surface water is often going in the underground through sinkholes and potholes. In Anina Coal Mining Area the groundwater is used for water supply for Anina town and the suburbs of this town. One of this catchment areas used for water supply is Certej-Buhui system. This is the main water supply source for the city of Anina. This karst system is partly regulated through an artificial lake, the Buhui Lake (Iurkiewicz et. al, 1996).

At the entrance of Buhui Cave where Buhui Creek leave the caves' galleries were built in 1886-1889, as we can read on a table placed in the cave wall at the resurgent point (Figure 8a), a water supply channel for Anina town (Figure 8b). This water supply systems (Figure 9) is used also today as we may read in the presentation of water supply and sewerage system which we may be found on the web site of AquaCaraş (the company dealing with sewerage

and water supply system in Anina and some other towns in Caraş County) (http://www.aquacaras.ro).

a b

Figure 8 A table placed at the resurgent point of Buhui Cave when the water supply channel for Anina town was finished in 1889 (a) and the dam with the adduction channel for water supply at the resurgent point of Buhui Creek from Buhui Cave (b)

Source: Artugyan, 2011

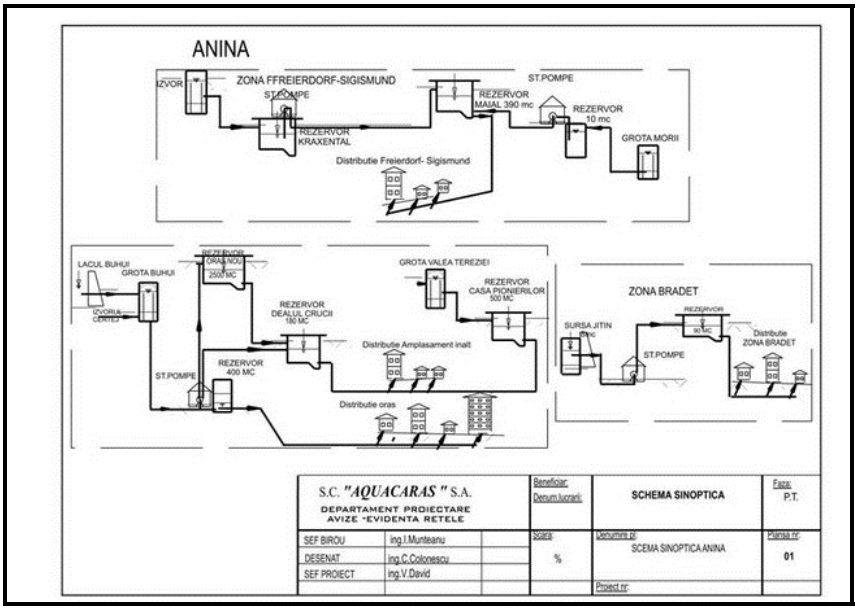


Figure 9 The water supply systems scheme for Anina town

Source: http://www.aquacaras.ro

Being located in a karstic area, one of the biggest ecological problems in Anina town is represented by water circulation in the karst terrains. Because carbonate rock does not permit water storage, there is a rapid infiltration and the water capacity of self-purification is diminished (Satmari, 2008).

TOURISM IN ANINA COAL MINING AREA

Coal mining in Anina starts in the year of 1792, when the first coal seams were discovered by the Austrian colonists who came there for exploit charcoal. These coal mines were exploited for more 200 years, but the mining activities were stopped in 2006 (Popa et al., 2010).

Based on the karstic landforms, Anina Coal Mining Area and its surroundings, has a great touristic potential. Even in the 1970s Vasile Sencu, the main researcher of this area, point out a large numbers of touristic attractions as gorges, caves, springs, lakes, uvalas.

In the past this area has as main economic specific mining activities and extraction of rocks. But after the socialist regime has collapsed, mining activities began to decline and in 2006 all mining activities were stopped permanently after an accident with many victims. In the 1990s, when mining activities began to decline, Anina Coal Mining Area began to lose people as a consequence of increasing unemployment. But these many touristic attractions may be a chance to revive the area economically and to become an important touristic area in Banat area and in Romania.

A large part of this area is included in the Cheile Carașului - Semenic National Park and because of this there are many protected areas inside Anina Coal Mining Area. The most representative protected areas are Buhui Cave, Caraș Spring, Gârliște Gorges and Buhui Gorges.

One of the most serious problems in this area from touristic perspective is the small number of accommodation places. Even in 1978 when Vasile Sencu wrote the first touristic guide for Anina Mountains, he said that the number of accommodation places is insufficient (Sencu, 1978).

This area is relatively far away from the largest roads network, but one national road and more regional roads that are connecting this touristic area with other regions. This situation is almost the same as in the 1980s when Sencu presented the same for accessibility (Sencu, 1978).

But nowadays the number has decreased, not increased. In Anina Coal Mining Area Maial Chalet and Diana Motel lose its character of spaces for accommodation. Steier Hotel (the only one hotel in Anina town) has an uncertain situation nowadays, but tourists are very rarely seen in this area because touristic infrastructure we can say that it is missing.

Based on the karstic landforms present in this area there are many types of tourism that may be practiced: adventure tourism, speleological tourism, scientific tourism, balneo-climateric tourism and recreational tourism. Besides, this area has another potential resource that may be exploited in tourism field - industrial and mining heritage.

In this area exists a geopark (only by the name) were we can see many items of plant fossils (Figure 10). This geopark is located in Zânei Hill (in local speaking called *Tâlva*). All these touristic resources must be exploited in an ecological way, without affect environmental processes.

Figure 10 An example of plant fossils located in Zânei Hill (*Tâlva Zânei*) belonging to the Jurassic flora

Source: Artugyan, 2009

There are many proposals and ideas to protect the geological and paleontological heritage present in Zânei Hill. For researchers the heritage of this hill deserves to be protected and in their opinion this thing is possible only by creating an organized geopark, under a law. This potential geopark is seen as an opportunity to increase the environmental preservation, but also a chance to increase the economic potential of Anina town (Popa et al., 2010).

These paleontological resources are very valuable from the historical point of view because the collection present in Zânei Hill has a high diversity of plants species belonging to the Jurassic flora (Popa et al., 2009).

All these natural resources and human made resources may be exploited through tourism. This economic domain that nowadays is sporadically present in Anina Coal Mining Area can be the chance for those who live in this area and are living to limit or below the limit of subsistence.

It is very important to value these resources without forget about protect the environment, but as Satmari Alina (2009) said, *unfortunatelly we pretend today ecological consciousness to a people that has never received an ecological education* (Satmari, 2009).

Even if this paleontological site is very valuable, this aspect is not used for develop a touristic site where tourists may see Jurassic flora in the mining landscape of Ponor Pit. Unfortunatelly for the economy of Anina town this site is a touristic point, but without charging any fee for tourists and without bringing income for the local budget.

For those who have studied this area in terms of geosystem, tourism as an alternative may be a solution, but even this one with some difficulties. From outside tourism seems to be the first solution for sustainable development for Anina Coal Mining Area, but within the system the economic and social tension has led to depletion of active demographic and ideological resources that should work together to achieve such a goal (Satmari, 2009).

CONCLUSIONS

Anina Coal Mining Area it is a very interesting region from many point of views. In the past this area was a very important economic center. Because of this starting from the 60's and to 90's these area was a research zone which was study from geologic, hydrogeologic and speleologic perspectives. After 1990, when political context has changed in Romania, the economic decline starts in this mining area and also research activities. But after 2000 Anina Mining Area became in the attention of researchers and some studies were made in this area. As we may see above, in the previous sections, karst topography is the specific relief present here. This type of relief and its specific elements are defining this area, but also are influencing all environmental elements and human life too.

Studying the geomorphology of this area we may analyze two large sections of study, the valleys and the plateaus, but also the surface landforms connected with the underground surface. I think that an integrate study of all these parts which compound karst topography may be a solution for a good environmental management which may lead to an ecological area where people live in harmony with the environment after decades of pollution.

In my opinion the future of this area from the point of view of geomorphological research must be a research which must lead to certain results that will help to better understand karst topography and how people should exploit such a relief without affecting karst environment. Furthermore I think that a geomorphological study may help to highlight the main touristic attractions present here, karstic landforms. And for a very poor area, were unemployment has very large rates, tourism may be an opportunity for those who are living in Anina Coal Mining Area.

In the last decades of the 1990s Anina Coal Mining Area was an area very interesting for geologist and geographers. Vasile Sencu performed many studies regarding the geology, hydrology, geomorphology and karstology of this area. But these approaches were at the level of that period. Because in the modern period in this area studies regarding karst geomorphology were almost inexistent, we think there is needed to study this karstic area from modern geomorphological approaches using methods of GIS and geophysical methods.

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THE FORTRESSES

Ioan D. ȚARCĂ
PhD student, Department of Geography, University of Oradea, Oradea, Romania,
E-mail: nelutu_d_ioan@yahoo.com

Remus FOLVARI
PhD student, Department of Geography, University of Oradea, Oradea, Romania,
E-mail: remus_folvary@yahoo.com

Abstract: In this article we try to present a different side of geography, the military geography. Military geography role is to study the characteristics of land in military terms and relief the importance of knowledge elements in organizing the fight. Knowledge of the field strengths can make the difference between victory and defeat, and applying appropriate tactics can change the tide of battle. The fortresses had an important role in time, and in this article we try to present those elements specific geographical.

Key words: defense and patriotic war; defense system

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THE HISTORY OF THE SUBJECT IN FOCUS

In Antiquity, the system of fortifications was spread across all the Carpathian-Danubian-Pontic space, highly present in the study area. Almost all the settlements in this area were fortified with defensive ditches and large ramparts. As for example the ones in Andrid, Carei, Pir (The Someş Gate), Girişu de Criş, Otomani, Văşad (The Crişurilor Gates) and so on.

The first grouped fortification systems appear after exiting the Somes Gate from the Transilvania Plateau: Dej, Bobîlna, Lozna, but also on Mureş Valley. These are generally displayed on the highest peaks using different construction methods, from the simplest one made of mud, protection fosses, to the more complex ones, with palisades, etc. The military fortresses of the Getae-Dacians have produced even since ancient times strong impressions on contemporaries; Herodotus called them „the bravest and justest of the Thracians”[1].

During the reign of Burebista, in Dacia spread the phenomenon of building mud and especially stone fortifications whose clear purpose was to protect its own population from the invasions of the enemies. Likewise, the main responsibility of the king was to organize a permanent army, meant to assure the territorial integrity of the created state and another army formed by men all over the Dacian territory, the entire army having about 200.000 warriors. The main focus was on the construction of fortified settlements and fortresses having as purpose to protect not only the population but also the Dacian centralized state.

[1] Herodotus, Histories, IV, page 93

The fortified settlements were generally built on a headland above a river or an abyss, being usually defended from three parts of steep slopes, hard to climb. The only access point which connected the settlement with the plain or the surrounding heights was blocked by a rampart of mud or crushed stone and on its crest a wooden palisade. Usually the rampart was surrounded by a defensive fosse without water. They are different from other fortresses in the sense that the settlement was entirely (or at least a part of it) protected and defended by fortification elements, having as main purpose to protect its inhabitants; the military role is relatively general, these being strong points of the Getae-Dacian state, representing the main, local effort in defending the entire population; the fortresses do not include within their defensive elements a great number of dwellings and implicitly a high and stable population; on the other hand, the fortresses could have different roles, sometimes cumulative: either an exclusively military role, either used as abodes for leaders and acropolis (compared to the neighboring civil dwellings) or as shelters when in need.

There are even rarer the settlements completely fortified by such defensive elements (rampart, fosse, palisade). Dacian settlements of the type headland fortified by rampart and fosse can be found at *Tăşad* (Bihor county) on „Cetăţeaua" height, *Marca* (Sălaj county) on „Cetate" ridge, etc (Dumitraşcu,1993).

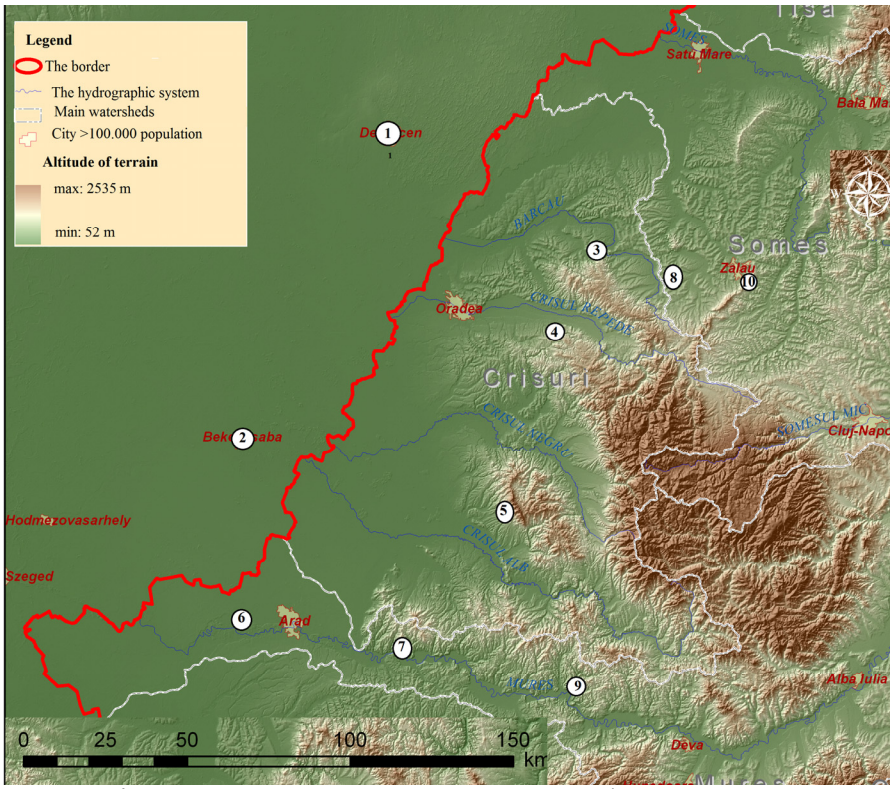

Figure 1 The Geto-Dacic Fortresses between. 1 î.Ch - 1 d.Ch. centuries.
În study area is observed: 1 – Debreten, 2 – Bekescsaba, 3 - Sacalasău Nou, 4 – Tăşad, 5 - Ciurbeşti (?), 6 – Pecica, 7 – Cadova, 8 – Marca, 9 – Cetăţeni, 10 - Tusa (?)

Fortresses distinguish themselves through the ingenuity of the construction related to the available materials, land configuration and other factors. There are displayed all over the Getae-Dacian state, the tendency of construction usually being in hilly and mountain regions, on dominant peaks, at the entrance or exit from passes where there were good visibility conditions to great distances, in order to prevent attacks by surprise. The main construction materials were stone, for mixture wood and mud were also used (Gudea, 1972).

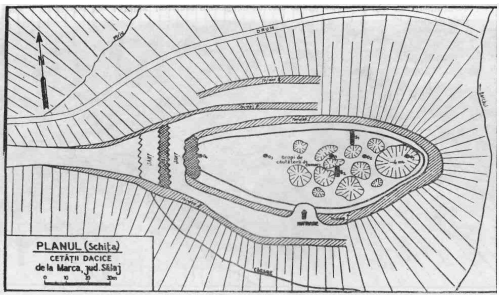

Figure 2 Dacic fortress from Marca, jud Sălaj

Source: Dumitraşcu, 1993, p. 171.

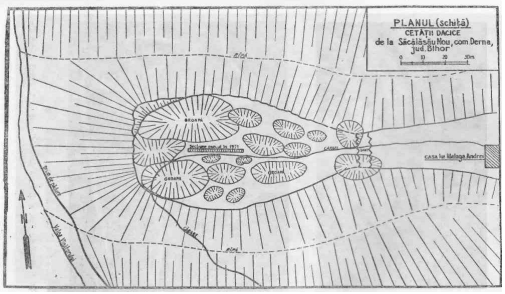

Figure 3 Dacic fortress from Săcălăsău Nou

Source: Dumitraşcu, 1993, p. 173.

After Dacia was conquered by the Roman Empire, a true in depth, network fortification system was developed in order to observe and control all the activities in the territory in front of the border, all the access possibilities and to quickly inform the entire defensive system, including the fort behind it.

These fortifications were generally built at the highest points on the entire ridge of and the Western part of Apuseni Mountains, protecting like a long, natural barrier. The towers built on the ground maintained the visual connection between them and the first defensive elements of the systems, on one hand, and the entire observation and fort system, on the other hand. A part of these towers had a wide observation radius both inside and outside, being considered observation and signalization points, and the other ones were barely linking points, namely to convey the signals of the observation and signalization points.

According to their display on the land, their established technical characteristics and the distance between them, there is some general information about towers:

a. the external shape of the towers is that of a mamelon with a circular base and deep in the middle; the diameter measures between 6-15 m, the height is between 0,50 – 2,00 m; it has in the upper part a narrower or wider circle.
b. most of the towers were built on a top or natural high land which allows such a dominant position. This high land can either be an isolated peak on a ridge, a smaller one downhill or even the level oscillation of a ridge.
c. the towers were never built exactly on that particular height, being mostly in the inner part, either to protect the construction from strong winds or to directly observe the outside.
d. regarding the location but strongly related to the position of the other towers or forts, the towers can be grouped according to the width of the observation radius and visibility in towers with a large observation radius towards the outside, practically unlimited, towers with a medium observation radius, limited to a close area and towers with very limited observation radius.

e. the distance between towers and the other elements of the system varies according to the necessities of the system, their role as well as of relief. Where the land is oscillating the towers are numerous, the linear distance between them being very small. For example, in the area of Porolissum complex, the relief imposed the control and observation over every valley or access point and the distances between towers are small. They vary from 25 – 50 – 100 to 300 – 500 m. Where the ridge is higher, being itself a barrier, towers can be found at bigger distances.
f. strongly related to the observation radius there are several possibilities to convey signals; therefore we have towers that convey signals to forts only through the towers from their group, having no direct visual contact with the fort or its closest area and there are towers that could convey signals to forts only through other two or even three towers.
g. the role of the towers is determined by two basic needs: the necessity to observe and convey, to alert through signals the entire system and also the forts. Actually, this role is much more complex: towers had to keep an eye outside on the actions of possible enemies, to control the access points, to guard these points and signalize the forts every type of danger. Their role is, exclusively, to offer protection, therefore there is not surprising that in the more exposed sectors their number grew, or that their size and type would change according to the needs of the location.

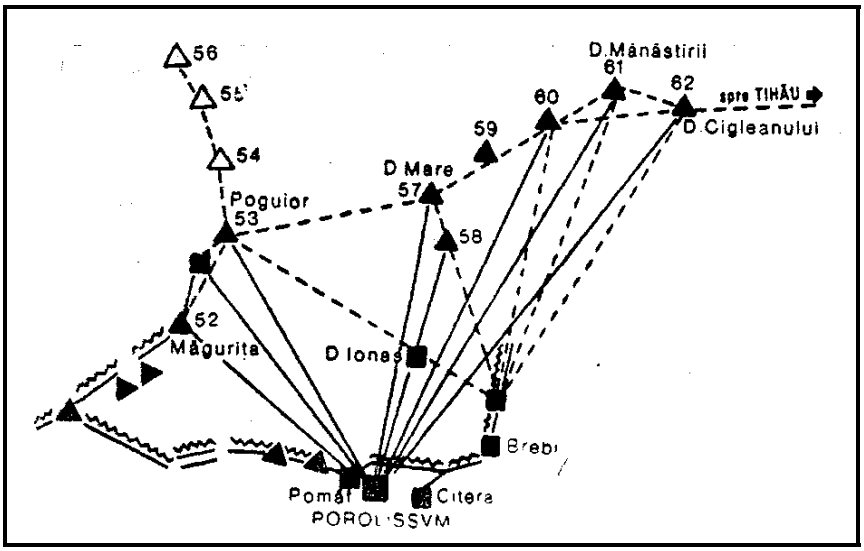

Figure 4 Porolissum defence system

Source: Gudea, 1986, p. 38.

From the point of view of the construction material we could identify towers made of stone and probably wood. The last category is less probable. It is the type of towers which according to the trace left on the ground are typical for a tower but the researches could not identify clear evidences or stone ruins. Even though there are traces of Roman habitation, data regarding the type and system of construction are missing.

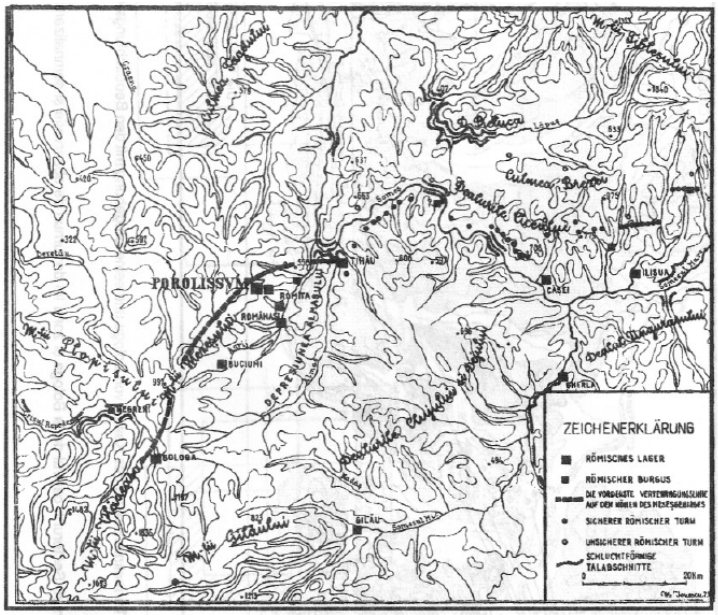

Figure 5 Map with a system of towers in the area of Meseş Mountains, drawn by I. Ferenczi
Source: Gudea, 1997, p. 101.

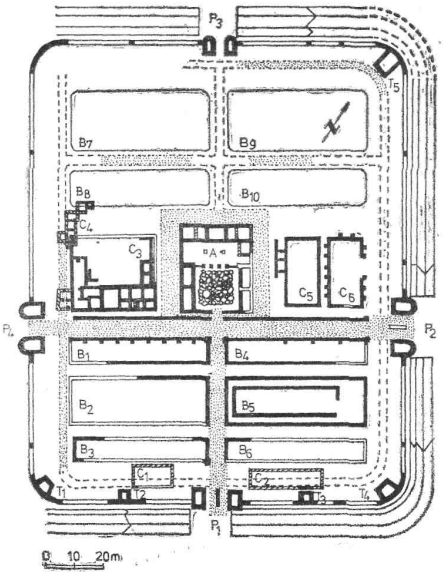

Figure 6 Roman fortress from Buciumi

Source: Gudea, 1972, p. 106.

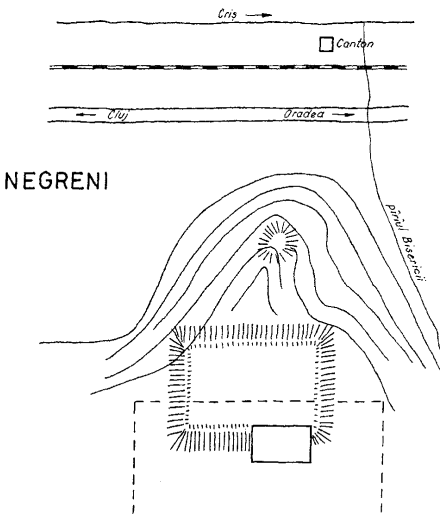

Figure 7 Observation post from Negreni

Source: Gudea, 1997, p. 104

MIDDLE AGES

The demographic concentrations and the continual evolution of the Romanian state organization created new, superior resources for the development of fortifications whose execution implied hiring important work force, a certain specialization and a leadership able to make use of their authority in such a wide territory. There were identified a growing number of fortifications.

On the territory of Transilvania and Banat, the Anonymous Chronicle mentions *Biharea* and *Satu Mare* fortresses in Menumorut's voivodeship, Gelu's *cetatea de Ungă Someş* (unmaned) and Glad's fortresses: *Orşova* (Urscia, Ursua), *Horom* (Haram) and *Cuvin*. Without entirely replacing the mud and stone fortresses meant to protect in case of danger entire communities, gradually appeared a series of fortifications of smaller size, destined to a certain number of feudals and their families or being the abodes of the leaders of some social and political structures. In certain situations, such fortresses were considered observation points and border resistance or in some areas of military importance (fords for main rivers, communication nodes, Carpathian passes, etc).

The value of the fortification executions proved itself during the heroic, defensive battles carried out by the voivodeships of Menumorut, Gelu, Glad, Ahtum, Jula when fortresses such as Biharea, Satu Mare, Dăbîca, Arad — Vladimirescu, Morisena (Cenad) resisted for a long time to some heavy sieges.

Judging by the unfolding of some wars, fortresses were used as resistance points during invasions (and also as own force concentration), in order to divide, induce losses and delay the enemy penetration. Meanwhile, the main forces of the Romanian army was fighting at the border, harassing, impeding the enemy to supply itself and preparing the ultimate effort of resistance and aggression.

Between the VIII—XIII centuries, the Romanian people had to face the invasion attempts of the Slavs, Bulgarians, Pechenegs, Uzis and Cumans followed by the Mongolo-Tatar invasion.

Facing this situation, Menumorut conceived the in depth, strategic approach, taking advantage of the land, fortification constructions and the submission to battle of all population. The defensive actions were conducted on directions, focusing on the Southern troops in order to outnumber and deny their access to Biharea fortress. Withholding relatively small valued troops combined with violent fight back offensive, the army of the Romanian leader managed to defeat the enemy's intentions to achieve the strategic objective of the Souther troops. Finally, the in depth intervention of the main forces along the course of Crişul Repede withstood the invasion of the Souther troops towards the vital center of the voivodeship.

At the same time, a part of the forces of the Bihor voivodeship were fighting against the Northern enemy troops. Having greater forces, the enemy managed to advance until Sătmarului fortress, though having important losses, where the Romanian leader decided to surprise them in battle. The attack for defending the fortress started in the nearest access areas, to which participated the population of the nearby settlements and, by offensive strikes, the troops of the fortress' army, which had the necessary ammunition for a long distance battle. The defenders fought back with arrows, stone projectiles and flammable material. Their effort materialized in the successive fight back of the enemy's actions, with great losses for the latter part, our army managing to heroically resist the attack for four days.

After the fight from Satmarului area, followed by a period of recovery, the forces of the north enemy groups, united with the remains of the one from the south, headed for to search

for plunder towards Meseş Gate, where they received a response from the army of the Principality of Transylvania under Gelu's reign.

The attack towards the inner side of the Carpathian Arch marked a new phase of aggression of the worrior tribes. It started under the leadership of Tuhutum who tried to enter the Transylvanian Basin.

The attacks of the worrior tribes against Menumorut's territories were resumed in the years 906-907. Invading powerful forces joined an important detachment of Seklers, and entered the principality. In the face of this new and dangerous invasions, Menumorut decided that some of its forces to be dedicated to the defense of the fortress Bihar, while the other, under the personal leadership of the ruler, to regroup in the mountainous area between Crişul Repede and Barcău, favorable for a lengthy defense to which the entire population able to wear arms could participate. The Bihor soldiers have resisted to the invaders first at Iozăşel river, and then they tenaciously defended themselves inside the fortress Bihar. The heroic resistance of the Romanian soldiers under siege lasted 13 days, during which they produced heavy losses to the invaders.

Since the mid-thirteenth century one would rapidly pass to amplify the fortification works (thickening and elevation of waves, deepening and widening ditches, palisades and towers combine in a complex wooden structures etc) and especially in building strong fortresses of stone.

The fortifications virtually became authentic systems that ensure the security and integrity of the territory over which they exercised their authority. That constructive effort in this field was oriented according to a military unique concept in each state formations is shown, inter alia, the erection of fortresses in strategic points of importance: the direction most likely to break the opponents (Satmar to guard Somes, Soimus and Mures Gate etc) required in passes and crossing points, royal residences and commercial centers (Dabica - Cluj, Alba Iulia, etc). Continuing and developing the art of building fortifications, the political and military leaders, the craftsmen of the VIII-XIII century erected fortresses of great complexity, adapted to the destination, land, building materials available in the area, and to the weather vintage weapons and way of fighting a war those days.

The size of fortifications, some closing a large area (Arad - Vladimirescu Dabica, Pacuiul lui Soare), outlines the garrisons that could amount from a few dozen to several hundred fighters.

Also during this period feudal fortresses appear in the plain and hill areas in order to protect the nobility and also as veritable control points in some conflicts. This way the fortresses from Căpâlnaş appear (dating from the Roman period, attested in the XVth century), Arad - Vladimirescu (IX – XI centuries), Căpruţa (XVth century), Cladova (Păuliş village- dating from the Dacian period and certified in the Xith century) etc..

In the second half of the XVIth century the fortresses from Carei, Săcuieni and Oradea built, the last fortress being irregularly shaped, slightly oval, located in a flooded, marshy area, fed by the waters of the river Crişul Repede and Petea (stream of hot water), to which the experts of that time have changed the course through underground galleries, so that the water not to freeze around this fortress, reducing its vulnerability, these fortresses were considered "pond fortresses", aimed mainly at stopping the attacks of the western enemy.

Conducting wars of defense that the Romanian principalities were forced to support against the invaders gives the opportunity to draw some conclusions. A first conclusion concerns the predatory expeditions that they had from the beginning of the actions of the worrior tribes. Another conclusion is that these expeditions did not have serious, immediate of future consequences, upon the natives and their socio-political organizations. Finally, the third drawn conclusion is that, those who used the land intelligently, studying its major forms, making the environment an ally, had everything to gain.

THE PRESENT

Since World War I, following the development of means of fire, improving accuracy and constantly increasing the range of the guns, one gave up to the idea of big fortresses, hard to build, with little defense possibilities, in their place appeared either wooden fortresses (pillboxes) of earth or stone, half buried, with a strictly limited number of staff to defend it with one or more modes of fire (cannons or machine guns) that through their power were able to provoke the enemy importent losses and to keep him away (Cucu, 1988). Such fortresses/pillboxes were developed in World War II, defending in general strategic directions or points required for passage (RAAW, 1980).

Although we are part of the modern era, with very good means of protection, and with highly advanced means of impact with a great range and great accuracy, one still focuses on the construction of fortified points, that however have characteristics specific to the fortified places (Cucu, 1993). The modern war that the U.S. military conducted over the past decade, showing practically what I said earlier: it starts with a blitzkrieg, in the air, in order to gain air supremacy, continues with strikes on ground targets, a massive scale ground assault, the last part being to stabilize the area. This can be best seen in Afghanistan, where the Romanian army participates with other NATO belonging armies to stabilize the country and where this strategy has been successfully applied (M. G. C., 1993).

Figure 8 Afghan and Romanian soldiers in an observation post
Qualat area, Zabul province, South west of Afghanistan (2012)

I will do a comparison of the arrangement of the fortified settlements/fortresses from antiquity or the Middle Ages with the last part of Enduring Freedom Operation, in the Romanian-American area of responsibility, where I worked for a period of about 7 months: as well as in the antiquity, the bases of the ISAF forces were deployed according to the

characteristics of the area where they were located, the number of troops serving them, the means of fire at their disposal etc.

Thus, the checkpoints were deployed in the mandatory crossing points, were served by a strictly limited number of troops (usually maximum a platoon), but instead they had striking means (machine guns) placed on certain heights, located in close proximity of them with the often having circular firing possibilities.

The observation and advance posts were placed on dominant hights of the ground, but some of them having modern means of observation. They dominated the heights of mountain chains and were designed to observe passageways, insurgency in the area and possibly to intervene when the situation demanded, in support of coalition military

The largest, called FOB's (Forward Operations Base), as their name implies, were able to support units, depending on their size and to provide all necessary facilities and military establishments. It had facilities from the physiological type to workshops, necessary to repair the combat equipment, recreation rooms, fitness, churches etc.

As it can be seen in Figure 8 this observation post sits on top of a mountain, it is able to track up to a large distance any activity; there are no waves of earth but earth walls, supported by a supporting structure consisting of a fence iron wire and concrete; in this post of observation there are weapons capable of fighting back at any time to an attack or to support the soldiers in patrol missions who were surprised by the actions of the terrorists.

CONCLUSION

The fortresses signified heavy points of a country in asserting the national independence of a state. Therefore, since ancient times, people have sought to understand the environment and defense possibilities of the communities in which they lived, and not infrequently, the fortresses were places of extremely bloody confrontations

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MODERN RESEARCH METHODS APPLIED ON PERIGLACIAL LANDFORMS FROM UPPER BASIN OF CAPRA VALLEY, FĂGĂRAŞ MOUNTAINS

Roxana PUTAN
PhD Student, Department of Geography, West University of Timişoara, Romania
E-mail: roxana.putan@gmail.com

Abstract: Different field methods, which may result dynamic of periglacial landforms are discussed. For rocky landforms lichenometry and Schmidt hammer test are recomended and for vegetated ones self potential is suitable. Various factors need to be taken into consideretion in order to avoid errorrs. For lichenometry and Schmidt hammer tests it is important to have many control points but also to investigate a large number of boulders. For self potential investigation many measurements are recomended for each profile line or gridded survey. A recent application of this method on periglacial landforms from upper basin of Capra Valley is discussed.

Key words: periglacial landforms, modern research methods, Făgăraş Mountains

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INTRODUCTION

Făgăraş Mountains are the higest mountains from Romania, and due to the enviromnent characteristics, periglacial processes can be observed. The Capra Valley is one of the most complex glacial valleys from Romania. It is situated south from the main ridge of Făgăraş Mountains (Figure 1). In the upper basin of Capra Valley many different types of periglacial landforms can be identified: rock glaciers, debris slope, avalanche paths, solifluxion terraces, periglacial hummock, ploughing blocks. The aim of this study is to identify the dynamics of periglacial landform, form the uper basin of Capra Valley, to see if there is any. Also it is important to determine the places where these processes are developed, how intese they are and what their effects are. To determine the periglacial processes some modern research methods will be used. Using these methods, the provided data it is more accurate and more precise.

FIELD METHODS

There are three main methods that will be applied on periglacial landforms from upper basin of Capra Valley. Two of them are suitable for rocky landforms and one for grass landform. **Lichenometry** is a method introduced by Beschel (1950), for dating rocky deposits. The growing curve of lichens was first analiyed on *Rhizocarpon geographicum, Apicilia cinerea* and *Lecidea promiscens* from Gran Paradiso National Park by Beschel in 1958. Lichenometry

was first applied on Alps (Beschel, 1950), and then on arctic environment in Greenland (Beschel, 1961) so it was possible a comparison between this two areas.

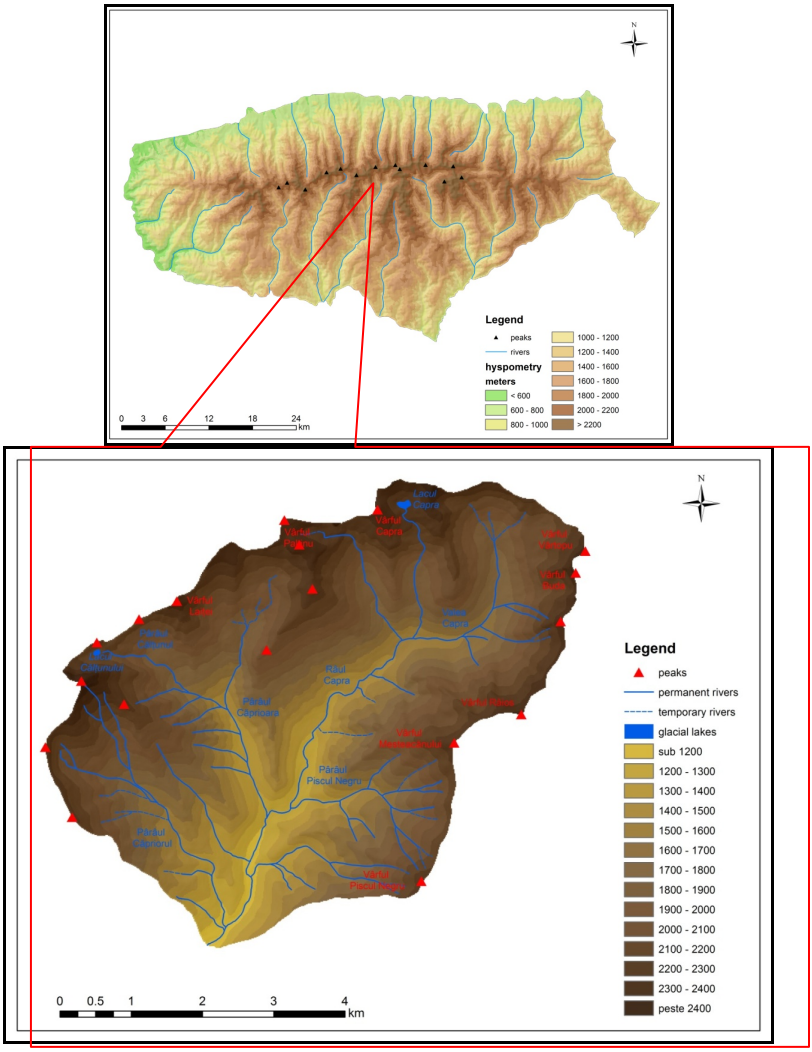

Figure 1. Făgăraş Mountains (Source: SRTM DEM), Upper basin of Capra Valley.

Source: topographic maps 1:25000

Lichenometry is a method used in identifing rock surfaces even 500 years old (Innes, 1985), and even more. The most common analized species of lichens are *Rhizocarpon* and *Lecidea* because they have a really slow growing rate (Beschel, 1961). The fundamental of this method is that the largest lichen form an area is the oldest and is related to the date when the surface os the rocks started to weathered (Beschel, 1961). The smaller lichens started to grow latter so they don't represent the real age of the rock surface (Mottershead, 1980). The

growing rate of lichens depends on the species, on the environment characteristics (Mottershead, 1980). Another fundamental in lichenometry is that the lichens dimensions and the boulders dimensions that lichens grow on are proportional. So it is assumed that the largest the boulder, the larger the lichens that are growing on it.

There are many species of lichens and each of them has particular subspecies and families. Most common analyzed lichen is *Rhizocarpon*, due to its abundance in almost all alpine and arctic areas. *Rhizocarpon* has many subspecies and each of them has its own growing rate. Even each subspecies has different growing rate depending of environment characteristics. In Europe, most common is *Rhizocarpon geographicum*, but *Rhizocarpon alpicola* can be also identified (Innes, 1985). In The Carpathians, Rhizocarpon *geographicum* is the most common, so in this study the same subspecies of lichens will be analyses in the upper basin of The Capra Valley (Figure 2).

Figure 2 Boulder with *Rhizocarpon geographicum* on The Capra Valley.

Source: Putan, 2012

For each analyzed lichen, some parameters should be measured. At first, the most common parameter was the small axis, or the small diameter of the lichen (Locke et al., 1979). Most of the time, the shape of the lichen is irregular so it is quite difficult to establish the small axis. The most common parameter is the long axis of the lichen, also named the maximum diameter (Hansen, 2008). At the beginning of their life, lichens are circular and then they become more irregular. It is very important to measure the lichens that are more circular so the accuracy of measurements will increase (Innes, 1985; Hansen, 2008). The cover percent of the lichen is also an important parameter. This percent should increase in time if there is any disturbance of the rock surface (Innes, 1985). Using this technique, the maximum cover percent of one boulder could be measured. Also the mean cover percent of the entire area, the cover percent of one species of lichens or the cover percent of the entire population of lichens (Innes, 1985) were established. Until now, the cover percent of lichens used to be estimated by visual observations. There are some photographic methods that are used to estimate the cover percent, but they are not exactly precise (Hansen, 2008). The size-frequency distribution of lichens (Locke et al., 1979) can be one of the most characteristic parameter for lichen population. This technique analyzes not only the biggest lichen, but most of them. All the values can be classified on size classes, and the size-frequency can be

obtain. This tehnique is time consumig because sometime 1000 lichen should be measured, though it is the most suitable method for analysing dynamics of a landform covered by lichens. All small lichens categories represent innapropiate periods of time for growing lichens (Winchester, 1994). This tehnique it is very usefful for larger areas, where it is difficult to observ the five biggest lichen in order to estimate the age of the rock surface. Size-frequency distribution it is recomended for unstable landforms like avalanches paths, solifluxion terraces, debris slope (McCarroll, 1994).

Every area has its own particular lichenometric curve due to the different characteristics of the area. The size of lichens is related to the age of rock surface. The most important growing factors of lichens are: light, humidity, temperature, snow cover, amount of water, altitude, slope, aspect, rock surface (Bechesl, 1961, Innes, 1985).

There are many different methods for analysing lichen population to determine the age of a rock surface. Many enviromnent parameters influence the growing rate of lichens so each region and each particular area has it's one growing rate of lichens. Size-frequency distribution and cover percent of lichens will be applied on upper basin of Capra Valley to estimate the age of rock surfaces and to analyse the age differences between the rocks from the same landform. In this way it is possible to determine the areas where periglacial processes determine dynamic landforms. For the size-frequency distribution the long axis of lichens from the big boulders of the landforms will be measured. The cover percent should be obtain from processing photographic images with computer assistance.

The results of lichenometry can be checked with **Schmidt hammer tests**. This methods is realted with the weathering of a rock surface. Schmidt hammer is a device to measure the elastic propetries or stranght of rock, surface hardness mainly. It was invented in 1950 by Ernst Schmidt, to determine the hardness of concrete. The hammer measures the rebound of a spring-loaded mass impacting against the surface of the sample. Its rebound is dependent of the hardness of the rock. The rebound value can be used to determine the compressive strength. The weathering decrease the strength of the rock, and the Schmidt hammer tests show this (Frauenfelder et al., 2003). It is possible to make many readings with Schmidt hammer in a short time and this is an advantage of the method (Nesje et al., 1994). First the Schimdt hammer tests were applied in geomorphology on moraines by Matthwes (1974), but the most important improvements were made by McCarroll (1989, 1994).

The main factors of rebound are degree of weathering, climate, lithology, rock surface hardness, rock surface roughness, sample design (McCarroll, 1989). The new exposed rock surfaces are smooth and they have high values of hardness. This parameter decreases with the exposure time and with increasing weathering (Frauenfelder et al., 2003). The measurements should be applied on a clear rock, without lichens and at least 5 cm away from any joint, where the hardness is lower than usual. The number of blows per boulder, and the number of measured boulders per each landform it is important to establish before starting the survey. McCarroll suggested that 4 blows per boulder and 50 boulders should be measured. La Pera and Soriso-Valvo (2000) measured 6 blows per boulder and analyzed 50 boulders. The number of the measured boulder should be different, depending on the size of the analyzed landform.

In case of schist, the blows should be perpendicular and parallel with the schistuosity layers, due to the difference of the hardness of the rock surface. In upper basin of Capra Valley most of the periglacial landforms are on the schist, so the rebound will be measured in both ways. On a rock glacier, we recommend to apply the Schmidt hammer tests along some profile lines transverse on the movement direction. For each profile 50 boulders should be measured. The mean rebound suggested the characteristic rebound for a certain part of the rock glacier for each profile line. For more accurate interpretation the rebound values for each boulder should be analyzed particularly (Frauenfelder et al., 2003).

The Schmidt hammer tests will be applied on different periglacial landforms from upper basin of Capra Valley. If the hardness value is lower, the rock surface was exposed for a long period. In this way, it is possible to know the relative age of the landform. In addition, the lichenometry determines the relative age of a rocky area. In conclusion, these two methods correlates, in order to help us determine the time when the rock surface started to be exposed.

For the vegetated periglacial landforms, **self-potential** it will be the main method applied. Natural potentials occur about dissimilar materials, near varying concentrations of electrolytic solutions, and due to the flow of fluids (Mainali, 2006). There are many different potential types: streaming potential, mineral potential, diffusion potential, sedimentation potential, absorption potential, and thermoelectrically potential. It is important to know the potential types in each area to know how calculate the weighted average. The most common type is the streaming potential.

The required equipment includes two unpolarized electrodes, wire and a high impedance milivoltmeter (Figure 3). The voltmeter should be at least 10^8 Ω, in this way it will be no current delivered on the ground and the electrodes will remain unpolarized. The electrodes consists of plastic tube as main body filled with saturated solution of $CuSO_4$ and connected with a bare copper wire immersed in the electrolyte (Mainali, 2006). One electrode is stationary and one is a traveling electrode connected by a long cable. The stationary electrode is connected to the negative terminal of the voltmeter and it is placed outside the survey area, while the mobile electrode is connected to the positive terminal and it is moved along the profile or all around the grid. The temperature and the soil moisture it is very important during the survey, because they influenced the natural potential. So these two environment parameters need to be measured at the beginning and at the end of the survey (Drahor, 1999).

Figure 3 Milivoltmeter (left), roving electrode (right).

Source: Putan, 2012

This is a specific method mainly for hydrogeology and karsts, but it also applies for periglacial landforms, where the water is one of the main factors. During the summer of 2012, field surveys on upper basin from Capra Valley where applied. The measurements where realized during dry period, in July and August. The same areas will be investigated in late spring in 2013, just after the snow melts. Until now solifluxion terraces, earth hummocks, solifluxion lobe and areas near ploughed blocks were investigated.

RESULTS

An important solifluxion terrace is situated near Laita Peak. Here, we applied profile and gridded survey for self potential during July and August 2012. The profile lenght was 50m, and on each metre the self potential was measured in donwslope direction. The electrical potential difference fluctuated between -14 and 76 mV. The high values were related to the rocky, flat areas of terraces and the lower values were related to the vegetated areas. The gridded survey was 400 m², with 121 measuring points, 11 rows and 11 columns. The electrical potential difference was measured on each 2 m. The rocky areas had high values, up to 50 mV, and vegetated areas had low values, down to -41 mV. There are two main rocky terraces that are well observed also in the gridded results (Figure 4).

South-west from these periglacial terraces is a slope with periglacial hummocks between Laita Peak and Lăiţel Peak (Figure 5). A profile line, 50 m long was realised in august 2012. The electrical potential differrence was measured on each 1 m during high temperature and low humid soil. The measurement direction was donwslope and at the end of the slope was a flat humid vegetated area.

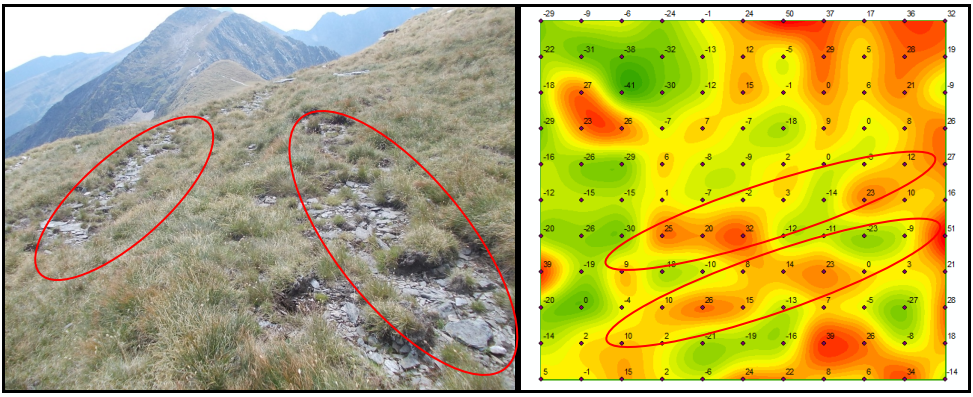

Figure 4 Solifluxion terraces near Laita Peak (left), self potential results (right), rocky areas have high values (megkérni, hogy tegye helyre az ellipsziseket)

Source: Putan, 2012

The base electrode was fixed toward Laita Peak and the roving electrode was moving downslope. The electrical potential difference have values between -10 mV and 59 mV. The values fluctuate like in solifluxion terraces case and where are rocky areas are high values and on vegetating areas the self potential is low. At the end of the profile line are just low values due to the flat humid area (Figure 6).

Figure 5 Periglacial hummocks located between Laita Peak and Lăițel Peak.

Source: Putan, 2012

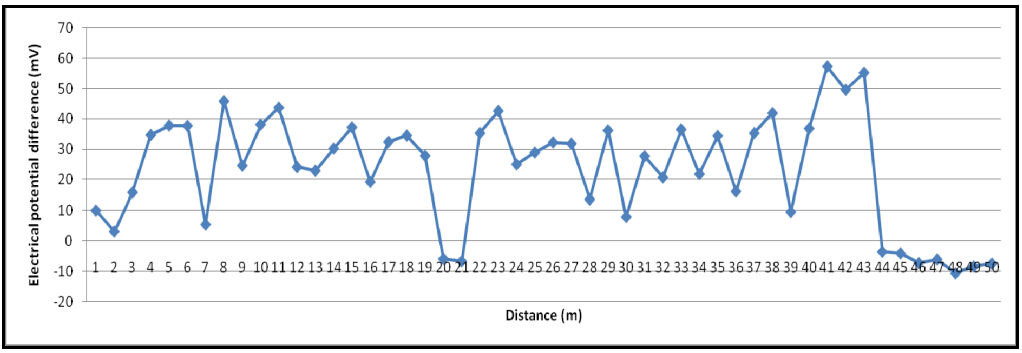

Figure 6 Self potential values on periglacial hummocks located between Laita Peak and Lăițel Peak

Source: Survey data, 2012

In the same area periglacial processes generated ploughing blocks. Around a 1.7 m ploughing block (Figure 7) the self potetial was measured. Behind the rock is a small rocky path, and in front of it is the largest vegetated area. The measurements were made on each 0.5 m on 6 m². The values are between -6 mV and 68 mV. The lower values -6 mV, -4 mV and -1 mV are related to the vegetated area in front of the ploughning block. Aslo in the right and the left part of the block are low values. Backwards the values rise due to the existance of small rocks from the rocky path behind the ploughing block.

Figure 7 Ploughed block located near Laita Peak

Source: Putan, 2012

Near the Capra Lake profile lines were measured on two different periglacial teracces. Here the slope is higher than near the Laita Peak and the tickness of vegetated area is lower. Northern than Capra Lake is another periglacial landform. Here a gridded survey was realised on 900 m² with 6 rows and 6 columns. The values are between -27 mV and 106 mV. The highest value is on the center of the area and on the margins are lower values.

CONCLUSION

The main methods that will be applied on upper basin of Capra Valley are lichenometry, Schmidt hammer test and self potential to analyzes the periglacial processes and the landforms determined by them. The first two methods are relative age mehtods so it is possible to know the age of the rock surface and to determine the dynamic periods of landforms.

The self potential is specific to vegetated landforms and determine the electrical potential diference between the two particular points (Urdea at al., 2008). During july and august 2012 were made the measurements of self potential on periglacial landforms. The temperature and the humidity are the main two climatological factors of self potential. First surveys are from a very dry period and next surveys will be in late spring when the snow melts. Then both sets of values should be compared and analysed.

These methods should be carefully applied in upper basin of Capra Valey because there are just some precending studies in the same direction. The growing rate of lichens is unknow for Romanian Carpathians untill now so the tehniqes of lichenometry should be very well motivated and applied and the self potential is a method applied more on hydrogeology due to the main natural potential, the streaming potential.

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THE ROLE OF TOURISM IN THE URBAN REVITALIZATION OF NUCET AND VAŞCĂU TOWNS (BIHOR COUNTY, ROMANIA)

Mariana PRAŞCA
PhD student, Department of Geography, Tourism and Territorial Planning, Faculty of Geography, Tourism and Sport, University of Oradea, Romania,
E-mail: mariana_prasca@yahoo.com

Rodica PETREA
Professor, Department of Geography, Tourism and Territorial Planning, Faculty of Geography, Tourism and Sport, University of Oradea, Romania,
E-mail: petrearodica@yahoo.fr

Abstract: In Romania, the former mono-industrial small towns, at the same time with the cessation of the main industrial activity, mainly since the 90's, have undergone an increased economic and demographic decline. The revitalization of these towns remains a challenge for the territorial development policies. Under these circumstances, the inventory and the capitalization of their tourist potential can be a pillar of economic recovery, tourism being one of the activities that can support urban revitalization. The purpose of this paper is to identify the elements of the tourist potential of the towns of Nucet and Vaşcău (located in South part of Bihor County) and the main forms of tourism that are the most suitable for these areas and that can be, beside other economic activities, an adjacent support for the local development. It is known that globally, more and more towns aim at strengthening their tourism sector, either for economic recovery, or to diversify their local development strategies. Moreover, this paper aims at providing an insight into the way in which the tourist activity of the towns is encouraged and supported by the higher territorial administrative structures.

Key words: small towns, urban revitalization, tourism potential, Nucet, Vaşcău

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INTRODUCTION

The promotion of tourism and cultural use to regenerate declining urban areas is expanding within many cities, as a response to deindustrialisation (Bianchini, 1993; Evans and Dawson, 1994; Evans 2001) tourism being use as an urban regeneration tool, as a part of partnership approach. Inclusion of tourism activity in urban regeneration projects underlying a marketing strategy designed to sell the community to the outside world as a destination. (Sedakat et al., 2007) From economic development perspective the major benefits of tourism activity are the creation of employment for residents, increase and modernization of the infrastructure and a better access to services, all these being possible using the existing resources present within the community (Beshiri, 2005; Cox, 2004; Page et al., 1999; Wilson et al., 2001). According to the literature, many examples of successfully revitalization projects based on tourism were implemented especially in case of former industrial small towns from

UK. (McCarthy, 2007) Considering that in Romania for the small former mono-industrial cities, there are very few research about the role and impacts of the tourism sector in designing and managing regeneration schemes, this document aims to highlight the importance of tourism activity, as an alternative able to support the economic growth.

Although demographically, they are two of the smallest Romanian towns, with a population under 3000 inhabitants each, a feature of these small towns is represented by the large unincorporated area, specific to the majority of small towns appeared in the communist period (Ianos, 2004) when in their administration were introduced some neighboring villages as well. Their territorial display triggers a high degree of ruralization and also a varied tourist potential, which is currently very little capitalized, having a modest tourist infrastructure and a low offer of tourist products.

Nucet and Vascau towns, located in the southern part of Bihor county (Figure 1), appeared in 1956, as a result of forced industrialization. (Petrea et al., 2012). Location of these two towns in the western part of the country, in the mountains and in proximity of Apuseni Natural Park, can make them attractive from touristic point of view, at the same time for the population from surrounding areas but also for the foreign tourists, especially Hungarian population attracted by the mountain areas and their varied landscape.

In the studied area, the specific initiatives focused on tourism developement are less present, although for these former monoindustrial towns, the tourist resources could turn into a possible "engine" of their economic revitalization.

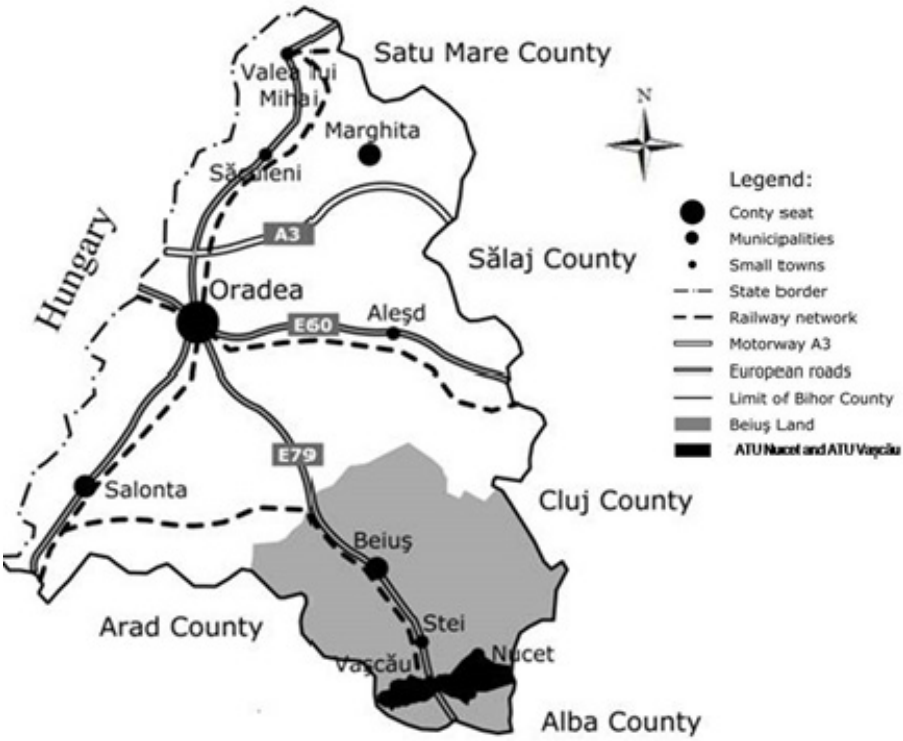

Figure 1 Nucet and Vașcău. Territorial context

OBJECTIVES AND METHODS

The material aims at the assessment of the existing tourist potential, the purpose being its higher capitalization. The target is the working-out of some development proposals for tourism development, complementary to the measures set out in the existing plans and strategies at local and regional level, based on the identification of appropriate forms of tourism and tourism infrastructure issues. The entire approach is meant to support the revitalization of the two neighboring towns that appeared in the same context and which are currently facing similar problems. The study was conducted mainly based on bibliographic documentation and field research. Also, by statistical data processing was performed an analysis of the current situation and were identified several types and forms of tourism suitable for this area, whose development can support the urban revitalization process. Using existing information, a schematic zoning of the tourist potential was compiled through GIS technology.

THE TOURIST POTENTIAL OF NUCET AND VAŞCĂU TOWNS

The economic changes occurred in the post-communist period after 1989, caused the cessation of industrial activity, which in the end led to their economic and demographic decline.

The main feature of the local tourist resources is diversity, given by the large extension of the administrative areas of these towns. They have both natural resources, given by the diversity of landforms and the presence of large areas covered by forests and pastures, and anthropic ones (old churches, rustic technical installations), a real support for the development of tourist activity.

Most natural tourist resources are found in the mountain area, respectively in the hilly areas of the two towns, areas developed as stripes, represented in the case of the Administrative Territorial Unit (ATU) Vaşcău by Momei Hills and Codru Moma Mountains, and in the case of the ATU Nucet by Bihorului Hills and Bihorului Mountains. Unlike the natural resources, the anthropic ones are concentrated in the depression area, along the Crişul Negru Valley and its tributaries. (Filimon, 2007).

In the category of tourist resources of the landscape, as elements that give the landscape personality (Cocean, 2010), the most important are: the karstic area corresponding to Vaşcău Plateau, which includes a wide range of shapes of exo-karst and endo-karst like: Câmpeneasca Cave, Câmpeneasca Pothole (Figure 2), sinkholes located on both sides of the road Vaşcău - Câmp, intermittent spring at Călugări, Sforaş Spring, Boiu Spring – speo-karstic reservation.

Important tourist resources are also located in the upper part of Crişul Băiţei Basin and on the common interfluve with its right tributary (Sighiştelului Valley). There are numerous karst phenomena with over 36 caves, located on the Prislopu Ridge – Pietrele Negre - Peak Ţapu (Berindei, 1977), and on the Nucet ATU territory there are three of these caves: Fânaţe Cave, Secăturii Cave, Porţile Bihorului Cave. (www.welcometoromania.ro).

All these relief features constitute tourist resources of local and regional interest, which are currently unsuitable and difficult to access, because of the lack of signs and markings, the quality of the access roads also being precarious. They could be capitalized by creating an integrated circuit, both for cycling and hiking (Petrea et al., 2012), connected to the existing tourist circuits or by creating a joint tourism development strategy at intercommunal level, for the Ştei Zone Intercommunity Development Association.

Figure 2 Câmpeneasca Pothole

Figure 3 Lime-burning kiln (Camp Moti)

The tourist resources of hydrography are represented by springs, hydrographic arteries, but a significant tourist importance is given by the tarns specific to the karstic area of the ATU Vaşcău, the most important of them are: Barna Tarn, Iezer Tarn, Ponor Lake (Câmp-Moți), Ghib Tarn (between Câmp and Izbuc), Colești Tarn, Țapului Tarn (Vaşcău), (Țucra, 2000), to which is added the anthropic lake at Marmura (the bigest lake in Vaşcău area). Some of them are important for the fishery development due to the presence of fish. Streams, currently undeveloped, can also be used for the practice of sports such as kayaking and rafting.

The climate tourist resources are closely linked to the sheltering topo-climate with curative effects. Also, an attractive climate element for the tourist activity is given by the persistence of the snow layer, which is abundant and lasts a long period of time - in the spring. The extreme duration of the last snow layer was until May 29 (Gaceu, 2005). This allows the practice of winter sports for a longer period of time, the best example being the developement of Vârtop Holiday Village. (ATU Nucet).

The tourist resources of vegetation and fauna are varied due to the extended surface of the administrative areas of these towns: in the case of ATU Nucet forests cover 70% and pastures 21% of the total area, according to the LDP (Local Developement Plan) and in the case of ATU Vaşcău forests represent 32% and pastures 49%, according to the LDS (Local Developement Strategy). The varied vegetation can constitute the basis for the development of camping sites, parks, sites of observation and research of flora and fauna, also vegetal associations provide a varied hunting fund, representing potential destinations for the hunting tourism.

The protected areas are numerous in the studied area and could be capitalized by practicing a sustainable tourism. They are divided into two categories: protected areas of community interest (Natura 2000) – Vaşcău Plateau (14% of total ATU Vaşcău surface) and protected areas of national interest (Câmpeneasca Pothole and Boiu Spring- natural speo-karst reservations). Noteworthy is the fact that 47.7% of the ATU Nucet belongs to the national protected area "The Apuseni Natural Park", as set out by the Order of the Ministry of Water, Forests and Environmental Protection nr.7/1990 (Figure 4).

So, we can say that the studied administrative areas have a varied natural tourist potential of local (ATU Vaşcău) and national (Vârtop Holiday Village, ATU Nucet) interest, which is suitable for various activities: winter sports, hiking, caving, paragliding and which, through an optimal and sustainable capitalization, can contribute to the revitalization of this area.

The anthropic tourist resources are currently very little valued. The most important anthropic elements of tourist interest are: the old churches made of wood and stone, the

oldest and the most important one is the wooden church at Coleşti (1752), as well as the churches at Vărzarii de Sus and Vărzarii de Jos; peasant technical facilities - lime-burning kilns (Câmp Moţi)- Fig.3, water mill (Vaşcău), traditional rural architecture, traditional crafts, traditional costumes and customs.

Among other anthropic tourist resources stand out: traditional crafts (chalk processing - Figure 3, marble carving, weaving); traditional costumes, dances and songs, traditional customs for wedding and funeral, also appropriate religious holidays of the year. Although local customs and traditions are becoming less transmitted to the younger generation it is possible and necessary to save them, because they all represent a great potential for the development of rural tourism.

The unique landscape of Beiuş Land itself is a tourist resource, to which are being added the local cultural and social events: fairs, festivals, pilgrimages and local celebrations. Apart from the traces left by the mining activities, the specific landscape, especially in the case of the localities belonging to Vaşcău ATU, is an archaic one. Not the same thing can be said about Nucet town, where the urban character is more evident due to the prevalence of high buildings, land use and the effects of a polluting industry, the exploitation of uranium from Băiţa Plai. This case is a particular one because, after the definitive closure of the uranium exploitation in 2009, the industrial landscape continues to decay, a possible solution could be given by greening and the reconversion of the former industrial buildings, mainly turning them into possible points of tourist attractions like: mining museum or rare minerals (existing in Băiţa) museum.

In conclusion, one can say that Nucet and Vaşcău ATUs have different and complementary resources, but poorly capitalized. Under these circumstances, it is necessary to develop an integrated strategy for sustainable tourism, meant to preserve the uniqueness of this area and also to be an important element in the local development process.

TOURISM INFRASTRUCTURE

Accommodation and catering facilities in recent years, there have developed more in the ATU Nucet, due to the development of Vârtop Holiday Village. A large number of guesthouses and tourist lodges appeared, many of them are still uncatalogued. Currently there are: 2 hotels, 13 boarding houses, 2 villas, 6 chalets, summing up a total of 652 accommodations, predominantly ranking 2 or 3 stars. In addition there are also about 50 completed holiday homes (www.turistinfo.ro), and others are still under construction.

The main feature of the Vârtop Holiday Village is the winter sports, where the entire development is carried out around the new ski slope ”Piatra Grăitoare”, opened in 2011 and which is actually a complex of two ski slopes. The former is 1150 meters long, of which 500 meters are of high difficulty, and the latter is longer (1400 m) of average difficulty, equipped with a chairlift system with a capacity of 1,400 seats per hour. (www.adevarul.ro/locale/oradea). But the major problem of this holiday village is given by the seasonality of the tourist activity, during the warm seasons there are not so many possibilities to spend a holiday here.

On the territory of ATU Nucet, the most important accommodation units are located in the Vârtop Holiday Village, while in the town itself are only one motel and a guest house with low accommodation capacity.

In terms of accommodation establishments, the ATU Vaşcău has a modest situation. According to the data obtained from the local authorities, this administrative unit doesn’t have a catalogued accommodation infrastructure, there is only an old forest district (6 seats), which is currently out of use.

Access roads have a strong negative impact on tourism development, especially for the ATU Vaşcău, where the connection between the town itself and the component villages situated in Vaşcău Karst, is made by using the county roads DJ245 and DJ244 which are in a precarious situation. Although the karst area has a rich tourist potential, the lack of road infrastructure triggers a low potential capitalization.

Another weak point for the tourism development in the area is the lack of direct routes between the villages belonging to the ATU Vaşcău and the neighboring localities. (Figure 4) For instance the development of the access roads between Vărzarii de Sus and Nucet, or between Izbuc village (located south of the ATU Vaşcău, on whose territory is the intermittent spring Călugări) and Cămp village, or between Coleşti and Şuştiu (north of the ATU Vaşcău) would be appropriate. Also important for the tourist activity is the modernization of the road between Şuştiu and Moneasa, over Pădurea Craiului Mountains, so the tourists could combine curative tourism offered by Moneasa resort with cultural and recreational tourism corresponding to the villages in Vaşcău Karst, or specific to the mountain area of ATU Nucet (Bihor Mountains).

APPROACH OF TOURISM IN PLANS AND STRATEGIES OF LOCAL AND REGIONAL DEVELOPMENT

According to the evaluation made by the Ministry of Regional Development and Tourism (MRDT) in 2009, an assessment of the tourist potential was carried out for each administrative territorial unit in which were analyzed several elements of tourist potential: natural tourism potential, cultural heritage, general infrastructure, tourism infrastructure and environmental quality. According to the score of this assessment, the analyzed areas have an average potential for tourism development of 27.07 points - ATU Nucet and 39 points - ATU Vaşcău of the maximum of 100 points (Table 1), even though these rates are quite low, however, they are situated above the average rate obtained for Bihor county (24 points). It should be noted that, although the score for general infrastructure and transport is higher for Vaşcău town, Nucet has a superior quality of road infrastructure.

Table 1. Scores obtained from the assessment of tourist potential, 2009

	Natural resources (points)	**Heritage (points)**	**General infrastructure (points)**	**Tourism infrastructure (points)**	**Total score for tourism development potential (points)**
ATU Nucet	14.5 (max 25)	0 (max25)	12.5 (max 30)	0.07 (max 20)	27.07 (max 100)
ATU Vaşcău	11 (max 25)	8 (max 25)	20 (max 30)	0 (max 20)	39 (max 100)

Data source: MDTR

From this evaluation results the poor situation of these two small towns in terms of tourism infrastructure, general infrastructure shortages and the modest representation of the anthropic resources of regional and national importance.

At regional level, within the tourism development strategy of the North West Region (2007-2013), the ATU Nucet is part of the Apuseni Mountains Territorial Development, which provides the integrated development of several mountain resorts, including Vârtop,

and creating corridors linking the tourist areas, including Vârtop - Arieşeni. It is a goal reflected in the Strategic Plan for Sustainable Development of Nucet as well, where the tourist activity is considered an important pillar of local development and is focused on the development of mountain tourism (winter sports), the priority being to complete the general infrastructure of Vârtop Holiday Village.

The regional sector programs for the studied towns are the sector program B – proposing the development of circuit tourism (mining road, pilgrimages, tours of natural and anthropic sights) and the sector program C that encourages the development of theme and amusement parks. The overall objective of the regional tourism sector is to increase the competitiveness of the tourist sector by modernizing and developing the infrastructure and services, including investments in creating new attractions.

The local plan of development for the ATU Vaşcău, 2007-2013, has also some priorities for tourism development: supporting the agro-tourism activity, promoting the local tourist potential through media, association with neighboring localities to develop common tourism programs and initiation of joint training for agro-tourism promoters.

Locally the most important touristic project implemented is the realization of ski slopes from Vartop for which Nucet Hall, in collaboration with Bihor County Government through investments in tourism infrastructure program, subprogram "Skiing in Romania", received a grant of 6 million euros from the MDRT (Ministry of Regional Development and Tourism). Thus, from 2011 the town has a ski slope, an annex building with parking, chair lift to transport visitors and slope maintenance equipment. As a consequence 10% of the active occupied population of Nucet operates in touristic sector, in majority of the cases the tourism workforce being retrained from other economic domains. Entrepreneurs and local investors build hostels and chalets in the Vartop holiday village, many of them being made by accessing European funds.

Opposed to Nucet to Vascau were not implemented major tourism projects.

In the context of modest financial contributions from local and regional budgets, for both towns the greatest potential in terms of funding sources, which can be accessed for development of tourist activity, is held by the EU's financial contribution through structural instruments according to Axis 5 of Regional Operational Programme (Sustainable Development and Tourism).

So we can see that, at national and regional level, between 2007-2013, tourism is an economic priority, a fact reflected in the regional and local strategies, but the positive effects of tourism in revitalisation of the analyzed small towns are not visible yet.

POSSIBILITIES TO EXPLOIT THE TOURIST POTENTIAL FOR THE REVITALIZATION OF THE STUDIED TOWNS

Currently, for Nucet ATU the sports tourism stands out, mainly winter sports specific to Vârtop Holiday Village. But an important aspect to be taken into account is the seasonal specific of the tourist activity in Vârtop, a situation that requires the need for planning other touristic elements like adventure parks, events etc. designed to attract tourists throughout the entire year, the aim being to create a dynamic tourist activity. Although Vaşcău ATU has a significant tourist potential, currently it has a very low tourist activity, only isolated types of weekend tourism.

In the future, the tourist potential of the two administrative units could successfully support other types of tourism. Thus, since Vaşcău ATU is a component of the folk subarea of Crişul Negru Valley (Butură, 1978), it is suitable for practicing some types of rural tourism, especially agro-tourism. This would allow the exploitation of peasant household availability for accommodation, adequately prepared to receive guests, providing dining services and

other complementary activities, dependent on the local specific (Petrea, 2004). It is necessary to preserve traditions and crafts like: pottery (red ceramics) across localities Sălişte de Vaşcău and Criştioru de Jos, near Vaşcău ATU, traditions and crafts that could be capitalized by tourism. A very specific activity for Vaşcău is carving in stone and marble, and also lime processing (artisanal production of lime) specific to the Vaşcău component village of Câmp Moţi. Although the rural tourism is particularly suitable for Vaşcău, because of the urban status of this settlement, it cannot be included in the development programs for rural tourism and cannot benefit from the advantages of the rural areas. Under these circumstances, if rural tourism proves to be beneficial and important enough to revitalize Vaşcău ATU, it could become a serious reason to start the process of dropping out its current urban status. Based on the dominant karst topography, speleology can develop in Vaşcău Karst Area. Unlike Vaşcău, the northern part of ATU Nucet coincides with the Apuseni Natural Park, and is mainly suitable for ecotourism.

Thus, in the analyzed area are outlined two complementary tourist areas: Vaşcău Tourist Area and Apuseni Natural Park Tourist Area, covering the northern part of ATU Nucet (Figure 4).

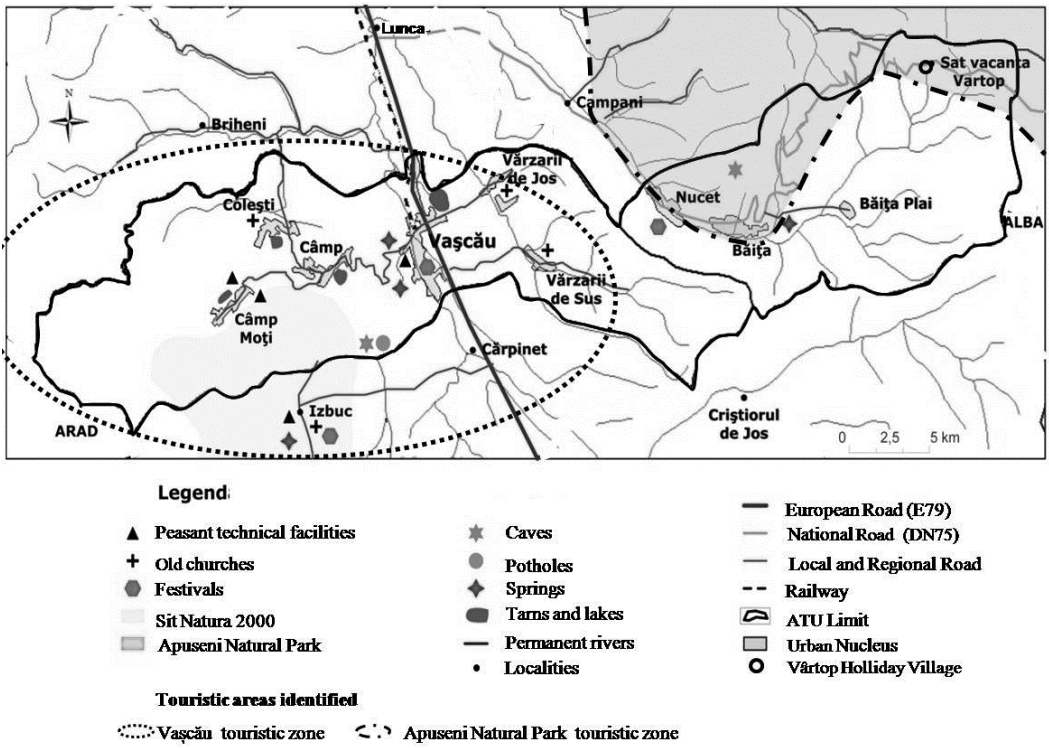

Figure 4 Tourist layout of the ATU Nucet and Vaşcău

Both identified areas are adequate for relaxation and leisure tourism. This form of tourism can be developed within both towns, supported by the landscape and relief diversity (large area of hilly and mountainous areas), as well as stimulating climate conditions for relaxation and recreation (Ciangă, 2006).

Tourist resources of these areas can also sustain tourist activities like: hunting and fishing, extreme and adventure tourism, rafting and canyoning, horse riding tourism, cycling, speo-tourism, climbing etc.

The development of tourism can lead to the development of other economic sectors, and is important for the local economy because it is based on the capitalization of the internal potential. Thus, agro-tourism can be a solution to revitalize the agricultural sector by increasing the demand for fresh agricultural products produced locally, mainly in the case of ATU Vaşcău. The setting up and promotion of tourism programs based on traditional cuisine by using ecological agricultural products, pilgrimages and observation of the community lifestyles, in communities which still maintain and practice traditions and natural medicine, would provide a greater number of tourists.

Tourists from nearby cities of the studied area and those foreigners, especially Hungarian tourists prefer to visit this area for practicing winter sports and mountain tourism (climbing, hiking). Certainly diversifying tourist activity (through practicing rural tourism in Vascau) would lead to complementary tourist activities, which ultimately would attract even greater numbers of tourists. Even if for small towns tourist activity is developed in accordance with the local specific, the introduction of some additional new elements (off-road tours, adventure parks, museums etc.) would increase their attractiveness.

An important factor in the development of tourism is marketing accompanied by "branding", the promotion of branded products, with regional and national recognition. The experience of tourism traditional areas shows that once created a brand, it causes a chain development, increasing the attractiveness of these small towns for new investors in tourism and beyond. (Evans, 2009). For example in the studied area branding could be based on ecotourism and agrotourism.

Touristic promotion of studied area is modest being provided by travel agencies, but only for the ski slope from Vartop (ski packages), while others tourist attractions from Apuseni Natural Park appear only mentioned on the website of some local NGOs (Beius Land, Ecological Club Transylvania - I love Apuseni), but without being included in itineraries and tours. So a better promotion of the area would be appropriate.

Even if the local community has the necessary means (human resources, potential for rural and sports tourism) and is interested in the possibility of developing tourism, the absence of promotion of local objectives and the lack of integrated tourism circuits, reduce the chance to achieve a successful tourism. Tourism activity will have an important contribution to economic revitalization of studied towns in the conditions in which at national level we will have a mass tourism and at local level will be realised integrated touristic circuits with a good promotion provided by the local authorities and the tourism agencies.

CONCLUSION

Tourist resources of the two neighboring towns, although not spectacular, by complementarity, can ensure the development of various types and forms of tourism.

The main feature of the local tourist resources is the diversity, given by the large extension of the administrative areas of both towns.

Another feature that influences tourism development in the studied areas is the strong rural character of the administrative areas of both towns, which have both types of resources: natural (given by the diversity of landforms and the presence of large areas covered by forests and pastures) and anthropic (old churches, peasant technical installations etc.).

There were identified two areas of tourist interest (Figure 4): Apuseni Natural Park Tourist Area, suitable for practicing ecotourism and winter sports and Vaşcău Tourist Area suitable for rural tourism and tourism for leisure and recreation.

Properly capitalized, through a joint strategy for tourism development, the tourist potential of the studied area can provide an important role in the revitalization of the two towns, being a viable alternative for their development.

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EVOLUTIONARY TRENDS IN THE SCIENTIFIC RESEARCH OF GOLD EXPLOITATION IN APUSENI MOUNTAINS: FROM ANCIENT TIMES TO NOWADAYS

Emilia Anca BAGOSI
PhD student, Department of Geography, West University of Timişoara, Romania,
E-mail: pasca.emilia@yahoo.com

Abstract: Without claiming an exhaustive coverage, the purpose of this paper is to approach the evolution of the scientific research related to gold extraction activity in the Apuseni Mountains, Romania. The history of the study area and its inhabitants is closely connected with the activity of gold exploitation; this fact can be proved by the strong linkage existing between these three elements reflected in studies and researches that have been made since Ancient times to nowadays. The gold mining activity and its related aspects were studied by specialists in various scientific domains, all contributing to the enlargement of a rich and complex historiography that will be partially figured in this study. The works will be presented by the main important historical periods of the gold extractive activity, including: the pre-Roman period, the Roman period, the Hungarian and Byzantine domination period, the Habsburg period, the interwar and the communism period and the post-communism period, periods which also marked a different direction of the scientific research. The final part of this study will give us a transversal review of the literature, helping us to understand the evolution of this long-time developed activity even better.

Key words: gold exploitation, the Apuseni Mountains, Roşia Montană, literature review, scientific research

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INTRODUCTION

Gold exploitation in the Apuseni Mountains, Romania, has a long and remarkable history. This "rich in gold" territory was dominated by powerful empires, such as the Roman and the Austro-Hungarian Empire. The mining activity attracted not only a huge economic interest, but also a scientific interest, gold exploitation in the West range of the Romanian Carpathians being certificated since Ancient times.

This paper aims to establish the evolution of the studies and the researches regarding gold extraction in the Apuseni Mountains, by highlighting the research domains specific to each historical period and the connection between the interest of knowledge and other socio-economic and political aspects of the study area. To create a bibliographical data-base of the studies conducted for an economic activity that have been developed in a geographical area, is very useful, because it can be considered as a starting point for other future studies related to the subject. It also helps researches to find out about the development of the knowledge linked with the development of the activity that has been studied, in this case, with the development of the gold exploitation.

DATA AND METHODS

In order to reflect the evolutionary trends in the scientific research regarding gold exploitation in the Apuseni Mountains, this paper presents the studies and the researches chronologically which are related to the subject, by using specific geographical and historical methods of data collection. The main method which was used to present the studies was the historical method, presenting the most important researches made in each relevant period of the history of gold exploitation in the Apuseni Mountains.

The bibliographic data-base inventory includes books, articles and cartographic materials, collected from libraries ("*Eugen Todoran*" Central University Library of Timisoara, "*Lucian Blaga*" Central University Library of Cluj-Napoca, and Romanian Academy Library of Timisoara), from the electronic data-base of "*Eugen Todoran*" Central University Library of Timisoara and also from the official sites of public institutions and mass-media. Some information was collected during a field research conducted in June 2011.

To elaborate this study some basic steps were followed. First, materials were selected, studied and included in a data-base. Then the selected materials were chosen and sorted chronologically (included in the specific period of time). The specific research domains and the connections between the research interests and other socio-economic and political aspects of the study area were established for each period. The bibliographic information was verified from multiple sources. The omission of some studies was mainly caused by the territorial spread of the scientists concerned with this phenomenon.

THE STUDY AREA AND A SHORT HISTORY OF GOLD EXPLOITATION

The Apuseni Mountains represent the northern half of the Western Carpathians of Romania. The gold ores are located in the southern divisions of the range, in the so-called "*Golden quadrilateral*". The quadrilateral is located in Metaliferi Mountains between the districts of Baia de Arieş (NE), Căraci (NV), Săcărâmb (SV) and Zlatna (SE), covering an area of approximately 2500 km² (Sîntimbreanu et al., 2006). The main gold mining centers were (the exploiation has stoped) Baia de Arieș, Roșia Montană-Roșia Poieni-Bucium, Zlatna-Stănija and Brad-Săcarâmb. This area hosts, without doubt, the largest gold ores in Europe.

The history of gold exploitation in the study area begins in the Late Neolithic, when gold was extracted from alluvial sands by Deccea Mureşului, a cultural group that inhabited the mountains, followed by the Dacians. The Dacian people mostly obtained the gold from surface exploitations, but they started to follow the native gold veins and to crush the rocks (Pașca, 2010). The Dacian Thesaurus was a significant reason for which the Emperor Trajan conquered the Dacia Felix land. During the Roman rule, Alburnus Maior (Roșia Montană today) was the center of mining operations, Alburnus Minor (Abrud) was the regional mining center, and Ampelum (Zlatna) was the administrative center (Rusu Abrudeanu, 1928). At Alburnus Maior they developed a vast system of underground exploitation.

After the Roman withdrawal (274 A.D.), a period of barbarian invasions follows and there is no evidence about the mining activity until the 12th century, when the Hungarians occupied Transylvania. In the Middle Age the gold was extracted both from the alluvial sands and from underground, using rudimentary tools; this is a period of traditional mining. The Austrian administration (16th century) brings modernization programs, with effects on the extraction techniques and the production and producers. In the first half of the 20th century, the mining production had a strong capitalist character; largest amounts invested belonging to some Austrian, Hungarian, German, but also Romanian private investors (Roman et al., 1982). This was followed by a period of intense modernization and mechanization of the

mining activity. After the Unification on the 1st of December 1918, the underground reserves are owned by the state, so the produced gold by private individuals had to be sold to the state.

In the year 1948 the mines were nationalized by the government and the communist regime was very interested in the development of the gold mining industry. In 1970 they started surface exploitation at Cetate open pit (massif surrounding Roșia Montană), organizing the largest gold mining area of the Social Republic of Romania (Roman et al., 1982). To extract gold from the exploited materials, they used cyanide and mercury. After year 1990 the mines were declared unprofitable, and started to close. In 2006 the gold mining in Apuseni Mountains ceased, but, because of the existing reserves, new exploitation programs appeared (for Roșia Montană, Certej and Rovina areas).

STUDIES AND REASERCHES MADE BEFORE THE 18th CENTURY

The presence of the auriferous ore in the Apuseni Mountains, especially in the southern divisions of this structural unit, as well as the early exploitation of gold and silver place the beginnings of the empiric knowledge of this region into the ancient period. The exploitation of precious metals in the Apuseni Mountains awoke the interest of preroman and roman nations which had populated this region of Dacia Felix, known for its richness in gold.

The Pre-Roman Period

The beginnings of the gold exploitation and processing activities in the Apuseni Mountains are indirect documented by more recent archeological proofs which date the practice of these activities in the late Neolithic, at about 2800-2500 B.C.. The fact that the gold metallurgy on the current territory of the Apuseni Mountains took a strong burst in the Bronze Age is proven by the thousands of pieces that archeologists have discovered and studied.

Herodot is the one to offer us the oldest written references regarding the Apuseni Mountains and thus about the gold exploitation. „*The father of history*" relates in the 4th volume of his work *Histories* about the invasion of the Persian over the Scythians in 513 B.C. (Duma, 1998) and asserts that on the bank of the river Maris (the current Mureş River) there lived a nation rich in gold (Rusu Abrudeanu, 1928). That nation was the Agathyrsi about whom the great historian mentioned the following: „*The Agathyrsi are wealthy people and wear a lot of gold. They live among each others as brothers and do not envy each other. Regarding their other habits they are much alike the Thracians*" (Rusu Abrudeanu, 1933, p. 57).

The Romanian erudite Plinius the Old (27-29 AD) also spoke about the inhabitants of the Apuseni Mountains. In his encyclopaedia *Naturalis Historia* he mentions: „*the inhabitants of these parts employ themselves in gold extraction from alluvia*" (Tamaş-Bădescu, 2010, p. 14).

The Roman Period

The gold of Dacia Felix respresented one of the important reasons for the emperor Trajan to conquer Dacia's land. The Romans intesified the gold exploitation in the Apuseni Mountains and came with procedures and techniques in order to reorganise the gold ore extraction. The written documentation of that period includes discovered inscriptions in the area of the gold ore territories, as well as creations written by the „scholars" of the Roman Empire.

The Romanian historian Dio Cassius, the author of the 80 books joint in his creation *The History of Rome* (150-235 AD), describes the wars between the Romans and Dacians in the book 67 and 68. The fragments of these works also contain mentions about the Dacian treasure hidden on the bottom of the river Sargetia, near Sarmizegetusa (Roman et al., 1982). The Romans discovered here „*a great quantity of silver and gold and other very valuable*

objects" - Dio Cassius, LXVII, 14, 4 (Cary, 1925). The registration of the Dacian treasure was done by Criton, Emperor Trajan's physician, in his work *Getica* (Sîntimbrean et al., 2006).

Remarcable testimonies regarding the Roman gold extraction activity in the Apuseni Mountains are to be found in the waxy plates. These date back to the years 131-167 AD and represent *wodden books* containing texts of Roman Civil Law, regarding several agreements: agreements for sale, loan agreements with interest, evidence of expenses and prices, etc. (Sîntimbrean et al., 2002). Between 1786-1855 there have been discovered 25 plates in the mines of Roşia Montană which have been lettered in the mining centre Alburnus Maior (Roşia Montană) and in nearby villages. The plates have been found in the ancient mining heads of the marginal massifs of Roşia Montană (Sf. Ladislau, Sf. Ecaterina, Cătălina-Monuleşti, Sf. Simion) and nowadays they enrich the museum collections in our country and abroad: Budapest, Vienna and Berlin (Tomozei, 2003).

Suggestive archeological testimonies are also being offered by the subterranean passages of the Roman mines in Roşia Montană, which allow the elaboration of the hypothesis regarding the type of development concerning the subterranean activities in the 2nd and 3rd century AD.

The Hungarian and Byzantine Domination Period

The references regarding the Apuseni Mountains and thus regarding the gold extraction grew in the Middle Ages from the point of view of numbers and their scientific content. The empirical creations, mostly historical, were completed by incipient geographical and geological studies which made their appearance at the end of the medieval period.

After the retreat of the Roman domination, the territory of Transylvania with its auriferous mountains is gradually invaded until the 10th century by many nations (Goths, Huns, Avars, Slavs, etc.). Very few documents and testimonies are dated form this period concerning the gold exploitation in the Apuseni Mountains, an activity that seems to have been suspended during those barbarian invasions.

But we find references in this period in the writings of the Byzantine ancient historian Joannes Lydus Laurentius who assesses the spoils of war in his creation *De Magistratibus reipublicae Romanae*, the 2nd volume, spoils of war taken by the Romans from the Dacians Dacians (Rusu Abrudeanu, 1933). Even if the numbers refering to the gold and silver quantity (1,650,000 kg gold and 3,310,000 kg silver) are considered to be exaggerated, it is possible that these reflect the rumours at that time (Istoria României. Transilvania, 1997).

In the 10th century AD began the occupation of Transylvania and thus the territory of the Apuseni Mountains was conquered by the Hungarians. In the chronicle *Gesta Ungarum* (The Hungarian Facts), regarding the exposure of the events from the 10th century, Anonymus, the anonimous notary of King Bela the IIIrd, also describes the intra-Carpathian terrotiry which was found by the Hungarians in 895 when their settlement began. Thus in Odmund's report, one of Tuhutum's (a Hungarian conqueror) chieftains, the presence of gold is metioned in the Arieş river: *„this country is being damped by the best streams...And that gold can be exploited from their sand and the gold of that country is very good.*" (Tonciulescu, 1996, p. 21). Restarting and exercising the Transylvanian mining during the first centuries of the second millennium is mentioned in the diploma of King Andrew the IInd (Roman et al, 1982), the Hungarian ruler between 1205-1235.

The gold of the Apuseni Mountains is mentioned in many documents of the 14th century. Thus a document from the year 1320 relates about the extraction of gold, silver and other metals from the mountainous region between Abrud and Zlatna. Then, in 1347, the gold mines from Abrud and Zlatna are mentioned for the first time (Roman et al., 1982). In the following centuries the legsilative and judicial Hungarian documents regarding the auriferous regions from the Transylvanian principality had become more and more and refelcted the interest for them by the central force in order to extract gold. It should be noticed that more

complex and elaborate mining laws appeared, which gave information about organising the auriferous exploitation in the Apuseni Mountains.

From this period dates the work *Hungaria*, a complex historical, cultural, geographical, ethnographical creation, of the humanistic scholar Nicolaus Olahus (1493-1568), who had a Romanian origin and was one of the first natives to underline the Latin origin of the Romanian people and who wrote about the Romanian language and habits (Pompiliu, 2002). In the last chapters of this work I will introduce a few quotations in which the region of the Apuseni Mountains and their gold is being described: „*The mines offer precious metals. Some gold nuggets have the size of a farmhouse bread*" (Gyöngyvér, 2011, p.64).

Georgius Agricola published his work *De re metallica* in 1556 in Basel, an appreciated work for that time which represents an encyclopaedia of metals and mining. The work describes the medieval mining technology, including many illustrations, thus becoming an important source for the first European mineralogical studies (Jardine et al., 1996). The description in the 8th book reflects the smashing and washing process of the gold ore, a process which had also been practiced in the regions of the Apuseni Mountains. In Agricola's work the following places are mentioned: Abrud, Zlatna and Baia de Criş (Roman et al., 1982), which is a proof for the fact that these auriferous centres were well known in the medieval period.

STUDIES AND RESEARCHES MADE IN THE 18th AND 19th CENTURY

The Habsburg Period

After 1700 the geological studies will enrich, showing the interest of the Austro-Hungarian geologists for the auriferous deposits in Transylvania. The auriferous deposits of the Apuseni Mountains will be mentioned more frequently in scientific works in the 13th and 19th century and whose exploration keeps an almost exclusive geological character in the modern age.

In 1717 Samuel Koleseri, a gubernial adviser, published his work *Auraria Romano-Dacica* in Sibiu, which is considered to be the first scientific work regarding the geology, the deposits, the mineralogy and the mining practised in Transylvania. The title page of this work offers a general overview with an iconographic character regarding the mining sites in order to extract gold from a mining territory in the Apuseni Mountains (probably from the valley of the Crişul Alb - White Criş), so that one can notice the important number of stamp mills existing in the 17th and 18th century (Roman et al., 1982).

In 1774 the first minearalogic observations regarding the auriferous deposits from the Southern divisions of the Apuseni Mountains were made, which were referable to Iganz Edlen von Born (Duma, 1998). The enlightener, born in Transylvania, wrote a series of letters in German addressed to Prof. Ferber in 1770, in which the mines and mountains of Transylvania and Banat are being described, letters which have later been translated into many languages. The letters were published in 1774 in Frankfurt under the title *Briefe über Mineralogische Gegenstände auf seiner Reise durch das Temeswarer Bannat, Siebenbürgen, Ober-und Nieder-Hungarn/Letters Regarding Mineralogy Objects During His Trip Through the Timisoara Banat, Transylvania, Hungaria*.

These creations were followed in a descriptive manner by studies centred around different auriferous areas from those that geologists as: Fichtel, Ruprecht, Hingenau, Neuboren (Duma, 1998) have mentioned or studied. The geologist Johhann Ehreinreich von Fichtel published his book *Beitag zur Mineralgeschichte von Sibenburgen/A Contribution to the Transylvanian Mineralogy* in 1780, which was followed by *Mineralogische Bemerkungen von den Karpaten/Mineralogy Observatiions from the Carpathians* in 1791, a

book that has been praised both for its geological character and for the study of the orography of the Transylvanian mountains (Diaconovich, 1900).

Professor Muller von Reichenstein is unforgettable in the specialist literature as being the one who wrote the first review/report about Roşia Montană in 1789, after having analysied/studied a piece of rock he had found in a museum in Vienna (Sîntimbrean et al., 2006).

In the following decades the studies regarding the geology of the area were continued. In 1822 the metal-bearing mountains in the Apuseni Mountains, (Metaliferi, Trascău and Zărand divisions) appeared on the first geological map made by S.F. Beudant (Duma, 1998), a French mineralogist, who published his scientific studies in the volume *Voyage mineralogique et geologique, pendant l'annee 1818/Travel for mineralogy and geology studies, during the year 1818*. Another published work of that period is *Mineralogie Siebenbiirgens/The Mineralogy of Transylvania*, written by Johann M. Ackner, who lived in Sighişoara, a transilvanyan medieval town.

Further, even more thorough studies, including real and precise data, mainly focusing on the auriferous deposits in Săcărâmb, Roşia Montană and Baia de Arieş were included in works made by foreign and Romanian scientists, as: Fr. Hingenau (1856), J. Grimm (1857), B. Cotta (1861), Fr. Posepny (1868, 1870), Tschermak (1869, 1874), B. Inkezy (1879), Gesell (1897), etc. Once those studies had been published, they marqued the beginning of systematic researches in the second half of the 19th century due to the interest of the Austro-Hungarian geological institues for studying the Transylvanian territory, and especially the Apuseni Mountains.

One of he remarkable studies of that time is *Geologia Transilvaniei/Geologie Siebenbiirgens/The Transylvanian Geology* which has been published in 1863 in Vienna and had been written by the Austrian authors F. von Hauer and Guido Stache, a study, in which the two geologists introduced the term „*dacite*" into the scientific literature. One chapter of the study is dedicated to the eruptive-volcanic rocks from the Roşia Montană area (Sîntimbrean et al., 2006).

During the first half of the 19th century we can notice a debut of scientific publications in Romanian laguage. Iacob C. Chiriac, a doctor, physician and a naturalist professor, published the first treaty of natural history in Romanian in the Cyrillic alphabet in 1837 in Iaşi. Chiriac's work *Istoria naturală/Natural History* had three chapters and the third one was entitled: *Imperia mineralelor/Metals Imperia*. The chapter about mineralogy of that study represented in fact a taking-up after the textbook *Lehrbuch der Oryktognosie/The Textbook of Mineralogy* published in 1833 by the doctor Johann Rheinhard Blum (1802-1883), a lecturer for mineralogy at the University of Heidelberg (Băran, 2008).

Basiliu Başota (1830-1906) got interested in the study of this Carpathian area after having travelled through the Apuseni Mountains. In 1883 the author published his study *Studiu geologicu asupr'a structurei muntilor metalici ai Transilvaniei/Geological study regarding the structure of the metal-bearing mountains of Transylvania* (Morărescu et al., 2009), one of the first Romanian studies which presented the geological aspects of the Metaliferi (metal bearing) Mountains.

STUDIES AND RESEARCHES MADE IN THE 20th and 21st CENTURY

The Interwar and the Communism Period

After 1900 the first trade magazines regarding mining issues made their appearance. The first publication was Anuarul Institutului de Geologic din *România/The Almanac of the Romanian Institute for Geology* in 1907, followed by the magazine *Analele Minelor din România/The Annals of the Romanian Mines* in 1918. They both contain important articles

written by famous scientists at that time. In 1929 the first number of the magazine *Miniera* was published, one of the most comprehensive economic information sources during the interwar period (Rişcuţa, 2007).

After the Union of Transilvanya with Romania (the Great Union) in 1918, the substratum deposits passed over into the state property and the gold extraction became a major target for the newly founded state. At the same time with the extraction of gold, started the scientific research activity regarding the auriferous deposits in the Apuseni Mountains, but especially in the Metaliferi Mountains, the richest mountains in gold deposits. The 20th century researches examined the gold mining under different aspects (geografical, geological, social, economical, political, cultural, and historical) and the results became an abundant Romanian bibliography.

In the interwar period have been published some works concerning the researches of the auriferous exctractions in The Apuseni Mountains from a geological, geografical, historical, political, economical point of view, etc. Among these we consider Ion Rusu Abrudean's outstanding studies; Rusu Abrudian was from Abrud and who left a legacy of various creations about the national history. Two of Abrudeanu's publications, *Moţii, calvarul unui popor eroic, dar nedreptăţit/The Transylvanians, The Nightmare of an Heroic, but Aggrieved Nation* (1928) and *Aurul Românesc. Istoria lui din vechime până azi/The Romanian Gold. Its History from the Beginning Until Now* (1933) represent two important documentary sources in order to study the auriferous extploitations in the Apuseni Mountains, both offering detailed information about the mining activity in this area. The historical character of these sutdies is underlined by intercepting various political, economic, social and geographical aspects.

The research areas became more and more elaborate, thus resulting in some studies which contribute to the diversification of points of reference necessary for analysis. Among the local persons, who became well known, was Maria Botiş Ciobanu, a resident of Roşia Montană, who had done a remarcable socio-cultural work, leaving behind publications as *Ţara Moţilor – legende şi credinţe/The Land of The Transylvanians – Legends and Beliefs*. The cultural and social aspects from her creations will later be quoted in numerous works concerning the culture and ethnography of the Transylvanian goldsmiths.

A lot of information that had been published before, was also revisited, analysed and translated into Romanian, including studies from earlier historical periods and the ancient world, thus intensifying the interest for the research of the auriferous mining in the Apuseni Mountains. One of the themes researches were frequently confronted with in the studies during the interwar period, will be intensified in the second half of the 19th century, insofar as the Dacian and Roman artifacts/relics had been discovered. One example therefor are the works*: Zăcămintele minerale ale Daciei Superioare/The Mineral Deposits of the Upper Dacia* or *Aurul Daciei şi Imperiul Roman/The Dacian Gold and the Roman Empire* (1942), which had been published by the mineralogist Victor Stanciu.

In 1940 appeared the publication *Industria aurului în România/The Gold Industry in Romania*, an important work for the historiography of national mining, which presented relevant details about the mining techniques regarding gold exploitation and processing, together with the description and analysis of the auriferous regions in the Apuseni Mountains. Ilie Haiduc, the author of that publication, outlines economical and various social contemporary aspects in his study.

During the second half of the 19th century, the works regarding the gold exploitation in the Apuseni Mountains maintain their variable character in the point of view regarding the approach as well as in the study subject, showing the increasing interest of the communist regime for the local auriferous deposits. The appearance of geological studies continued and their content researched with the geology of some volcanic-neogene areals or the geology of some divisions as *Evoluţia geologică a Munţii Metaliferi/The Geological Evolution of the*

Metaliferi Mountains (V. Inovici and its collaborators, published in 1969), but also complex studies concerning the geology of the Apuseni Mountains in their entire range.

The researches of that period also present approaches under an economic point of view, but especially those concerning the mining industry. Among the researchers of these domains, we could mention: Ludovic Bathory, Alexandru Herlea, David Nicolae, Aurel Sîntimbreanu, Ludovic Vaida, etc. Social, historical and cultural works also became important. A complex scientific work, which had been published in 1982, was *Aurarii din Munții Apuseni/The Goldsmiths in the Apuseni Mountains*, published by Bazil Roman (photographer), Aurel Sîntimbrean (geological engineer) și Volker Wollmann (historian, specialist in industrial archeology).

The Post-Communism Period

After the fall of the communistic regime the auriferous deposit exploitation activity in the Apuseni Mountains came into a decline because it was considered to be profitless. Thus a history of over two millenniums in auriferous mining had stopped, but it was the beginning of a period of socio-economic conflicts that had been caused by the great gold deposits which had been left over. Thorough geologic researches using the latest technology started to be undertaken during the last years of the 20th century in order to estimate the depostis, which had been left over in the underground. The investigations mainly concentrated on three auriferous areas in the Apuseni Mountains: Roşia Montană, Certej and Rovina, areas for which new exploitation projects had appeared. The suggested projects gave a rise to pro and contra reactions and stimulated scientific researches and studies at the same time. Most studies focussed on the area of Roşia Montană, whose historiography had been enriched with the publications of numerous geologists, engineers, archeologists, sociologists and historians who had paid attention to the ancient Alburnus Maior. In the following we will concentrate upon researches concerning this matter.

Thus in the period 1999-2001 an archeological research was carried out in Roşia Montană, which was led by the archeologist Béatrice Cauuet, a scientist at C.N.R.S (Centre National de la Recherche Scinetifique) having French and Romanian archeologists and researchers taking part in it. This archeological study brought an interdisciplinary approach, at that point almost unknown in Romania, opening the doors to a new research direction: the mining archeology. The results obtained after the study were published by Beatrice Cauuet, Bruno Ancel, Christian Rico, Călin Tămaş in chapter 5 of the series Alburnus Major I , under the title *Rețelele miniere antice. Misiunile arheologice franceze 1999-2001/Ancient Mining Formulas. Frech Archeological Tasks 1999-2001,* in 2003 (Damian, 2003).

A National Research Programme took place in the following period (2001-2006) in Roşia Montană, and it was entitled *Alburnus Maior*. According to affirmations made by respresentatives of the Roșia Montană Gold Corporation it was considered to be the biggest archeological research programme in Romania and one of the biggest in Europe. The programme had been introduced by the Minister of Culture and Cults, being coordinated by The Romanian National History Museum and financed by the Roşia Montană Gold Corporation. In the context of this programme there had been made hisorical-archeological, architectural and urbanistic studies which led to the identification of 13 archeological sites. The Romanian National History Museum coordinated the researches from a scientific point of view. The main objective of that national research programme was "*to enlarge the sphere of knowledge regarding the area in terms of archeological, historical, ethnographical, architectural and immaterial patrimony*" (Popoiu, 2010, p.7). 21 specialised institutions from Romania and 3 from abroad (France and Germany) took part in the research. Among them were the museums of history from Bucharest, Alba-Iulia, Deva, Bacău, Suceava, the universities from Bucharest, Cluj Napoca and Alba Iulia, as well as a series of cultural and archeological institutions. The results obtained after the project, have led to the creation of

the monographic series „*Alburnus Maior*" and „*Anthropos*", which includes 19 scientific bilingual volumes (Romanian and English), which have already been published or are going to be published soon. Up to now there have been published 6 volumes:

- in 2003, Alburnus Maior I – Rezultatele cercetărilor arheologice preventive din anii 2000-2001/The Results of the Preventive Archeological Studies from 2000-2001;
- in 2004, Anthropos I – Roşia Montană. Studiu Etnologic/Roşia Montană. An Ethnological Study;
- in 2005, Alburnus Maior II – Monumentul funerar de la Tăul Găuri/The Tombstone from Tăul Găuri;
- in 2007, Anthropos II, C. Rişcuţa – Exploatarea Roşia Montană. Investiţii economice şi realităţi social-culturale (1919-1948)/The Exploitation in Roşia Montană. Economic and Social Cultural Investments (1919-1948)
- in 2008 Alburnus Maior III – Necropola romană de la Tăul Corna/The Romanian Necropolis from Tăul Corna;
- in 2008, C. Tamaş - Structuri de brecii endogene (breccia pipe – breccia dyke) şi petrometalogenia zăcământului Roşia Montană, Munţii Metaliferi, România/Structures of endogenous breccias (breccia pipe – breccia dyke) and metal and rock composition of Roşia Montană deposit, Metaliferi Mountains, Romania;
- in 2010, Anthropos III, P. Pompoiu - Roşia Montană. Studiu Etnologic, vol. II/ Roşia Montană. An Ethnological Study, volume 2.

In the studies regarding Roşia Montană we can notice a dualism of researches among the scientists (and not only them) who either are the sustainers of the project or those who consider that the new exploitation could destroy the cultural-historical and archeological patrimony/heritage and the socio/cultural identity of the inhabitants in that area. Thus the works that had been published with the financial support of SC Roşia Montană Gold Corporation SA are being doubled by works, whose historical, archeological and cultural content underlines the „richness" of the territory and the civilisation from Roşia Montană, a heritage that could be destroyed by launching the new project. Aurel Sîntimbrean, a former engineer at the national exploitation Roşia Montană mining, a current member of the Cultural Foundation of Roşia Montană, among other researchers started to publish works as: *Roşia Montană. Alburnus Maior. Cetatea de scaun aurului românesc/Roşia Montană Alburnus Maior. Romanian Gold Citadel* (2002), *Aurul şi argintul Roşiei Montane/The Gold and Silver in Roşia Montană* (2006), *Bazil Roman. Fotograful aurarilor din Ţara Moţilor – Munţii Apuseni/Bazil Roman. The Photographer of the Goldsmiths in Ţara Moţilor – the Apuseni Mountains* (2008) which represent the cultural reality of Roşia Montană and the bordering auriferous area. The researches that have been carried out are divided among the cultural foundations and the teams of specialists hired by the company, having a positive outcome upon the written works. In May 2011 there have been published the first tourist guides of that area: *Ghid turistic. Călătorie în Ţara Aurului – O destinaţie legendară din Munţii Apuseni/A Tourist Guide. A Journey into the Land of Gold – A Legendary Destination in the Apuseni Mountains* (published by SC Roşia Montană Gold Corporation SA) and *Roşia Montană. Ghid cultural – Turistic/Roşia Montană. A Cultural Touristc Guide* (published by The Cultural Foundation Roşia Montană), which for the first time offered a touristic approach for the auriferous patrimony.

At the same time the project wrote a memorable page in the history of Roşia Montană. Due to the created dispute/controversy Roşia Montană, its inhabitants and their cultural and industrial patrimony had become worldwide familiar. A lot of media campaigns, pro and against the project, have been launched in the country and abroad. The gold culture had especially been highlighted by those who oppose the future project. The articles as: "*A (Cyanide) Taste for Gold*" (Balaciall, 2003), "*Romanian Town to Be Razed to the ground for*

Gold" (Schofield, 2004), "*Gold is not enough*" (Eyres, 2004) "*Fighting over Gold in the Land of Dracula*" (Smith, 2007), "*Mountain of Troubles*" (Demian, 2008), etc. express the effort, whose ampleness had not been foreseen in the battle for protecting the locality and the uncertainty of what the future may reserve for the local community. The debates have also inspired several documentaries which capture the essence of the conflict between the economic, cultural and environmental interests. The interest of the media for this locality has become obvious due to some thorough studies which emphasize (or hide) the elements of the social present.

These are the main important works concerning the ore exploitation from the territory of the Apuseni Mountains. Due to the arrangement in periods of study, we can trace the evolution of the scientific researches and thus the research courses cand be chronologically followed (Figure 1).

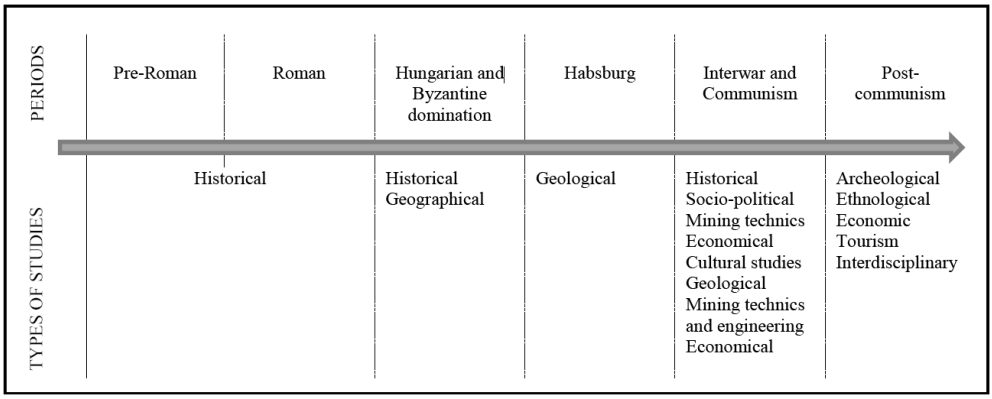

Figure 1 Evolution of the scientific research of gold exploitation in Apuseni Mountains

Source: own research

The evolution of the research begins in Ancient times with the empirical knowledge exposed in historical studies. The information about gold exploitation in the pre-Roman and the Roman periods are mostly indirectly documented, from the newly-revealed and studied archeological evidences. In the Middle Age the historical works regarding gold exploitation are supplemented by early geographical studies. From the Hungarian and Byzantine domination period are also dated several legislative and legal documents and the first mining law (Roman et al., 1982). In the 18t^{h} and the 19th centuries the research has an almost exhaustive geological approach, reflecting the huge importance that the gold ores of Transylvania had for the Austro-Hungarians. After year 1900, the scientific magazines appear, including various mining technical research articles. The interwar period gold extraction becomes a major objective for the state, so the research of the gold deposits is increasing. The economics studies and the socio-political ones extend, contributing to the diversification of the research area. The communists, focused on the extension of the industrial activity, require the development of the geological, engineering and economic research. After the mining activity collapses, the concerns regarding the future of the gold exploitation areas lead to the elaboration of some extensive research. Nowadays, the main research subjects related to gold exploitation in Apuseni Mountains are: economic development, remaining underground reserves, impact of the mining activity, socio-economic evaluation, alternative development, tourism reorientation, etc. The most

discussed area is Roșia Montană, an Ancient mining center, which is considered to shelter the largest gold and silver deposit of Europe.

CONCLUSION

The scientific research of gold mining in the Apuseni Mountains includes numerous historical, geographical, geological, economic, political, cultural, archeological studies, comprised in works corresponding to different domains of approach, and in works with an interdisciplinary approach. The chronology of appearance and development of the studies and researches related to this subject reflects the age of this occupation within Apuseni Mountains, especially the growing interest of all the people that dominated this land on gold ores. The importance of this economic activity and the attraction of the precious metal caused, at least until the seventeenth century that the studies regarding gold exploitation and those related to the study area and its inhabitants to interfere frequently.

This paper has intended to present the evolution of the scientific research regarding gold extraction in Apuseni Mountains, highlighting the specific types of studies for each historical period and the linkage between the interest of knowledge and other socio-political aspects. As shown in the figure above the studies and the research domains had developed from ancient historical works to the interdisciplinary studies conducted today. The evolution of the scientific approach was strongly influenced by the socio-economic and the political context of each period of time. The subject of gold mining was, and still is approached in the Romanian and the international literature, by specialists of various scientific areas. Those studies represent a complex documentary material that offers us the possibility to extent the universe of knowledge by further studies that address current issues related to the mining areas of the studied mountains using new methods of research.

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GEOMORPHOLOGICAL STUDIES OF SLOPE PROCESSES BY THE ANALYSIS OF TREE-RINGS

Patrick CHIROIU
PhD student, Department of Geography, West University of Timişoara, Romania,
E-mail: p.chiroiu@gmail.com

Abstract: Dendrogeomorphology is one of the most precise methods used in investigating spatio-temporal patterns of geomorphic processes. Based on the fundamental process-event-response principle, dendrogeomorphic studies identify and interpret growth disturbances found in tree-rings, in order to get a better image upon the past occurrence of slope processes. This paper aims to describe the way slope processes affect trees and to explain why and how growth disturbances appear. The second goal of this paper is to argue on the issues subject to constant disapproval between researchers in the field, such as sample strategy, number of samples, and interpretation standards, and eventually to identify common views and similar opinions.

Key words: tree-rings, dendrogeomorphology, slope processes

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INTRODUCTION

Understanding the way the earth is shaped by internal and external processes implies the analysis of geologic and geomorphic phenomena. Geomorphic agents are continuously shaping the earth's surface, being variable both in time and space. Methods implied in the analysis of spatial and temporal behavior of these processes rely on archival data and on chronometric methods such as radiocarbon dating, accelerator mass spectrometry, lichenometry, or dendrochronology (Walker, 2005). Dendrochronology extracts useful information contained in tree-rings to get insights in past environmental conditions and to date events that affected tree growth (Speer, 2010).

Dendrogeomorphology as defined by Alestalo (1971), is using plant ecology and dendrochronology in order to study the spatio-temporal behavior of geomorphic processes. The analysis of tree-rings is a precise method of dating growth disturbances induced by slope processes, and has been enforced in a variety of studies in the field (Burrows and Burrows, 1976; Braam et al., 1987; Stoffel, 2005; Bollschweiler, 2007; Butler and Sawyer, 2008; Stoffel et al., 2013).

Any dendrogeomorphological analysis is based on the use of the fundamental principle defined by Shroder (1978) as *the process-event-response principle*. This concept states that any kind of geomorphic *process* can cause an *event* by affecting a tree, and this event will induce the formation of a speciffic growth *response* in the tree-ring series. The aims of this study are, therefore, (i) to describe the way slope processes affect normal tree growth and induce speciffic reactions within tree-rings, (ii) to argue on the issues subject to

constant disapproval between researchers in the field, and at the same time, (iii) to provide an insight in recent literature.

SLOPE PROCESSES AND DENDROGEOMOPHOLOGY

Slope processes such as rockfall, debris flows, landslides and snow avalanches have been investigated all over the world using dendrogeomorphic techniques, most studies being conducted during the last four decades. But what issues regarding slope processes can a tree-ring analysis solve? Dendrogeomorphology is firstly a dating technique, therefore the early approaches in the field were restricted to the dating of major geomorphic events (Moore & Matthews, 1978; Butler & Malanson, 1985). Along with a better understanding of the variety of information contained in tree-rings, various studies were undertaken in order to reconstruct past process occurence (Stoffel et al., 2005; Germain et al., 2009), determine the frequency and return periods of a speciffic phenomenon (Muntan et al., 2004; Bollschweiler et al., 2007; Schneuwly and Stoffel, 2008), identify triggering factors (Fantucci and McCord, 1995; Carrara and O'Neill, 2003; Šilhan et al., 2012), assess the magnitude of events (Dubé et al., 2004; Butler and Sawyer, 2008), and reconstruct spatial extent of past events (Reardon et al., 2008; Corona et al., 2010). In addition to the main trend of researches, tree-ring related studies were used to unravel different kinds of process-speciffic issues, such as bounce heights of falling rocks (Schneuwly and Stoffel, 2008), seasonal timing of debris flows and snow avalanches (Szymcsak et al., 2010) or movement rates of rock glaciers (Bachrach et al., 2004). Individual anatomical tree reactions such as growth releases (Fraver and White, 2005), formation and spread of callus tissue (Schneuwly et al., 2009), tangential rows of traumatic resin ducts (Stoffel, 2008), compression wood and eccentric growth (Duncker and Spiecker, 2008) were thoroughly analized as well.

In Romania, dendrogeomorphic approaches are scarce. Urdea (1998) studied rock glacier dynamics in the Retezat Mountains, and more recently, Voiculescu (2010) found tree-ring records of a major avalanche in the Bucegi Mountains. Snow avalanches in the Făgăraș Mountains (Voiculescu and Onaca, in press) and landslide activity in the Călimani Mountains (Surdeanu et al., 2011) were recently analyzed in terms of tree-ring research.

Slope processes as listed above, frequently occur in forested areas, and trees are affected due to direct impact with downslope transported material, or indirectly, following changes in growth conditions. Interactions between a tree and a geomorhic process is known as an event. Following an event, the tree will react upon the induced disturbance with a speciffic growth response.

EVENTS AND ASSOCIATED RESPONSES

Stem Injury

Slope processes carry solid material such as rocks, boulders, ice, tree stumps and debris. In the case that trees are hit by this moving material, the protective bark could be penetrated and the cambial layer damaged. This event, called corrasion, causes an impact scar or wound on the tree stem (Figure 1). Scarred trees are a common feature in areas with active geomorphic processes and most tree-ring studies assign this indicator as most valuable.

After the event, the tree will almost imediately start the healing process, by chaotically producing wood cells from he outer margins, in order to seal the wound (Stoffel and Bollschweiler, 2009). This cells will form a hard edge called *callus tissue* (Schweingruber, 2007). The dendrogeomorphic importance of this growth disturbance is high, due to the rapid triggering of this anatomical reaction. The positioning of the callus tissue within a tree-

ring allows a seasonal dating of the event, and enables even a distinction between the type of process that occured (Stoffel, 2008).

Some conifer species, especially *Larix decidua, Picea abies* and, in some cases *Abies alba*, react to stem injury by producing tangential rows of *traumatic resin ducts* (Nagy et al., 2000). Luchi et al., (2005) states that the resin production will start only a few days after the wounding, assuming that the disturbance was inflicted during the growing season. Events associated to the dormant season will be reflected by callus tissue and traumatic resin ducts in the first cell layers of earlywood.

Figure 1 Wounding of the trunk (middle), and the associate growth disturbances: tangential rows of traumatic resin ducts (left) and formation of callus tissue (right)

Stem tilting

Trees with J-shape stems are common on unstable slopes, where slow and continuous, or sudden and rapid mass-movements occur. The bent stems are a consequence of tilting, induced by a sudden mechanical pressure. Trying to regain its vertical growth position, the tilted tree will produce *reaction wood* and form *eccentric growth rings* (Alestalo, 1971). Reaction wood in gymnosperms is called compression wood, and appears on the tilted side of the trunk (Timell, 1986), while angiosperms produce tension wood on the opposite side of the tilting direction. Tree-rings with reaction wood are easy to detect due (Figure 2) to the fact that they are wider and have a darker appearance (compression wood has a brown-reddish appearance and tension wood is yellow-grey).

Cross-sections of trees with undisturbed vertical growth exhibit concentric annual rings. When a tree is tilted, the stress induced by gravity will alter the balance and the weight distribution. In such conditions, tree-rings will grow eccentric (Braam et al., 1987). This anomalous growth will last until the tree has regained its vertical position and static pressures dissapear. Dating the first eccentric growth ring, provides the date of the tilting event. Moreover, if eccentricity is accompanied by reaction wood, the dating reliability is enhanced, because as Duncker & Spiecker (2008) acknowledge, eccentric growth commonly

appears in tilted trees along with reaction wood. However, multiple tilting events lead to a variation in eccentricity, which leads to a more difficult dating process.

Figure 2 Tilting of the stem will cause the formation of reaction wood and growth of eccentric tree-rings

Root exposure and stem burial

Some geomorphic processes, such as debris flows, flooding or landslides, are active erosional agents. Denudation on forested slopes can lead to complete or partial root exposure. In case of complete exposure, roots will die off, while partial exposed roots will continue to fulfill their primary functions. However, the exposed part of a root will suffer certain anatomical changes shortly after the event. Dating these changes provides information on the timing of slope processes responsible for the event (Hitz et al., 2008). Furthermore, trees with exposed roots will experience shortage in water and nutrient supply, which will affect the annual production of wood cells. Tree-rings formed in the following years will be significantly narrower (Shroder, 1980). This speciffic growth disturbance is called abrupt growth supression, or simply *supression*.

Opposite to erosion, aggradation generates the deposition of material at the base of the stem. Material transported by gravitational processes can accumulate up to various heights, inducing changes in soil humidity and nutrient amounts (Stoffel & Bollschweiler, 2009). The tree's response to stem burial is abrupt growth suppression in the following years, and if aggradation surpasses certain thresholds it will, eventually, cause the death of the tree.

In some cases of aggradation, trees can develop adventious roots (Alestalo, 1971), counting the rings found in these roots could provide relative data on the occurence of the event. However, even if recent contributions state that exposed and adventious roots contain important data for dendrogeomorphologists (Gaertner, 2003), suppression is the most reliable growth response in case of exposure or burial.

Stem breakage, decapitation and branch loss

Heavy impacts with large boulders or debris, which exceed the capability of the tree to dissipate the impact energy, will result in stem breakage or decapitation. A special case of decapitation is the apex loss caused by the *hula-hoop* effect, which occurs when the impact energy propagates from the lower part of the trunk to the apex of the stem (Dorren & Berger, 2006). Butler & Malanson (1985) acknowledge that after stem breakage or decapitation trees develop a certain morphology, called candelabra growth, which is the result of lateral branches and new lateral shoots which try to take the lead and replace the lost apex. Trees which endure such severe trauma, will react with abrupt growth suppression (Figure 3) in the years following the impact (Stoffel, 2005). This response is caused by the massive loss of foliage, which leads to a decreased capability of wood production, due to photosynthesis surface reduction. Likewise, an impact that causes loss of branches, will also be reflected in growth suppression.

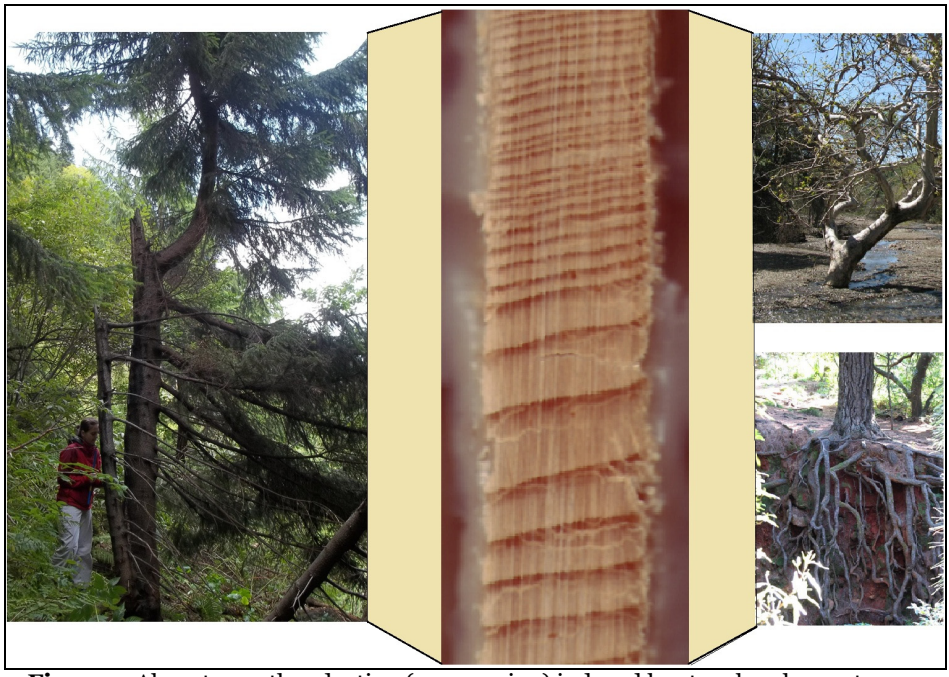

Figure 3 Abrupt growth reduction (suppression) induced by stem breakage, stem burial and root exposure

Death of trees

In dendrogeomorphology, areas bordering the spatial development of a slope process, play an important role. In these areas, trees that were not directly affected by geomorphic events, will benefit from more light, water and nutrients, due to the elimination of neighboring, thus

concurrent trees. These trees, growing in border areas, will react to the improved life conditions by an abrupt growth release, or *relaxation* (Fraver and White, 2005). Tree-rings that are produced after such an event will be considerably larger.

In every dendrogeomorphic study, tree-ring series exhibiting growth releases and suppressions should be compared to a master chronology. Master chronologies are based on the development of growth curves of undisturbed trees, and are considered as reference chronologies to be used for crossdating with the increment curves of disturbed samples (Burrows and Burrows, 1976). The same principle of crossdating is applied on samples belonging to trees killed by a geomorphic event. Assessing the death date of these trees can be used along with the other above discussed growth responses to infer precise dating of past events.

SAMPLING DESIGNS AND INTERPRETATION ISSUES

As seen above, trees record mechanical disturbances induced by slope processes and develop characteristic growth responses. Dendrogeomorphological research is based on the identification and interpretation of these typical reactions, therefore sampling strategies are developed to catch the best dendrogeomorphic signal, and the responses obtained are processed and interpreted so as to extact the best information relevant to the investigated phenomenon. Even if growth disturbances used in various approaches are commonly the same, sampling strategies, sampling size, index values or intensities assigned to certain types of responses differ between researchers. Further, we will describe and argue about the different points of view found in recent literature regarding the above mentioned issues.

The sampling design issue

In every dendrogeomorhic approach, selecting which trees are suitable to be part of the analysis, is one of the basic issues, and the quality of results is a direct consequence of this decision. Trees are selected according to a certain sample strategy which is primary dependent on the type of geomorphic process and the avaliability of affected trees in the study area, and secondly, subordinated to the aims of the study. Jenkins and Hebertson (2004) note the most used sampling strategies in snow avalanche research, which are suitable for most slope processes as well: focused sampling, transect sampling, grid method and random sampling. Some authors are using the focused sampling strategy, by selecting trees with obvious damage, clearly inflicted by the investigated process (Butler and Malanson, 1985; Stoffel et al., 2005; Malik et al., 2009; Decaulne et al., 2012). Other researchers design their strategy on speciffic transects along different sectors of their study area, sampling all trees within certain boundaries, without taking into account visible damage on selected trees (Corona et al., 2010; Casteller et al., 2011). The grid method allows for a more accurate reconstruction of the spatial extent of certain events, while random sampling needs to be very exhaustive in order to catch spatio-temporal patterns.

Choosing one or the other of the above mentioned strategies will clearly affect event replication in time and space. Trees that exhibit visible growth anomalies, such as impact scars or burried stems, will tend to provide more data on the recent past, knowing that visible damage will be blurred after just a few decades (Stoffel & Perret, 2006). Older trees, on the other hand, will be less sensitive to recent events, but will represent excelent individuals for reconstructing older events (Stoffel and Beniston, 2006). Based on this, and on a rich field experience, Stoffel et al. (2013) recommend a balanced sampling of older and younger trees, well distributed along the study area, and with no preference to trees with visible damage. They call for a systematic sampling approach and emphasize on transect sampling designs in

case of avalanches, rockfall and landslides, and speciffic radial distances from fan and cone apices, when analyzing debris flows, floods or lahars.

A question that often arises in literature is what sample size (number of analyzed trees) is needed to reach the desired level of confidence? Early work of Butler et al., (1987) concentrated on this issue, and analyzed a series of papers dealing with various geomorphic processes such as flooding, snow avalanches, slow and rapid mass-movements and permafrost ground heave. They concluded that sample size is primary dependent on the type of geomorphic process studied and the personal choice of the researcher. Hebertson and Jenkins (2003) recommend a minimum sample size of 20 trees in the study of snow avalanches. Comparing archive data on a well documented avalanche path with tree-ring results, Corona et al., (2012) state that the best replication of known events starts with a sample size of 100 trees. This number is confirmed by the statistical analysis of Stoffel et al. (2013), moreover, statistical results highlight that the best process replication is obtained with a sample depth of around 100 trees, adding more trees to the analysis will not lead to a significant improvement. This recent paper also states an optimum sample size for debris flow and landslides. Even if the best statistical result for debris flow reconstruction is obtained with 300 trees, in terms of costs and benefits, a sample size of 150 trees, can be considered a good compromise between field efforts, laboratory analysis, and results obtained. In the case of a landslide study, the best replication is obtained with a minimum sample size of 50 trees (Stoffel et al., 2013).

Eventually, Table 1 presents a review of the most cited studies in the literature of dendrogeomorphology, with emphasis on sample strategies, sample sizes, threshold values and intensity classes if available, showing great diversity, but noting that an increasing trend in sample size is recognizable in recent studies. This observation accords to the general principle of replication in dendrochronology, which states that a higher amount of samples will lead to a reduction of noise and an improvement of the dendrochronological signal.

The index threshold issue

Following the field trip, samples are brought into the laboratory, prepared, measured and eventually analized, looking for identification of growth disturbances. In this phase, growth anomalies are categorized, summarized and interpreted. This process usually ends with a reconstruction of the events ocurred in the past, according to the number and strength of the extracted signal. Subsequently, researchers have to make a distinction between dendrogeomorphic signal, and noise induced by non-geomoprhic agents. They mainly do this by setting a threshold above which the responses are decoded as a past event.

At this point, there still is massive disagreement regarding the best threshold value. This problem was already recognized by Butler et al. (1987), which states that the number of event years inferred from tree-rings is strongly controlled by the size of the Index Number (threshold). Thresholds found in literature are ranging from 1 responsive tree (Burrows and Burrows, 1976; Stoffel et al., 2006) to 2% of all trees (Lopez-Saez et al., 2012, Šilhan et al., 2012) and further to 10% (Dubé et al., 2004; Reardon et al., 2008, Casteller et al., 2011, Decaulne et al., 2012), and 40% (Butler & Malanson, 1985; Butler and Sawyer, 2008). It is a fact that evidence left in trees, as well as the nature and strength of the reaction, will ultimately be dictated by the nature of the geomorphic process itself. Therefore, it is established that different thresholds should be defined for different types of processes (Stoffel et al., 2013). Processes with a large spatial extent will leave their mark in a higher number of trees than, for instance, sparse rockfall, which would only harm a few individuals. Furthermore, sample size will influence threshold values as well. The more samples are included in the analysis, the less the threshold should be. A large number of growth reactions inferred from a large number of samples, will induce an increase in reconstructed events.

These studies imply threshold setting mainly for distinction between major and minor events (Germain et al., 2009).

Table 1 Overview of past dendrogeomorphic studies. Issues discussed in this paper were emphasized

Author and Year	Location	Process	Sampling strategy	Sample size	Threshold value	Classification
Shroder (1978)	Utah (USA)	Landslide	Focused	260	4%	NO
Butler & Malanson (1985)	Montana (USA)	Snow avalanche	Focused	30 + 48	40%	NO
Braam et al. (1987)	Alps (France)	Landslide	Focused	56	7 - 17%	NO
Corrominas & Moya (1999)	Pyrenees (Spain)	Landslide	Focused	250	30%	NO
Carrara & O'Neill (2003)	Montana (USA)	Landslide	Focused	32	25%	NO
Jenkins & Hebertson (2004)	Utah (USA)	Snow avalanche	Combined	78	not provided	NO
Stoffel & Beniston (2006)	Valais (Switherland)	Debris Flow	Focused	1102	not computed	NO
Bollschweiler et al. (2007)	Valais (Switherland)	Debris Flow	Focused	960	not computed	NO
Stoffel et al. (2008)	Valais (Switherland)	Debris Flow	Focused	451	not computed	NO
Butler & Sawyer (2008)	Colorado (USA)	Snow avalanche	Focused	10 + 12	20%, 40%	YES
Reardon et al. (2008)	Montana (USA)	Snow avalanche	Combined	109	10%	YES
Germain et al. (2009)	Chic-Choc Mts. (Canada)	Snow avalanche	Combined	243	10%	YES
Muntan et al. (2009)	Pyrenees (Spain)	Snow avalanche	Transects	131	16 - 40%	NO
Stoffel & Bollschweiler (2009)	Valais (Switherland)	Debris Flow	Focused	35	not computed	NO
Malik & Owczarek (2009)	Sudetes (Poland)	Debris Flow	Focused	19	not computed	NO
Szymcsak et al. (2010)	Valais (Switherland)	Debris Flow	Focused	148	not computed	NO
Corona et al. (2010)	Alps (France)	Snow avalanche	Combined	232	10%	YES
Casteller et al. (2011)	Patagonian Andes (Argentina)	Snow avalanche	Combined	95	10%	YES
Šilhan et al. (2012)	Caucasus (Ukraine)	Landslide	Focused	48	5%	YES
Lopez-Saez et al. (2012)	Alps (France)	Landslide	Focused	403	2%	NO

Recent work focused on this issue was conducted by Stoffel et al. (2013), trying to set standards in dendrogeomorhological research. Mass-movements, such as snow avalanches, debris-flows and landslides were analyzed separately. The final statement regarding avalanches, referred to the use of a variable threshold, which would need to be adjusted to changes in sample size so as to capture a maximum of past events. Threshold setting in the case of debris flows is strongly dependent on the terrain features and, thus, needs to be based on the experience of the investigator. Finally, several threshold values were statistically tested for landslide activity, results showing that for a subset of 50 trees, a growth disturbance threshold of 5% would be optimal to certify a past event.

The response intensity issue

Disturbances induced in normal tree growth and growth reactions detected in tree-rings contain useful information about the energy of the geomorphic process. Internal and external evidence exhibit different intensities. For instance, reaction wood lasts one or many years, scars are of different sizes and a broken trunk is a stronger signal than a scratch. Therefore, some dendrogeomorphologists choose to define intensity classes, in order to weight the influence of growth disturbances included in the analysis. There is, once more, great disapproval on this topic, between different approaches. The first and most important difference is set by the nature of slope process, certain responses being more frequently identified for a type of process than for another. For instance, rockfall will induce a higher number of scars than tilted trees, while landslide will mainly result in tilted trees than wounded ones. Consequently, the nature and intensity of growth responses is highly dependent on the sample strategy. The outcomes of a focused sampling design, for example, will reflect the sampling choice of the researcher and anticipate the type and intensity of

respones. In order to get a clear image on the possibilities of categorization, and to exclude confusion induced by different slope processes, we will depict the most used and cited intensity classes found in recent snow avalanche literature.

Luckman & Frazer (2001) defined five intensity classes, a rating system that depends heavily on the presence of corrasion scars and reaction wood, but which is less quantitative in the measurements associated with ring-width variations and circumferential extent of reaction wood. Note that this classification is also used by Pederson et al. (2006), Reardon et al. (2008), Butler and Sawyer (2008), and Corona et al. (2010), and is similar to that found in the paper of Germain et el. (2005). The five different ratings are the following:

1. clear impact scar associated with obvious reaction wood or growth suppression;
2. clear scar, but no reaction wood or suppression of growth, OR, obvious reaction wood/suppression of growth that occurs abruptly after complacent or "normal" growth and that lasts for approximately three years;
3. well-defined reaction wood/suppression of growth, but only prevalent in 1 or 2 successive growth years;
4. reaction wood or growth suppression present but not well defined, OR, reaction wood present but formed when tree was young and more susceptible to damage from various environmental and biological conditions;
5. same as 4 except reaction wood is very poorly defined, and slow onset may indicate other processes such as soil or snow creep may be primary causes (Pederson et al., 2006, p. 439).

Impact classes defined by Germain et al. (2009) include external features of trees as well. This classification contains four „impact classes" and could be summarized as follows:

Class A (4 points): Broken stem associated with abrupt change in radial growth, or reaction wood lasting more than 2 years and covering 100% of at least 2 tree-rings, or scar with an angle of at least 90° from the pith to the outer scar limits;

Class B (3 points): Reaction wood lasting more than 2 years and covering 100% of the first and 50% of the second tree-ring, or scar with an angle between 60° and 90° from the pith to the outer scar limits;

Class C (2 points): Reaction wood lasting more than 2 years and covering 50% of the first and 30% of the second tree-ring, or scar with an angle between 30° and 60° from the pith to the outer scar limits;

Class D (1 point): Single year of reaction wood, or scar with an angle less than 30° from the pith to the outer scar limits;

Casteller et al. (2011) assignes scores to each indicator and classifies them in three intensity classes. In this fashion, scars were assigned a score of 10 points, reaction wood and eccentricity variations were both assigned 5 points and abrupt growth changes 3 points. This rating system emphasizes features that are in most cases associated with avalanche events, from others that can be induced by a variety of causes besides avalanches.

Decaulne et al. (2012) adapts the first classification to their analysis, which emphasizes eccentric growth, classes resulted are following:

Class 1: eccentricity marked by an abrupt increase in radius C, i.e. obvious tension wood, associated to a drop of D growth, i.e. growth suppression, where the snow-avalanche effect on the growth clearly seems to be the cause of the tension wood formation; only the first year of reaction wood formation, i.e. the first year of occurrence with increase in C and decrease in D, is taken into account, as reaction wood might persist several years after a snow-avalanche hit without new snow avalanche activity.

Class 2: eccentricity characterised by a growth increase in C, marking tension wood formation, while the D growth stays still, where tension wood formation seems obvious, although it might be an artefact due to the tree effort to gain back the upright position after a previous shock;

Class 3: C>D while the master curve shows a decrease of growth conditions, but C and D growth might both increase, where reaction wood forms but might be due to the tree physiology rather than to snow-avalanche events.

However, there are other authors that ignore the instensity of the disturbance, providing only a quantitative analysis (Dubé et al., 2004; Laxton & Smith, 2009). Going thoungh all of these these classifications, it becomes clear that assigning intensity classes, strictly depends on factors particular to each study, regarding nature of slope process, terrain features, sample strategy, and even nature of growth disturbances identified. We presume that a researcher cannot decide on which intensity classification he shall use, before preparing and analyzing the collected samples.

CONCLUSION

In this paper we have firstly described the constitutive items of the process-event-response principle, and consequently, we exhibited the existing connections between a certain event and its associated response/s. Afterwards, we raised the problem issues in dendrogeomorphological practice and argued on each one of them, listing the diverse views found in recent literature.

Presuming that site selection is perhaps the first important aspect of every dendrogeomorphic approach, sample size and sample strategies must be very carefully decided, with respect to the nature of the slope process analyzed. Each type of process has found its optimum sample size, as we have seen before, snow avalanche behavior would be best unraveled by sampling around 100 trees, landslides request an optimum of 50 trees, while debris flows are more sensitive, and require at least 150 trees to be sampled. Regarding the sample strategy, a well balanced strategy is recomended, without emphasis on visually damaged trees, older or younger, conifer or deciduous trees. These conditions being met, signal interpretation problems arise, regarding threshold values and intensity classes. Provided that thresholds are conditioned by sample size (a high number of samples requires a low threshold and vice versa) and the „eye" of the researcher, the intensity class issue is not easy to solve. Therefore, a future study with respect to testing the various classification on the same sample set, would be very useful for enlargement of the set of standards in dendrogeomorphic research.

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TOURISTIC DEVELOPMENT OF THE ANDESITE AND KAOLIN QUARRIES IN PLEŞCUŢA COMMUNE, ARAD COUNTY

Mihaela UNGUREANU
PhD student, Department of Geography, Tourism and Territorial Planning – CSAT, University of Oradea, Romania,
E-mail: umihaela59@yahoo.com

Abstract: The present study has the purpose to present a model of putting to a good touristic use of the former andesite and kaolin quarries, located in Pleşcuţa commune, by integrating them as part of some touristic routes. There have been existing several stone quarries since the nineteenth century within the administrative limits of the Plecuţa commune; the most important are those in Aciuţa, Tălagiu and Gura Văii. The stone exploited in Aciuţa has been used to different pavements, railway beds or important buildings in Arad, Timişoara, Budapest, Szeged, Gyula etc. Huge amounts of gravel have been used to improving roads on Crisul Alb Valley and his afluents. Apart from the economical utility, the stone represented a way of artistic manifestation for the habitants of this commune, being used by the local craftsmen in carving gravestones and other religious landmarks. The activity of stone exploiting has encountered a continous downfall after 1990, due to industrial reorganization and liberalization of the market. Currently , there are one kaolin and four stone quarries in the commune but all non-operating. The economic and social effects generated by ceasing extracting activities are considerably harmfull: increasing of the unemployment rate determined by the lack of other new economic activities, the migration of population to nearby towns and cities (Sebiş, Ineu, Arad), ageing process, decrease of birth rate and local income, low standard of living atc. The tourism represents a viable solution for improving the social and economic circumstances of the Pleşcuţa a commune, taking into account the remarkable touristic potential at the area.

Key words: stone quarries, touristic potential, economic and social development

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INTRODUCTION

Pleşcuţa commune is situated in the West of Romania, the eastern side of Arad county (Figure 1). From the physical and geographic point of view, the administrative territory of the commune identifies to the depresionary corridor of Hălmagiu – Gurahonţ. Crossed by the Crişul Alb river, it is delimited by the Zărand Mountains piedmonts to the south and Codru-Moma Mountains piedmonts to the north (Coteţ, 1973; Ianovici, 1976; Oancea, 2002)

The given study analyses the possibilities of touristic development of the andesite and kaolin quarries on the territory of Pleşcuţa commune by introducing them in some touristic routes. The purpose consists in increasing the attractivity level of the commune in order to draw new investments, especially concerning tourism. The inhabitants of the commune have been and remain diligent and very hospitable persons. Most of them are

employed in agriculture, stock farming being favoured because of the large surfaces covered with pastures and meadows. Up until recently, the agricultural sector has been closely followed by the industrial one, respectively the stone quarrying (Mager, 1938; Pârva, 1983). Between the 1990 and 2013, the companies involved in exploiting andesites brought to a stop their activities, mostly because of the economic crisis and liberalization of the market. Unfortunately, they shown no interest in rehabilitating the former exploiting areas, as specified in the agreements completed with the local authorities, when the lands were leased. As a result of exploiting these deposits, many decaying buildings, rusted and twisted equipments have remained, giving a desolating and unaesthic tone to the landscape. The main action which is to be adopted by the authorities implies the ecological restoration of the anthropical relief issued.

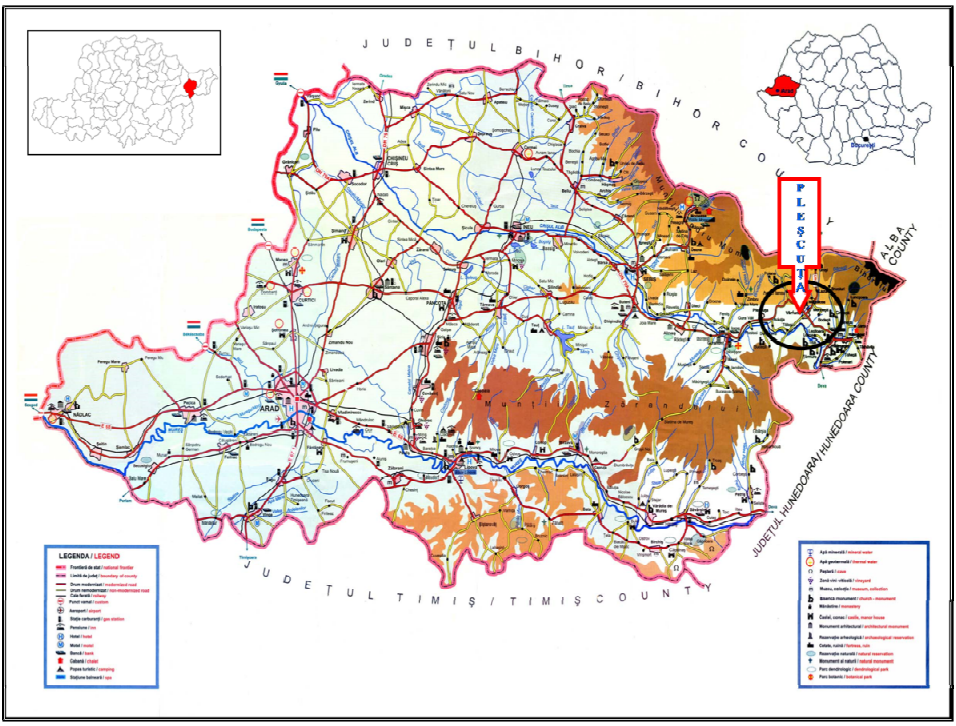

Figure 1 Pleşcuţa commune – localization in Roumania and Arad county

Source: www.virtualarad.net

Using minimal touristic improvements, without great investments, the former industrial exploitations could be transformed in touristic objectives of economical, educational, geological and ecological concern. The touristic valorization of these industrial sites is in keeping with the new politics of regional, national and European development which anticipate conservation and preservation of the industrial past. The touristic exploitation of these resources depends on several aspects: the level of touristic attractivity of the studied area, development of the touristic facilities (ways and means of transport, structures of touristic accommodation and serving meals, leisure facilities), types and forms

of practiced tourism, touristic circulation, social and economic circumstances etc. (Minciu, 1995; Ritchie, 2005; Ilieş, 2009).

DATA AND METHODS

In order to realise this paper it has been used the classical methodology of research, respectively the bibliography associated with the research area has been consulted regarding the relief, petrography, climate, hydrographical system, soil, demography etc., then it has been realised the field work and eventually, the final shape of the text was settled in the laboratory. Thus, the stage of the bibliographical documentation directly or indirectly pointed to the aspects aproached in the given workpaper. Among the methods used during the field documentation we mention: observation, analysis, investigation and mapping. Field researches were meant for identification, localization, description and fotography of the most attractive touristic resources in Pleşcuţa commune , in order to integrate them within some touristic routes. For this purpose there have been used the topographical maps 1:5000. Also, the visit in the area of study allowed the procurance of some information from the local authorities, concerning the projects in progress, the elements which might contribute to local development, the obstacles blocking economical increase, the possibilities of tourism increment, as long as the current life standard of the community. The stage of the touristic prospecting has been followed by the laboratory stage where the identified, located, analysed and described aspects were transposed in a final text. Spatial representation of certain analysed elements has been made by usage of specialized software, called ArcGIS.

DISCUSSIONS AND RESULTS

Pleşcuţa commune, like many others localities or even regions, whose economy has been influenced by the reorganizations in the extractive industry is facing critical social-economical issues like: depopulation, decrease of the standard of living, increase of the unemployment rate, ageing of the community, decline of the birth rate etc. The economic profile of the commune is the agrarian one, but the subsistence agriculture is practiced. For the economic revival and improvement of the standard of living in the community, the local authorities have initiated a series of projects based on tourism development. These mainly consider amelioration of the infrastructure: asphalt work comprising all the commune roads, sewerage, water alimentation and management of the garbage.

The social and economical frame

Pleşcuţa commune is formed of seven villages: Pleşcuţa (the main village), Aciuţa, Rostoci, Gura Văii, Budeşti, Tălagiu and Dumbrava. Its administrative territory bounds on Hălmagiu commune to east and south-east, Vârfurile to north and north-east, Gurahonţ to north-west, west and south and Vaţa de Jos to south-east. It is crossed from east to west by DN 79A, the main road that makes the connection with Gurahonţ commne and town of Ineu. There are three train stations on the territory of the commune (in Aciuţa, Tălagiu and Gura Văii) which ensure the railway access to important towns as Brad or Arad. The distance till the closest town in the county (Sebiş) is approximately 33 km far and Arad, the biggest city in the county is set to 115 km far. (Oancea, 2002; PATJ Arad).

Demographic aspects

According to census in 2002 the total and constant population of the commune was counting 1498 inhabitants, from which 47.40% men and 52.60% women. In 2010, by token of

evaluations made by National Institute of Statistics, the population of the commune counted 1282 habitants, decreasing by more than 50% since 1948, when the number was 3148 persons (fig 7). Persons of the age 0-14 were representing 11,42% of the total, while those older than 59 years were 37,9%. Population growth rate has negative values (-18,8%). Because of the low birth rate and the emphasis of the migrating phenomenon, the population is continuously decreasing. By the number of inhabitants in each village, the population is thus allocated: Aciuţa-247 habitants, Budeşti - 49, Dumbrava – 123, Gura Văii – 189, Pleşcuţa – 294, Rostoci – 132, Tălagiu – 472 (*http://www.insse.ro/cms/rw/pages/index.ro.do*). According to calculations made by National Institute of Statistics, till 2025, the population will decrease with 42% (PATJ Arad)

Economical activities

The agriculture represents the basic occupation of the active population in Pleşcuţa commune, but it is practiced as a measure of subsistence. Due to existence of the large surfaces covered with pastures and meadows, the main agricultural activity of people remains stock farming. The stock of wood consists in one of the most important resources of the villages, about 3728 ha of the total surface (47.24%) of the commune being covered with forest. The intense activity of exploiting the wood lead to clearing of some considerable amounts of surface and as a consequence, certain areas have been affected by landslides, which requires urgent measures of stabilizing some of the slopes by replanting trees (PUG Pleşcuţa). The sustainable development of the sylvan area may be realized in a tight connection to the tourism by:

- valorization of the touristic potential of the forest (by various types of tourism: hiking, medical, scientific or discovery tourism);
- creating certain touristic routes whose main theme would be the importance of the forest as an ecosystem;
- picking of medicinal herbs, wild berries and mushrooms and commercializing them as a local brand;
- founding some workshops for manufacturing wood;

The stone extractive industry had a major importance in the past, but currently the exploitation activity is suspended in all the four open-air excavations in the range of the Pleşcuţa commune. *The services* are poorly developed. There are seven functionally centres of commercial and food service, all of them being placed in the proximity of the main access routes which cross the villages. In spite of the social and economic problems already mentioned and despite the lack of touristic infrastructure, the tourism represents the most viable option of local development due to raised level of attractivity offered by the natural and antropic resources, along with the potential given by the position of the commune on the touristic axis Moneasa – Vaţa de Jos (PATJ Arad; PUG Pleşcuţa; http://www.mdrt.ro).

The natural and antropic touristic resources

The touristic resources both belonging to the natural and anthropical background are the main components of the atractive resources. (Cocean,1997) The functionality of the touristic components is influenced by many parameters, including the natural and anthropical resources as indispensable to development of the tourism, as long as the motivation of taking a touristic objective in a sight is based upon these resources. (Ilieş, 2000; Ciangă, 2007; Cocean, 2010).

The Pleşcuţa commune dispose of high touristic potential due to a great number of morphological, hydrological, fauna and floral elements with concrete valences of attractiveness, as well as the existence of the shelter climate, specific to the mountains and hills areas. Among all the elements of the natural background, *the relief* brings the most

important contribution to the construction of the touristic function of this area. The main morphological resources consist of:
- piedmonts of Codru-Moma and Zărand mountains, auspicious to hiking, cyclotourism, equestrian and discovery tourism etc.;
- several peaks as Măgura, Balint, Dealul cu Meri, Târsăli, Văratec, Gorunului, Pleşului and Chicera offer a large panoramic view over the couloir of the Crişul Alb river, Codru-Moma and Zărand mountains, up to the highest peak of the Apuseni, Cucurbăta Mare (1848 m) in Bihor Mountains;
- the epigenetic gorge of Crişul Alb river, between Aciuţa and Tălagiu, where the countryside road that accompanies the riverbed perfectly fits for enjoying cyclotourism in a picturesque background;
- the anthropic relief, distinguished by andesite (Figure 2) and kaolin quarries (Figure 3), offer the chance for a knowledge of some geological aspects, of the technology used in the process of extraction of these rocks, of the impact over the natural environment and the changes surveyed in the local landscape. On the territory of the commune there are four stone and one kaolin exploitation quarries, the deposits being in conservation. (PUG Pleşcuţa).

Climate and weather are elements able to favour or inhibit the course of tourist activities (Gaceu, 2003). The climate of shelter, specific to depressionary submontane spaces opened to west only, has relaxant and stimulant effects in the human body. The climatic coefficient of Romania (Fărcaş, 1968), marks out the dominant aspects of climate determined by evolution of its main parameters (the period of sun brightness, the medium temperature of the month, the period of precipitations). Based on these standards, the Hălmagiu-Gurahonţ depression integrates herself with the regions of maximum bioclimatical potential.

Figure 2 Andesite quarry in Aciuţa

Figure 3 Kaolin quarry in Tălagiu

The hydrographical resources come into prominence as an important source of attraction. Crişul Alb river and his afluents in the area of the commune (Gura Văii, Rostoci, Tăcăşele, Tudor's Valley, Village Creek, Pleşcuţa, Bear Valley, Tălagiului) have a very special function from a touristic point of view. Crişul Alb river is the largest tourist resource as concernig hydrography. The whole morphohydrologic assembly, comprising the low river meadow, terraces, slopes, secondary valleys and piedmont hills gravitates towards its riverbed, creating a special impression in the landscape. (Todoran, 1972). The river banks represent a strip suitable to weekend tourism, by their microclimate and appropriate landscape (Cocean, 1997). To the surface array of waters are added a few artificial lakes, filled by rainfalls, which formed into small cavities spread in the areas of andesite exploitation. The

largest one, in surface and depth is the lake at the Tălagiu quarry (Figure 4), placed in the immediate vicinity of Crişul Alb river, between Aciuţa and Tălagiu. Its aesthetical function in the landscape could be improved by transforming it into a fishery.

Vegetation is not a neglectable resource in tourism development. The touristic function of broadleaf forest is given by the high level of accessibility, various possibilities offered to recreational hiking and the purity of the air which has benefic effects in the human organism (Cocean, 1997; Ciangă, 2007). Also, the microclimate of the wooded areas cuts thermic roughness and slows down the winds. The large extention of the forest in the territory of the commune (47.24 %, meaning almost 3728 ha) is a positive aspect regarding to development of touristic activities. The edge of the wood is an area specially meant to temporarly concentrate tourists, where the grasslands are proper for camping. This 'edge effect" can be exploited on Tăcăşele Valley, which is particularly pitoresque and concentrates the most part of tourists during the weekend. Grasslands can be met in the waterside and terraces of the Crişul Alb river and impresses by the polychromy created in the local landscape due to the numberless floral species that invade the grass carpet. *The game fauna* is represented by animals like rabbit, wild boar, fox and deer. Tourists interested in capturing inedited images with the behavior and beauty of these animals are free to go "hunting" photographies and videos. The birds populating beechwoods and riverside coppices, as: chickadee, woodpecker, eagle owl, blackbird, raven and chaffinch provide for the sonorous background, creating an agreeable ambiance for hiking. The ichtyofauna, represented by species like barbel, broad snout or chub offer the possibility of fishing as a form of recreation. Thus, the fauna has a major contribution to the animation of landscape, enrichment of the aesthetic background and diversification of the recreational offer concerning the studied area (Ardelean, 1999).

The anthropic resources are also various and rich within the area of study, the ethnographic, religious and historic al ones being the most remarkable. Among the attractions of the anthropical resources in Pleşcuţa commune there are:

- *Hallaky Castle* (XVIIIth century) (Figure 5) built in neoclassic style; the legend tells that the owner was one of the cruelest oppressorin the area. A school have functioned here for a while but the building is currently in a high state of degradation (Mager, 1938; Pârva, 1983).
- *The wooden church „ Înălţarea Domnului"*, located in Budeşti village (Figure 6) has been built in 1772 (the date is carved above the door), in maramureşean style (Petranu, 1927; Godea, 2007) and has been declared historical monument. In 2002 some works of rehabilitation started by replacing the roof, but soon stopped because of the lack of funds. Thus, it remained uncovered, so the rainfalls destroyed the inner painting almost totally.

Figure 4 Anthropical lake in Tălagiu

Figure 5 Hallaky Castle in Aciuţa

Figure 6 The wooden church in Budeşti

Figure 7 Half tree bridge in Tălagiu

In this commune there is a great number of houses that kept the architectonic style specific to etnographic area of Ţara Zarandului. The structure of the traditional house implies the existence of two rooms and a passage hall that makes the connection between the rooms. The materials used in construction are stone (for the foundation) and wood. In the front part there is the porch made of clay and enclosed by a wooden verandah. (Pârva, 1982). In Budeşti all the houses are very old, a real etnographic patrimony. There can be also found here many domestic and household objects as: the kneading trough for bread, old ox-carts etc. in the middle of the village it can be seen a draw well. The improvised bridges made of halves of trees and used to cross the small kreeks of the villages are very interesting, too (Figure 7). The traditional technical equipment is represented by an old water flour mill situated in the Tăcăşele Valley and prune distilleries. In addition to all these objectives, the anthropic potential also integrates a range of activities and manifestations which become a source of interest only in certains temporal whiles (Cocean, 1997). In this category can be included the markets, a two days festival called ''nedeie", the expositions, the pilgfimages etc. *Nedeia* celebrated in the Tăcăşele Valley during the last weekend of June, gathers people from almost 30 surrounding villages and towns.

The touristic infrastructure

The infrastructure numbers the alltogether of goods and means by which the attractive resources of a territory are touristic exploited (Cocean, 1997; Ciangă, 2007). The touristic infrastructure includes: ways and means of public transport, accommodation and food service, recreational and treatment facilities. In the Pleşcuţa commune access is smoothed by DN 79 A road (Vârfurile-Pleşcuţa-Gurahonţ-Arad), which ensures the connection with the western part of Arad county and Hunedoara county to the east. The others roads of the commune are not very passable, being very roughly in some sections and hardly approachable by car. The numerous forest roads ease the access in the woods and to the quarry stones. The railway traffic to Arad or Brad is simplified by the train stations existent in Aciuţa, Gura Văii and Tălagiu. As for the accommodation and food service, there are no such facilities in the commune so far. The inhabitants hire out unregistered guest rooms to the passing tourists and those who remain during the weekends.

The touristic traffic

The main type of tourism developed in this administrative-territorial area relates to *weekend tourism*, which use as motivation recreation, rest and hiking. Tăcăşele Valley concentrates the most of touristic flows, its waterside being chosen as camping space. The lack of touristic

structures specialized in accommodation or another possibilities of recording the data regarding the dimension of touristic flows, emitter areas, qualitative structure of the flows (socio-professional profile of the tourist, the motivation in choosing destination, satisfaction level etc.) has not allowed a very clear analysis of those aspects. After the touristic prospectation in order to obtain certain information concerning the touristic flow I resorted to the method or the first-hand interview. The tool used in this research was a questionnary which I have applied for a month during the weekend, to 50 tourists who have chosen to camp along the Tăcăşele Valley. After the summarization of data the following conclusions have issued:

- the issueing areas are mainly represented by urban centers in Arad county (Sebiş, Ineu, Arad) and bordering counties (Hunedoara, Alba, Bihor), but also in the neighbour villages (Gurahonţ, Vârfurile); the most part of the tourists are visiting their relatives;
- the purpose of movement is to recreate and spend spare time in the middle of nature, in a clean environment;
- all tourists used their own means of transport in order to arrive in this area;
- the persons of 15 – 40 years are dominant;
- the great majority of the tourists have as main complaint the poor state of the roads and the lack of accommodation an food service spaces;
- all tourists have appreciated the beauty of the natural background.

Touristic development of the andesite and kaolin quarries by introducing them in two touristic routes

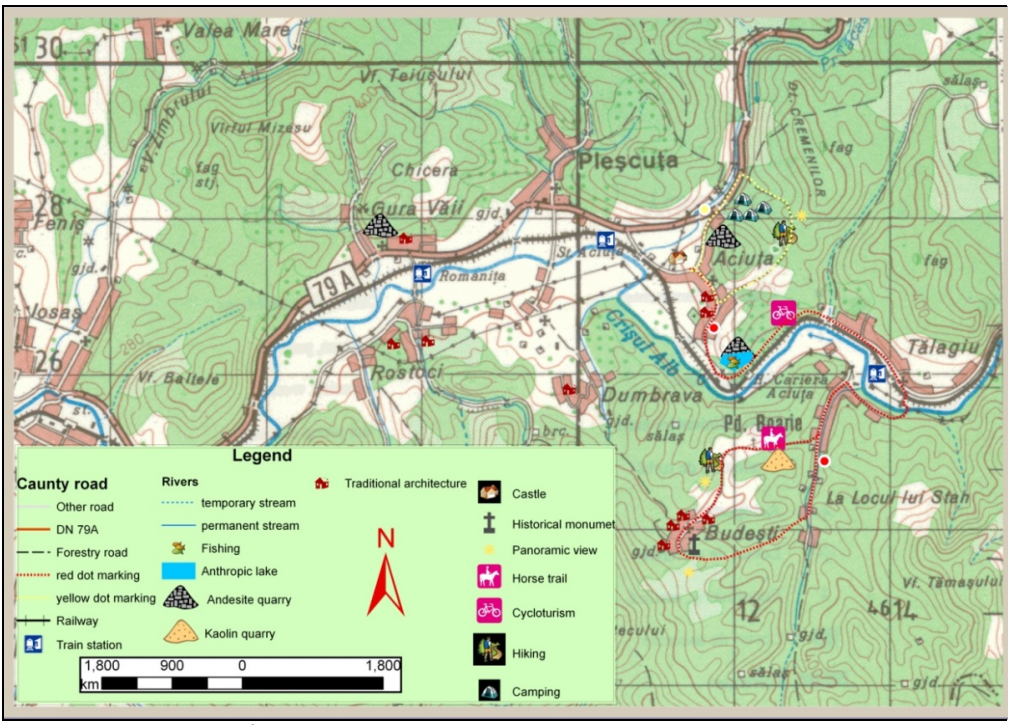

Figure 8 The map of the touristic route proposed

I. Touristic route: Aciuţa – Dealul Balint – Valea Tăcăşelelor – Aciuţa (Figure 8).
Marking: yellow dot
Time: 2 h 30 min
Distance: 3 km *Lift*: 180 m
Facilities: marking poles, informational boards to each touristic objective, including the camping, trash bins nearby the camping.
Necessary objects for the route: hydration resources, a map of the area.
Touristic objectives on the route: Hallaky Castle, andesite quarry Balint II, Tăcăşelelor Valley, Dealul Balint (363 m) – panoramic view.
Features of the route: circuit route, difficulty level - easy, practicable at any season; proposes viziting the andesite quarry in Aciuţa village, admiring Tăcăşelelor Valley landscape and traditional architecture of Aciuţa village. Also, Dealul Balint (363 m) offers a large view over the couloir of Crişul Alb river and the beech wood*(Fagus silvatica)* ensures the pleasure of hiking in a healthy, clean and relaxing environment.

II. Touristic route: Aciuţa – Tălagiu – Budeşti – Aciuţa
Marking: red dot
Time: 4 h
Distance: 9.4 km *Lift*: 260 m
Facilities: marking poles placed where the marked trees lack, informational touristic boards posted at the entrance in Tălagiu and Budeşti villages and also at the objectives marked on the route (panoramic views, exploiting quarries of andesite and kaolin etc).
Necessary objects on the route: food and hydration beverage, a map, protection accessories (raincoat, sunglasses, hat, UV protective lotion).
Objectives marked on the route: defile of the Crişul Alb river, andesite quarry situated nearby the road between Aciuţa and Tălagiu villages, kaolin quarry situated on the left slope of Văii Satului creek in Tălagiu, traditional architecture and household objects in the village of Budeşti.
Features of the route: circuit route, hardly approachable in winter; raised level of difficulty because of the distance (9.4 km); the route involves crossing the epigenetic defile of Crişul Alb river, situated between Aciuţa and Tălagiu, admiring the polychrome landscape of the grassland that covers the riverside of Crişul Alb river, visiting an andesite and kaolin quarry, both situated in the vicinity of Tălagiu village, visiting Budeşti (wooden church *„ Înălţarea Domnului”* – historical monument, vernacular architecture), contemplating the large panoramas ofered by the high hills marked on the route (Dealul cu meri, Dealul Târsăli) and returning through defile of the Crişul Alb river.

CONCLUSION

After the analysis made, next conclusions can be drawn:
a) The analised administrative-territorial area is facing serious social-economical problems due to freeze of the industrial unities engaged in exploitation of andesite an kaolin. Among the most critical issues we mention: depopulating and ageing process (in Budeşti there have been left 49 inhabitants in 2002, and the youngest was 56 years old), youth migration to the urban centers (Ineu, Sebiş), decrease of birth rate and standard of living etc. Agriculture is the main activity of the commune bt it does not bring profit and is not viable. The forest fund is the most valuable resourse of the area but the exploitation of the wood is not in agreement with the principle of sustainable development of the territory.
b) The natural and antropical resources of the teritorial- administrative area studied are various and numerous (traditional architecture, historical and cultural monuments, natural

background with a high degree of attractivity etc.), but there are not touristic developed because the technic-urmanistic infrastructure is poor, and the touristic infrastructure does not exists. In spite of all these, the area is visited during the weekends by a considerable number of tourists, most of them camping in the Tăcăşelelor Valley, close to the andesite quarry in Aciuţa. For the sustainable development of this area, the most viable solution is represented by tourism. Taking into account that currently the only forms already practiced are weekend and relatives visiting tourism, the development of some touristic routes would be one first step towards touristic promovation of the area and introducing it in the county and regional circuit. Introducing the andesite and kaolin quarries within these touristic routes seems to be the most indicate solution for sustainable development of the territory.

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* ** www.virtualarad.net

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MODEL OF TOURISM DEVELOPMENT FOR A HANDICRAFT WORKSHOP IN BUCIUMI, MARAMUREŞ

Diana Mihaela MOJOLIC
PhD student, Department of Geography, Tourism and Territorial Planning, University of Oradea, Romania,
E-mail: dyanyta_m@yahoo.fr

Abstract: Tourism development is the result of the interdependence of several factors, resulting models to be implemented in the territory, designed to help tourism development of the area. The ethnographic regions of Maramures enjoy traditional preservation and conservation to some extent, enabling it to offer tourists a wide range of tourism products. Making a planning model is a solution for tourist resources capitalization and implicitly enhancement of a specific spreading area conferring it an identity. The option to achieve a model of tourism development for a handicraft workshop was made in order to promote a traditional product in a locality situated along an international road, included in a traditional ethnographic area, but subject to the new trends of modernization.

Key words: tourism development, craftsman, straw hat, Buciumi, Maramureş

* * * * * * *

INTRODUCTION

The model is considered for geographers a strong tool which helps to understand a system's behavior also helping to make decisions at the local level. The model is defined as a „*simplified representation of natural or human phenomena*" (Martin and Bertazzon, 2010) within a system.

Depending on the area to be landscaped models can be made for: complex mountain areas, hilly areas, plains and coastal areas, and particularly for protected areas, urban areas and peri-urban areas, rural settlements, recreational areas (Erdeli and Gheorghilaş, 2006).

Depending on the tourism potential analyzed and presented, we will consider the territorial system Chioar - Lapus an area within which natural elements are combined with folk manifestations as well as elements of popular culture, historical relics and religious buildings, finally becoming *a complex tourist area* (Iosipescu, 1977).

Located at the contact between Chioarului hills and Baia Mare Depression, Buciumi village is administered by Şomcuta Mare town, and it is crossed by the European road E58 (Figure 1).

The geographical coordinates of the locality are: 47°28' 16" northern latitude and 23°29' 14" east longitude. Dating back from1566 (Puşcaş, 2007), and integrated in the ethnographic area Chioar, the locality has 810 inhabitants in 2002 (DJS Maramureş, 2012).

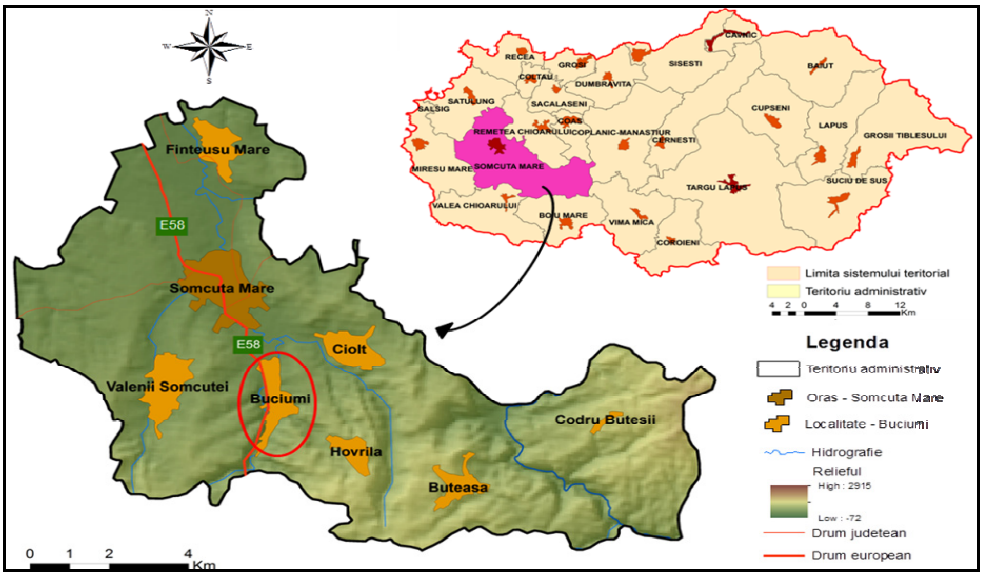

Figure 1 Geographical location of Buciumi village
Source: Topographic from ArcGIS Online

METHODS AND METHODOLOGY

The study is based on observations obtained in the field, closely connected to the consultation of literature. The aim of this study is to highlight, by creating a model of tourism development, the existence of the traditional product, of folk crafts given that today's society is based on ***eco*** issues.

To obtain information in order to shape the model of tourism development we used bibliographic documentation, literature, (Gunn nad Var, 2002; Erdeli and Gheorghilaş, 2006; Ciangă and Dezsi, 2007; Ilieş, 2007; Puşcaş, 2007; Hall, 2008; Martin and Bertazzon, 2010; Băltăreţu, 2012), but also certain information obtained from specialized institutions or websites, *analyzing* the main elements to be involved in the action of tourism development and representing the results obtained on a *GIS map,* and constituting a real model.

Taking into account the theoretical part, but considering also the practical part (Figure 2), models can be classified as follows (Getz, 1986, p. 22-23):

1. Theoretical models, which in turn are divided into:

- Descriptive Models (they present the general state of the tourism system making a general statement of its components);
- Explanatory models (they present the interaction between components);
- Predictive models (they interrelate the causes and effects that can occur during tourism development);

2. Dynamic models, of action:

- Subjective models (are based on a concrete plan, on certain principles used in tourism development);
- Problem-solving type model (manifested by proposing objectives, analyzing alternatives and identifying the best way for planning);
- Integrated model (tourism development seen as a system, resulting from the collaboration between theory and practice).

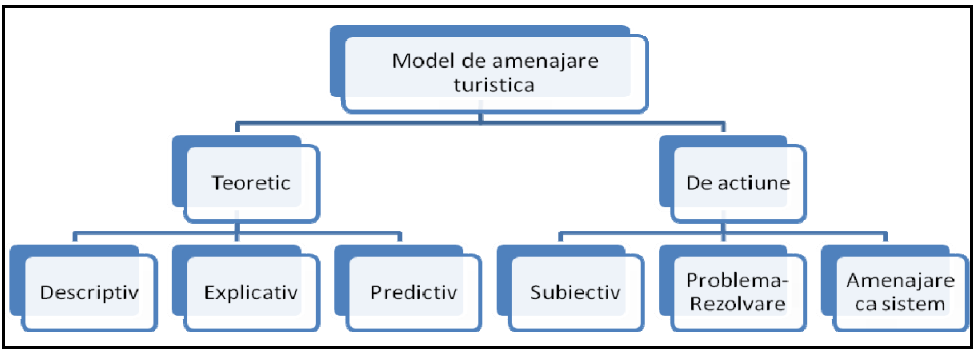

Figure 2 Classification of the models of tourism development
Source: according to Getz, 1986, p. 22, with the author's contribution

DISCUSSIONS AND RESULTS

Popular costumes represent the pride of each locality and they are the traditional symbol of an ethnographic region. Irrespective of its component parts, or of age of its intended wearer costume is an element of local identity. At the same time, it represents „the exclusive product of domestic textile industry, made only by technical plants (*hemp, flax*) and animal products (*wool*). Thread processing is done by *softening*, *scutching, hackling,* etc.) followed by *cloth weaving* (in domestic micro-workshops), *cutting* and *embroidering*. We add to all this *craftsmen specialized* in making *sheepskin coats*, *thick long coats, long-haired shepherds's coats*, *traditional sandals* and *hats"*[1].

Thus, hat is an important accessory for the popular clothing of the inhabitants in the territorial system, irrespective of the raw material it is made of (straw - Chioar, felt - Lăpuş).

Concerning tourism activity Buciumi locality can be integrated into a circuit due to its popular tradition that still persists in the region. Craftsmen are "the ambassadors of traditions and cultural heritage of this area of the country"[2], irrespective of the craft they master.

Even though they gradually diminish we feel the need to return to tradition, to those peaceful times and to find the craft of straw hats manufacture in two local workshops: Albu Viorel and Uţă Gheorghe.

To achieve tourism development for a handicraft workshop we crossed the threshold of the second craftsman, Uţă Gheorghe, a young gentle man, who carried on folk tradition of Chioar and of other ethnographic areas with his wife and mother. In achieving this process we will take into account the four concepts that give *„family, village or region identity, as part of creating a tourism destination brand*" (Ilieş, 2007, p.58):

Craftsman or **artisan**: *the cloche maker* Uţă Gheorghe, a man with respect for the traditions of Chioar, who became craftsman after his apprenticeship completed with another master of this popular art;

Handicraft product: *straw hat (cloche)*, preserving its past characteristics , representative for each ethnographic area separately;

[1] PATJ Maramureş, vol III, 2008, p. 51
[2] www.discover-maramures.com

Craft: *straw hats manufacture,* that is perpetuated from generation to generation;
Handicraft workshop: the current location of the craft is *the outbuilding „shed”*.

Like any other craftsman, the symbol of the craft made that represents him and gives the identity is present since the first contact, by means of a concrete hat on the pillars of the house (Figure 3).

Figure 3 Craftsman's identity symbol (the gate pillar)

The activity of tourism development for a handicraft workshop manufacturing straw hats involves, firstly, gradual identification of the stages of manufacture:

1. Raw material consists of straw and shavings. If in the past raw material was collected after harvest, nowadays it is found increasingly difficult, wattles being brought (Figure 4, 5) from Mureş and Covasna counties.

2. Wattle tapering. Straw is wattle in strips of approximately 40 m length, which must undergo thinning to become ideal for the manufacture of straw hats.

3. Wattle "smoothing" (ironing, dressing). Wattle passes through a traditional instrument (Figure 6), that consists of two rolls, between which a stretch, modeling of the wattle takes place so that it is easier to pass it by the sewing machine.

4. Hat sewing. This stage marks the sewing of the wattle in the desired shape for hat model. It is performed at a special sewing machine for these items (Figure 7).

5. Pressing. Hat shape is achieved according to some moulds (Figure 8); then they are pressed in a traditional tool that operates manually, by pressing with a 10 atmospheres pressure (Figure 9, 10).

6. Hat decoration. This is the final step during which different motifs are applied on the

hat depending on the ethnographic region (Maramureş, Chioar, Codru), traditional specific character, age (Figure 11, 12).

Figure 4 A part of the raw material for straw hats manufacture

Figure 5 Vase with ears of wheat (center) and different wattle patterns(right)[3]

Figure 6 Traditional tool for "smoothing"

Figure 7 Hat sewing machine[4]

[3] www.skytrip.ro
[4] www.descopera.ro

Figure 8 Forms (moulds) for hats

Figure 9 Traditional tool for pressing

Figure 10 Traditional tool for pressing – detail

Figure 11 Decorated "Cloche" from Maramureş

Figure 12 Simple hat

Crafts have a great importance in tourism activity, as the sale of products is a mean to promote the cultural heritage of the region.

The basic idea is to use traditional raw materials; the technique and the motifs used are similar to those used in the past, thereby achieving authentic products with genuine value (Inkeep, 1991).

This leads to the need to set up a handicraft workshop to inform tourists about the method of execution, the material it is made of, also offering the possibility to perform certain stages of the product manufacture or even all stages.

Starting from a model of pottery workshop (Ilieş, 2007, p.61), we present below a handicraft workshop (Figure 13), made in accordance with a certain space and according to the traditional techniques used in straw hats manufacture.

The first two stages will remain undeveloped, taking into account that raw material is not local, and it is bought from other parts of the country, wattle is delivered in different shapes, size and thickness, and their thinning results in some mess.

Stages 3, 4, 5, 6, are placed in a room, taking into account the sequence of their implementation. The traditional appliances which help their manufacturing, will have separate informative panels (picture, text), explaining the process of straw hat execution. At the same time, there is a central area reserved for the tourists, who can actively participate depending on their preferences in the manufacture of hats, especially in stages 3, 5 and 6.

Once this process is completed, the product is the result of tradition, genuineness and place identity and it is necessary to arrange a room for its display and sale.

Taking into account the fact that the region is crossed by an international road there is mainly transit tourism, therefore the promotion of the handicraft product for tourism purposes is facilitated.

Included in rural tourism products (Cândea et. al, 2012), handicraft product highlights the ethnographic character of the area, tradition and old occupations. As a tangible product, a commodity, it participates with tourism services in tourism product design.

Straw hats are not made for the financial income they can produce, as it is insignificant, but for revival of the tradition, of the costumes, return to original, traditional village.

Its promotion is done at the local level by indicators (Figure 14), as well as by participation in various specific events (Festival of traditional and ecological products and Craftsmen Fair, Fair of Traditional Crafts on sale, Baia Mare or village or town fairs: Şomcuta

Mare – on Monday, Copalnic Mănăştur – on Wednesday, Ariniş – on Friday) (Figure 15) or dedication days of monasteries.

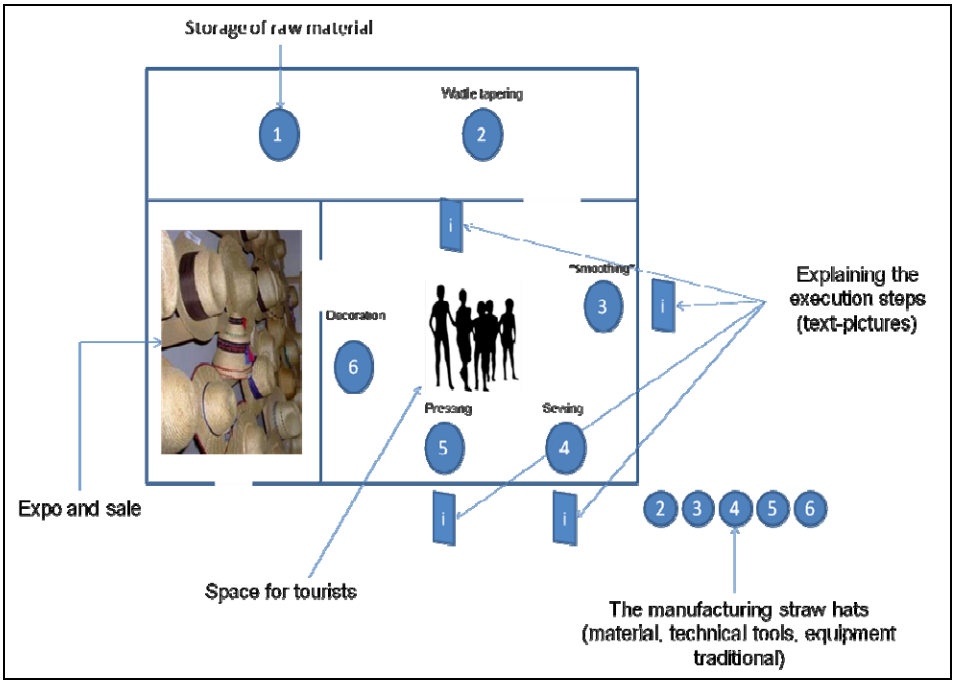

Figure 13 Model of tourism development of the handicraft workshop - straw hats

Source: according to Ilieş, 2007, with the author's contribution and adaptation

Figure 14 Indicators for craftsmen in Buciumi

Figure 15 Sale of straw hats at specialized fairs[5]

[5] www.ifz.ro

At the same time, local TV coverage of this topic (MaramuresTv, Tv eMaramures) and in local newspapers "*Informaţia Zilei de Maramureş"* (Maramures Daily Information), *"Glasul Maramureşului"* (Maramures voice*), "Graiul Maramureşului"* (Maramures voice), *"Gazeta de Maramureş" (*Maramures Gazette), are actively involved in promoting traditional products and craftmen. The newest and fashioned form of tourism promotion is represented by social networks (Facebook) or blogs creation but this is done primarily for pensions or localities on the whole.

CONCLUSIONS AND REFLECTIONS

As we advance in technology secrets, we feel the need to return to tradition, which is done most easily by means of tourism, fact that is evidenced by the large number of persons who prefer villages, quiet places with impressive landscapes to relax and escape from urban chaos.

Even though in some localities tradition has been lost gradually over time, while technological progress is achieved local identity is reborn. Preservation of the costumes in many localities gives identity and labels a community.

The appropriate tourism development, considering the actual situation in the territory and in collaboration with human communities, highlights this region of tradition, which is in the process of modernization.

Taking into account the village location at a relatively small distance from an urban center (3 km from Şomcuta Mare, 31 km from Baia Mare) a permanent commodity market can be established, which may contribute to the reputation of the village.

By making a craft workshop planning model we fulfill an objective in tourism development of a tourism circuit that also includes other crafts (costumes manufacturing, wood carving, egg shoeing, pottery) within a larger territory (Chioar – Lăpuş territorial system).

If Romania wants to become an attractive and tourist destination it is necessary to keep and preserve its **traditional values**.

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EXAMINATION OF INNOVATIONAL CO-OPERATION BETWEEN INSTITUTIONS OF HIGHER EDUCATION AND AGRIBUSINESS ENTERPRISES IN THE NORTHERN GREAT PLAIN

Szabolcs NÉMETH
PhD student, Kerpley Kálmán Doctoral School of Crop Production, Horticulture and Regional Sciences ,
Faculty of Agricultural and Food Sciences and Environmental Management,
University of Debrecen, Hungary
E-mail: nemeth@agr.unideb.hu

Mónika RŐFI, PhD
Center of Alumni Association, University of Debrecen, Debrecen,
E-mail: rofi.monika@unideb.hu

Abstract: Economic changes have significantly accelerated in the 21th century. In this turbulent market environment enterprises are forced to adapt continuously as they must be flexible in order to meet changing market needs. To achieve flexibility companies require innovation. The economic relevance of innovations is significant in every market sector and agriculture is no exception. Re-dynamizing agricultural innovation is a possibility for the outburst of the Hungarian agriculture. Agricultural enterprises have to face competitors as well and they should give priority to efficiency, sustainability and competitiveness in order to preserve their position in BOTH global and domestic markets.

Keywords: Agribusiness, innovation, enterprise, R&D,

* * * * * * *

INTRODUCTION

In the second half of the twentieth century, world economy underwent a dynamic revolution. The former ”fordist” economy that based on an industrialized and standardized form of mass production was replaced by a system of production that based on specialized markets, small flexible manufacturing units and is called ”post-fordism” by scholars (Teperics, 2003). These changes resulted in changes in the laws of the economic game too and there are also such paradigm changes in which the part and sense of knowledge have extensively misvalued; moreover, the prime movers of these changes are information and communication technologies (Dőry, 2005). Generating relevant knowledge and innovation from the point of view of economic, progress institutions of higher education and research institutes have important parts.

Throughout history universities have been undergoing significant improvements and are still improving at present. The prime milestones of their adjustment to environmental conditions are demonstrated by academic revolutions impounded by Henry Etzkowitz. (Table 1)

Table 1 Changes in the missions of universities

Periods (academic revolutions)	Dominant economic activity	Rate of students	Mission of university
Before Industrial Revolution	Agriculture	Elit Education: 1-2% of the relevant ages	Education
After Industrial Revolution (The First Academic Revolution)	Industry	Extended Elit Education: 5-10% of the relevant ages	Education and Research
From the end of the 20th century to Present (The Second Academic Revolution)	Service	Mass Education: 30-40% of the relevant ages	Education, Research and Social and Economic Role

Source: Lengyel, 2005, p. 196.

It can be seen that before industrial revolutions universities had only one mission: education. Technical advances generated by industrial revolution created new circumstances. On the one hand, academic knowledge was broaden, hereby new opportunities were given for experimentations of industrial applications; on the other hand, under the effect of mechanization productiveness hasincredibly increased and generated manning requirement. Parallel with the appearance of industrial workers ”fordist” organisation of production increasingly required white collar workers who were familiar with logistics, therefore there was a need for an extension of elite education (Mezei, 2008). Universities; besides education, increasingly took part in basic researches financed by the state, hereby extending their influence on a wider social base. As a result of the needs and processes mentioned above, the first academic revolution (well known by Humboldt) ran its course and it follows that the mission of universities widened with researches besides education.

Globalisation processes started in the 1950s created new environmental conditions again for institutions of higher education. Economy was gradually shifted towards the tertiary sector and because of the increasing knowledge intensity, research laboratories and centres tried to bridge the huge gap between industry and researches, by this means the economic part of universities had begun (Mezei, 2008). Among these new conditions there is not only a need for education and research but the mission of universities widen with economic and social parts, which is called the second academic revolution.

THE THEORETICAL BACKGROUND OF THE RESEARCH

Principally, universities can promote economic development by education and their innovation activities. To be able to define the economy-stimulating part of universities a system is needed (Regional Innovation System – RIS) in which university can be inserted, and various innovation processes can be modelled with the help of it.

Before introducing RIS in details, some words must be mentioned about the solidity of knowledge for the sake of the acknowledgement of putting territorial dimensions forward. According to Mihály Polányi, two types of knowledge can be distinguished. One is that we cannot write down or cannot be said by words, so it can be deliverable only personally, (”without words”) by gestures, face-to-face interactions etc. that is locally. This is called unspoken or tacit knowledge by Polányi (Polányi, 1994). Polányi just like his followers admitted spoken knowledge as well. Codified or explicit knowledge means that knowledge

can be spoken, written, widely interpreted and can reach further distances and go faster in space than tacit knowledge (Dőry, 2005). In Attila Varga's (2004) study, besides universities' regional economic influence he also mentions the spatiality of knowledge. The spreading of determining elements of knowledge in terms of developing new technologies is very sensitive to distance in space. These elements of knowledge are defined (by Polányi, 1966; Dosi, 1988) as hidden knowledge. Literature that researches the regional economic part of universities has its root in three different traditions of economic thinking: neoclassic economics, Schumpeter economic development theory and in traditions of economic geography. In literature of the recent past three tendencies have been evolved for valuing the part of localised straining of university-knowledge in innovation: examinations based on questionning industrial researchers, investigation of spatial distribution of references on universities' patents and methods based on the empirical examination of the knowledge production function. On the basis of the results it is definable that in the straining of university-knowledge the part of spatial nearness is decisive (Varga 2004). It is also emphasized in the study that the spatial spreading of knowledge and the economic influence of universities depend on many other factors, of which the region, the size of the town, the kind of the industry, sectors of the industry can be emphasized. On the whole, we can define that (economically more relevant) knowledge gained from institutions of higher education has its stimulant effects on economy locally, which means that knowledge transfer examinations of universities' should be fulfilled on the regional level.

According to Edquist (2001) innovation system consists of the factors and the connection between the factors that have an influence on the formation, spreading and use of innovation and these factors can be investigated in national, regional and departmental contexts as well (Kiss, 2005). According to Philip Cook and his joint authors (1998) we can only talk about the existence of the regional innovation system if two sub-systems learn from each other systematically and interactively. The regional production structure or knowledge utilisation sub-system mainly consists of companies and often shows the tendency of becoming clusters, while the regional supporting infrastructure or the sub-system of knowledge production consist of common and privately owned research laboratories universities and colleges, agencies that promote propagation of new technologies, vocational training institutions and organizations. Generally, regional innovation system is a cooperation system of private and common institutions and organizations whose main aim is supporting companies of the region in strengthening the regional innovation capacity and competitiveness (Doloreux, 2003; Mezei, 2008).

For the efficient functioning of RIS, an interactive cooperation between the members is necessary. Former linear innovation models (technology push and market pull models) have changed throughout history and there are so called (interactive) chain models instead in which there are constant feedback between certain innovation periods (Kiss, 2005; Rothwell, 1994). Interactive common learning is necessary for RIS so a keystone of our research is the examination of the interactions between organizations that support innovation and sub-systems that apply knowledge.

Inside the system of universities can behave in many different ways, which process can be examined with the help of universities' innovation models. By researches of Katalin Mezei (2008) two strong groups of university innovation models can be distinguished. One line is the contractor university defined by Henry Etzkowitz (2004) and the other is the regional commitment university by John Goddard (1999) of between there are many significant differences. (Table 2)

Table 2 The most important features of the Etzkowitz and Goddard model

Features of Models	The Model of Etzkowitz	The Model of Goddard
Theoretical background	Innovation systems	Learning economy
Frame of the model	Regional innovation system	Learning region
Formation	1980s, USA	1990s, England
Spread	USA, Scandinavia, Brazil, Portugal, Denmark, Italy	Europe, member countries of OECD
Motivation	Economic pressure	Social responsibility
Emphasized function	Research	Education
Role of university	Creation	Development
Mission objective	Knowledge capitalization	Community service
Academic attitude	Proactive	Adaptive
Methodology	Applied at MIT	there is no methodology
Role of government	Equal	Cooperative
Regional organizing role	Institutionalized	Individual

Source: Mezei, 2008, p. 98.

In connection with universities' third (economic, social) kind of part in the regional development of economy there are no antagonist contrasts in the models. Differences are mainly in point of stresses. While the Etzkowitz model wishes to work in a proactive way, with the part of a creator, based on researching functions as an equal partner inside RIS, the Goddard interpretation promotes economic development in an adaptive way, having social responsibility in sight, emphasizing educational functions with the part of a collaborator. Standardization of Hungarian universities by the above respects is quite difficult since in our country both economic and social pressure are presented together; moreover, improvement of universities' are different from the examples mentioned above. Our opinion for defining their third kind of function and towards their more efficient working in the regional innovation system, universities have to be aware of economic demands in their surroundings (region). On the strength of demands in the region, the institution can respond with sufficient supply, hereby an efficient and interactive system can be evolved that can raise the economic competitiveness of the given region.

THE AIM AND METHOD OF THE RESEARCH

The aim of our study is to get acquainted with the spatial structure and processes in the structure of the (agrarian) innovation system in the North-Hungarian Great Plain region and furthermore to get more detailed ideas about innovation activity and interactions of institutions of higher education. Results can help to define the third mission of the University of Debrecen, Centre for Agricultural and Applied Economic Sciences (DE-AGTC) and can make the working of institutions of knowledge production (mainly DE-AGTC) more efficient within RIS.

We did our research among agrarian enterprises of the North-Great Hungarian Plain region. There is a strong contrast in the region in respect of economic output and available innovation potential. By data of GDP/person; preceding the North-Hungarian, this region is in the last but one place nationally (Table 3). Relative state of development position of the area shows a worse picture now than both in the socialist era and in the middle of the 1990s.

The relatively disadvantageous general economic survey is strengthened by the low employment rate and weak productivity of labour (Rőfi, 2006; Szabó, 2012).

Table 3 The changing of economic state of development of Hungarian planning and statistics regions (in the percentage of the GDP/person and the national average)

Name of Region	2000	2005	2010
Central Hungary	152,9	161,6	164,4
Central Transdanubia	96,4	94,7	87,3
Western Transdanubia	112,9	99,8	100,0
Southern Transdanubia	75,1	69,4	68,2
Northern Hungary	64,8	66,3	61,0
Northern Great Plain	66,0	64,2	63,5
Southern Great Plain	74,7	69,1	65,2

Source: Own construction based on KSH

At the same time, in the case of indicators that are made for measuring innovation potential a reverse order can be noticed (Table 4). By the number of R+D places and their headcount, the region is in the third, while on the strength of total R+D outgoings it is in the third place.

Table 4 Indicators for measuring innovation potential

Name of regions	2005				2010			
	A	B	C	D	A	B	C	D
Central Hungary	1204	27513	14740	138789,8	1471	31291	20094	202588,6
Central Transdanubia	161	2656	1158	9673,4	203	2731	1597	16476,9
Western Transdanubia	188	2325	966	6736,6	256	3151	1587	15532,9
Southern Transdanubia	206	4400	1342	6458,5	203	3213	1455	7927,6
Northern Hungary	141	2219	961	5890,3	191	2764	1467	11354,3
Northern Great Plain	300	4869	1946	17913,3	307	5068	2441	27320,5
Southern Great Plain	316	5742	2126	14658,2	352	5773	2839	23616,5

Legend: A - Number of R&D Units, B - Actual staff number at R&D Units (capita), C - Calculated staff number at R&D Units (capita), D - R&D Expenditure (Million HUF)

Source: Own construction based on KSH

The contrast between the economic state of development and the innovation potential is very interesting because several economic analysis showed that innovations are in a positive relationship with regional development (competitiveness). The introduced two-facedness requires a more detailed examination of the innovation system in the North Great Hungarian Plain.

On the one hand, the reasons for our examination focused on the agrarian sector is that the spreading pace of knowledge that got out from universities can be different regarding industries, so the examination of different sectors requires different methods. On the other hand, the natural endowments of the region are obviously prosperous for agriculture, which defines the economic character and utilisation of the area (Nemes-Nagy, 2003). The rate of agriculture in the economic output of the region is significant since in 2010 in the North Plain region by the departmental distribution of the added gross value, agriculture was presented a 7.8% rate that was almost double of the national average (3.51%) (KSH, 2012). Nevertheless in the reports for the innovation strategy of the North Plain region, agriculture is presented as a leading sector on which the management will be able to lean on by decisions about economic development in the near future.

In pursuance of compiling the examination pattern we set out from the term of *agribusiness,* which evolved in the 1950s in the United States. Agribusiness besides food economics involves other sectors that are connected to it (e.g. machine industry or chemical industry), hereby raising the part of agriculture in national economy (Tracy, 1993). The examination focused on enterprises with 10 employees or above with more factors behind. On basis of former researches and experiences in innovation processes and co-operations micro enterprises are less activated than bigger ones (Csizmadia and Grosz, 2011), while small and middle enterprises play an important part in the competitiveness of the regions (Lengyel, 2003). On the one hand, small and middle enterprises usually work on local markets which means that the produced goods and profit remain in the region. On the other hand, the pace of restructuring that influences competitiveness mainly depends on the innovation capacity of the small and middle enterprise. In the North Plain region, 572 enterprises have met the requirements and we examined them with the use of a questionnaire method in the summer of 2012. There were five group of questions: general features, R+D activity, innovation activity, factors that influences innovation and their different kinds of interactions (Table 5). In this study I introduce the results regarding innovation co-operations.

We investigated the innovation processes in RIS from three sides. We examined interactions by cooperation partnerships (institution of higher education, state research institution, private research institution and other institution that helps innovation), by geographical dimensions and we focused on the types of cooperation with universities. We distinguished eight types of interactions with universities: 1. Discussions between company employees and academics (tacit knowledge); 2. Vocational trainings of company employees by academics/researchers (tacit knowledge); 3. Phd and master courses involving universities and company employees with common leadership (tacit knowledge); 4. Mobility of people with university degree from universities towards companies and vice versa temporarily or permanently (tacit knowledge); 5. Employing academics /researchers as experts (tacit knowledge); 6. Purchasing results of university researches (explicit knowledge); 7. Formalized research and development co-operations (tacit and explicit knowledge); 8. Access to the physical facilities of the university/company (tacit knowledge). The examination concentrated on two intervals: between 2009 and 2011 and the three years between 2012-2014 with the aim to be able to make a prognosis about the probable processes from experiences of the past and present.

Table 5 Indicators used in the course of the research

Introduction questions	R&D Activity	Innovation Activity	Hindering Factors of Innovation Activity	Innovation Cooperations
Seat of enterprise	R&D Expenditure	Frequency of different types of innovations between 2009-2011	Factors of macro-level	Innovation Co-operations (2009-2011)
Number of employees	R&D employees	Frequency of different types of innovations between 2012-2014 (Planned	Factors of region-level	Innovation Co-operations between Enterprises and Universities (2009-2011)
Rate of foreign ownership of enterprises			Tender activity	Planned Innovation Co-operations (2012-2014)
Net income in 2011				Planned Innovation Co-operations between Enterprises and Universities (2012-2014)
Acquisition and sale				
Part of any group of companies				

Source: Own construction

INTRODUCTION OF THE EXAMINED SAMPLE

216 of the questionned 572 companies sent back the questionnaires and we processed their answers. The sending-back rates are shown by figure 1 on a micro-regional level. It is apparent that the rates are always above 25% except Törökszentmiklós, Nádudvar and Ibrány-Nagyhalász micro-regions. The biggest rates are in Mezőtúr, Polgár and Záhony micro-regions, which can be explained by the relatively small number of enterprises.

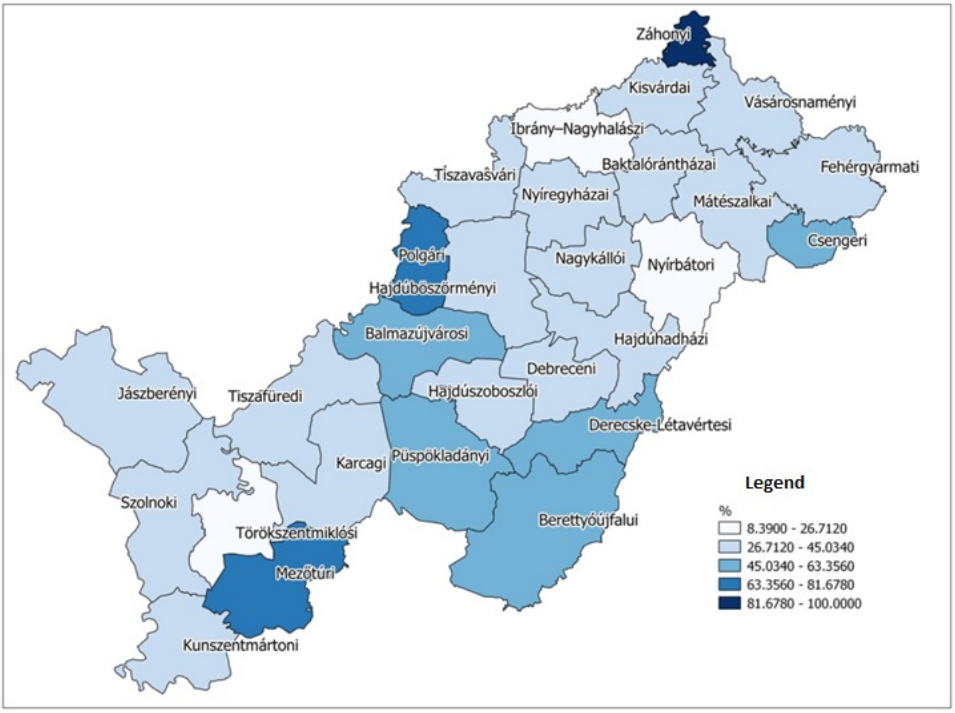

Figure 1 Spatial division of sending-back rates

Source: Own construction

Much of the inquired enterprises are in Hungarian property, altogether there were seven with foreign property with the average of 60.4% (MIN=9%, MAX=100%). Most of their procurement (North Great Hungarian Plain=52.26%, Hungary=29.38%, Abroad=18.36%) and sale (North Great Hungarian Plain=58.92%, Hungary=32.01%, Abroad=9.07%)[1] are done on local and international markets therefore they are non-traded enterprises. Preferring local markets can be considered as good news since the produced goods, services and profit remain in regional economy.

RESULTS

In the last three years (2009-2011) innovation cooperation can be shown at 90 enterprises. Among cooperative partners universities and colleges were rampant and they were followed by state research institutions and other institutions that help innovation (Figure 2). The part of private research institutions is irrelevant in the examination. In the next three years 97 enterprises plan to get into cooperation with one of the innovation supporters. Probably in

[1] By the percentage division of enterprises' answers for questions about procurement and sale channels.

the near future the gradiation of partners will be the same as three years earlier because henceforward institutions of higher education will be the most common participants of the R+D+I innovation co-operations of agribusiness enterprises.

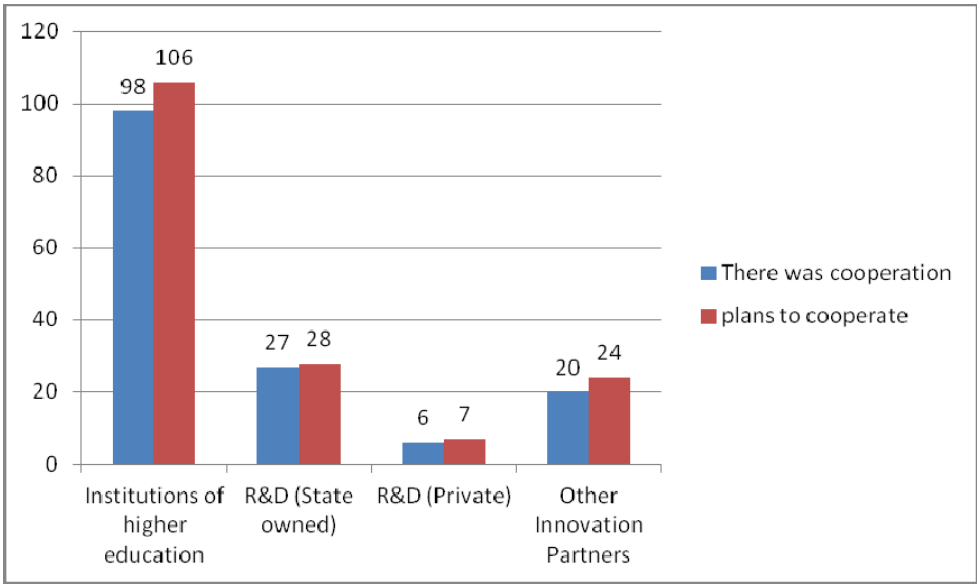

Figure 2 Prevalence of innovation supporting partners

Source: Own construction

The division of co-operations that have been established and those that are probable are shown on Figure 3 by geographical dimension. It can be seen that in both examination period University of Debrecen was the most common cooperative partner. Regional institutions of higher education (except DE) and those that are outside the region are presented with 20% while foreign institutions are there with 4% among cooperative partners and probably this will not change before long.

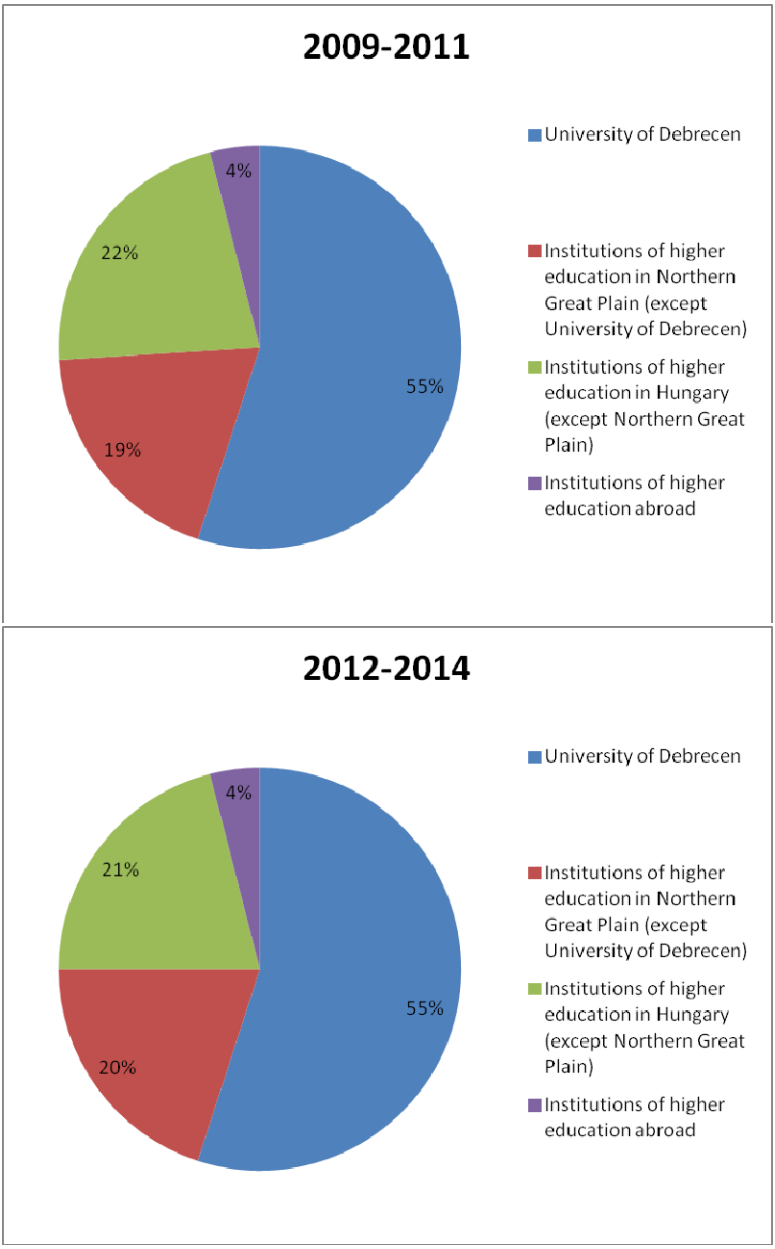

Figure 3 The division of co-operations already established and those that are probable by geographical dimension

Source: Own construction

Regarding interactions, discussions and the types of students' mobility were dominant in the last three years (Figure 4).

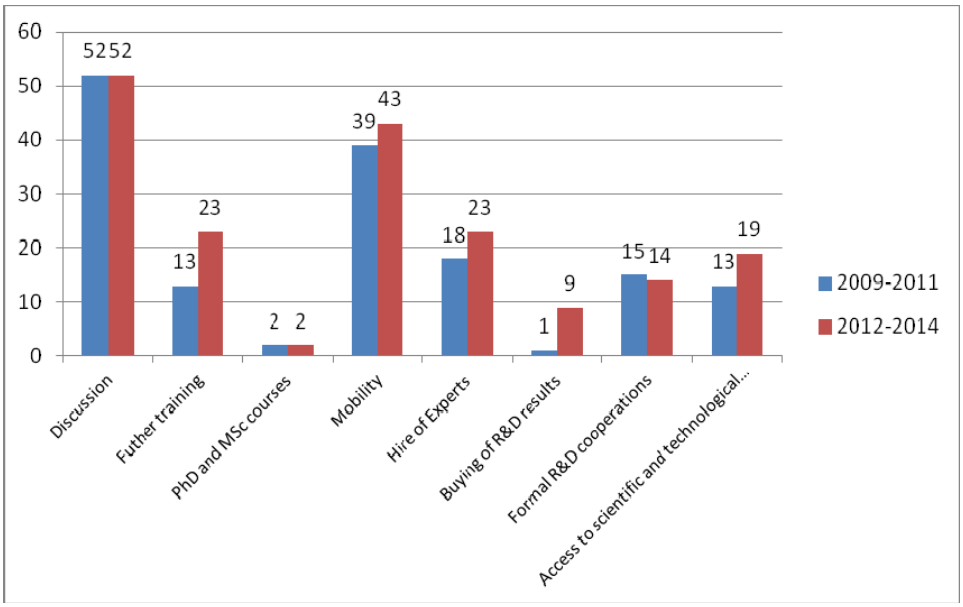

Figure 4 Frequency of different kinds of interactions

Source: Own construction

By analysing the different types of interactions it can be defined that the employment of academics/researchers as experts almost occurs as often as vocational trainings, formalized co-operations and access to physical facilities of each other. Launching common PhD and master courses and purchasing research results sold by institutions of higher education is not typical at all.[1]

A strong change of incidence of interactions is not probable in the following period. Discussions and mobility will be dominant in the future too but a relatively raising interest is shown in vocational trainings, expert employment and access to physical facilities of each other. An interesting increase can be noticed in the case of demands regarding the purchase of research results since earlier it happened only once; contrarily, in the following year, nine enterprises show interest in the results of higher education. There probably will not be a strong interest in common trainings in the near future.

It has turned out from the results referring to types of cooperative partners that University of Debrecen is determining in the North Plain region so we examined the spatial distribution of number of relations at the university in the two examination periods as well (Figure 5)

1 By the percentage division of enterprises' answers for questions about procurement and sale channels.

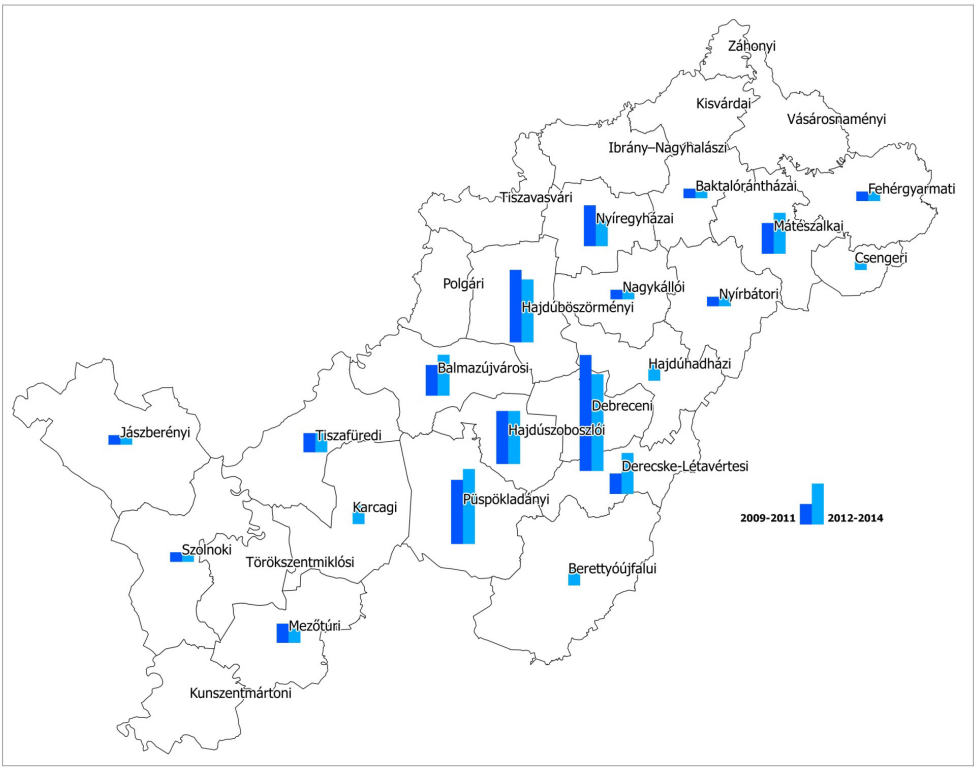

Figure 5 Spatial division of potential agribusiness enterprises in cooperation with the University of Debrecen

Source: Own construction

Several conclusions can be drawn from the map. On the one hand it can be seen that the regional influence of the University of Debrecen is demonstrable in the whole region. On the other hand the locality of unspoken type of knowledge can be noticed since it could be seen at interaction types that first of all *face-to-face* relations are typical (e.g. discussions, mobility, employment of experts), where the unutterable, tacit knowledge is determining. The frequency of relations is the highest in micro-regions near by the university and it is not connected with neither the sending-back rates nor the amount of enterprises. We have worked up four types of micro-regions on the basis of number of frequency: stagnant, potential developing and decandent micro-regions (Figure 6). In this particular case, by stagnant micro-region we mean that in the examination periods fulfilled and planned co-operations between the University of Debrecen and agribusiness enterprises occurs almost in the same number. Earlier, in the case of the potential micro-regions there were not any interactions but they show interest in services of the university. In declining micro-regions the interest is decreasing, but in developing ones it is rising in contacting the university.

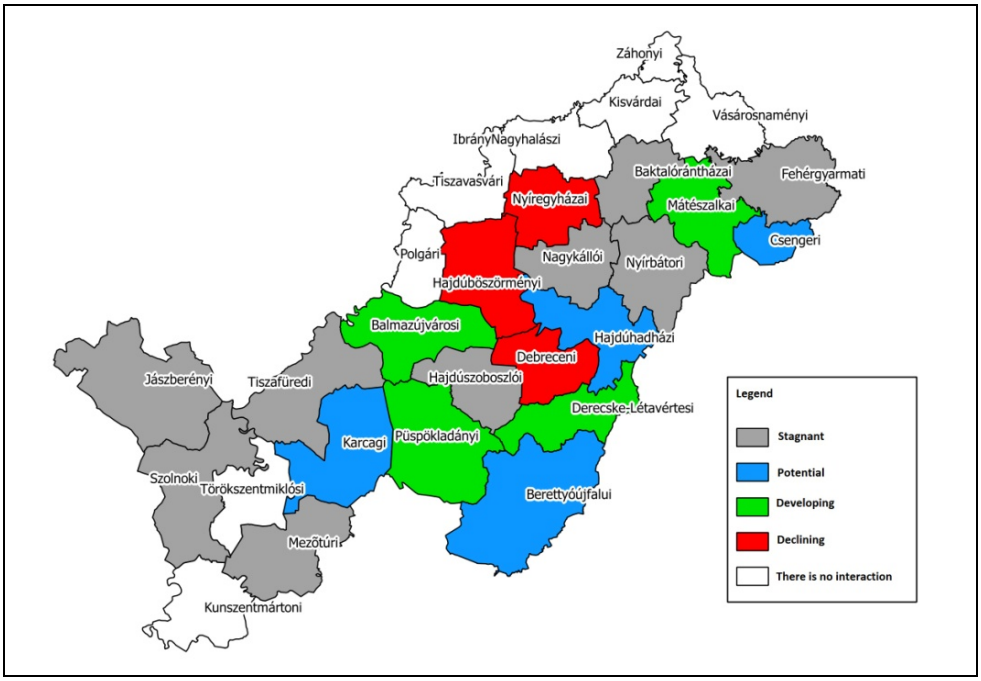

Figure 6 Territorial division of micro-region types (evolved by prevalence) in the North Plain region

Source: Own construction

It can be seen on the map that there were no cooperation between the University of Debrecen and enterprises altogether in eight micro-regions and this result can be in connection with the relatively low sending-back rate and the number of enterprises. By answers for the questions regarding the near future enterprises in the nine stagnant micro-regions are likely to reserve their cooperation with the institution but it is not the same in the case of the Debrecen, Hajdúböszörmény and Nyíregyháza micro-regions wherethe number of interactions will probably reduce. The four ”developing” (Balmazújváros, Püspökladány, Derecske-Létavértes and Mátészalka) and the four potential (Karcag, Berettyóújfalu, Hajdúhadház and Csenger) micro-regions open the door for the university for broadening its circle of cooperation partners.

CONCLUSIONS

On the basis of the results of the questionnaire examination we can say that more than 40% of the inquired enterprises established R+D and/or innovation cooperation in the last three years and probably, this rate will be typical in the next three years as well. Among interaction partners institutions of higher education are determining (University of Debrecen is dominant), so universities and colleges have important parts in the regional agrarian innovation system. By the types of interactions discussions based on tacit knowledge, opinions of experts and two-way migrations are determining. Among agribusiness enterprises of the North Great Hungarian Plain the economic and social influence of the

University of Debrecen can be demonstrable that predominates stronger locally. Mosaic picture of the results requires a detached strategic and marketing political approach from the institution's point of view. Strategies with external environment demands end in view provide an excellent base for institutions of higher education to specify their third function and their more efficient work within RIS, and by means of this activity they can promote the economic and social development of the North Plain region.

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