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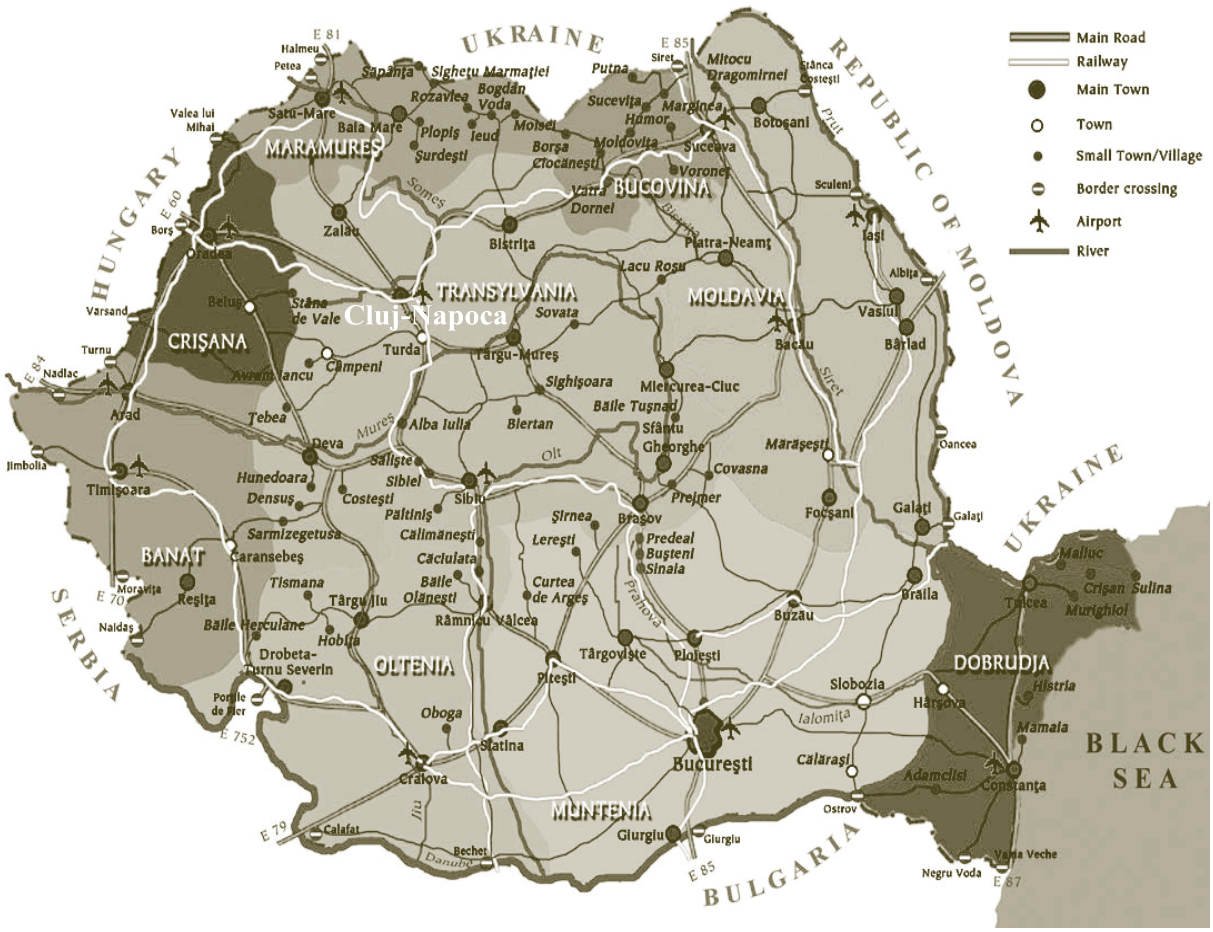

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DEBRIS FLOW ACTIVITY RECONSTRUCTION USING DENDROGEOMORPHOLOGICAL METHODS. STUDY CASE (PIULE IORGOVANU MOUNTAINS)

ROXANA VĂIDEAN[1], D. PETREA[1], GH. HOGNOGI[1]

ABSTRACT. – Debris Flow Activity Reconstruction Using Dendrogeomorphological Methods. Study Case (Piule Iorgovanu Mountains). Debris flows are one of the most destructive mass-movements that manifest in the mountainous regions around the world. As they usually occur on the steep slopes of the mountain streams where human settlements are scarce, they are hardly monitored. But when they do interact with built-up areas or transportation corridors they cause enormous damages and even casualties. The rise of human pressure in the hazardous regions has led to an increase in the severity of the negative consequences related to debris flows. Consequently, a complete database for hazard assessment of the areas which show evidence of debris flow activity is needed. Because of the lack of archival records knowledge about their frequency remains poor. One of the most precise methods used in the reconstruction of past debris flow activity are dendrogeomorphological methods. Using growth anomalies of the affected trees, a valuable event chronology can be obtained. Therefore, it is the purpose of this study to reconstruct debris flow activity on a small catchment located on the northern slope of Piule Iorgovanu Mountains. The trees growing near the channel of transport and on the debris fan, exhibit different types of disturbances. A number of 98 increment cores, 19 cross-sections and 1 semi-transversal cross-section was used. Based on the growth anomalies identified in the samples there were reconstructed a number of 19 events spanning a period of almost a century.

Keywords*: debris flow, dendrogeomorphology, growth anomalies, Piule Iorgovanu Mts.*

1. INTRODUCTION

Debris flows are one of the most destructive mass movements occurring in the mountainous regions of the earth. As being described by Takahashi (2007), debris flows are massive sediment transport phenomena that manifest themselves in the channel of mountain streams, consisting of a large variety of solid material. The manifestation of these phenomena is related to the morphometric characteristics of the terrain, the

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amount of loose rock and the water input. Under a favourable combination of these variables there are created excellent conditions for debris flow initiation. Unlike some hydrological phenomena such as flash floods which occur regularly in the mountain streams, debris flows are more difficult to predict (Armanini, 2005). After repeated debris flow occurrences the material deposited leads to the formation of a debris flow cone (Costa and Jarett, 1981, Takahashi, 1991, Hungr, 1995).

The debris materials, formed mainly by rocks and boulders of all sizes, affect the riparian vegetation along the channel and on the cone surface causing them different types of disturbances. The impact of debris flows on trees depends on the flow velocity and on the composition of the flowing mixture. The higher the velocity, the stronger the impact is and the bigger the size of the transported materials, the higher the number of the disturbances on the riparian trees. Any mechanical injury causes morphological changes in the cell structure of the wood, consequently, all of the disturbances are being recorded in the tree's growth (Alestalo, 1971; Shroder, 1980; Schweingruber, 1996, 2007; Strunk, 1997; Stoffel and Bollschweiler, 2009 etc.). Thereafter, the analysis of the tree ring data enables us to determine the temporal and spatial aspects of past debris flow activity.

In Romania there are only a few recent studies that have been concentrated on the assessment of debris flow activity (Pop *et al.,* 2008, 2010; Ilinca, 2009, 2014; Văidean and Petrea, 2014; Chiroiu, 2015) though there were some mentions about past occurrences before (Bălteanu *et al.,* 2004).The main purpose of this study is to reconstruct debris flow occurrences using dendrogeomorphological methods on a small catchment located on the northern slope of Piule-Iorgovanu Mountains.

2. STUDY AREA

The study area is represented by a small catchment located on the northern slope of Piule Iorgovanu Mountains (fig.3). The main collector is a left tributary of the Lăpuşnicul Mare River, draining an area of 244 ha which extends from an elevation of 2000m a.s.l. to 1320ma.s.l.The permanent stream flow initiates at the elevation of 1870 ma.s.l., reaching the confluence with Lăpuşnicul Mare River after 3.2 km.

The torrent surface is mainly built of metamorphic rocks (80%) represented here by crystalline schists and sedimentary rocks (20%). Also in the middle part of the basin, especially along the channel there are huge amounts of proluvial deposits (fig. 1). These unconsolidated materials are the main sources of debris flows initiation as they can be easily mobilised during rapid flows. The debris fan is composed of non-sorted debris of all sizes ranging from the sand size to blocks of over 1 m in diameter. Because of the lithological structure, both the channel of transport and the slopes have high degrees of declivity, the mean value being of 18°. The forest standing on the cone and bordering the channel mainly consists of Norway spruce (*Piceaabies* (L.) Karst.).

Fig.1. Prolovial deposits along the channel

Fig. 2. Deposits on the right side of the cone

The multiannual precipitation value is of 1176 mm (Gura Apelor, 956 m). During summer occasionally occur high intensity rainfalls which represent the main triggering factor of debris flows. One particularly major event had occurred in the interval 11-14 July 1999, when after 4 days of rain, on the night between 11 and 12 of July, there was registered a heavy rainfall which locally exceeded 135 mm in 7 hours (Văidean and Hognogi, 2015). The rainfalls triggered flash floods and other associated mass transfer processes affecting the entire area of the upper and middle basin of Râul Mare, including our study site. The event caused 13 deaths, 21 injuries, 30 homeless and enormous economic and private property damages.

The study site has not been under a high anthropogenic influence and there are no permanent settlements. There is only one road which connects Poiana Pelegii site to the Gura Apelor Lake and crosses the debris flow cone. At the apex of the cone there is a small bridge and concrete frame structures which are designed to drain the water flow. Also, in the upper part there are two dams which are filled with sediments and the pressure on the structure had led to the appearance of a few cracks.

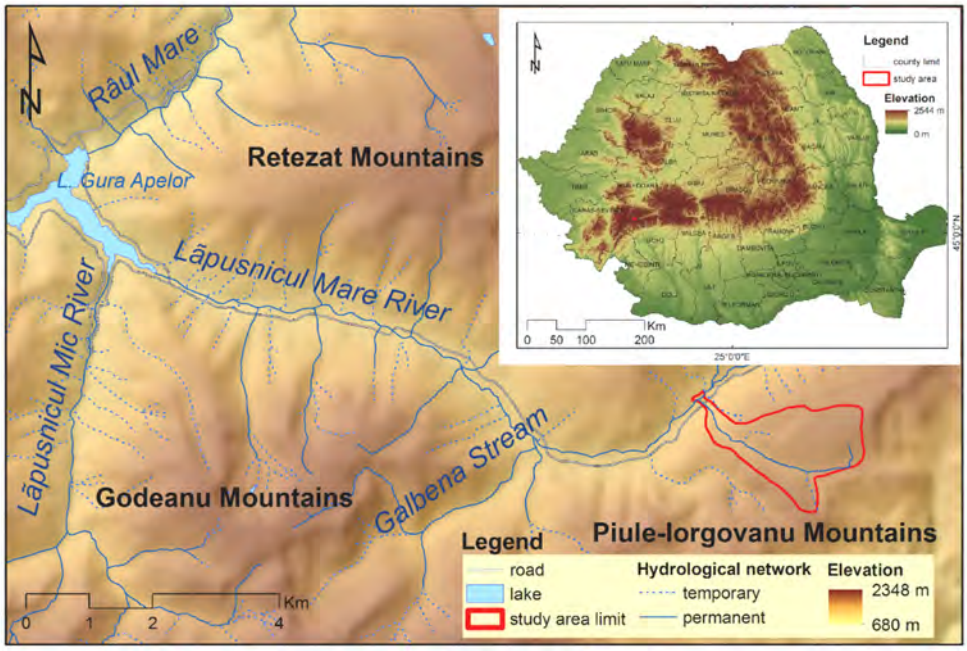

Fig. 3. Geographical position of the study site

3. METHODOLOGY

In dendrogeomorphological studies there are some specific steps which have to be followed in order to obtain the best results. Firstly, a detailed assessment of the study site is necessary by analyzing different cartographic materials (topographic map 1:25000, ortophoplans 1:5000, satellite images, etc.) and other expertise. Any information regarding previous occurrences of hydro-geomorphological phenomena that had occurred in the nearby area were gathered. The archival records on flooding in adjacent rivers or other phenomena were collected either by consulting data of the public and private institutions (SC Hidroelectrica SRL, Haţeg filiation) or by interviewing eyewitnesses, including victims, who had clear recollection of the events.

After a detailed assessment of the area, there were organized several field campaigns to sample the trees affected by past debris flow occurrences. The most affected trees were those growing on the surface of the cone and near the streambed.

Using a Pressler borer there were sampled 98 increment cores, 19 cross sections and 1 semi transversal cross-section (wedge). The trees exhibited many disturbances among which the most frequently encountered were scars at the stem level, buried roots and tilted stems. According to the identified injury, two cores were extracted per tree. The trees which had scars, two increment cores were extracted, one close to the edge of the wound and the other on the opposite side. In the case of curved or tilted stems, the samples were taken from the maximum concavity and on the opposite side respectively, from the direction of inclination. In addition to this, relevant information regarding the sampled trees such as type of disturbance, position, diameter, height etc. were gathered. For normal conditions, other 40 increment cores extracted from undisturbed *Piceaabies* trees which grow near the study site were used.

In the laboratory, the samples were prepared and analysed according to the procedure described by Stoffel and Bollschweiler (2008). First, the samples were fixed on wood mountings and dried up. In order to obtain a clear surface necessary for fine anatomical observations, the samples were sanded using different abrasive belts. After that, the rings of each core and cross section were counted and the ring widths were measured with 0.001mm precision using a LINTAB measuring station and TsapWin™ software. The growth curves of the affected trees were compared and cross-dated with the reference chronology of undisturbed trees in order to identify climate influence on growth. Subsequently, using a binocular microscope device each sample was visually examined in order to identify the growth anomalies and the year in which they appeared.

The reconstruction of the events was based on the number of reactions per tree (minimum 3) and on their intensity. According to this, the reconstructed events were divided in two types: probable when the reactions were more than 5 and possible when there were less than 5 reactions but of high intensity. Therefore, the probable events are more likely to have happened. Also, we took in consideration the frequency index with a minimum 10% threshold. The frequency index was calculated after the following formula:

$$I_t = \left(\left(\sum_{i=1}^{n} Rt \right) / \left(\sum_{i=1}^{n} At \right) \right) * 100$$

where: Rt = the number of responding trees in year t and At = number of the sampled trees in year t.

4. RESULTS

The sampled trees have an average age of55 years and a standard deviation of 36 years, the oldest one having 202 years, while the youngest is only 16 years old (fig. 4). The age structure of the trees reveal a predominance of the class age ranging from 31-60 years (45%). Also, there are only 7 trees exceeding 100 years and before 1900 only 2 are available. All of the trees used for the reconstruction of the debris flows

exhibited different types of disturbances (fig. 5). In total, there were identified 415 growth anomalies, among which the most frequently encountered were abrupt growth reduction of the rings (45%) followed by tangential rows of traumatic resin ducts (30%). Other anomalies found were in form of compression wood (15%) while growth release was only occasionally found (10%).

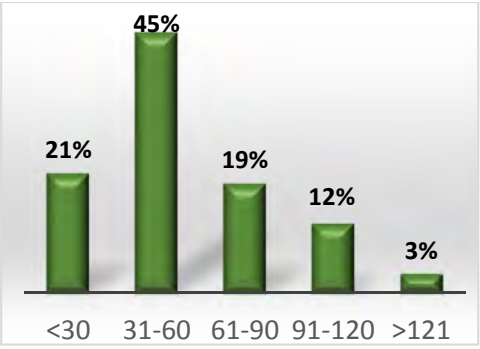

Fig. 4. Age structure of the sampled trees

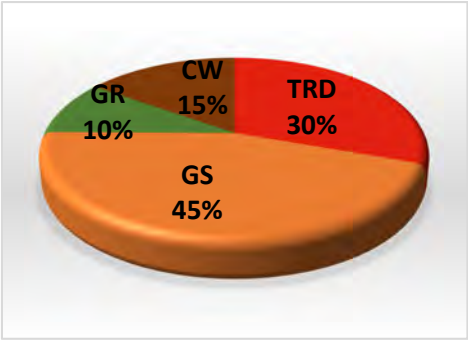

Fig. 5. The percentage of the growth anomalies

The oldest growth anomalies were found in 1828 in form of traumatic resin ducts (TRD). Even though they were of high intensity, there was only one tree available for that period so it could not be included in the events chronology. Some important growth anomalies were found in1853, 1856, 1864 and 1879 but there were just two trees available for the reconstruction. In 1900, one tree responded through a pronounced growth reduction which was maintained for more than 7 decades. Also, in 1913 two growth anomalies were found in form of TRD and compression wood (CW) but the number of the available trees is still low (only 7 sampled trees). After just 2 years, one tree responded through an abrupt growth suppression (GS) which was maintained until 1928. In 1935 a number of 3 spruces responded but the reactions had low intensity. Because of the reduced number of the responses due to the low number of available trees only1935 was considered as possible year-event (fig. 6).

The first year considered as probable year-event is 1944, when 5 trees responded mainly through abrupt growth reduction, the value of the frequency index being of 36%. In 1949, other 6 trees reacted via GS and TRD. After this, in 1952 and 1956 there were found some growth anomalies either in form of CW or GS, but the number of responses is relatively low, so we considered them as possible events. Given the high intensity of the TRD found in one cross-section which clearly showed that the tree was hit in 1959, to which we add some other growth anomalies in form of GS and CW, we accounted this as a probable event year. Other probable event-years are 1963, 1966 and 1969, when different types of disturbances were found. In 1972 and 1973 we identified some strong reactions via TRD and GS, but the number of trees that responded was relatively low. Also, 1976, 1980, 1983, 1989 and 1996 were considered as possible event years rather due to the intensity of the responses and not because of their number.

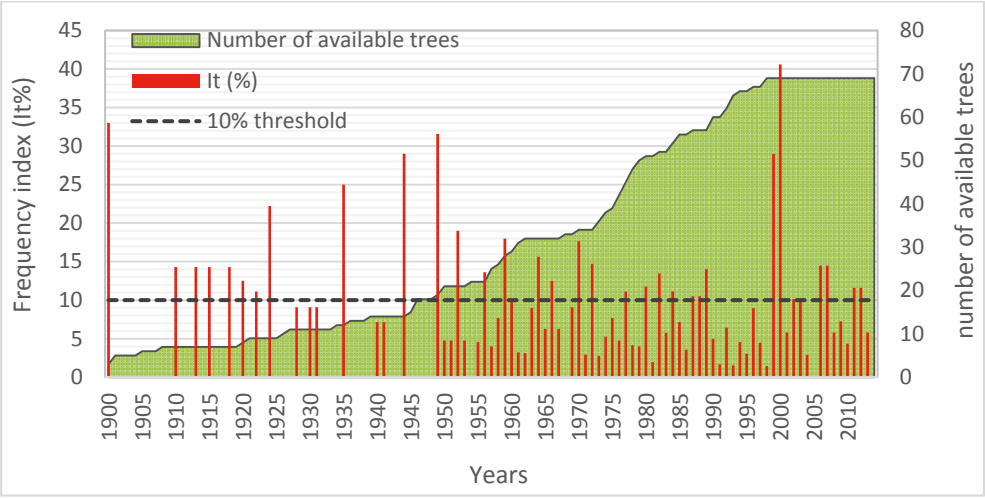

Fig. 6. Frequency index value and the number of available trees

The most numerous growth anomalies were identified in the interval 1999-2001, when 52 spruces (75%) reacted through different types of disturbances. As shown in the figure 7, most of the trees reacted in 2000 with 59%, followed by 1999 (30%). Also, in 1999 most of the trees reacted through TRD and CW, while in the next year there were more cases of GS and other TRD. Interestingly, even in 2001 there were encountered some new TRD but most of the reactions (67%) were in form of growth release (GR). Moreover, the intensity of the disturbances was very high, in many cases the TRD and GS was maintained for several years consecutively or even till the sampling year. Other reconstructed years after this major event were 2006 and 2011 to which we add 2008 as possible event year.

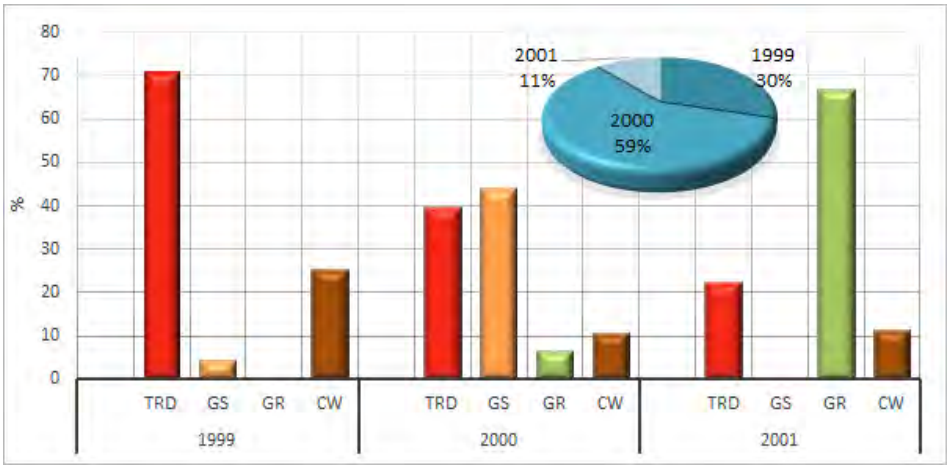

Fig. 7. The percentage of the trees responding to the event that occurred in July 1999 and the percentage of the growth anomalies found in the interval 1999-2001

The analysis of the tree ring data allowed the reconstruction of 10 probable debris flow events, from which 2 were considered as major events, 1969 and 1999 respectively, and also other 9 possible events. The oldest event introduced in the chronology was in 1935while the newest occurred in 2011 (fig. 8). The recurrence interval varies between 3 and 9 years and the return period is of 4 years.

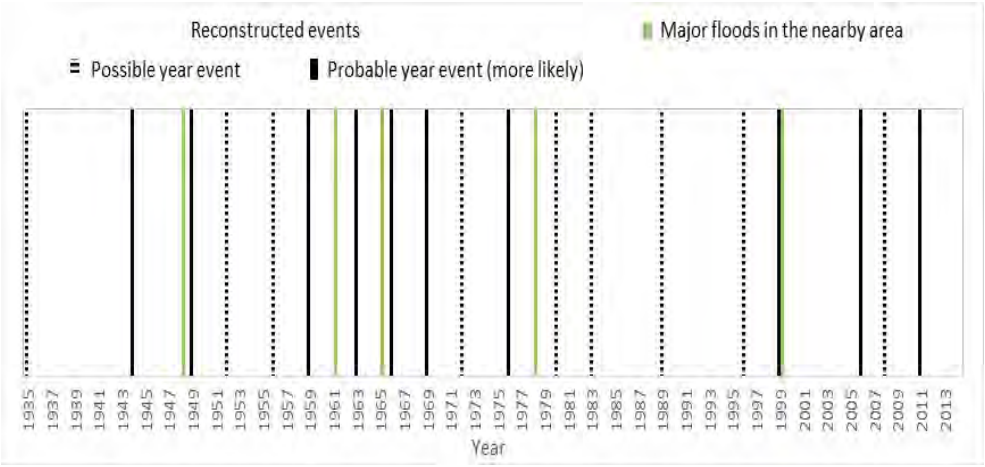

Fig. 8. Reconstructed year-events starting from 1935 (the first possible event-year). The dash lines represent the reconstructed possible event years, the solid line shows reconstructed events which are more certain and the green lines are the years in which there were recorded major flood events in the nearby area.

5. DISCUSSIONS

The analysis of tree ring data provided a sequence of 19 debris flow events spanning almost a century. As one can notice, debris flow events are quite uniformly distributed, the return period being of 4 years. The reconstruction of past debris flow occurrences were based on the number and the intensity of the growth anomalies mentioned above. The higher the number of reactions the higher is the probability of the event occurrence in that specific year and the stronger the reactions are the higher the magnitude of the event.

Although some reactions have been identified since the XIX century, they could not be used in the reconstruction process because only two trees were available. There were identified different types of growth anomalies from which the most frequently encountered were in form of growth suppression and traumatic resin ducts. These are typical reactions for the trees affected by debris flows especially on those growing on the cone.

During the reconstruction period there were registered six major flood events that occurred in the nearby area, all of them being caused by heavy rainfalls. Under a favourable combination of the sediment availability and a large amount of water to

which we add the terrain characteristics the debris flow initiation is imminent. Tree-ring data partially coincide with the archival records but in two cases (1948 and 1965) the reactions were delayed one year. Also, in the case of the event that occurred in July 1999 it was clearly shown that most of the trees reacted only in the following year. From this we can deduce that not only the number of the growth anomalies in a particular year is important but also the reactions of the previous year. If there are a few strong anomalies prior to the one which shows a higher number of disturbances, that year might be the event year. Moreover, the intensity of the growth anomalies is also important and even if there are not so many responses, they should still be taken into account. The events which were characterized as possible are based on a lower number of reactions but also they might have been of a smaller magnitude, case in which only a few trees could be affected.

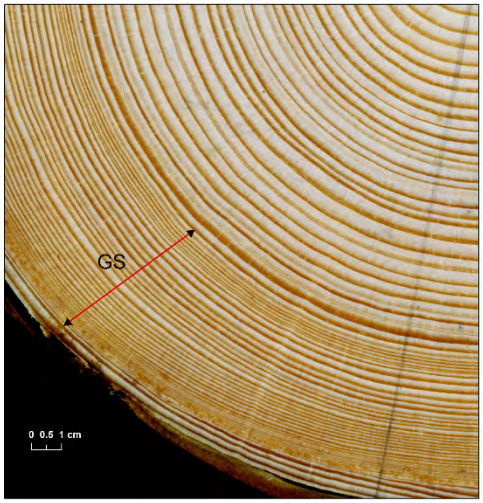

Fig. 9. Severe growth reduction found in a cross section starting from 1972

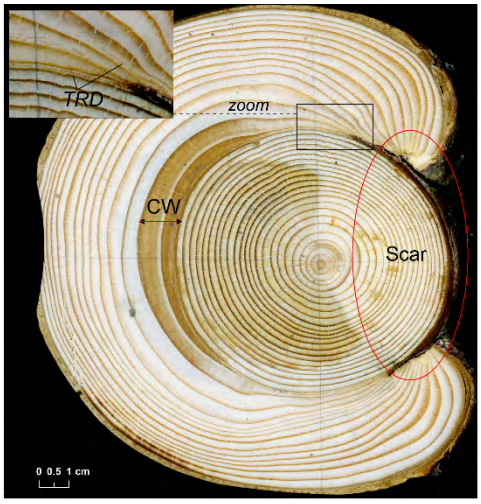

Fig. 10. Multiple growth anomalies identified in a cross section after the event of July 1999

The results interpretation can be really difficult when the trees are severely affected and the rings width is too narrow (fig. 9). There can be missing or false rings which complicates even more the analysis. In the increment cores these types of disturbances are hard to detect while the cross sections provide more useful information (fig. 10). Also, in the cross sections the intensity of the reactions can be more precisely established offering a clearer picture of the responsible event. As most of the growth anomalies are discovered using the microscope, the human error is another factor which might affect the reconstruction process. The events reconstruction represents a minimum frequency of debris flows occurrences as it depends on the interaction between the process and the riparian vegetation.

There is a necessity of gathering as much information as possible regarding past debris flow occurrences as this area has an important touristic attraction and there is only one road that connects Poiana Pelegii camp site to the Gura Apelor Lake. Moreover, this data can be taken into consideration in the assessment of debris flow activity at regional or medium scale.

6. CONCLUSIONS

The dendrogeomorphological analysis applied in the reconstruction of debris flows that occur on a small catchment located on the northern slope of Piule-Iorgovanu Mountains, revealed a chronology of 19 events, covering almost a century.

The results showed that most of the affected trees reacted through growth suppression and tangential rows of traumatic resin ducts. The reconstruction was limited by the young age of the trees, as a consequence the event chronology started only since 1935. Also, the temporal reconstruction of debris flows partially coincide with archival records on flood events that occurred in the nearby area. As in some cases the trees reacted only in the following year of vegetation, the number of growth anomalies seems to be irrelevant for the reconstruction process. It should be also taken into consideration the growth anomalies found in the previous year if there are any and their intensity. Furthermore, the cross sections offer more information about past events than increment cores.

The reconstruction of debris flow activity is important for the estimation of their frequency and magnitude which are required in hazard and risk assessments. Given the high potential of tourist attraction of the area, mitigation plans and countermeasures are imperative necessary in order to prevent negative consequences.

ACKNOWLEDGEMENTS

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INTERACTIONS BETWEEN HUMAN SETTLEMENTS AND GEOMORPHOLOGY IN HUŞI DEPRESSION, NE ROMANIA

ELENA CHIRILĂ-ACATRINEI[1]

ABSTRACT. – Interactions between Human Settlements and Geomorphology in Huşi Depression, NE Romania. The present paper analyses the way in which terrain morphology influences the typology and distribution of human settlements in the depression basin of Huşi, landforms being one of the main factors conditioning the location and development of localities. Also, the habitable space of the depression has been analyzed by using some mathematic and statistical indicators computed for the administrative units in this geographical area. Such are the indices regarding settlement dispersion, centrality and concentration. Thus in the study area one notices an unequal dispersion of the settlements, with large surfaces lacking habitation in the central part of the depression, a large percentage of small localities with a subsistence agricultural economy and a reduced degree of urbanization. The only town is Huşi, which offers low economic dynamics to the rural settlements in the depression.

Keywords: *Huşi Depression, geomorphology, human settlements, dispersion, centrality*

1. INTRODUCTION

The analysis of the physico-geographical conditions in the depression of Huşi in relation to the influence they exert on the territorial repartition of human settlements points out to the complexity of the interrelations between humans and the environmental components. The development of human settlements depends both on the social, economic and historical context and on the peculiarities of the environment that have favored or restricted the agricultural utilization of terrains, access to water resources and building materials, the development of communication networks and implicitly the expansion of settlements.

The first viable sources of information regarding the settlements in the study area date from the end of the 19th century and the first part of the 20th century, these being a series of statistical data and cartographic materials used both by historians and geographers in several papers. For the inter-war and the contemporaneous periods there is much more information, making up valuable references for the research of human settlements in Moldova.

At the beginning of the 20th century a special interest was given to rural or village geography, theoretically established by Mihăilescu, who published numerous papers in this period, also conducting the first morphological typology of the Romanian villages (1926). Tufescu studied the semi-urban settlements (boroughs) and their economic importance (1942) as well as the distribution of the free peasant (*răzeşi*) villages (1937).

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Other papers approaching regional aspects are those of Năstase (1946) regarding the Prut Valley and Gugiuman on Elan-Horincea region (1938), Lohan valley (1942) and later Huşi Depression (1959).

Aspects regarding the geomorphology of Huşi Depression are found in different papers of local, larger spatial coverage or national scale. Most of the papers have approached geological aspects of the Moldavian tableland (David, 1921, 1922), the premature ageing of the floodplains (Filipescu, 1950), landforms and present geomorphological processes in the Moldavian Tableland (Bacăuanu et al., 1980). A series of studies referring to slope processes and cuesta landforms in the Bârlad Basin have been conducted by Gugiuman (1932, 1938, 1942, 1959) and Ioniţă (1985, 1997, 2000). Among the geomorphological studies approaching larger regions that include the area of Huşi Depression are those of Martiniuc (1954, 1955), Hârjoabă (1968, 1977), Gugiuman et al. (1973), Obreja (1958), Paraschiv (1964), Donisă et al. (1984) and Rădoane et al. (1996, 2008a, 2008b).

2. STUDY AREA

Huşi Depression is located in the south-eastern part of the Central Moldavian Plateau, subunit of the Bârlad Plateau, limited on the west by Lohan Ridge, that is 100-200 m higher than the rest of the territory, on the north by Pietrăriei Cuesta, situated on the right of Moşna River, on the south by Drăslăvăţ Cuesta and on the east by Prut River. Between these limits, the depression of Huşi has an area of approximately 300 km^2 and includes the town of Huşi and 18 other villages, belonging to five administrative territories: Huşi, Arsura, Duda-Epureni, Stănileşti and Drânceni (fig. 1).

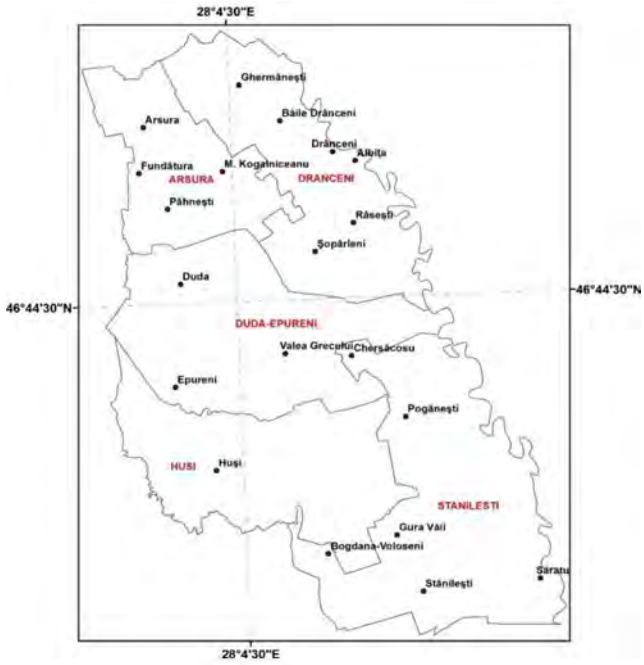

Fig. 1. Geographical position and administrative-territorial organization of the depression of Huşi.

3. RESULTS AND DISCUSSIONS

The overall aspect of the Huşi Depression is that of an amphitheater opened to the SE. The western part of the depression is higher, the hills here frequently exceeding the altitude of 300 m. The central part of the basin presents a hilly relief, which descends to the Prut River. On the right side of the Prut valley there are some more developed terrace levels. The geological deposits are represented by Sarmatian limestones and sandstones, which contribute to the formation of a structural relief represented mainly by plateaus and subsequent asymmetric valleys (fig. 2).

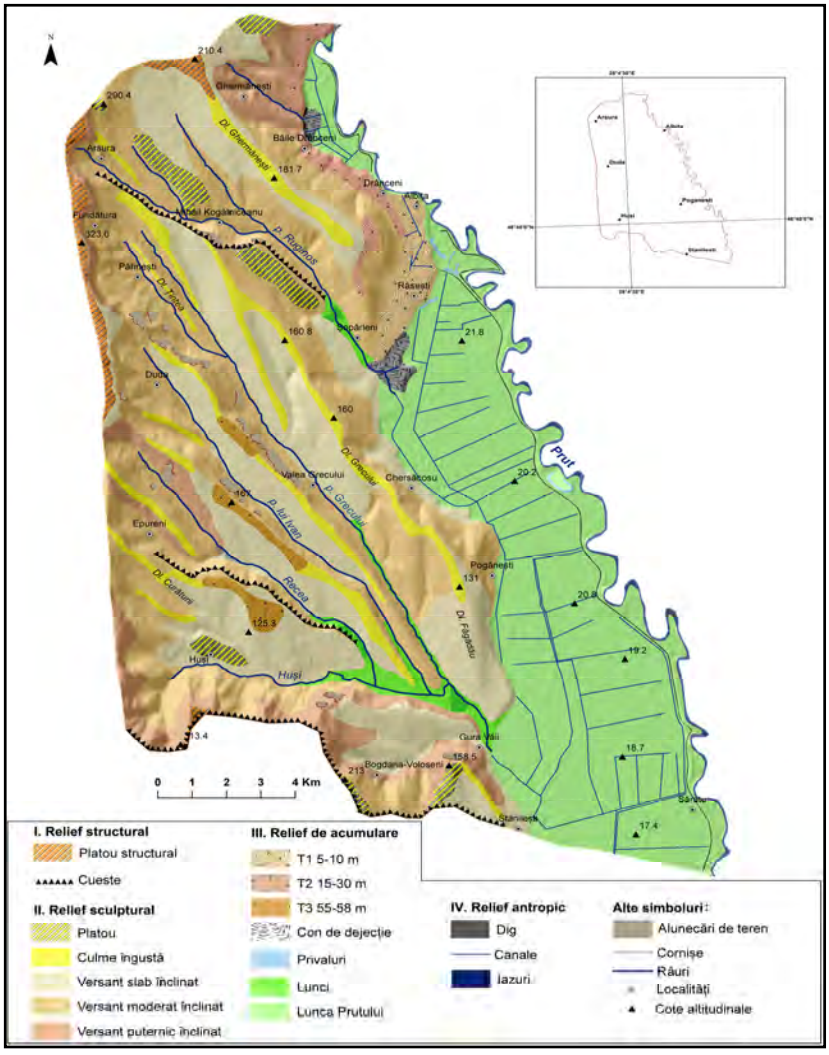

Fig. 2. Geomorphological map of Huşi depression.

The relation between geographical conditions and rural settlements can be approached both at local scale, separating site morphological types, and at regional scale, separating "series" types of settlements (Băcăuanu et al., 1980).

In the class of site morphological types enter the *terrace settlements* (Drânceni, Râșești, Pogănești) with favorable development conditions due to the flat or low declivity landforms, the terrain favorability for agricultural use and the facility in what regards the water supply.

River basin source settlements, situated in the basins of tributaries, have limited development conditions due to landslides and the large distance from the modern communication network, despite benefiting from a sheltering micro-climate, aquifers and springs. This is the case of Arsura, Fundătura, Păhnești and Ghermăneşti villages, whose surfaces have suffered an advanced decline during the last decades. The basin source settlements from the cuesta areas are characteristic for the Moldavian rural network morphology. The genesis of this site type is an archaic one, which regarded mainly the defensive position and protection against winds. Cuestas represent repulsive areas for settlements position, being strongly affected by landslides, which prevent emplacing households. They are fragmented by numerous secondary tributaries which fragment the cuesta front, and thus villages have settled either in the reception basins of these tributaries or on the small alluvial fans. The basin source settlements have generally occupied the semi-circular landslide basins of the "hârtop" type (Ioniță et al, 2014). The occurrence on the surface of some groundwater from the landslide deposits (water coming from rainfall or springs), together with the terrain instability and un-uniformity, the micro-climatic shelter and the security conditions have represented attraction elements for establishing settlements in these positions. Their isolation has later become an impediment in the economic development in the modern and contemporaneous periods. Even the relative close position to the well-drawn development axes or to larger towns has not influenced the economic dynamism of these settlements. Conversely, they represent repulsive rural areas with a subsistence dominant agricultural economy. An example in this sense is the rural area from the Iași Cuesta. An urban variant of this situation is the town of Huși, positioned in a small erosion depression which ensures a sheltered micro-climate.

The interfluve settlements (Valea Grecului, Chersăcosu) are more recent in the depression and are met in the central part of the depression. This settlement type gives the rural localities an optimum declivity, yet from the relational viewpoint, during the modern and contemporaneous period this became an obstacle for the connection to the communication networks. Another impediment for the rural settlements from this category is represented by the lack or insufficiency of water sources. At present, the site implies sometimes insuperable difficulties for the accessibility to the communication network (Țurcănașu, 2006).

The floodplain settlements are found in the major floodplain of Prut, especially on levees (Săratu), are partially floodable, are affected by water excess and are exposed to negative climatic phenomena such as frequent fogs or cold air invasions.

The glacis and alluvial fan site is a common one for the rural settlement network of Moldova. Besides a certain protection against floods, this category offers favorable conditions in what regards declivity, water supply, the proximity of forests and others.

These settlements are positioned on alluvial fans of secondary tributaries and on proluvio-coluvial glacises developed at the contact between the floodplain and the right slope of Prut valley (Pogăneşti, Stănileşti).

At regional scale, the villages located in the most favorable local conditions result in *alignments of localities,* which point out the major geographical conditions for development. The settlement series represents the frame in which enters each morphological site type (Băcăuanu et al., 1980).

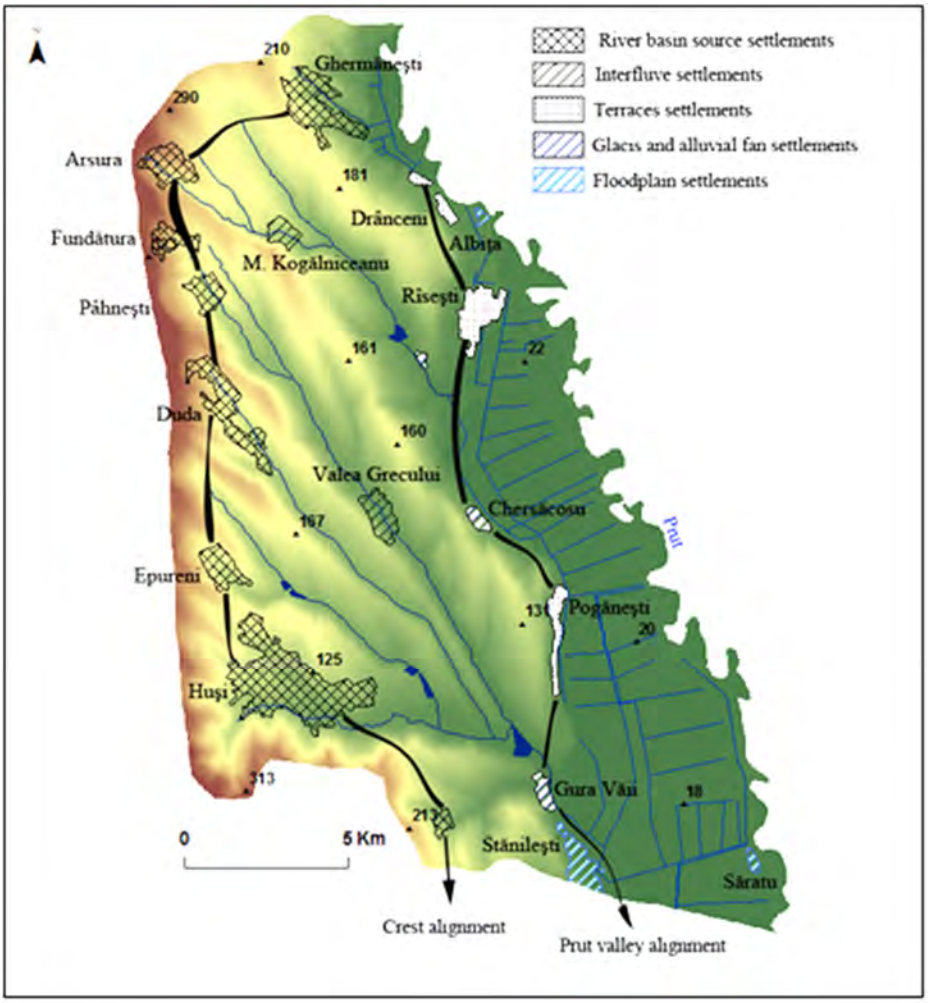

Figure 3. Settlement types in Huşi Depression.

In the depression basin of Huşi, first of all one notices the *settlement alignments of geographical contact*, which benefit from the advantages of the contact between two geographical subunits. The contact position makes use of complementary resources available from the geographical subunits different as landforms, climate, vegetation, soil cover etc. Most of times in Moldova, this category is associated with the *intersection position*. Huşi is developed at the contact between the higher forested and the lower, silvo-steppic geographical sub-units of the Moldavian Tableland (the Bârlad Tableland and the hilly depression of Elan-Horincea). It also has an intersection position, favored by the presence close to the town of passes and of major rivers (Prut), which enlarge its hinterland.

In the depression, some localities form *alignment in cuesta areas* with landslides, which may also be associated with the position of geographical contact. These are generally formed of old villages with a dispersed structure. In some cases (Duda, Novaci, Arsura) one sees a densification of the households from place to place, according to family groups or stages in the formation of some neighborhoods, the dispersed structure having a *polinuclear* character (Gugiuman, 1959). These localities can be considered as also forming *crest alignments*, their position marking spring lines, deforestation phases etc.

The valley alignments of settlements are represented in our case by the alignment along Prut valley. The settlements from this area belong chronologically to the Middle Ages. These are some of the nuclei of dense population in Moldova that have occurred quite early and are in fact inserted in the northern periphery of the medieval state nucleus. The morphology of the alignment has not become more complicated in the modern period, on one side due to the border situation and on the other as a consequence of the terrain morphology and the inexistence of well-developed terraces (Ţurcănaşu, 2006).

The crest alignments surround some hills, with the villages emplaced on secondary tributaries. They had favorable development conditions in Fălciu Hills, and they are also associated to contact alignments, having in view the fact that the respective rural alignments are situated in the proximity of the contact between subunits of the Moldavian Tableland.

The characteristics of the habitable space can also be analyzed with the help of mathematico-statistical indicators computed at the level of the administrative units inside the depression basin. The interpretation of these indices has mostly a theoretical aspect and the eventual comparisons with existing situations can lead to uncovering similitudes between the recommendations given from their study and the *de facto* situation (Iaţu, 1998). These indicators that regard the dispersion, centrality and concentration of settlements express the relative position of each locality in the settlement network of the depression and the degree of concentration and dispersion of the component villages of the townships. At the same time, these indices allow for the correlation between human settlements and the components of the geographical landscape.

The dispersion index indicates the degree of dispersion of the localities, and has been computed according to the formula elaborated by the French geographer Albert Demangeon:

$$\mathrm{Id} = \frac{(N - N')n}{N}$$

where Id is the dispersion index, N= total number of inhabitants, N' = number of inhabitants from the village acting as administrative seat, and n = number of villages minus the administrative seat.

In the case when the administrative unit is composed of only one settlement, the dispersion index will take the zero value (the case of Huşi). The more the index values tend towards zero, the higher the concentration degree of that administrative unit. The *Demangeon* dispersion index takes higher values as the number of settlements within a commune is higher. Thus, for the communes inside the depression of Huşi the higher values have been obtained for Drânceni (4.52) and Stănileşti (3.03). The higher dispersion in these cases is due to the higher number of localities inside these administrative units and to the fact that the population of the component villages is higher than that of the administrative seat (table 1).

Table 1.

Dispersion (Id), centrality (Ice) and concentration (Ico) indices for the township residences from Huşi depression

Locality	Id	Ice	Ico
Huşi	0	15	0 .25
Arsura	1 .75	19	0 .08
Duda-Epureni	2 .01	17	0 .11
Drânceni	4 .52	15	0 .10
Stănileşti	3 .03	18	0 .09

Another attribute of the settlement system is *centrality*, which is given by the preferential orientation of the material, human and information flows from a certain territory towards a polarizing center. The centrality index is defined as being the mean distance of a locality in relation to the other localities inside a territory (administrative or geographical unit etc.). The index has been computed as the arithmetic mean of the distances between the administrative seat and each component locality:

$$\text{Ice} = \frac{d1 + d2 + \cdots d\text{n}}{n}$$

where $d_1, d_2, \ldots d_n$ = are the distances between the administrative seat and the other localities of the commune, and n = the number of distances between the component localities.

According to the calculations of the centrality index for the administrative seats in Huşi Depression, it can be seen that Huşi has the lowest value of the index (Ice = 0.15), although it does not have a central position. This situation is due to the fact that the town of Huşi benefits from a certain disposition of the road network that connects it to the other villages which makes it the most important settlement in the depression. A similar value of the index has been obtained for Drânceni, which takes advantage of its position on the Prut valley on the 24 A national road. The highest values of the centrality index have been obtained for the commune seats Arsura (Ice = 19) and Stănileşti (Ice = 18),

which although have a peripheral position inside the depression, are situated at small distances to the other localities from the administrative territories they are part of (table 1).

The concentration index is used to measure the way the localities are positioned inside the territory in comparison to a homogeneous model, in which they would be uniformly spread on the surface of the administrative unit, at equal distances. The concentration index has been calculated as the ratio between the theoretical and the real distances between the localities acting as township residences. The formula is:

$$Ico = \frac{Dr}{Dt} = \frac{\sqrt{\frac{T}{N}}}{d1 + d2 + \cdots d\mathrm{n}}$$

where Ico = the concentration index, Dt = the theoretical distance between the localities, Dr = the real distance between the localities, T = administrative unit surface, N = the number of localities inside the administrative unit, n = total sum of distances between component localities of the administrative unit.

As the values of the concentration index are lower, the localities are less favorable located, with large distances between them. This is the case of Arsura and Stănileşti, situated at the periphery of the depression, and also of Drânceni and Duda-Epureni. A more favorable position is that of Huşi, with a value of the concentration index of 0.25.

4. CONCLUSIONS

The configuration of the relief inside the depression of Huşi is due to the erosion activity of Prut River and its tributaries, which have evolved regressively towards west, forming the present valleys that have their sources under the high ridge that forms the western limit of the depression. In this context, the formation and evolution of the settlements inside the depression is closely related to the genetic landform types, which make up the support on which they evolved in time. Thus, at the source area of the main rivers that drain the depression, in favorable shelter and defense conditions, the first and the more numerous settlements have formed and evolved until now (Huşi, Arsura, Fundătura, Pâhneşti, Duda and Epureni).

Another alignment of settlements is positioned at the contact between the right slope of Prut valley and its floodplain (Ghermăneşti, Drânceni, Răşeşti, Chersăcosu, Pogăneşti and Gura Văii). These localities have made use of the conditions including low declivities and drained terrains from the colluvial glacises neighboring the 50-100 m relative altitude terrace. In the central-eastern part of Huşi Depression, the villages of Şopârleni, Mihail Kogălniceanu and Valea Grecului are situated on the valleys of Şopârleni, Ruginosu and Grecul brooks. Şopârleni is situated at the terminal part of an interfluve summit, while Mihail Kogălniceanu and Valea Grecului villages have evolved at the base of some cuesta slopes of the Ruginosu and Grecul valleys respectively. The town of Huşi has extended during time at an accelerated rate, occupying at the beginning the medium altitude hills and the higher hills from west and south, and later the southern parts of the lower rolling hills, the base of the cuesta slope from the right side of Huşi river and its floodplain near the confluence with Recea brook.

The statistical indices regarding the dispersion, centrality and concentration of the settlement system allow for making correlations between human settlements and the landforms of the depression, which condition the accessibility of localities, and implicitly the supply possibilities, ensuring diverse services, circulation of the labor force etc. Thus, in the depression of Huşi one may witness an unequal distribution of settlements in the territory, with large surfaces lacking habitation in the central part of the depression, a high percentage of small localities (12 villages with less than 500 inhabitants) and a reduced degree of urbanization.

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THE IMPACT OF MINING ACTIVITIES ON THE WEST OF PETROŞANI DEPRESSION AND IDENTIFICATION OF AFFECTED GEOMORPHOLOGICAL RESOURCES. CASE STUDY: ANINOASA-VULCAN-LUPENI SECTOR

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ABSTRACT. – The Impact of Mining Activities on the West of Petroşani Depression and Identification of Affected Geomorphological Resources. Case Study: Aninoasa-Vulcan-Lupeni Sector. The west region of Petroşani Depression, like the whole depression, suffered some changes in the geomorphologic environment as a result of coal mining activities. Following displacement processes of mass materials and relocation of it, changes in shape are brought to the original territory that contrast with the natural landscape. The human impact on the West of Petroşani Depression and hence to the analyzed sector is especially highlighted as it materializes into waste dumps and coal pits.

Keywords*: mining activity, coal, anthropogenic impact, geomorphology, Petroşani Depression*

1. INTRODUCTION

The western region of Petroşani Depression was formed on a synclinal oriented West-East, on a length of about 36 km, to the confluence of Eastern Jiu and Aninoasa valleys. It is limited to the North and South by Retezat and Vâlcan Mountains. It appears as a depression corridor inside the surrounding mountains and is the largest region of the depression. The corridor character of this western unit lies in the existence of two major fault systems oriented East-West (Northern Fault of Jiu River). The main type of this unit remains the tectonic element. It imposed the morphologic development direction of the region. Against this background overlapped major elements of diversification and intensification of erosion generated by the rate of petrography, the evolution of the river etc (M. Ardeiu, 2004; Silvia Lupu 1967, I. E. Pop 1963).

The presence of coal deposit in this region has been reported since 1780 but due to the low level of industrialization of Transylvania at the time, the geographical position, the relative isolation of the basin and the lack of appropriate modes, the first industrial operation appeared only in mid-nineteenth century (V. Tufescu, C. Mocanu, 1964; I. E. Pop, 1963).

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Underground coal mining has great repercussions on the land surface by causing subsidence, rupture or collapse. These phenomena do not allow normal use of the land by the initial goals, but seriously affect the buildings in the area. The severity of surface deformation depends on assistance from the ground, the level of stress and deformations arising and always have the effect of destroying the stability of the surrounding rock. The impact of coal mining led to the emergence of anthropogenic landforms, both positive (dumps and slag deposits) and negative (coal pits), whose evolution over time is unpredictable (C. Nimară, 2011).

1.1. Location and limits

The ***northern limit*** of the western region of Petroşani Depression is morphologically expressed; one can also see the difference of the physical and geographical features along the morphological limit. This can be seen on the SW-NE direction, between Câmpu lui Neag and East of Aninoasa town.

At the contact of the two units, the slope break line can be seen, which on SW-NE direction goes to the South of the following peaks: Pleşei Hill (1930 m), Păroasa Hill (1436 m), Dealul Mare (1509 m), Zănoaga Peak (1526 m), Ursu Hill (1020 m).

The ***South and South-East limit*** can be seen between Câmpu lui Neag and Western Jiu valley (at the entry of Jiu gorges), the southern limit is represented by Vâlcan Mountains. The limit is between 1601 m (Cioaca Negrul Hill) and 1548 m (Cândoiul Hill) to the gorge.

This limit in the West-East direction goes across a series of Jiu valley tributaries, going to the North of Cioaca Negrul Peak (1601 m), Şigleul Mare Peak (1681 m), where the piedmont level dissapear and the limit is made by the northern slope of Şigleul Mare Mountain; this makes a direct contact with the right bank of Jiu River. To the East, the limit goes to the North of Coarnele Mountain (1650 m) and Cândroiul (1548 m) going upstream of Jiu Gorges (Gr. P. Pop, 2006).

The ***eastern limit*** has been considered the conventional line which goes across between Jiu Valley and Aninoasa Valley.

2. IDENTIFICATION OF AFFECTED GEOMORPHOLOGIC RESOURCES

2.1. Căprişoara Valley

The deposit of slag and ash of Căprişoara Valley is located at 1.5 km from the power plant and covers an area of 45 hectares, consisting of two compartments. Deposition of slags and ashes is done in steps, consisting of cant executed successively in the various compartments of the deposit. The impact on the landscape is perceptible from a visual standpoint, being in disagreement with the natural environment, changing the original purpose of the land by the emergence of new landforms (fig. 1).

Fig. 1. Affected geomorphologic environment, in Vulcan perimeter (Căprişoara Valley). (Source: https://earth.google.com/).

Slag and ash dumps from power plants using solid fuel (coal) being in operation or after the termination of exploitation and abandonment represent an anthropogenic hazard increasing the susceptibility to risk through (I. Mac, D. Petrea, 2003):

- the impact of particulate ash against the adjacent areas: reducing visibility, dusting the buildings and the equipment located outdoors, partial necrosis of crop residues as a result of mechanical impact with coarse particles of ash blown by strong winds, increasing the frequency of fall flowers of young trees and fruit trees, tinted powder coating the ash and photosynthetic capacity reduction;
- changing the initial land destination, the emergence of new forms of relief;
- changes in the composition and quality of soil in the vicinity of the dump due to ash deposits;
- noticeable aesthetic impact: landscape changed in contrast to the natural environment.

2.2. Meadow of Arsului River

The anthropogenic landform which affects the Arsului Valley meadow is a small heap, with an area of 1,938 hectares surrounded by Ţarina Chiciorii hills in West and Arsului Hill in East. It was established for tailings storage resulting from underground coal exploitation in block VIII. In terms of geomorphology, the area is relatively flat, represented by Arsului Valley meadow stream with a general inclination from NNE to SSE and a relative altitude of 661 m (fig. 2 b). Following the dump process, because of dumping, besides the geomorphologic processes and phenomena, the terrain morphology was changed by + 3 m to 8.7 m.

In hydrographic terms, the dump area and the adjacent areas are affected by Arsului Valley brook and gullies that formed on the slopes during heavy rainfall. After dumping in the valley, the stream has diverted its riverbed and downstream a lake has been formed due to land sinking by the underground mining activity, with natural drainage possibilities (fig. 2a).

Fig. 2. The anthropogenic lake from Arsului Valley (a); The meadow of Arsului brook (b). (Source: C. Nimară, 2011).

The presence of the lake, formed locally, is an unfavorable factor in terms of stability, as water saturates the rocks at the bottom of the heap and modifies the physical and mechanical properties of the land base.

By the current configuration of the dump, it results that the dumping was made in several alignments, putting into evidence the existence of two bodies of dumping, the oldest one in the North-West, and the second body located in the southern part.

In the middle of the dump there is now a central clough running through its central body in the NE - SW direction (fig. 3) (C. Nimară, 2011).

Fig. 3. Clough formed in the central part of the sterile dump. (Source: C. Nimară, 2011).

2.3. The perimeter between Ferejele Valley and Boncii brook

This landform is affected by the sterile dump of Lupeni coal preparation factory (fig. 4), being surrounded by the hills: Dâlma, Boncii and Renghii (the slopes are between 6° and 35°).

Fig. 4. The anthropogenic impact on the relief in the Ferejele valley-Boncii brook perimeter. (Source: https://earth.google.com/).

The slope of the dump is about 9°. Because of these angles and due to the presence of water runoff during periods of heavy rainfall, erosion and some slip phenomena are present. The form of the dump on all three sides is not uniform and the material deposited on the dump consists of sandstone rocks, clay, marl, shale and carbonaceous sandstone. In the area of the waste material, cones can be seen, which are then leveled by a loader so that ultimately leveling platforms are formed.

Shallow formations represented by topsoil and hillside covering the area are sometimes eroded and basic rocks in outcrops occur. There are landslides on the southern slope in the area of P4 and P5 pillars, accompanied by repressions of the land base. This landslide that extends over 170 m in the present is stabilized by placing the rocks of the group of sliding at an angle of slope of 24°-25°. After waste materials were dumped in the perimeter of the two valleys, the stream riverbeds have been diverted and upstream several lakes were formed without natural drainage possibilities.

Three such lakes are between the two dump bodies of the branches R-1 and R-2 with a surface area of 550-1 320 m^2 and the other three lakes were formed in the upstream of R-2 branch, the lakes 1 and 2 have small areas of approx. 800-1 100 m^2 and lake no. 3 has the largest surface of about 7 600 m^2 (C. Nimară, 2011).

2.4. Câmpişoara Hill

Câmpişoara Hill affected area is delimited to the East by Vulcan mining field, and to the West is delimited by Bărbăteni, Bolosineştilor and Plisabeia brooks. To the North it is delineated by Retezat Mountains, and to the South by Vâlcan Mountains.

The total surface area that corresponds to Victoria coal pit is 200,682.6 m^2, which is totally degraded. On the other hand, the northern slope of the coal pit is affected by landslides due to rainfall.

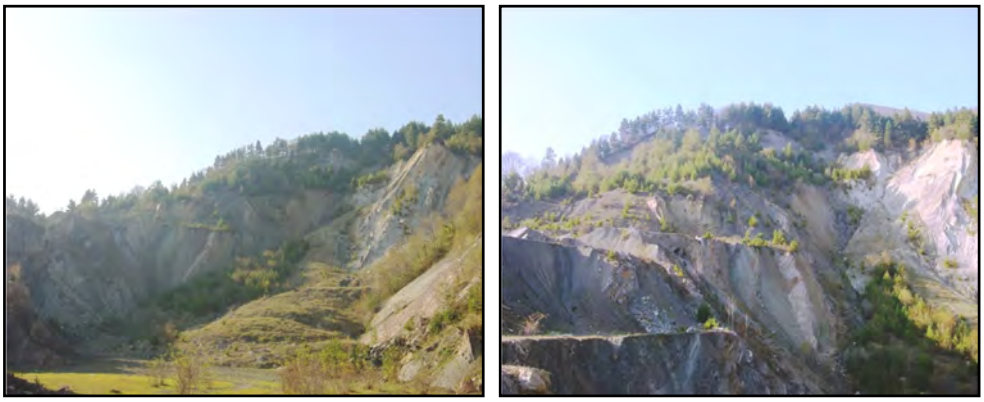

Fig. 5. Victoria coal pit and the landslides on its slopes.
(Source: Nimară, 2011).

Generally in areas with rugged terrain, as in the area where Victoria coal pit is located, breaking the static equilibrium where there is a rock deposit is caused by shear forces that alter the internal cohesion of the particles constituting the rocks in a field gravitationally active as a side can initiate land mass displacements (fig. 5) (R. U. Cooke, J. C. Doomkamp, 1990; I. Rotunjanu, 2005).

The sterile dump of Victoria coal pit is in conservation. Structurally, the dump is made of clay covering an area of 3.18 hectares and has a volume of 2,875,272 m^3 (fig. 6).

Fig. 6. Sterile dump, Victoria coal pit.
(Source: Nimară, 2011)

2.5. Mierlaşului Valley

The sterile dump from Bărbăteni mine is located on the southern slope of Mierlaşu Valley (Mierlesei Valley on some maps, fig. 7 a). This form of anthropogenic accumulation is located about 2 km away from Lupeni and arose from mining excavation processes of EM Bărbăteni.

The largest amount has been dumped since 1980, but in recent years the site has not been used for dumping, but for the storage of ashes from the thermal power plant of the mine.

Fig. 7. The sterile dump from the left slope (a); The lake formed at Mierlaşului Valley (b). (Source: Nimară, 2011)

In terms of grain size, the sterile dump consists of rock fragments with similar particle size fractions of gravel and boulders, covered in a mass of yellow-gray clay.

Rainfall that have a high frequency in April-May and September-October, given the physical and mechanical properties of the rocks present in the constitution of this form of accumulation (clay, marl, sandstone, shale coal), led to the launch of mass displacement processes, after which there was a partial crossing of the brook and the formation of a reservoir upstream of the dump body at the western end. The bottom of the lake is situated at an altitude of 867 m and has an almost oval shape (fig. 7 b).

3. CONCLUSIONS

The impact of mining activities on landforms is influenced by various factors, which usually act synergistically: the extraction procedure and the development stage of the operation, local hydrological conditions, the type of rock, work scope, topographic surface characteristics. It manifests itself in all the stages of mining works. It is about the exploration stage, production and decommissioning as well as the intensity and duration of the specific interaction between the anthropogenic component and geomorphological elements (G. Darmer, N. Dietrich, 2001; Maria Hosu, 2003, Y. Wang et al., 2001).

For the western region of Petroşani Depression, the impact sources have a local and regional significance, the effects being felt at the geomorphological component level by the cascade system character. The main geomorphological units affected are: Căprişoara Valley, meadow of Arsului Valley, Ferejele Valley and Boncii Valley, Câmpişoara Hill and Mierlaşului Valley.

Modifying actions related to mining activities consist of the deployment of large amounts of materials (especially for open pit mining), relocation and storage in various forms and at various stages of the production process. In addition to these, there are morphological and functional changes caused by geomorphological processes (for example: subsidence/collapse).

The geomorphological significance of anthropogenic activities in general and of mining in particular, derives from both the morphological and functional changes induced by these landforms and the relationship of these changes with the anthropogenic component.

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RAINWATER MANAGEMENT AIMING TO IMPROVE THE QUALITY OF URBAN SURFACE RUNOFF

I. HAIDU[1], KINGA IVAN[1]

ABSTRACT. – Rainwater Management Aiming to Improve the Quality of Urban Surface Runoff. Currently many urban areas experience the quality degradation of rooftop runoff and accumulated rainwater. The present study aims to estimate the volume of water draining from rooftops within an area of 0.68 km^2 in the municipality of Cluj-Napoca. The volume of water flowing from rooftops presents a beneficial alternative not only for collecting rainwater for later use, but also for reducing the volume of water and for improving surface runoff quality in urban areas. The procedure was based on the Michel Simplified SCS-CN model, a derived variant of the most popular hydrological model, the Soil Conservation Service Curve Number (SCS-CN). The results of the applied method reveal that the highest rooftop runoff water values correspond to the summer months, these being based on daily rainfall data. Estimating the volume of water draining from rooftops for future harvesting is an important step in the sustainable management of rainwater in urban areas and in improving water quality.

Keywords: *SCS-CN method, rooftop runoff, urban area, impervious area*

1. INTRODUCTION

In urban areas surface runoff can present a real danger to the population if the drainage system can no longer handle the large volume of runoff rainwater or when inlets get clogged with certain materials. The large volume of water that runs off the surface in urban areas is mostly due to extensive impervious surfaces. Impervious areas like roads, pavements, parking lots, and building rooftops are the main source of rainwater pollution especially during the first flush phase. In order to reduce the volume of urban runoff and to improve water quality certain solutions have to be implemented, such as the expansion of pervious surfaces or the introduction of techniques for rainwater capture and storage.

In the present study we intended to estimate the rooftop runoff volume that can assist local authorities in the implementation of sustainable techniques for collecting and storing rainwater. Rainwater harvesting technologies in urban areas can be applied by local public services and it can also improve the quality of runoff and accumulated water in urban areas.

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In urban areas impervious surfaces lead to the most significant flow of runoff rainwater, and among these surfaces rooftops are the most extensive and their extent is on the increase. Rooftop runoff volumes can be estimated on the basis of several methods. One of the most versatile and widely used procedures for estimating runoff volume and managing water resources is the SCS-CN model (The Soil Conservation Service Curve Number). This model takes into account a number of characteristics like land use, soil types and antecedent soil moisture conditions in order to estimate runoff volume (Crăciun *et al*, 2007; Hawkins *et al,* 2010; Mishra *et al*, 2004; Shadeed and Almasri, 2010; Soulis and Valiantzas, 2012), and based on the information related to soil types and land use using the ArcCN-Runoff extension, developed by Zhan and Haung, (2004), a CN map can be created which is essential in generating overland flow using GIS technology. GIS technology has been widely used in many studies for modelling overland flow (Ebrahimian *et al*, 2012; Fan *et al,* 2013; Greene and Cruise, 1995; Shadeed and Almasri, 2010). Over time several modified variants of the basic SCS-CN model have appeared, which were developed by Mishra *et al* (1999), Michel *et al* (2005) quoted by Singh *et al,* (2013) and a model developed and described by Hawkins *et al*, (2010). Singh *et al,* (2013) conducted a comparison between five models in relation to the quantification of potential of rooftop catchments for rainwater harvesting and the results revealed that the Michel Simplified SCS-CN model yields highest rooftop runoff.

In the present study, in order to estimate the volume of water that runs off impervious catchment areas (roof), we resorted to using the Michel Simplified SCS-CN model that can be applied to completely impervious surfaces and that has been developed based on the SCS-CN model.

2. MATERIALS AND METHODS

2.1 SCS-CN methods

The Soil Conservation Service Curve-Number (SCS-CN) method was developed by the US Department of Agriculture in 1956 and is documented in Section 4 of the National Engineering Handbook, Hydrology (USDA - NRCS, 2004). The model is widely used for estimating runoff volume and water resource management, and it constitutes the basis for a number of other new models with wide applicability.

Runoff volume at a single rainfall event based on the SCS-CN model is calculated using the following equation:

$$Q = \frac{(P - I_a)^2}{(P - I_a) + S} \tag{1}$$

where: Q – direct runoff
P – total rainfall
S – potential maximum retention
I_a – initial abstraction

The initial abstraction (I_a) represents all the losses before the runoff begins such as infiltration or evaporation, rainfall retention in surface depressions or interception by vegetation, is given by the empirical equation:

$$I_a = 0.2S \tag{2}$$

Substituting eq. (2) in eq.(1), eq.(3) becomes:

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad P \geq 0.2S \tag{3}$$

$Q = 0 \qquad P \leq 0.2S$

The potential maximum retention storage S value (mm) can be obtained by using the relationship:

$$S = \left(\frac{25400}{CN} - 254 \right) \tag{4}$$

The parameter CN (Curve Number) is a function of land use, land treatments and soil types. The CN indicates surface runoff potential and its value varies from 0 to 100. Lower numbers indicate low runoff potential in the case of pervious surfaces while larger numbers are for increasing runoff potential characteristic of impervious surfaces.

2.2 Michel Simplified SCS-CN (MSCN) Model

This model has been developed on the basis of the SCS-CN model and is based on soil moisture conditions. The model was developed for three soil moisture store levels as follows (Michel *et al* (2005)) cited by Singh *et al*, 2013):

For AMC I : $$Q = P \frac{P}{S + P} \tag{5}$$

For AMC II : $$Q = P \frac{(0.48S + 0.72P)}{(S + 0.72P)} \tag{6}$$

For AMC III: $$Q = P \frac{(0.79S + 0.46P)}{(S + 0.46P)} \tag{7}$$

where: Q - direct runoff, P - total rainfall, S - potential maximum retention, AMC I-dry condition, AMC II –normal condition, AMC III-wet condition of watershed.

In the present study from the three models developed for the three soil moisture levels (AMC I, AMC II and AMC III) we only used model (7) to estimate the runoff potential of rooftop surfaces which correspond with wet or completely impervious surfaces (Sahu *et al*, 2007; Singh *et al*, 2013).

3. APPLICATION

3.1 Study area

The estimation of rooftop runoff volumes was based on the Michel Simplified SCS-CN model in the study area of 0.68 km^2 within the total surface area of 98.38 km^2 of the municipality Cluj-Napoca. The area of study is located in the district of Mănăştur (Fig. 1) and is characterised by mixed land use with buildings covering an area of 0.114 km^2.

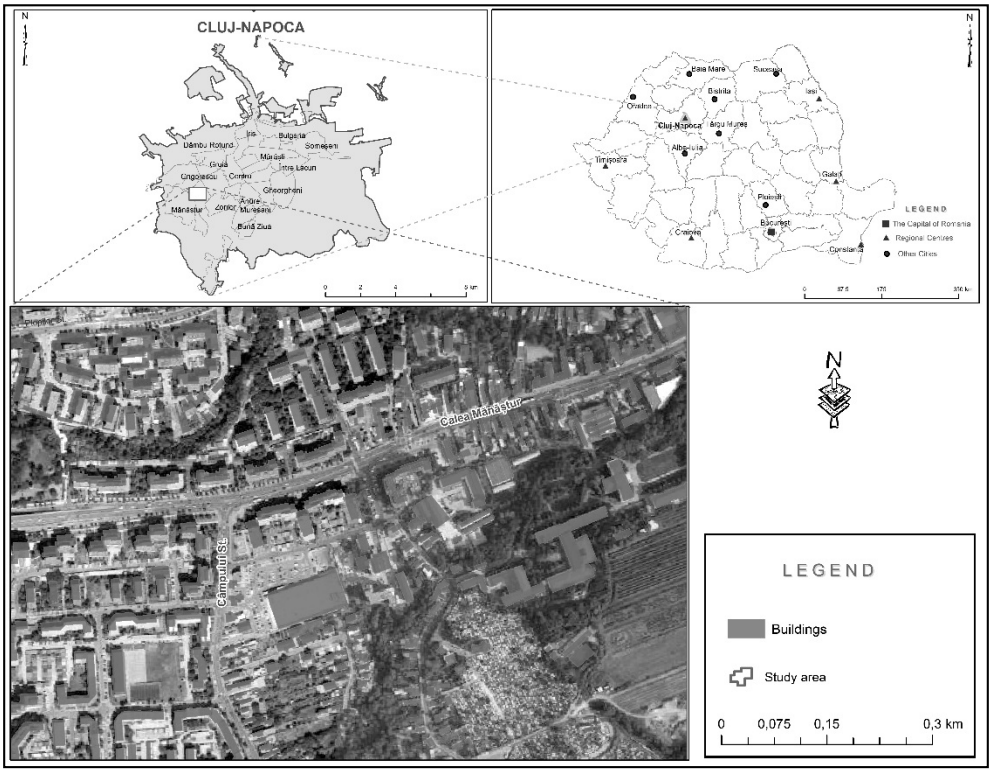

Fig. 1. Location of the study area within the country and the city.

The areas occupied by buildings that served as the basis for estimating rooftop runoff volumes were mapped using topographic plans of 1:500 scale and satellite images. Besides the cartographic database, rainfall data was also considered to estimate runoff volumes in the studied urban area.

3.2 Rainfall data

The estimation of rooftop runoff rainwater volume that can be captured for later use was based on daily rainfall data collected for the meteorological station in Cluj-Napoca from the European Climate Assessment & Dataset (ECA&C). The data was

collected and analyzed for the period 1969-2013. In the period under review, the average monthly rainfall values were the highest in June (95.3 mm), July (93 mm), May (75 mm) and August (66.8 mm) (Fig. 2). Since the highest rainfall values in 44 years were recorded during these months, it can be stated that the summer season is the most suitable period for capturing the largest volume of rooftop runoff rainwater and its future harvesting.

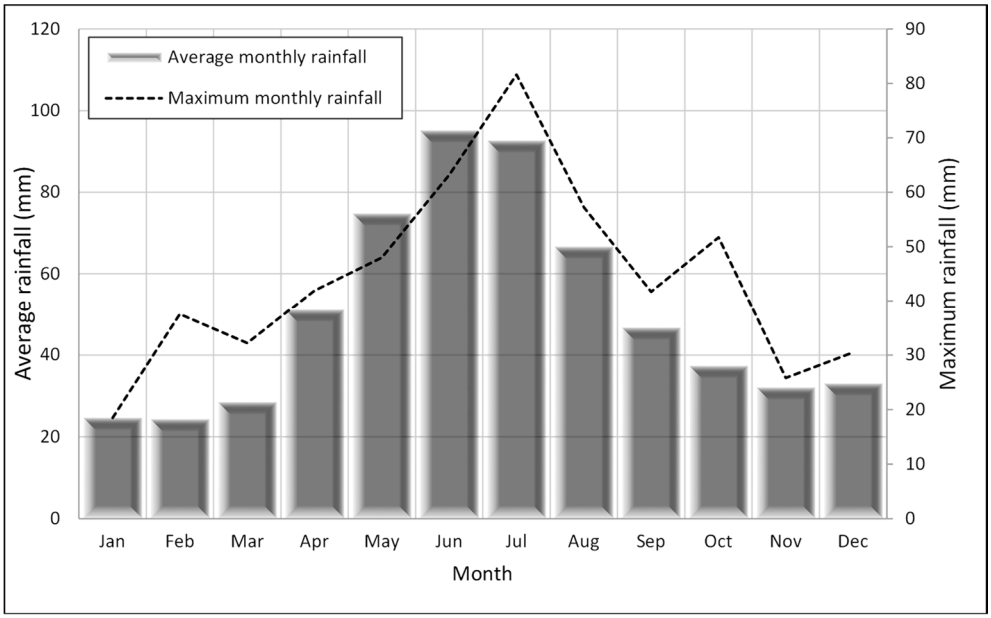

Fig. 2. Average monthly rainfall, Cluj-Napoca (1969-2013).

When estimating the volume of water draining from rooftops, in addition to using the daily rainfall data, a CN parameter with the value of 98 was assigned to completely impervious surfaces (buildings). Using the assigned CN value in equation (4) the potential maximum water retention was computed, which was later used in equation (7) to estimate the runoff potential of rooftop surfaces. Thus it was possible to estimate the runoff potential for every rainfall event throughout the year 2013.

4. RESULTS AND DISCUSSION

The results concerning the estimation of rooftop runoff volumes for each day for 2013 revealed large amounts of runoff during the summer season. The greatest amount of rooftop runoff rainwater corresponds to the rainfall event (P = 25 mm) recorded in July with a runoff depth of 23.3 mm (Figure 3a). In June, the highest value of runoff depth (21.6 mm) corresponds to the rainfall event (P = 23.2 mm), and in May and August the greatest amounts of rooftop runoff were 12.6 mm and 19.4 mm respectively.

When analyzing the monthly rooftop runoff volumes of 2013 that were estimated based on the MSCN model, results show a total runoff depth of 70.6 mm in May, 96.5 mm in June, 26.3 mm in July and 66.5 mm in August, values which were computed as the result of a total of 13 rainfall events recorded in May, 17 events in June, 5 events in July and 10 events in August (Fig. 3 a-d). The greatest amounts of runoff rainwater per month was recorded in June (96.5 mm) and the lowest amount was in December (8.1 mm).

The estimated daily and monthly rooftop runoff potential may help the local authorities to take measures for collecting and storing these amounts of water. Rooftops make up a significant percentage of the impervious surfaces within an urban area and roof-catchment systems are the most suitable for rainwater harvesting in these areas. Collecting rainwater in urban areas can offer a number of benefits. Harvested rainwater in urban areas can be used for washing roads, watering gardens and also for reducing overland flow in the urban area.

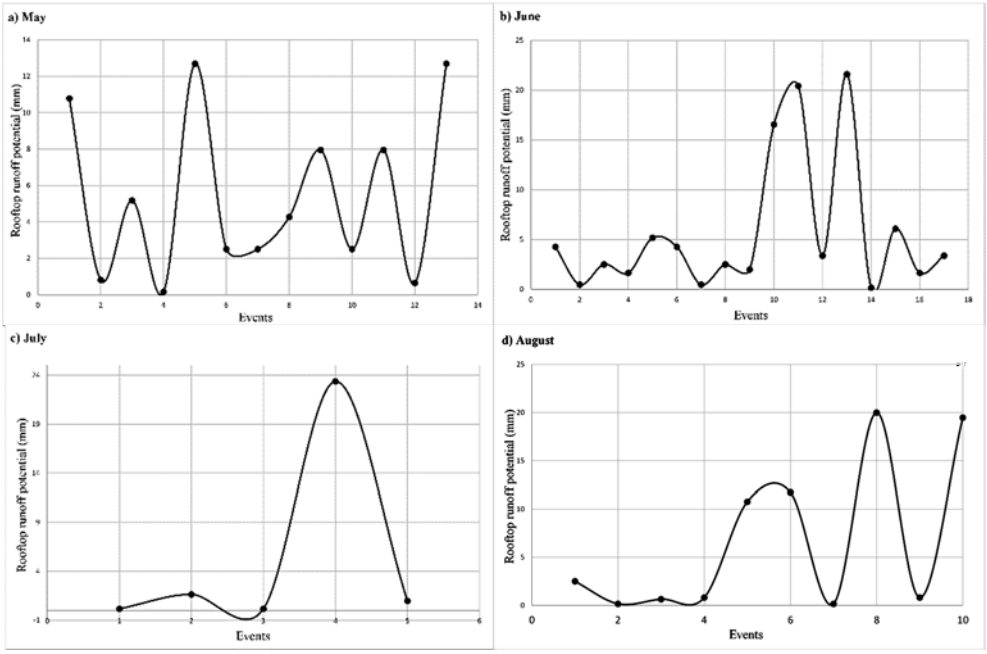

Fig. 3. Daily potential of rooftop runoff for the months of May, June, July, August.

Rooftop runoff capture and storage can address urban runoff problems and can lead to the improvement of surface runoff quality. Dry summer months or dry periods between rainfall events allow for pollutant build-up to occur on road networks or on building rooftops. Following the quality assessment of runoff rainwater accumulated on roads in three different areas of Cluj-Napoca (industrial, residential and commercial) during the cold and warm periods of 2015 we observed that the analyzed rainwater showed values that exceeded the maximum allowable limits for water quality parameters. The

limits on the pollutants accumulated on road surfaces were established in accordance with the Norms, NTPA – 002, on discharging conditions of wastewater into sewerage systems of localities and directly into wastewater treatment plants (H.G. 352/2005). 11 parameters were set to assess the quality of urban runoff rainwater discharged into the sewage system: temperature, pH, Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD), NH_4^+-N, P, Cu, Zn, Pb, Ni and Total Suspended Solids (TSS).

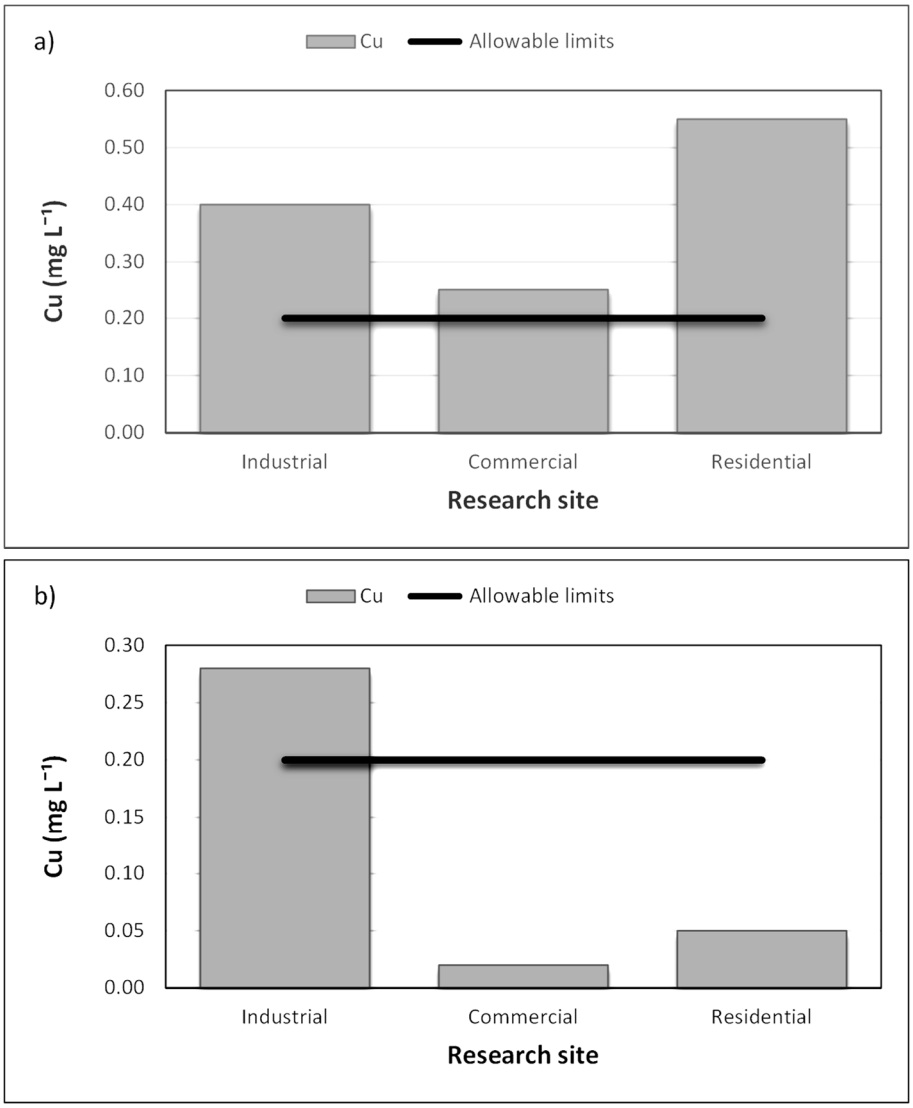

Fig. 4. Variations in copper concentration in the three urban areas and the maximum allowable limits a) in winter b) in summer.

Results showed that the degree of organic water pollution was high in the residential area during the cold season and in the industrial area during the warm season. The low levels of NH_4^+-N and P found in the rainwater that ran off road surfaces in both seasons showed a very low degree of pollution caused by these two parameters. Regarding heavy metal contamination, high levels of copper pollution in all three sampling areas characterized the cold season and in the warm season the degree of pollution was high only in the industrial area (Fig. 4), while the influence of zinc, lead and nickel on the degradation of water quality was minimal.

The level of total suspended solids (TSS) was high in the industrial area in both seasons and low in the commercial area, water temperatures did not exceed quality standards, while the recorded pH values were below 6.5 in the residential area during the summer period.

The primary sources of Zn and Cu in urban runoff are rooftops (Bannerman *et al*, 1993; Brown and Peake, 2006; Chow *et al,* 2013; Gnecco *et al,* 2005), brake wear from vehicles (Budai and Clement, 2011; Chow *et al,* 2013**)** and industrial activities (Bannerman *et al,* 1993; Brown and Peake, 2006; Chow *et al*, 2013). The capture of rooftop runoff water therefore leads to the quality improvement of surface runoff in urban areas.

5. CONCLUSIONS

In urban areas, due to rapid urbanization processes, impervious surfaces are continually spreading and this leads to an increase in runoff water volume and water quality degradation. The highest percentage of the land surface in urban areas is covered by rooftops and their extent is on the increase.

The estimation of rooftop runoff volumes for a series of daily rainfall events revealed a high runoff potential in the summer months. The greatest amount of daily runoff rainwater (23 mm) was recorded in July 2013, and the greatest amount of monthly runoff rainwater was recorded for June (96.5 mm). The lowest amount of monthly runoff was 8.1 mm recorded in December. The estimated daily and monthly rooftop runoff potential may help the local authorities to take measures for collecting and storing these amounts of water. Harvested rainwater in urban areas can be used for washing roads or watering gardens.

The implementation of sustainable measures for runoff capture and storage has an important role in urban rainwater management, flood prevention and improving surface runoff quality in urban areas. In addition to rainwater harvesting techniques implemented to reduce runoff volumes in urban areas, impervious areas should be directly connected to the sewerage system, parking lots and alleys should be covered with cobblestones or permeable pavers to allow the infiltration of water into the soil and green areas should be expanded. The percentage of impervious surfaces within an urban area is important because it directly affects the amount of runoff.

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VERTICAL ASYMMETRY OF RIVER CHANNEL CROSS-SECTIONS: A STUDY ON A MORIBUND DELTAIC CHANNEL

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ABSTRACT. – Vertical Asymmetry of River Channel Cross-Sections: a Study on a Moribund Deltaic Channel. Channel asymmetry has been quantified in three indices by Knighton (1981). His work has opened the wide porthole to have a search on every nook and corner of problems associated with channel asymmetry. The asymmetry of the river channel cross section is measured both horizontally and vertically. Horizontal asymmetry is well measured in index A*. Along with the horizontal component, the vertical component of asymmetry was incorporated in indices A1 and A2. In this present paper, the vertical asymmetry of river channel cross-section of a moribund deltaic channel has been examined through indices A1 and A2 and compared with ideal width-depth ratio.

Keywords: *Vertical asymmetry, vertical-oddity, d_{max}, channel asymmetry, centerline, mean depth*

1. INTRODUCTION

Asymmetry may be the eternal essence of nature that keeps it dynamic. It is true for river channel cross-sectional form. Most of the river channels are asymmetric (Leopold and Wolman, 1960) in nature. This is true even for a straight channel (Majumder, 2011) with successive bars of alternating pitch (Einstein and Shen, 1964; Keller, 1972). However, to quantify the degree of asymmetry of a river channel, Knighton (1981) has formulated three indices. To the end, he was influenced by the asymmetry measures by Sharp (1963) and Tanner (1967) and the work of Kennedy (1976) and Reineck and Wunderlich (1968) in similar fields. Knighton (1981) in his indices aptly considered the asymmetry components of one dimensional length of width and depth as well as two dimensional areas. But every work in the world is perhaps to be tuned to a better level, to open newer panes. The present paper does not aim to tune the indices into more perfect ones but to widen the panes, to shed light on more and more critical spectrums.

The first index of asymmetry, A* (Knighton, 1981), considers the differences in area between the two parts of the channel from center line. This index (A*) is very simple but very scientific to measure the degree of asymmetry of river channel cross-sectional form. This is very easy to apply because one can easily determine the channel central line and the cross-sectional areas to the right (Ar) and left (Al) of the channel

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centerline. As cross-section is a variable of two dimensions and as the formula incorporates the variation of area, it seems to be a good measure to the field. However, Knighton regretted that 'the measure does not explicitly include an indication of vertical asymmetry'. So he put forward indices A1 and A2.

$$A_1 = \frac{2x}{w} \cdot \frac{dmax}{\mathrm{d}}$$

In this index A_1 he met his discontent and incorporated the vertical component. But what happened here is that the vertical depth, even being incorporated, has been ignored. Center line of a symmetrical channel resembles an object and its laterally inversed virtual image (Gour and Gupta, 1998). In a symmetrical channel, 2x/ w = 0. But d_{max} / d will show no asymmetry at all even if there is a great difference between d_{max} and d. In a horizontally symmetrical channel the value of (d_{max} / d), when multiplied with (2x/w) produces 0. Moreover d_{max} / d never be '0' which goes against the rule *'The lack of asymmetry in the cross-sectional profile should be signified by a value of 0'* (Knighton, 1981). d_{max} / d = 1 is only possible, when the channel shape is perfectly rectangular. In all other cases, for example, semicircular and isosceles or equilateral triangular, d_{max} / d is always greater than 1. Yet in these cases, the value of (d_{max} / d) is ignored by the value of 2x / w. Therefore, the concept of '*vertical asymmetry*' is not possible at all, at least theoretically until and unless a *standard mean depth* of a given cross-sectional area of a channel is defined.

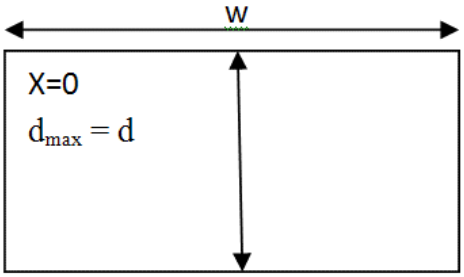

Figure 1. Symmetrical channel with d= d_{max}

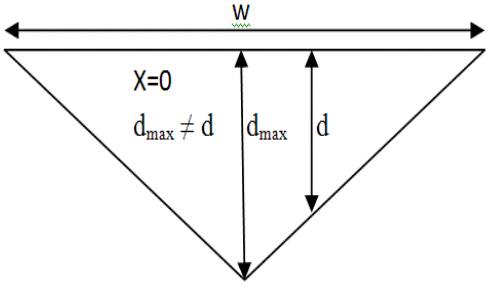

Figure 2. Symmetrical channel with d≠ d_{max}

$$A_2 = \frac{2x}{w} \cdot \frac{dmax - d}{d}$$

Here again, in a symmetrical channel, d_{max} = d is a '*sufficient condition for x=0'*, since it occurs only in a perfectly rectangular channel. In a symmetrical channel of any other geometrical shape like semicircular and isosceles or equilateral triangular, $d_{max} > d$ and $d_{max} - d \neq 0$. In this index also, the difference between d_{max} and d has been ignored if the channel is horizontally symmetrical. Therefore it seems that in equations of indices A1 and A2, although the component of depth has been incorporated, yet it has been remained insignificant. From this point, consideration of more critically tuned measures of vertical asymmetry becomes important. The present paper tries to measure vertical asymmetry from a different perspective incorporating the concept of ideal or standard depth of a channel with a given cross-sectional area.

Vertical Asymmetry

In figure 4 of his paper (Knighton, 1981), changes in the asymmetry indices, (A*, A, A2), for constructed channel shapes of equal area, width and mean depth has been shown as below where the dashed line denotes the channel centerline. The left-top horizontal arrow shows *'increasing horizontal asymmetry'* which is well illustrated in the figure. But left-top vertical arrow shows *'increasing vertical asymmetry'* which seems meaningless. Although the vertical depth (d_{max}) has been increased in successive channels keeping area, width and mean depth constant, but asymmetry is not visualised in vertical direction in column 1. What happened in reality is that, in every successive channels, the horizontal asymmetry has been increased in successive columns, not vertically. When (d_{max}-d) / d results 4/3, 2, 8/3, (fig. 3) mentioned in the first column, there is no vertical asymmetry at all.

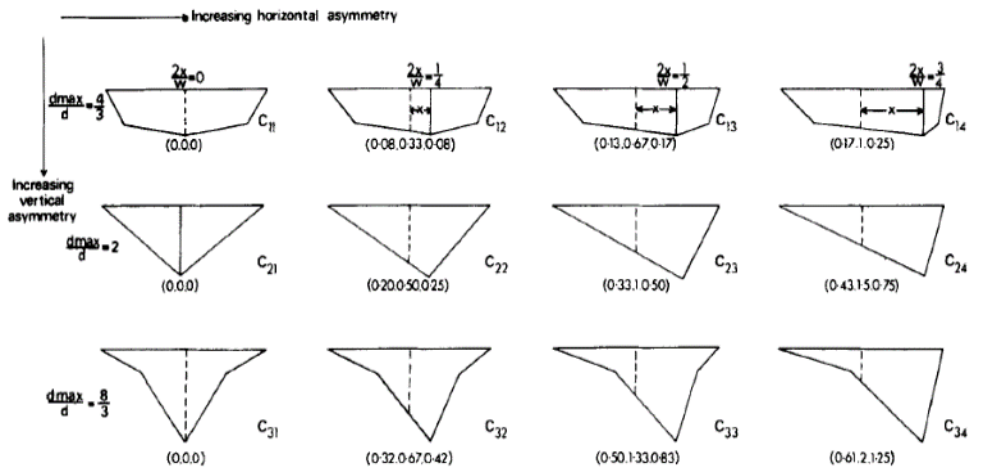

Figure 3. Increasing horizontal and vertical asymmetry (after Knighton, 1981)

If vertical asymmetry, better to term '*vertical oddity'* is to measure, then '*ideal and expected mean depth'* of a channel of given area, width is required to be calculated. In case of a triangular channel, $\check{D} = \sqrt{A}/1.52$ and $\check{D}_{max} = 2A/w$ (Das, 2014). Therefore if once the expected depth, width and d_{max} are known, then one can easily calculate the '*vertical oddity'* that is degree of deviation of observed mean depth from ideal and expected mean depth. Therefore vertical component of asymmetry can be measured by following formulas.

$$\bar{A}_d = (d - \check{D}) / \check{D} \quad (1)$$

where $\bar{A}_d$ = vertical asymmetry in mean depth.

If the channel has mean depth (d) equal to the expected mean depth ($\check{D}$), vertical asymmetry in mean depth will be zero. Positive value indicates greater depth and negative value indicates a mean depth shallower than ideal.

$$\bar{A}_{dmax} = (d_{max} - \check{D}_{max}) / \check{D}_{max}. \quad (2)$$

where $\bar{A}_{dmax}$ is the asymmetry in maximum depth.

In a semicircular channel, if $d_{max} = \check{D}_{max}$, vertical asymmetry of the channel is zero. Positive value indicates greater maximum depth and negative value indicates lesser maximum depth than expected.

In a single measure of vertical asymmetry both the parameters i.e. asymmetry in mean depth ($\bar{A}_d$) and asymmetry in maximum depth ($\bar{A}_{dmax}$) are to be incorporated. Therefore a product of the two may be adopted.

Vertical asymmetry

$$(\bar{A}_v) = \frac{d-\check{D}}{\check{D}} \times \frac{d_{max}-\check{D}_{max}}{\check{D}_{max}} = \bar{A}_d \times \bar{A}_{dmax} \quad (3)$$

Testing of equations

Taking 11 cross-sections (cs) of the river Jalangi (fig. 4), a moribund deltaic channel of West Bengal, India, vertical asymmetry was measured empirically. In all cases of eleven cross-sections, the observed mean depth (d) was less than the ideal mean depth ($\check{D}$) resulting negative vertical asymmetry in mean depth, as the average is -0.73. On the other hand vertical asymmetries in maximum depth were positive for cross sections 2, 3, 7, 9, 10 and 11, the average being 0.12. In the equation of A1, vertical asymmetry is measured as d_{max}/d. Average of d_{max}/d for 11 cross sections is 2.25 with maximum value of 5.79 and minimum value 1.15, which does not follow the basic rule 'index should have known limit '. In A2, vertical asymmetry is defined as $(d_{max}-d)/d$. Here the maximum value is 4.79 and minimum is 0.15 and it does not tell about 'known limit' of the index. As 'd_{max}' is always higher than'd' (except perfect rectangular channel), d_{max}/d and $(d_{max}-d)/d$ will never be confined within 0 and ±1. The index value of '$\bar{A}d$' and '$\bar{A}dmax$' also suffer from the same problem. But in one way, '$\bar{A}_d$' and '$\bar{A}_{dmax}$' are preferred because in these measures, comparison with the ideal mean depth and maximum depth and observed mean depth and observed maximum depth is possible.

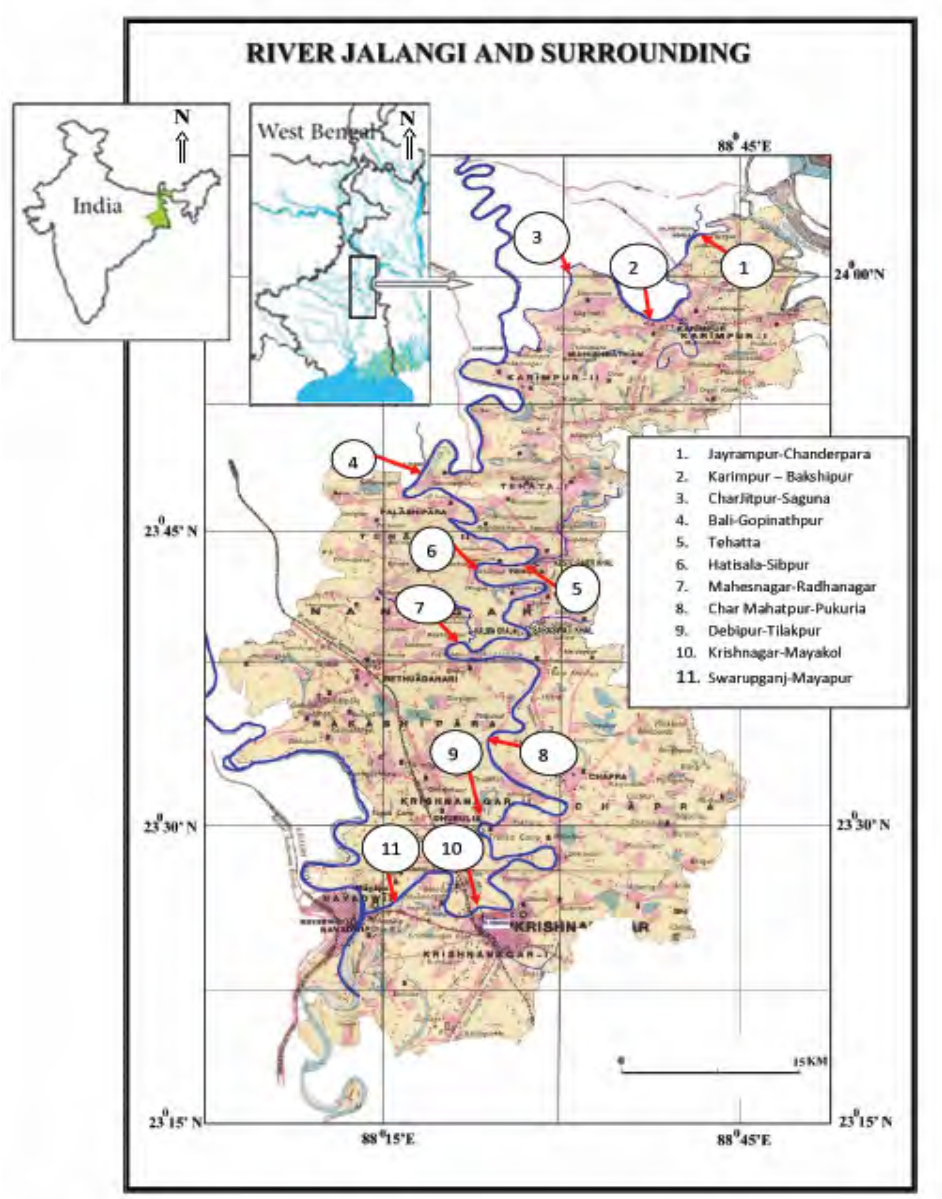

Figure 4. Location of study and sites of cross-sections

Table 1.

Different Parameters of Cross-sections of River Jalangi

Cross-section number	Area (Sq. m)	Width (w) in meter	mean depth (d) in meter	w/d ratio	$\check{D} = \sqrt{A}/1.52$	$\bar{A}d = (d-\check{D})/\check{D}$	d_{max}	$\check{D}_{max} = 2A/w$	$\bar{A}_{dmax} = (d_{max} - \check{D}_{max})/\check{D}_{max}$	$\bar{A}v = \bar{A}d \times \bar{A}_{dmax}$	d_{max}/d	$(d_{max}-d)/d$
1	172.21	116.64	1.48	79.00	8.63	-0.83	1.70	2.95	-0.42	0.35	1.15	0.15
2	453.66	181.01	2.51	72.22	14.01	-0.82	5.30	5.01	0.06	-0.05	2.11	1.11
3	30.11	47.12	0.64	73.74	3.61	-0.82	3.70	1.28	1.90	-1.56	5.79	4.79
4	568.90	135.00	4.21	32.04	15.69	-0.73	7.80	8.43	-0.07	0.05	1.85	0.85
5	524.78	98.72	5.32	18.57	15.07	-0.65	9.20	10.63	-0.13	0.09	1.73	0.73
6	860.22	134.20	6.41	20.94	19.30	-0.67	10.30	12.82	-0.20	0.13	1.61	0.61
7	672.63	117.22	5.74	20.43	17.06	-0.66	11.90	11.48	0.04	-0.02	2.07	1.07
8	1016.32	184.00	5.52	33.31	20.97	-0.74	10.60	11.05	-0.04	0.03	1.92	0.92
9	687.99	144.40	4.76	30.31	17.26	-0.72	11.05	9.53	0.16	-0.12	2.32	1.32
10	827.68	144.04	5.75	25.07	18.93	-0.70	12.40	11.49	0.08	-0.06	2.16	1.16
11	786.24	124.20	6.33	19.62	18.45	-0.66	12.70	12.66	0.00	0.00	2.01	1.01
Average	600.07	129.69	4.42	38.66	15.36	-0.73	8.79	8.85	0.12	-0.10	2.25	1.25
SD	296.04	37.67	2.00	23.93	5.11	0.07	3.72	4.00	0.61	0.50	1.22	1.22
CV	49.33	29.04	45.16	61.89	33.26	-9.56	42.30	45.16	492.02	-477.00	54.16	97.58

2. CONCLUSION

The ratio of width and depth is the function of channel shape. But mere width - mean-depth ratio (w/d) does not define cross-sectional shape (Hey, 1978) even though it is a widely used index. So to have comparison, instead of simple width to mean-depth ratio, the comparison of observed mean depth and maximum depth with expected ideal value is more meaningful. The asymmetry of the river channel cross-section is the function of bed material, slope, volume, velocity, Renold's number, secondary flow etc. So to understand channel behavior, the meaningful knowledge of asymmetry is essential.

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THE SZEKLERS AND HUNGARIANS FROM ROMANIA

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ABSTRACT. – The Szeklers and Hungarians from Romania. This study regards, as its main topic, the possibility of establishing at present, a geodemographical entity on Romania's territory, since certain representatives of the Hungarian ethnical minority in our country, and with a particular insistence of those in the vicinity of the western border, always remember to bring into view the problem of establishing an autonomy, common to a **Székely Land**, located in the central area of our country, which would include Mureş, Harghita and Covasna counties. Without carrying out a detailed account of this situation, it needs to be mentioned, just as it will emerge of the following presentation, that such an approach has neither the most reduced geodemographical support, since the Szeklers, after being assimilated by the Hungarian ethnic group, are no longer present at the census of 20 October 2011. By taking into account the above mentioned aspects, in order to be able to respond to the insistent requests for autonomy in Transylvania, we proceeded to highlight, through a fairly detailed approach of the Hungarian ethnical minority, obviously in point of the number of inhabitants and of their distribution on Romania's territory, resulting of this the fact that the number of Hungarians is of 1,227,623 people, value which related to those 20,121,641 inhabitants of Romania, means 6.10%. The total number of mentioned Hungarians is characterized by a pronounced concentration on Romania's territory, standing out by creating a **corridor** *with a diagonal aspect*, *on the northwest-southeast direction*, consisting of seven counties, the first four (Satu Mare, Bihor, Sălaj and Cluj) being registered with 2.01% (404,561 inhabitants) of those 6.10% Hungarians, the following three (Mureş, Harghita and Covasna) accounting for 3.03% (609,033 inhabitants), and hence in the corridor are present 5.04% (1,013,594 Hungarians) of 6.10% at the level of the entire country. The above mentioned corridor is surrounded by a **ring** of 11 counties (Maramureş, Bistriţa-Năsăud, Suceava, Neamţ, Bacău, Vrancea, Buzău, Braşov, Sibiu, Alba and Arad), in which there are only 0.76% (153,397 people) of the Hungarians living in Romania, while in the other **18 counties and Bucharest municipality,** the Hungarian ethnic group enrolls only with 0.30% (60,632 people) at national level (Table 7).

Keywords: *Romanians, Hungarians, Székely principalities, land, pashalics, corridor, ring, Glad, Menumorut, Gelu, Banat, Crişana, Transylvania*

1. INTRODUCTION

During the long period of activity unfolded in higher education, in the field of Human Geography, we succeeded in elaborating many studies of Romanian Population Geography, as it can be noticed from the attached bibliography, and of course, as far as the ethnic structure is concerned, lately, an adequate analysis of the last three censuses was worked out and published, respectively those of the years of 1992, 2002 and 2011.

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Due to the presence of the Hungarian ethnic group and of the fact that some of its representatives, with a particular insistence from Hungary as well, frequently bring into view the issue of autonomy, of establishing a Székely Land or another of a different type, the conclusion of elaborating a study on the current state of this issue has emerged, based on the census from October 20, 2011.

In order to get an overview regarding the analysed topic, it was deemed necessary to first address, in a condition of a corresponding synthesis, the whole set of events, beginning with the first documentary evidence of the Hungarians in Pannonia, until the end of World War I, and then to analyze the situation regarding the presence of the Hungarian minority in Romania, registered in the census from October 20, 2011, due to the fact that those who always stir up the issue of autonomy, are in a great lack of knowledge regarding this issue.

2. THE MOST SIGNIFICANT EVENTS DURING 896-1918

2.1. The 896-1526 period

In connection with this issue, the first event is the **documentary evidence of the Hungarians** in the year of 896, in the north-eastern part of Pannonia (north-east of current Hungary), followed by their gradual settlement in the area of a significant geographical unit, respectively the Pannonian Plain, positioned in Central Europe.

The next period coincided with the desire of "knowing" certain territories from nearer or more remote areas, the attention being directed towards Western Europe, where they made raids, pillaging everything all the way to Germany and even France, the latter ending in the year of 955, with the **Battle of Lechfeld**, with the decisive victory of the German King, **Otto the Great** (Lech, a city on the valley bearing the same name, upstream of Ausburg, this, confluent on the right side of the Danube, gathering waters from the northern slope of the eastern part of the Alps. As a result of this decisive victory, the forming of the first **German Reich** took place in the year of 962, consisting of Germany, Italy and Lorraine, Otto becoming the emperor of the Holy Roman-German Empire.

After this date, respectively the year of 955, the Hungarians, not having any other interests concerning the west, turned their attention to the eastern neighborhood of Pannonia, namely towards the voivodeships of Glad, Menumorut and Gelu.

a) The Voivodeship of Glad, located on the territory of Banat, with its residence in *Morisena* (Cenad, nowadays), entered gradually under the Hungarian domination, beginning with the second half of the 10th century and the early years of the following century, after many battles, followed by the closing of a peace treaty.

b) The Voivodeship of Menumorut, expanded territorially in the region of Crișana, with its residence in **Biharia** (just north of Oradea), was subjected to the conquest of **Arpad's** Hungarians. To this purpose, an errand was sent to Menumorut, in order to give up the voivodship. The answer being negative, Arpad sent a powerful army, which after several days manages to overcome the resistance of Menumorut's soldiers, the situation ending with the disposal of certain territories, on the one hand, and on the other, Arpad agreed that Menumorut's daughter, would become the wife of his son, *Zulta*.

c) The Voivodeship of Gelu, with its capital at Dăbâca (on Luna Valley), with expansion on the Someşuri (Cluj and Dej Hills) and Almaş Valley, came to the attention of the Hungarian conquerors during the time of **Tuhutum**, which sent many spies in the voivodeship, whom at their return spoke about the wealth of the investigated territory. The result of this fact is that Tuhutum receives the approval from Duke **Arpad** for entering in the Voivodeship of Gelu. Tuhutum's army meets **Gelu**'s army in Almaş Valley. After losing the battle, he ran away trying to escape, but, being pursued, was caught and killed at Căpuş Valley (near Gilău), the inhabitants of this territory submitting themselves to Tuhutum afterwards.

As a result of the acquired territories, the Hungarians continued their advancing towards east, with the Szeklers **as their front line**, these living for a certain period in Săcuieni area (the geografical-historical Province of Crişana), then on the Lower Arieş and Middle Mureş, their course continuing on Târnava Mare, then moving into Braşov Depression, where a part of them occupied the northern half of the unit, in front of Oituz Pass (866 m), other Szeklers being established in the depressions of Ciuc (the defense of Ghimeş Pass, 1159 m) and Giurgeu (Bicaz Pass, 1256 m). For the other Carpathian passes, the **Saxons** were colonized: in Bistriţa areas (Tihuţa Pass, 1200 m), Reghin (in the inferior part of Topliţa-Deda Gorge), Sighişoara and Mediaş (on Târnava Mare), Braşov (for Giuvala Pass, 1290 m, from Bran-Rucăr Corridor), Sibiu (Olt River Gorge) and Sebeş to Novaci (Lotru Pass, 1588 m), thus taking place, towards the end of the 12th century and the beginning of the next one, the end of Transylvania's conquest by Hungary.

The gradual strengthening of the Hungarians in Pannonia, led to their Christianization and forming of the **Hungarian Feudal Kingdom,** in the year of 1000, with certain consequences, after which, in some situations, they interfered with the affairs of the Romanians from Wallachia, Oltenia and Moldavia, this leading to the battles from Posada and Baia.

a) The Battle of Posada, November 9-12, 1330, determined by the emancipation of Prince **Basarab I** from under the wing of the Hungarian crown, situation which led to the entering of **Carol Robert of Anjou** in Oltenia and Wallachia, with his departure from Timişoara towards Turnu Severin, up to Curtea de Argeş, from where Basarab I had gone to another place (narrow, with high, wooded slopes, etc.), where the battle between the two armies took place, clearly won by Basarab I, (the leader of the Hungarian army remaining alive by changing uniforms with one of his soldiers). The result of this battle was **the birth of the Romanian Country**.

The location of the battle has never been determined, "the specialists" indicating several places known as "Posada": *the one from Mehedinţi, Gorj, Loviştе-Olt (on Olt River), Argeş, Prahova* etc.

b) The Battle of Baia, incited by the occupation of the Hungarian military base set at Chilia (January 25, 1465) by **Stephen the Great,** and by Stephen's entry in the Szeklers's area, in the summer of 1467, in order to attract the people towards his interests. As a result of these actions, **Matthew Corvin**, the king of Hungary, organizes and carries out, in September 1467, an expedition of reprisals against Stephen. The action began in Braşov, with the crossing of the Eastern Carpathians, through Oituz Pass (866 m), the march being continued by way of Bacău and Roman, then on Moldavia Valley,

reaching to **Baia** (Moldavia) on December 14, 1467. The battle took place precisely on the night of the 14th to the 15th of December, 1467, ending with the complete victory of Stephen the Great. Matthew Corvin, being wounded, was quickly transported to Hungary.

Among other things, it is worth observing that after the mentioned event, *Stephen* received from *Matia,* 67 villages in Transylvania, of which 60 were to be found in the Cluj-Dej-Năsăud area and seven in the region of Cetatea de Baltă, at that time, the stone church of Vad being built up, and in the case of Feleac locality giving just the command to cover a Tetravanghel completely in gold (hence the Diocese of Vad, Feleac and Cluj).

2.2. The 1526-1918 period

The first part of the 16th century corresponded with the evident increasing of the Ottoman Empire's power, which, after the **Battle of Mohács** in 1526, extended its domination in the Balkan Peninsula and then more towards north, on Hungary territory, where **Buda** and **Timişoara** *pashalics* were formed, in 1541 and 1542, while the **Pashalic of Oradea** was created in 1660. It must be pointed out the fact that Transylvania had, within the interval after the Battle of Mohács (1526) and up to the year of 1686, the statute of an **autonomous Principality under Ottoman suzerainty**.

Later, the Ottoman power declined gradually, reason that led to the entering of the Austrian army on *Transylvania's* territory, in 1686, the surrender of this geografical-historical province and of *Hungary* to the Habsburg Empire, being decided in 1699 by the *Treaty of Karlowitz*, after which *Banat* is incorporated into the Habsburg Empire until 1718, following the Treaty between the Ottomans and the Austrians, that took place at *Passarowitz*. This situation continued until 1867 (excepting the period of the Hungarian occupation during the years of 1848-1849), when the **Austro-Hungarian Empire** was formed, lasting for only 51 years, its disruption taking place in 1918, at the end of the First World War, the main event consisting in the union of Transylvania, Banat, Crişana and Maramureş, with Romania.

3. THE CURRENT SITUATION

After this brief presentation of the geographical-historical frame of the territory that is linked to the approached topic, the possibility of emphasizing of the next steps, namely the current situation of the *Szekler* ethnic group, within the space where they have been established by the Hungarian royalty at their arrival in the south-eastern and eastern part of Transylvania, and then of the *Hungarian ethnic group* existing in Romania.

3.1. The Issue of the Szeklers

As it was already mentioned above, the **Szeklers** have always lived next to the Hungarians, in the places in which they have been settled, the final locations being in the northern half of Braşov Depression and within the two depressions situated in its northern area, respectively *Ciuc* (on the Upper Olt) and Giurgeu (on the Upper Mureş),

especially in the last two, the conditions of the geographical environment being among the most unfavorable in all its aspects (orographically these being characterized by a special narrowness, therefore with a land that was agriculturaly insignificant, low temperatures, relative territorial isolation, etc.), in this situation always having in their mind the ideea of moving closer to the Transylvanian Depression.

However, the Szeklers continued to live in the territory where they have been located right from the very beginning, physically being present in the same location even nowadays, but the long period of time, the close relationship with those who established them in a vanguard position and in guarding the borders, led to **their full assimilation.**

Consequently, at the census from 1992, 817 Szeklers were registered (Table 1), then in 2002 a number of 532, which were included together with the Hungarians, and in 2011, this ethnic group has not been recorded in the census at all.

Table 1.

The frequency of the Székely population from Romania, on counties, at the census from the year of 1992

Crt. no.	Counties	Overall population	No. of Szeklers	%	Crt. no.	Counties	Overall population	No. of Szeklers	%
1	Alba	413919	4	0,00	22	Harghita	348335	68	0,02
2	Argeş	681206	1	0,00	23	M. Bucureşti	2354510	73	0,00
3	Arad	487617	65	0,01	24	Ilfov	286968	2	0,00
4	Bacău	737512	8	0,00	25	Ialomiţa	306145	1	0,00
5	Bihor	638863	58	0,01	26	Iaşi	8113 42	2	0,00
6	B-Năsăud	326820	5	0,00	27	Mehedinţi	332673	0	0,00
7	Brăila	392031	1	0,00	28	Maramureş	540099	7	0,00
8	Botoşani	461305	0	0,00	29	Mureş	610053	138	0,02
9	Braşov	643261	67	0,01	30	Neamţ	578420	2	0,00
10	Buzău	516961	4	0,00	31	Olt	523291	4	0,00
11	Cluj	736301	51	0,01	32	Prahova	874349	6	0,00
12	Călăraşi	338804	1	0,00	33	Sibiu	452873	19	0,00
13	C-Severin	376347	19	0,01	34	Sălaj	266797	3	0,00
14	Constanţa	748769	6	0,00	35	Satu Mare	400789	35	0,01
15	Covasna	233256	38	0,02	36	Suceava	701830	0	0,00
6	Dâmboviţa	562041	1	0,00	37	Tulcea	270997	0	0,00
17	Dolj	762142	0	0,00	38	Timiş	700033	68	0,01
18	Gorj	401021	0	0,00	30	Teleorman	483840	1	0,00
19	Galaţi	641011	1	0,00	40	Vaslui	461374	1	0,00
20	Giurgiu	313352	0	0,00	41	Vâlcea	438388	0	0,00
21	Hunedoara	547950	57	0,01	42	Vrancea	393408	0	0,00
						Total	**22810035**	**817**	**0,00**

B-Năsăud = Bistriţa-Năsăud; C-Severin = Caraş-Severin

As for the distribution of the Szeklers in 1992, at the counties' level, it is to be noticed that a number of 17 of those 41 counties of Romania, at which Bucharest municipality is to be added, fall into the category **exceeding 5 people,** within them, the following administrative-territorial units being remarked: Mureş (138 Szeklers), Bucharest (73) Harghita (68), Timiş (68), Braşov (67), Arad (65), Bihor (58), Hunedoara (57), Cluj (51) , Covasna (38), Satu Mare (35), Sibiu (19), Caraş-Severin (19) etc. Values of **1-5 individuals** were registered in 16 counties of Romania, the highest one being of 5 Szeklers in Bistriţa-Năsăud, then of 4 in Alba, Buzău and Olt, and 3 in Sălaj etc., in the other 9 counties, the Szekler ethnic group is not present (Table 1).

Having in view the observation made concerning the situation of the Szekler ethnic group on the territory of Romania, and the constant requests for autonomy addressed by the Hungarian ethnic group and especially of some of its "representatives" from among our western neighbors, we point out its manner of presence in our country down below.

Table 2.

The Frequency of Romanian and Hungarian population in 1992, 2002 and 2011

Year	Overall population	Romanians	%	Hungarians	%
1992	22.810.035	20.408.542	89,47	1.624.959	7,12
2002	21.680.974	19.399.597	89,48	1.431.807	6,60
2011	20.121.641	16.792.878	83,46	1.227.623	6,10

3.2. The presence of the Hungarian minority in Romania at the census from 2011

Before carrying out the mentioned analysis, we note, for a brief insight regarding this issue, the evolution of the number of inhabitants belonging to the Romanian and Hungarian ethnicities, during the years of 1992, 2002 and 2011 (Table 2), thereof ascertaining the fact that Romania's total population decreased from nearly 23 mil. in 1992, to 20 mil. in 2011, along with whom it decreased the relative value as well, during the years concerned being of 88.47% and 83.46%, and in the case of the Hungarian ethnic group is of 1.6 mil. and 7.12% in 1992, then of 1,2mil. and 6.10%, in 2011.

The research regarding the territorial distribution of the Hungarian ethnicity across Romania, registered at the Census from 2011, reveals, on the county level, two of the most relevant specific features (Table 3 and Fig. 1):

- the disposition along a **corridor** that is oriented towards northwest - southeast, consisting of Satu Mare, Bihor, Sălaj, Cluj, Mureş, Harghita and Covasna counties, in which the frequency of this ethnic group recorded the highest percentage values, starting at 32.69% in Satu Mare, then 24.02% in Bihor, 22.36% in Sălaj and 14.99% in Cluj, after which, in the last three counties, the relative values are the highest, respectively of 36.46% in Mureş, 82.90% in Harghita and 71.59% in Covasna[2];

[2] Regarding the representation of the inhabitants' number frequency in relative values (percentage), it is also necessary to mention the absolute value, because, for example, it is not the same thing, if we take Cluj County into consideration, with 691,106 people or Covasna County, with only 210,177 inhabitants.

Table 3.

The Frequency of Romanian and Hungarian population in counties from Maramureş, Crişana, Transylvania, Moldavia, Walachia and Banat, at the census of 2011

Crt. No.	Counties	Abbreviation for counties	Overall population	Romanians	%	Hungarians	%
1	Satu Mare	SM	344360	188155	54,64	112580	32,69
2	Bihor	BH	575398	366245	63,65	138217	24,02
3	Sălaj	SJ	224384	148396	66,13	50177	22,36
4	Cluj	CJ	691106	520885	75,37	103591	14,99
5	Mureş	MS	550846	227372	50,35	200858	36,46
6	Harghita	HR	310867	39196	12,61	257707	82,90
7	Covasna	CV	210177	45021	21,42	150468	71,59
1	Maramureş	MM	478659	374488	78,24	32618	6,81
2	Bistriţa-Năsăud	BN	286225	247627	86,51	14350	5,01
3	Suceava	SV	634810	588358	92,68	183	0,03
4	Neamţ	NT	470766	439834	93,43	98	0,02
5	Bacău	BC	616168	558507	90,64	4028	0,68
6	Vrancea	VN	340310	308390	90,62	68	0,02
7	Buzău	BZ	451069	409316	90,74	81	0,02
8	Braşov	BV	549217	453325	82,54	39661	7,22
9	Sibiu	SB	397322	338505	85,20	10893	2,74
10	Alba	AB	342376	291850	85,24	14849	4,34
11	Arad	AR	430629	340970	79,11	36568	8,49

- the mentioned corridor is surrounded by a **ring** of 11 counties on three of its sides, respectively Maramureş, Bistriţa-Năsăud, Suceava, Neamţ, Bacău, Vrancea, Buzău, Braşov, Sibiu, Alba and Arad, where the frequency of the Hungarian ethnic group is conditioned, on the one hand, by their geographical position, in relation with the nearness of the place of origin of the analyzed ethnicity, in this situation being the counties from the ring's extremities, respectively Maramureş (6.81% Hungarians) and Arad (8.49%), and on the other hand, by the vicinity with the situation specific to Mureş, Covasna and Harghita counties, in this condition being Bistriţa-Năsăud county (5.01% Hungarians) and Braşov county (7.22% Hungarians). Of course, most naturally, the counties of Moldavia, excepting Bacău County (0.68% Hungarians), have relative values lower than 0.04%, into this category being Suceava, Neamţ, Vrancea şi Buzău (Table 3 and Fig. 1).

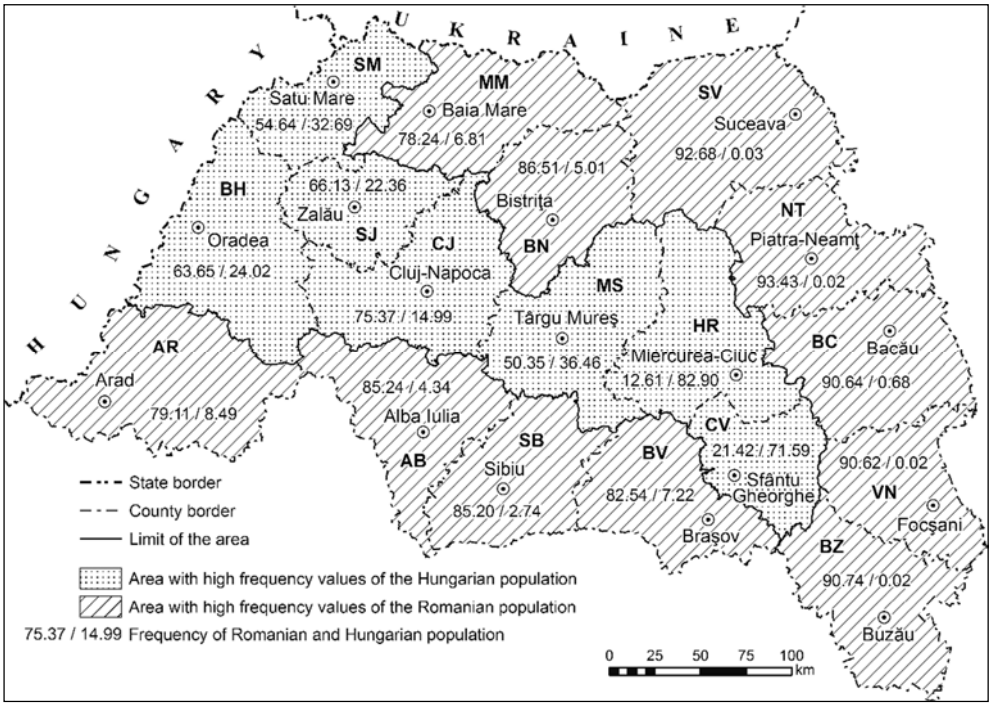

Fig. 1. The frequency of Romanian and Hungarian populations in the counties from Maramureş, Crişana, Transylvania, Moldavia, Wallachia and Banat, at the census of 2011 (Table 3).

Within the mentioned corridor and ring (Fig. 1), with a northwest - southeast orientation, as a result of an accessible orography (part of Crasna Hills, north of Meseş Mountains, as well as of Almaş-Agrij Depression), it is found what's defined as **Sălaj Gate**, this being the space through which the Hungarians managed to enter in Transylvania, following the routing along Crasna and Barcău valleys, respectively on Marca, Ip, Camăr, Nuşfalău, Boghiş, Măerişte, Carastelec, **Şimleu Silvaniei**, Pericei, Vârşolţ, Crasna, Horoatu Crasnei, Meseşenii de Jos, Sărmăşag, Şamşud, Coşeiu, Bocşa, Hereclean, Crişeni, **Zalău, Cehu Silvaniei,** Sălăţig, Dobrin, Benesat, **Jibou,** Cuzăplac, Almaşu and Fildu de Jos. Monitoring the frequency of the Hungarian ethnic group from these four cities and 24 communes, located in Sălaj Gate and in its neighborhoods, highlights the fact that eight of these fall in the gap **under 25%** (Marca, Măerişte, **Şimleu Silvaniei,** Horoatu Crasnei, **Zalău, Jibou**, Cuzăplac and Fildu de Jos), seven others, within the **25-50%** (Ip, Bocşa, Crişeni, **Cehu Silvaniei**, Benesat, Almaşu and Meseşenii de Jos), then the frequency is of **50-75%** in nine communes (Nuşfalău, Boghiş, Pericei, Vârşolţ, Crasna, Sărmăşag, Coşeiu, Hereclean and Sălăţig) and **over 75%** in only four communes (Camăr, Carastelec, Şamşud and Dobrin) (Table 4 and Fig. 2).

Table 4.

Localities from Sălaj Gate (Sălaj County), with frequency of Romanian and Hungarian populations (the latter one exceeding 10%), at the census of 2011

Crt. no.	Communes and cities	Documentary evidence	Overall population	Romanians	%	Hungarians	%
1	Marca	1314	2542	1925	75,73	350	13,77
2	Ip	1208	3648	1348	36,95	1716	47,04
3	Camăr	1349	1741	107	6,15	1509	86,67
4	Nuşfalău	1213	3600	442	12,28	2494	69,28
5	Boghiş	1214	1858	129	6,94	1282	69,00
6	Măerişte	1351	3081	2541	82,47	323	10,48
7	Carastelec	1241	1089	67	6,15	964	88,52
8	**Şimleu Silvaniei**	**1251**	**14436**	**8730**	**60,47**	**3000**	**20,78**
9	Pericei	1259	3768	1314	34,87	2129	56,50
10	Vârşolţ	1341	2209	616	27,89	1458	66,00
11	Crasna	1213	6485	1602	24,70	4103	63,27
12	Horoatu Crasnei	1213	2485	1856	74,69	339	13,64
13	Meseşenii de Jos	1341	3117	1929	61,89	954	30,61
14	Sărmăşag	1355	6092	870	14,28	4568	74,98
15	Şamşud	1349	1723	27	1,57	1580	91,70
16	Coşeiu	1299	1198	553	46,16	611	51,00
17	Bocşa	1349	3206	1572	49,03	1284	40,05
18	Hereclean	1415	3575	1315	36,78	2084	58,29
19	Crişeni	1387	2641	1731	65,54	754	28,55
20	**Zalău**	**1220**	**56202**	**42967**	**76,45**	**8662**	**15,41**
21	**Cehu Silvaniei**	**1405**	**7214**	**3136**	**43,47**	**3564**	**49,40**
22	Sălăţig	1329	2913	1253	43,01	1601	54,96
23	Dobrin	1423	1660	292	17,59	1295	78,01
24	Benesat	1475	1536	1099	71,55	423	27,54
25	**Jibou**	**1219**	**10407**	**8210**	**78,89**	**1192**	**11,45**
26	Cuzăplac	1219	1864	1346	72,21	325	17,44
27	Almaşu	1239	2237	1233	55,12	725	32,41
28	Fildu de Jos	1249	1441	782	54,27	299	20,75

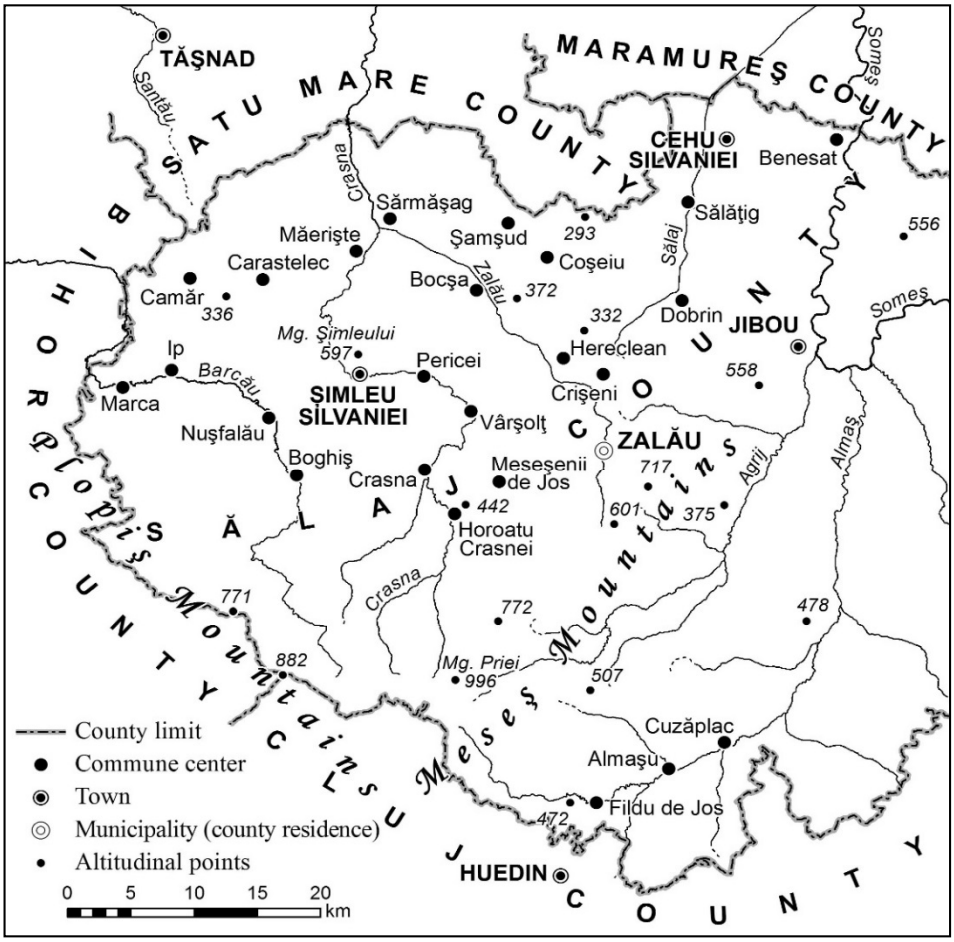

Fig. 2. Localities from Sălaj Gate (Sălaj county) and Almaș-Agrij Depression, with the frequency of Romanian and Hungarian populations (the latter one exceeding 10%), at the census of 2011.

Of course, most naturally, the Hungarians which arrived in Sălaj Gate, representing the most suitable area for getting into the middle of our country, made their way towards east, crossing the Someșan Plateau, while settling in a certain number, in Cluj, Dej, Huedin, Turda, etc. areas, after that, moving forward, came to conquer the entire territory of Transylvania. A most obvious fact to be noticed in relation to the settlement of the Hungarians in Transylvania, Banat, Crișana and Maramureș, is that they avoided the mountainous areas, the examples in this respect being multiple.

For example, the situation that occured on Crișul Repede, continuing with Căpuș, Someșul Mic and Nadăș, generalized within Oradea - Cluj-Napoca sector, where the presence of the Hungarian ethnicity highlights three specific sectors (Table 5 and Fig. 3):

Table 5.

The Frequency of Romanian and Hungarian populations on Oradea - Cluj-Napoca route, at the census of 2011[3]

Crt. no.	Communes and cities	Documentary evidence	Overall population	Romanians	%	Hungarians	%
1	**Oradea**	**1113**	**196367**	**132718**	**67,59**	**45305**	**23,07**
2	Oşorhei	1351	6532	4188	64,12	1162	17,79
3	Ineu	1214	4399	2516	57,19	414	9,41
4	Săcădat	1256	1910	1622	84,92	22	1,15
5	Tileagd	1256	6968	4556	65,38	1409	20,22
6	Lugaşu de Jos	1291-1294	3580	1528	42,68	1024	28,60
7	Ţeţchea	1256	3141	2021	64,34	277	8,82
8	**Aleşd**	**1291-1294**	**10066**	**6134**	**60,94**	**1559**	**15,49**
9	Auşeu	1406	3033	2545	83,91	10	0,33
10	Măgeşti	1508	2717	2396	88,19	120	4,42
11	Vadu Crişului	1259	4009	2753	68,67	751	18,73
12	Borod	1291-1294	3843	3093	80,48	237	6,17
13	Şuncuiuş	1256-1264	3259	2847	87,36	68	2,09
14	Bratca	1435	5158	4782	92,71	30	0,58
15	Bulz	1406	2104	1990	94,58	7	0,33
16	Negreni	1406	2321	2125	91,56	11	0,47
16	Ciucea	1384	1647	1488	90,35	5	0,30
17	Poieni	1500	4842	4445	91,80	27	0,56
16	**Huedin**	**1332**	**9348**	**5282**	**56,50**	**2598**	**27,79**
17	Izvoru Crişului	1276	1632	324	19,85	1290	79,04
18	Săcuieu	1461	1466	1238	84,45	2	0,14
19	Sâncraiu	1337	1633	332	20,33	1281	78,44
20	Mărgău	1408	1484	1430	96,36	6	0,40
21	Călăţele	1408	2243	1742	77,66	244	10,88
22	Mănăstireni	1332	1481	1192	80,49	157	10,60
23	Căpuşu Mare	1282	3295	1828	55,48	1228	37,27
24	Gilău	1246	8300	6586	79,35	722	8,70
25	Floreşti	1272	22813	17154	75,19	3276	14,36
26	Aghireşu	1263	7116	3694	51,91	2615	36,75
27	Gârbău	1487	2440	1190	48,77	1082	44,34
28	Baciu	1263	10317	6348	61,53	2994	29,02
29	**Cluj-Napoca**	**1183**	**324576**	**245737**	**75,71**	**49565**	**15,27**
30	Almaşu	1239	2237	1233	55,12	725	32,41
31	Fildu de Jos	1249	1441	782	54,27	299	20,75

[3] The localities from Oradea - Vadu Crişului sector can be identified by Berindei I.O., Pop P. Gr., 1972, on the colored map found at end of the paper, and those from Huedin - Cluj-Napoca sector in Pop P. Gr., 2007, on the colored map found at the end of the paper.

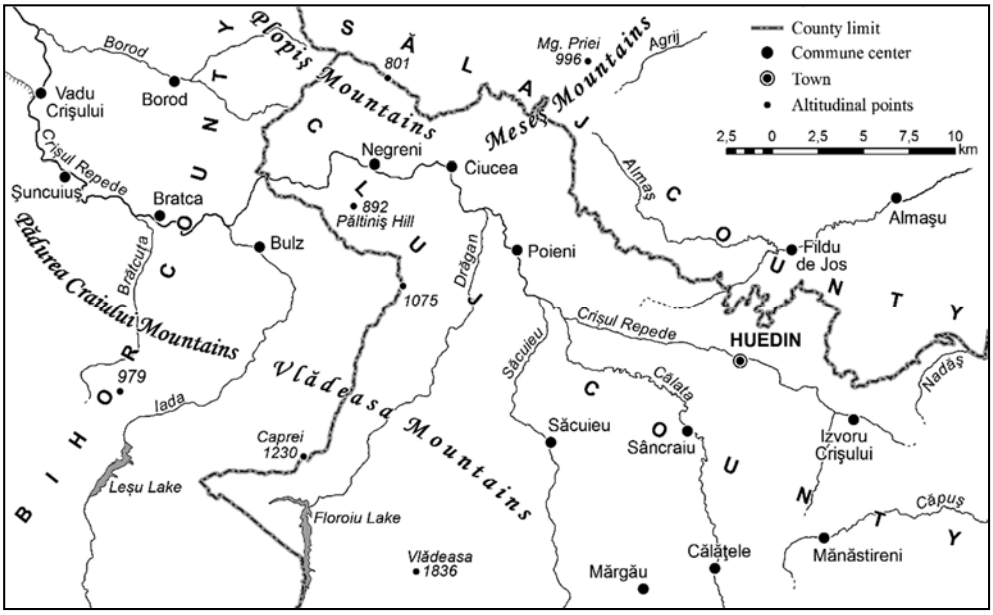

Fig. 3. The Frequency of Romanian and Hungarian populations on Oradea - Cluj-Napoca route, in Vadu Crişului-Izvoru Crişului sector, at the census of 2011.

- *Oradea-Vadu Crişului sector*, corresponding to Crişul Repede Corridor, where the frequency of the Hungarian ethnic group, in its 12 localities, registers relative values from 23.07% at Oradea and 0.33% at Auşeu (the eastern area of the Corridor);

- *Crişul Repede Gorge sector,* from Vadu Crişului, to Poieni, in which six localities are present, registers the highest frequency of the analyzed ethnicity, of 2.09% in Şuncuiuş and the lowest, of 0.30%, at Ciucea;

- *Poieni – Cluj-Napoca sector*, located in the upper basin of Crişul Repede and on Căpuş, respectively Nadăş valleys, is represented by two urban localities (Huedin and Cluj-Napoca) and 12 communes, the rate of the Hungarian ethnic group being of 27.79%, in Huedin and of 15.27%, in Cluj-Napoca. As far as the communes are concerned, the highest frequency of Hungarians is registered at Izvoru Crişului (79.04%), Sâncraiu (78.44%), Căpuşu Mare (37.27%) (the central area of Huedin Depression), Gârbău (44.34%), Aghireşu (36.75%), Baciu (29.02%) (Nadăş Valley) etc., and the lowest values are at Săcuieu (0.14%) and Mărgău (0.40%), the situation of the latter ones being a consequence of their vicinity to the mountainous space of Vlădeasa Massif.

Regarding the positioning of the settlements on Oradea - Cluj-Napoca route, there are differences of documentary evidence that are to be noted. Thus, those with a less acceptable orography, are mentioned in the 15th century, among them being registered: Auşeu (1406), Bratca (1435), Bulz (1406), Negreni (1406), Săcuieu (1461), Mărgău (1408), Călăţele (1408) etc., or even in the 16th century, in the case of Măgeşti locality (1508).

Keeping and recording documents was obviously a highly developed activity during the 13th century, in terms of significantly more appropriate geographical environment conditions, on the mentioned alignment the following settlements being noticed: Ineu (1214), Săcădat (1256), Tileagd (1256), Lugaşu de Jos (1291-1294), Ţeţchea (1256), Aleşd (1256), Vadu Crişului (1259), Izvoru Crişului (1276), Căpuşu Mare (1282), Gilău (1286), Floreşti (1272), Aghireşu (1263), Baciu (1263)[4], Almaşu (1239) and Fildu de Jos (1249).

To highlight, in a clearer way, the fact that the Hungarians have avoided the mountainous areas, in almost every case, we illustrate the situation with data recorded in Table 6 and Fig. 4, where only two of those 14 localities had one Hungarian person,

Table 6.

Few geographical features for 14 localities from the Gilău Mountains area, at the census of 1992[5]

Crt. no.	Locality	Doc. evid.	Overall of inhabitants	Romanians	%	Hungarians	%
1	Dealu Botii	1954	62	62	100,00	0	0
2	Giurcuţa de Sus	1954	215	215	100,00	0	0
3	Bălceşti	1909	160	160	100,00	0	0
4	Beliş	1913	600	600	100,00	0	0
5	Dealu Negru	1954	506	506	100,00	0	0
6	Rişca	1909	1233	1233	100,00	0	0
7	Mărceşti	1956	322	321	99,95	1	0,05
8	Dealu Mare	1954	419	419	100,00	0	0
9	Dângău Mare	1805	382	382	100,00	0	0
10	Dângău Mic	1909	327	327	100,00	0	0
11	Lăpuşteşti	1850	135	135	100,00	0	0
12	Mărişel	1854	1951	1950	99,95	1	0,05
13	Măguri-Răcătău	1956	889	889	100,00	0	0
14	Măguri	1805	1033	1033	100,00	0	0

Doc. evid. = Documentary evidence.

at the census of 1992, respectively Mărceşti and Mărişel. With regards to the presented situation, the moment of documentary evidence of those 14 localities has a specific meaning as well, in the order of this event's period, the situation presenting itself as follows: Măguri and Dângău Mare (1805), Lăpuşteşti (1850), Mărişel (1854), Bălceşti, Rişca, Dângău Mic (1909), Beliş (1913), Dealu Botii, Giurcuţa de Sus, Dealu Negru and Dealu Mare (1954), Mărceşti and Măguri-Răcătău (1956).

[4] The penultimate two on Nadăş Valley and the last two on Almaş Valley.

[5] This was done using information from 1992, because at the 2002 and 2011 Censuses the corresponding data at village level were not to be found.

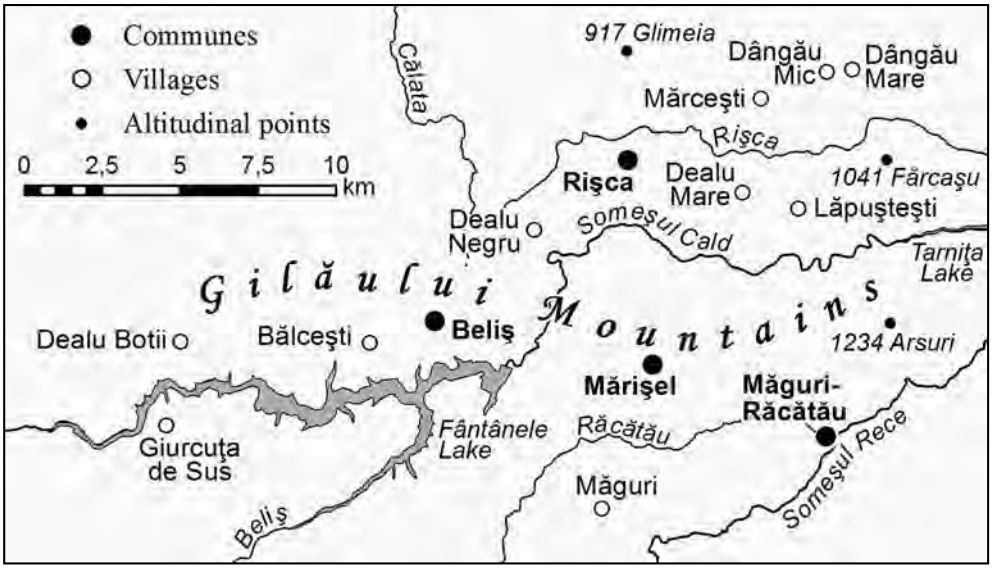

Fig. 4. Localities from Gilău Mountains where the Hungarian ethnic group was represented, in 1992, only by two individuals (Table 6).

4. CONCLUSIONS

This study seeks to make known to some "representatives", who are always seeking autonomy for the Hungarian ethnic group from Romania, the realities of the situation in this regard, a fact which emerges most clearly from the manner of approaching this issue.

Table 7.

The presence of the Hungarian ethnicity on national and territorial levels, according to the 2011 census

Content	Overall population	Hungarians	%
ROMANIA	20121641	1227623	6,10
Corridor	20121641	1013594	5,04
First four counties	20121641	404561	2,01
Last thrree counties	20121641	609033	3,03
Ring	20121641	153397	0,76
Other counties and Bucharest	20121641	60632	0,30

Firstly, it is worth noting that at the last census (2011), the Szekler population has not been identified, being fully assimilated by the Hungarians. So, specific elements of the Hungarian ethnicity were analyzed, on which the following aspects are to be mentioned:

- the research concerning the placement of the Hungarian population on Romania's territory reveals, firstly, a ***corridor***, in the northwest – southeast direction, very clearly expressed by seven of the counties of the country, respectively Satu Mare,

Bihor, Sălaj, Cluj, Mureș, Harghita and Covasna (Table 3, Fig. 1), in which 5.04% (1013594 Hungarians) of the 6.10% frequency registered on Romania's level (20,121,641 inhabitants), the first four counties accounting for 2.01% (404,561 Hungarians), and the last three ones of 3.03% (609,033 Hungarians);

- the mentioned corridor is surrounded by a **ring** consisting of 11 counties, respectively Maramureș**,** Bistrița-Năsăud, Suceava, Neamț, Bacău, Vrancea, Buzău, Brașov, Sibiu, Alba and Arad, in which there are only 0.76% (153,397 Hungarians) of those 6.10% from Romania;

- in the other 23 counties and in Bucharest municipality, the frequency of the Hungarian population is lower, accounting for only 0.30% it (60,632 inhabitants) from that of the Romanian state.

The plans and desires for autonomy of the analyzed ethnicity, brought to the surface especially by some "personalities" belonging to the western neighbors and in a less extent by ours, asserting that the ordinary people, respectively the minorities, live in conditions of normality with the inhabitants of our country, have in view the last three counties within the corridor: Mureș, Harghita and Covasna, with only 3.03% (606,033 Hungarians), on a national level, having no justification for constituting a Hungarian land within the **heart of Romania**.

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CO_2-DRIVEN COLD WATER GEYSERING WELL IN TRANSYLVANIA - BĂILE CHIRUI

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ABSTRACT. – Co_2-Driven Cold Water Geysering Well in Transylvania - Băile Chirui. Cold water "geyser" or geysering well is the internationally used term of such phenomenon where cold water is erupting from a hydrogeological well due to CO_2 movement. Until now there have been reported 14 geysering wells all over the World (Glennon & Pfaff, 2004). Through this article we would like to add a "new" cold water "geyser" to the above mentioned list, the so called Chirui Geyser. Investigations on Chirui Geyser were carried out several times during 2007 – 2013. Compared with the others, Chirui Geyser has the longest erupting phase with its minimum 38 hours of activity. Switching from the active to the inactive phase or vice versa the values of different parameters of the water are also changing. There has been described an oscillating phase before the water falls back into the pipe. Such activity has not been reported at other cold water geysering wells. Chirui Geyser is located in a post-volcanic area where most probably CO_2 has a volcanic origin. In the South Harghita region there are several hydrogeological drillings that reached CO_2 rich mineral water aquifers. Many of them could possibly have geysering activity.

Keywords: *hydrogeologic drilling, geysering well, cold mineral water, CO_2 movement, South Harghita Moutains, Chirui Geyser*

1. INTRODUCTION

There have been described cold-water "geysers" (cold water geysering wells) all over the World; even so we can say that it is a rare phenomenon. Some examples are described in the USA, New Zeeland and Germany, while in Switzerland, France, Slovakia and Serbia the number of cold-water "geysers" is only one in each country. Articles appeared in the 19th century report some geysering wells driven by CO_2 in Hungary and Transylvania as well, but they were influenced and reconstructed because of the mineral water usage.

The geysering well phenomenon does not have a large bibliography. A few internationally accessible articles are published in the second part of the 20th century (Rinehart, 1974, 1976, 1980; Baer and Rigby, 1978; Campbell and Baer, 1978; Mayo et al.,

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1991), more researches focusing on this topic were published after the year of 2000 (Waltham, 2001; Nurkamal et al., 2001; Lu and Watson, 2002; Glennon and Pfaff, 2004; Evans et al, 2004; Shipton et al., 2004; Lu and Watson, 2005; Lu et al., 2005; Gouveia and Friedmann, 2006; Bissig et al., 2006; Assayag et al, 2009; Barth, 2012; Han et al., 2013; Watson, 2014; Ladd, 2014). Several scientists refer to this topic because of CO_2 leakage or sequestration and not because of the geysering activity (Wilkinson et al., 2007; Heath et al., 2009; Burnside, 2010; Kampman et al., 2013). We need to point out some articles from the second part of the 19th century published in former Hungary that describe and present geysering wells in the Pannonian Basin, now eastern Hungary, eastern Transylvania and southern and south-eastern Slovakia, as well as some laboratory experiments used for the exposition of the phenomenon (Zsigmondy, 1875; Lucz, 1884; Antolik, 1890, Emszt, 1911, *, 1914). Nowadays the most researched geysering wells are the Crystal Geyser in Green River, Utah, USA and the Geysers from New Zeeland.

Cold water geysering wells have a geyser like operation due to periodic eruptions of water from a certain point. The water temperature is low, eruptions are caused by CO_2 movement.

The CO_2 driven cold water geysering wells are hydrogeological drillings and can be characterized by succession of active and inactive phases. The eruption of the water is considered to be the active phase, while in the inactive phase the water remains in the drilling tube but it is moving upward inside the tube. Usually the active and inactive phase periods/duration are each identical. The longest active period (among described geysering wells) can be observed at Woodside Geyser (USA) and Tumbleweed Geyser (USA) and they last for about 1.5 hours (Glennon and Pfaff, 2004). The longest inactive phase is characteristic for the Herl'any Geyser (Slovakia) and it lasts for about 32-34 hours (Glennon and Pfaff, 2004; Dobra, 1997; Dobra et al., 2007).

Hereby we intend to describe a "new" geysering well, the so called Chirui Geyser, that has not been presented in an international article yet. Chirui Geyser was first mentioned during the EU Intensive Program Seminar "Geography of Water" held in Romania in 2010 (Czellecz and Pál, 2011). Data and information described in this article are included in the PhD thesis of the author Czellecz Boglárka.

2. GEOLOGICAL AND HYDROGEOLOGICAL BACKGROUND OF CHIRUI GEYSER

The Chirui Geyser is located on the western slopes of South Harghita Mountains, along the Chirui creek valley at an elevation of 736 m (N: $46^0$18.176; E: $25^0$35.198). The study area can be characterized by Upper Pannonian volcaniclastics, pyroclastic flow and fall deposits on the surface that have a total thickness of about 500 m (Fig. 1).

Harghita Mountains is considered to be the southernmost segment of the Carpathian Neogene-Quaternary volcanic arc where the youngest edifices are located in the South Harghita segment. The Chirui valley is located on the volcanic plateau between Vârghiş (Harghita Mădăraş peak) and Luci-Lazu edifices that produced volcanic activity between 5.5 – 3.6 Ma (Szakács and Seghedi, 1995). As a post-volcanic phenomenon the underground CO_2 flow is still active and can be identified through the numerous

CO_2 rich natural mineral water springs in this region. The underground CO_2 flow is a complex and rhythmic process that is not influenced by the outside temperature or atmospheric pressure. The amount of the gas at a certain point is a sum of many flow-rates each of them having their maximum and minimum level successively (Ariniei and Pricăjan, 1975).

The main factor that operates the cold water gerysering wells is the underground CO_2 movement. Depending on the geological background the source of CO_2 can be multiple; in our case it probably has a volcanic origin.

The Chirui Geyser was last drilled (previous operation described by local people) for state order within an investigation project for mineral water resources in 1999 (László et. al., 1999). It has a total depth of 150 m where intersects a geological fault (Fig. 1). The tube is equipped with three filters corresponding to the aquifer layers with potential influx of water (Fig. 3). The Chirui Geyser gives highly mineralized and CO_2 rich mineral water; other free gas release can be observed as well (Fig. 2).

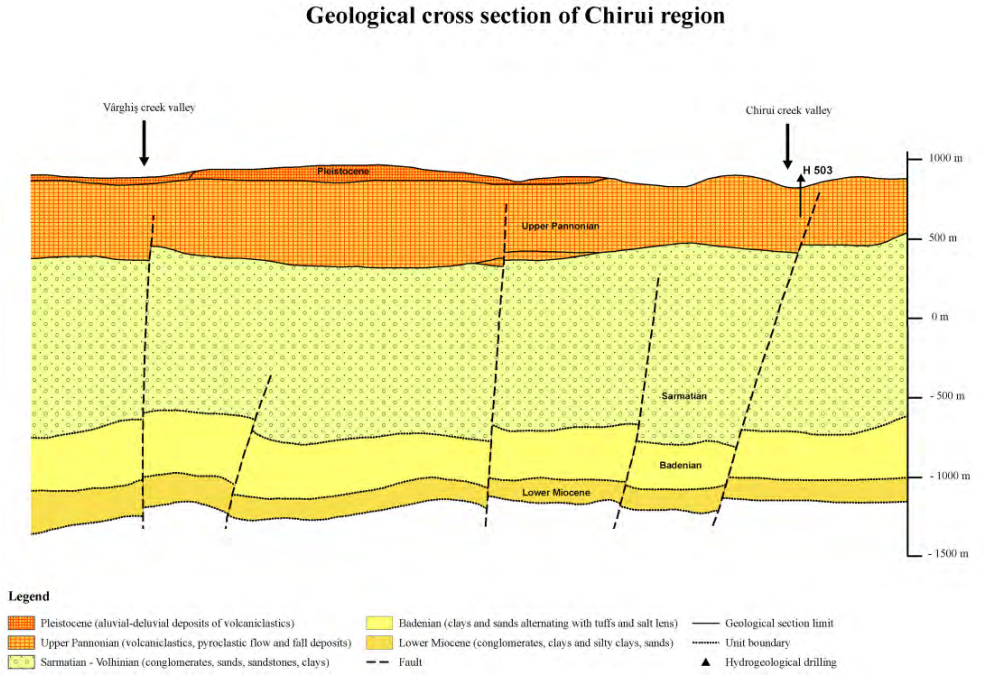

Fig. 1. Geological cross-section of Chirui Geyser surroundings
(Source: Geological map 1:50.000, L-35-64-A, sheet 79a, Băile Chirui, 1983)

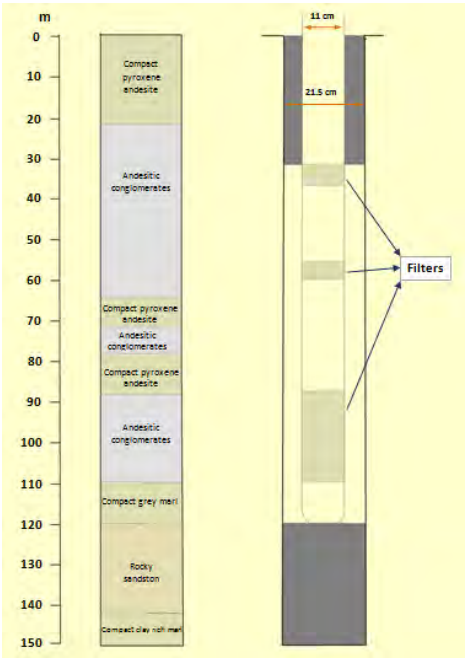

Fig. 2. Chirui Geyser in eruption phase (2015)
Fig. 3. Geological profile of the Chirui Geyser well (after László et al., 1999)

3. FIELD WORK MEASUREMENTS AND METHODS

In case of Chirui Geyser there are three possible aquifers for water influx into the system. Hydrostatic pressure deep down and CO_2 are the most important parameters that influence the operation of the "geyser". Analyzing the water quality is necessary to investigate the activation or deactivation of these aquifers and possible changes in the water physical and chemical characteristics during different phases.

During the first investigation period (2007-2009) there were measured the water temperature, water discharge, eruption level, electrical conductivity, pH, Total Dissolved Solids (TDS), CO_2 and HCO_3 content.

During the second investigation period (2013) we measured the water temperature, water discharge, electrical conductivity, pH, TDS and the hydrostatic pressure at different levels inside the drilling tube.

The water quality measurements were carried out using Thermo Orion Star multiparameter meter. Water discharge was measured manually using a 40 L keg. The hydrostatic pressure data were recorded at 10 m and 20 m deep using Dataqua DA-S-LTRB 118 electrode/equipment. The electrode was put in a few mm wide pierced pipe made of plastic that was introduced into the drilling tube. The aim of this method was to protect the electrode and to keep it fixed at the right depth.

During each investigation period the measurements were carried out in each hour, while the hydrostatic pressure data were recorded in each minute.

4. DESCRIPTION OF CHIRUI GEYSER PHENOMENON

During measurements carried out in the first investigation period, when there were no influencing acts in the "natural", original operation of the "geyser," we tried to define the duration of the active and inactive phases. Only one data set covers a full cycle (the period of time between two eruptions), while other, partial data sets are overlying to an active or inactive phase. The Chirui Geyser can be described as having an active (continuously erupting) phase of 38 hours and an inactive phase (water in the tube) of 13 hours. The full cycle duration is 51 hours (Fig. 4).

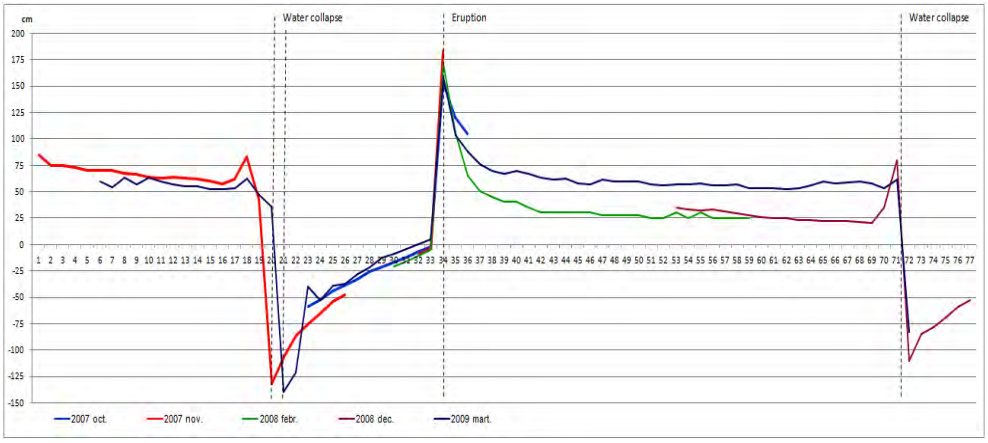

Fig. 4. The water level measured from the top of the pipe showing the full cycle of Chirui Geyser

The amount of CO_2 dissolved in the water and free gas movement are essential in the functioning of the "geyser". Theories about the operation mechanism of the cold water geysering wells say that because of hydrostatic pressure changes inside the drilling tube (water column) dissolved CO_2 is released. Free gases form large sized bubbles that are moving upward taking the water molecules with them and finally causing the eruption (Lu et. al., 2005). Accordant with this theory in case of Chirui Geyser dissolved CO_2 content is decreasing when water starts to erupt and is increasing when the water falls back into the tube. Switching from one phase to the other causes a difference in the dissolved CO_2 content of about 450-600 mg/l (Fig. 5).

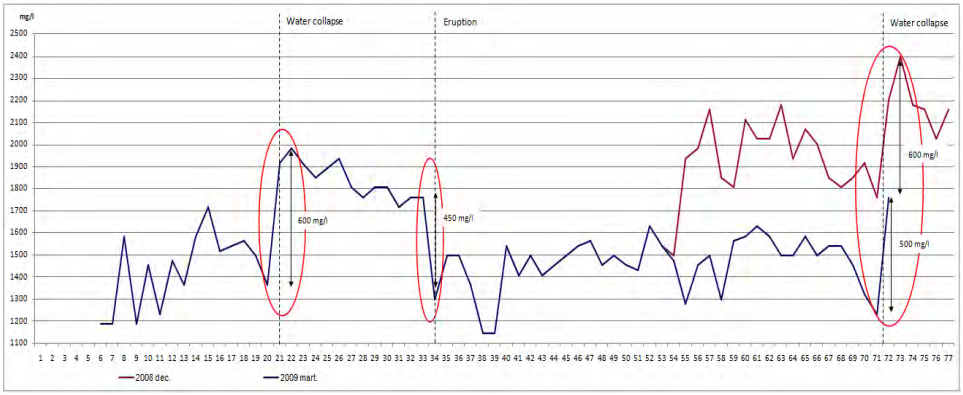

Fig. 5. Dissolved CO_2 content (mg/l) in the water at different phases of the Chirui Geyser

The hydrostatic pressure data set can be used for describing and analyzing the operation and a full cycle of Chirui Geyser. However, through interventions made inside the drilling tube for data collecting, the original mechanism of the „geyser" was influenced that caused a longer operation period.

In the inactive phase (called inactive because no water is coming out from the pipe) the water is moving upwards (increasing of the water level) inside the tube that can be associated with the increase of hydrostatic pressure. When water reaches the top of the pipe and flows out the hydrostatic pressure decreases suddenly and starts the eruption. This quick and significant decrease of the hydrostatic pressure values (approx. 0.35 bar difference) can be explained by appearance of many big sized CO_2 bubbles in the tube that push the water molecules upwards causing the eruption (Fig. 6).

In the first few hours the eruption level is the highest (approx. 150 cm), after that it stabilizes to a level of about 40 cm measured from the top of the pipe for many hours. A transition phase that can be characterized with the oscillation of the eruption level can be observed at the end of the active phase. These oscillations are reflected also by the changes of the hydrostatic pressure and water temperature values too (Fig. 6 and 7). As the moment of the water collapse is approaching the frequency of oscillations and the amplitude of eruption level are both increasing (Fig. 6 and 7).

The water falls back into the pipe very quickly (in a few minutes) to about 130 cm deep that causes a sudden increase of the hydrostatic pressure. From this moment the water level inside the tube starts to increase again that means the continuous increase of the hydrostatic pressure too.

The temperature of the water is also changing depending on the operation phase of the "geyser" (Fig. 6). During inactive phase lower temperatures can be observed (the lowest is 15.3°C); while in the active erupting phase higher temperatures are characteristic (the highest is 17.5°C). This trend and these temperatures of the water were observed during previous investigations too. In the inactive phase more CO_2 is dissolved in the water that correlates with the lower values of water temperature.

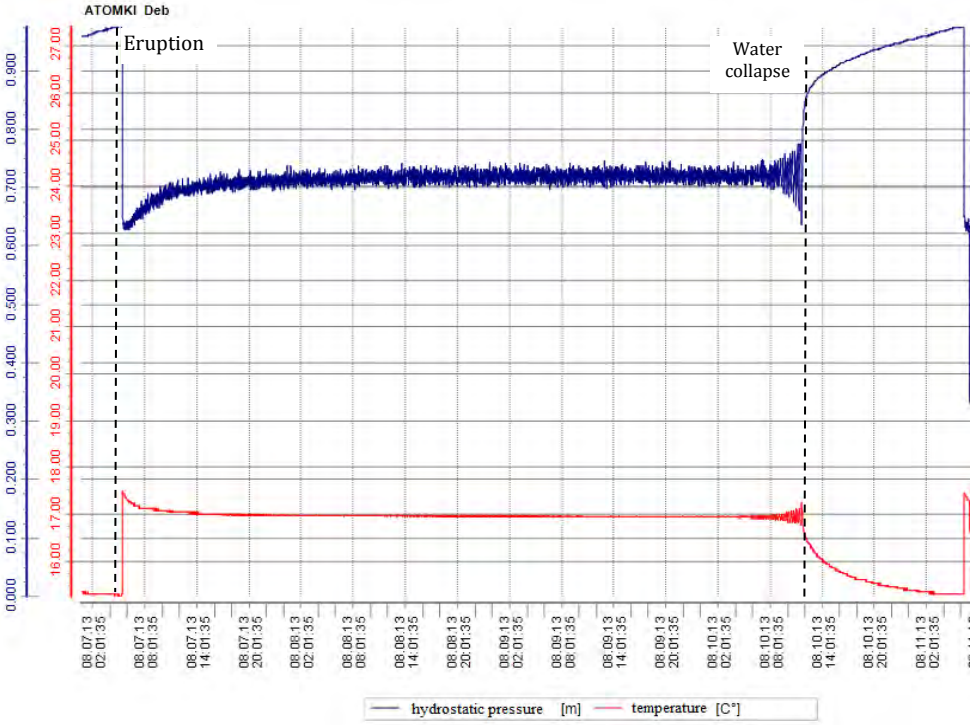

Fig. 6. Hydrostatic pressure (10 m deep) and water temperature changes in case of Chirui Geyser (August, 2013)

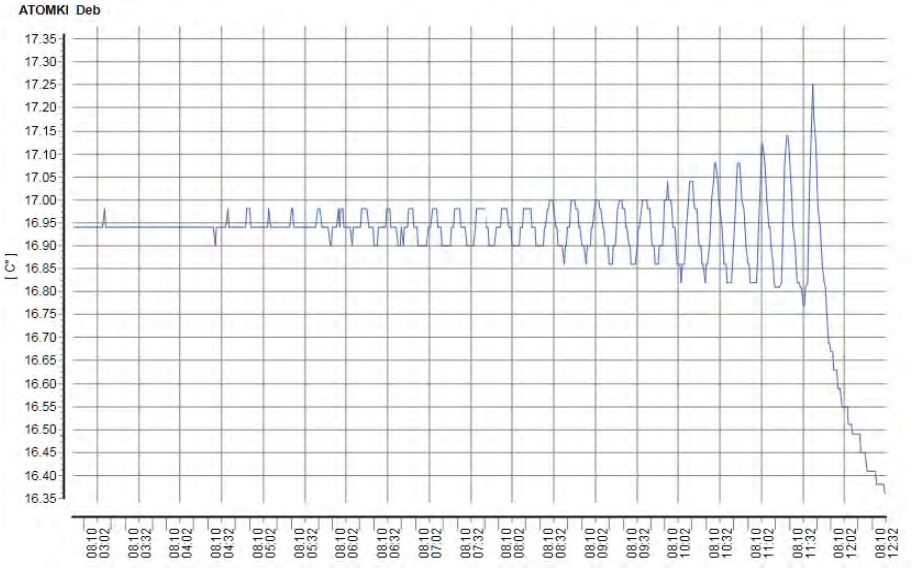

Fig. 7. Oscillation of water temperature values before collapse (August, 2013)

The values of electrical conductivity are not constant during the whole cycle; they are also changing and depend on the operation phase of the "geyser". The highest values are characteristic at the moment of the eruption, while the lowest values during the inactive phase. There were no identical values in none of the cases, but the trend and the amplitude of the changes in values are similar. So in case of the electrical conductivity data there is a difference of about 450 µS/cm between values measured in the inactive phase and the highest eruption phase. A difference of about 200-250 µS/cm was observed between the values recorded at the moment of the highest eruption and the constant, long lasting eruption phase. These observations were made during several measurements in the first investigation period. Analyzing the above mentioned data sets we can say that the Chirui Geyser has a constant water supply – during the inactive phase water is also moving inside the tube. Changes in electrical conductivity values at the eruption and water collapse can be explained by two possible events: (1) the activation or deactivation of a new aquifer that brings another type of water into the system, (2) the source of the water is the same but the HCO_3 content is higher or lower because of carbonic acid fractionation. More HCO_3 contributes to the increase of electrical conductivity. During field work in August, 2013 electrical conductivity was measured only in the active phase. In contrast with the previous statement, during measurements in 2013 a full cycle lasted for 97 hours (78 hours of activity and 19 hours of inactivity) probably because of interventions made inside the drilling tube. In this case the values of electrical conductivity show a periodic fluctuation in each 25 hours.

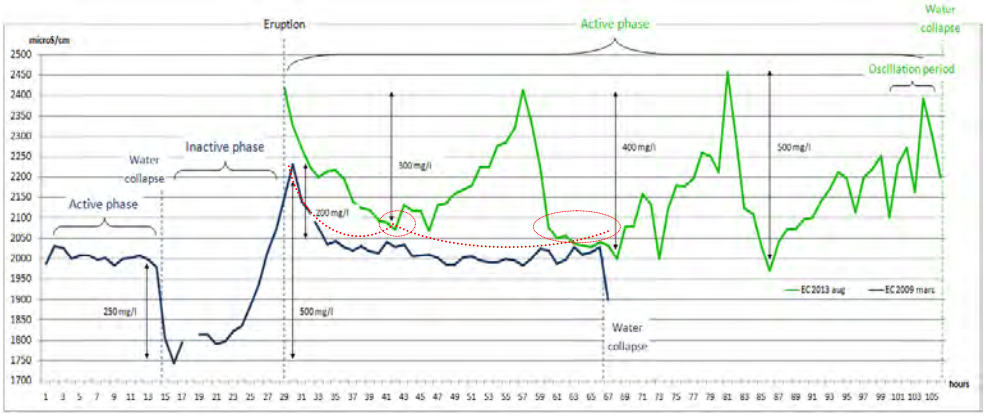

Fig. 8. Electrical conductivity values (µS/cm) of Chirui "Geyser" measured in 2009 and 2013

Data set that was recorded in 2013 (Fig 7) show that the amplitude of electrical conductivity fluctuation is getting higher as the active period evolves. The difference between peak and low values is increasing (300, 400, 500 µS/cm). In case of values measured in 2009 an obvious trend cannot be observed. Looking at the diagram carefully it can be identified a tiny fluctuation with a higher value event. This peak value was measured 12 hours after the eruption. The next higher value events happened 18-22-25

hours after the first one and can possibly refer to the oscillation phase before the water collapse. The short active phase in 2009 produced less and smaller fluctuations while the long lasting active phase in 2013 produced more and higher amplitude fluctuations. This hypothesis has to be demonstrated and confirmed by new measurements and observations.

The values of water discharge show that even if the length of a full cycle was different during the two investigations in 2009 and 2013 basically the "geyser's" functioning was similar in both of the cases. In 2009 we measured an average discharge of 6.48 l/s that means a total amount of 886.5 m^3 water during the active phase of 38 hours. In 2013 the "geyser" had an average discharge of 5.18 l/s and during 79 hours of activity produced a total amount of 1473.2 m3 water (Table 1). The highest discharge values are characteristic to the beginning of the active erupting phase, these are about 11-12 l/s.

Table 1.

The amount of water produced by Chirui Geyser during active phases in 2009 and 2013

	Active erupting phase (h)	**Average discharge (l/s)**	**Amount of water produced (m^3)**
Cycle 2013	79	5.18	1473.2
Cycle 2009	38	6.48	886.5
2013/2009 cycle rate	2.08	0.8	1.66

5. SUMMARY AND CONCLUSIONS

(1) In this article it was presented a hydrogeological phenomenon located in Băile Chirui, Transylvania that operates similar to the internationally so called "Cold water geysers".

(2) It can be described by the successiveness of active and inactive phases; eruption of water from the drilling tube is driven by physical and chemical lows, hydrostatic pressure and CO_2 dissolution/release.

(3) This phenomenon's operation shows a 51 hours periodicity with an active erupting phase of 38 hours and an inactive phase of 13 hours. A longer cycle can be observed when it is influenced by measurement equipment (the drilling tube's diameter is smaller).

(4) A full cycle can be divided into two main phases (active and inactive) and five part-phases: (1) the moment of eruption (highest eruption), (2) the long lasting stabile eruption phase, (3) the oscillation phase before collapse, (4) the moment of water collapse and (5) the inactive phase when water is inside the drilling tube.

(5) The drilling tube intersects a geological fault that facilitates CO_2 movement upward to the surface.

(6) Shifting from one main phase to the other implies some changes in the phenomenon's characteristics like increasing or decreasing of water temperature, electrical conductivity, hydrostatic pressure, CO_2 content, water discharge.

(7) Even if the full cycle is longer than usual, the main characteristics of the phenomenon are mainly identical. The amount of water produced is proportional to the duration of the active phase, only the source of it could be different.

(8) Similar properties and processes were identified and described in case of already known "cold water geysers" (ex. Crystal Geyser, USA and Herl'any Geyser, Slovakia) that allows us to say that the hydrogeological phenomenon located in Băile Chirui could be a CO_2 driven, cold water geysering well.

(9) New investigations have to be made at the Chirui Geyser – more parameters should be measured continuously during a full cycle to get closer in understanding the operation of this phenomenon.

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A GEOSPATIAL ANALYSIS OF THE RELATIONSHIP BETWEEN ENVIRONMENTAL DRIVERS AND VECTOR-BORNE DISEASES

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ABSTRACT. – A Geospatial Analysis of the Relationship between Environmental Drivers and Vector-Borne Diseases. Human health is profoundly affected by weather and climate. Environmental health is becoming a major preoccupation on a world-wide scale; there is a close correlation between a population's state of health and the quality of its environment, considering many infectious diseases are at least partly dependent on environmental factors. When we talk about the environment, we realize that it includes and affects fields of action from our daily life.

Earth observation from space, with validation from in situ observations, provide a greater understanding of the environment and enable us to monitor and predict key environmental phenomena and events that can affect our livelihoods and health. Even thought, the use of Earth observation is growing in usefulness for a wide variety of uses, it is extremely unlikely that Earth Observation will be able to detect infectious diseases directly. Instead, Earth observation can be used to detect high NDVI index (and possibly attribute the high surface chlorophyll concentration to a particular disease), and help predict the movement of the agents carrying vector-borne disease. Many diseases need certain temperature and moisture conditions to breed.

The primary objective of analyzing environmental health risk and vulnerabilities is to support the Development Regions to strengthen their capacity to assess, visualize and analyze health risks and incorporate the results of this analysis in a health risk map for disaster risk reduction, emergency preparedness and response plans. At the same time, such an analysis applied in health, allows starting the collection and homogenization of baseline data, information and maps to help health authorities and decision makers to take informed decisions in times of crises.

Informational Health Platform would be used for the integration of data coming from different sources in order to assess, analyze and map vulnerabilities and risks, contributing to the continuity of the decision process during the different phases of the emergency cycle. Decision support tools are based on creating health vulnerability platforms, which can be used first of all to evaluate the environmental conditions and to predict the possible risk of a disease infection in a given location, including variables as population densities, socio-economic issues, health indicators, accessibility to health care, land cover type, soil moisture and surface temperature.

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The fundamental purpose of this work is to reveal the necessity of establishing a quality framework for arguing on the connection between the environment and vector-borne disease transmission, supposing that on any kind of forecasting it is established the extent to which the past is likely to be an accurate guide for the future.

Keywords: *NDVI, vegetation, soil moisture, temperature, LANDSAT TM, vector*

1. INTRODUCTION

It must be agreed that health monitoring is a promising activity and research when thinking about the population wellbeing.

The focus of public health assessment and monitoring is to improve health and quality of life through the prevention and treatment of disease and other physical and mental health conditions, through surveillance of cases and the promotion of healthy behaviors. Health is an important investment and driver for development, with decreased risk of disease, illness, and injury; better immune functioning; speedier recovery; and increased longevity.

Since the time of Hippocrates (470 – 360 BC), physicians have noticed that some diseases occur at some places while not in others, and disseminate from one geographical region to another. A major milestone towards the use of spatial data in epidemiology was created in 1854 by John Snow, who mapped the occurrence of cholera and public water sources, and established a relationship between them (Dhama, K. *et al.*, 2013).

The World Health Organization (WHO) is the directing and coordinating authority for health within the United Nations system. It is responsible for providing leadership on global health matters, shaping the health research agenda, setting norms and standards, articulating evidence-based policy options, providing technical support to countries, monitoring and assessing health trends. The World Health Organization defines environment as it relates to health, as "all the physical, chemical, and biological factors external to a person, and all the related behaviours" (WHO, 2011).

The present study is designed for mapping the spatial distribution of West Nile fever, Tick-Borne Encephalitis and Lyme disease in Romania together with their environmental development conditions. The information appropriate for the vector-borne disease and vector abundance associated with geo-climate determinant variables contribute to mapping the line of disease transmission risk (Palaniyandi *et al.*, 2014).

A vector-borne disease (VBD) is one in which the microorganism which causes the disease is transmitted from an infected individual to another individual by a mosquito, tick or some other agent. Other animals, wild and domesticated, sometimes serve as go-between hosts. The whole issue is transposed into the figure 1 epidemiology triangle, considering that any epidemiology event is caused by interaction of the host, meaning who get the disease, an infectious agent, meaning what causes the disease, and the environment factor, meaning where the disease occurs. The vector is the "tool" for communicating the disease.

Land use/land cover dynamics, urban sprawl, irregular growth of urban development, deforestation, vegetation green up and permanent water are proper for developing a suitable environment of vector borne disease in Romania.

WHO reported that, since 1975, over thirty "new" or "emergent" human infections have appeared (WHO, 2004). Most new infections seem to be caused by pathogens already present in the environment, which have been brought out of obscurity, by changing ecological and social conditions. Infectious diseases have always been an important part of human life. They have significantly influenced human biology and society, even determining the course of major historical events.

Remote sensing is a valuable tool in disease surveillance, especially in vector-borne disease. Earth observation data can help epidemiologists to derive risk areas, vector distributions and relationships between diseases and environmental variables.

Many studies suggest that remote sensing imagery is a viable predictor of vector-borne diseases transmission. For example, some studies indicated that higher malaria incidence rates were associated with broadleaf hill forests, agricultural land, wetland and vegetation types and the lower rates were related to coastal swamps, tall herbs, wetland communities, urban development and water bodies (Hakre, 2004). Considering the nowadays striking situation of Ebola virus, satellite data help identify areas prone to the emergence and spreading of such epidemic by monitoring potential areas where initial contact with the virus might take place. Such areas are isolated rural settlements surrounded by dense tropical forests and oil palm cultivations. These are likely to attract fruit bats, one of the main vectors of the virus.

Living in the Copernicus era, from malaria to ebola, infectious diseases might not be able to play tricks for long. Copernicus satellites are increasingly used to provide accurate and timely information in the form of land cover reference maps that can be combined with census data.

Bringing into play the parameters extracted from satellite data, many researchers (Nelson, 2000; Wilson, 2001; Cowell, 1998; Sutherst) considered vegetation indices as the most consistent predictor of mosquito – borne disease transmission, being widely used in epidemiological studies. Among the various remote sensing based values, vegetation measures is utilized also in many epidemiological studies, applying the normalized difference vegetation index (NDVI) imagery, which is the most widely used for vegetation cover and production.

Some emerging and vectorborne disease are present in Europe and of importance to the EU, several thousand cases of tickborne encephalitis being reported here each year. The burden of Lyme disease in Europe in unknown, while cases of West Nile fever in humans were detected in the last decade in Italy, Romania and Hungary between 2008 and 2009.

European Centre for Disease Prevention and Control' mission is to strengthen Europe's defence against infectious diseases. The emerging and vectorborne disease (EVD) programme being part of ECDC Strategies for Disease Specific Programmes 2010 – 2013 is working towards the development of a wide range of timely and topical assessments of the risks that emerging and vectorborne diseases pose to EU citizens, contributing to strengthening EU-wide preparedness and response by providing Member

States with access to expertise, the latest scientific knowledge (ECDC, 2010). EVD programme impose a multidisciplinary approach involving environmental, entomological, behavioural studies, creating a connection between veteriarians, physicians and a wide range of laboratory expertise and academic research. According to this, the present paper research will focus on the usefulness and importance of using earth observation data in epidemiological research, considering imagery an essential source of rich information for enabling people to understand the world.

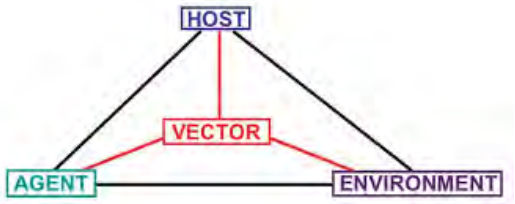

Figure 1. Infectious disease transmission chain

2. RESEARCH OBJECTIVES WITHIN THE STUDY AREA

The study aims at identifying the mutuality between vector-borne disease transmission and the environment using satellite data, fulfilling the following objectives:

- to mapping the spatial distribution of vector borne disease in Romania;
- to assess the climate, landscape and the environmental aspects of vector borne disease transmission;
- to establish a susceptibility index scale of the localities, where the population is prone to vector-borne disease outbreak considering that every small-proportion event in the past, without significant health impact on population, is likely to be an accurate guide for the future.

It is intended to explore the influence of a changing world, focusing on the impact of the environment on vector-borne diseases, considering climate a major environmental driver influencing vector-borne disease epidemiology.

Climate, temperature, precipitation, humidity, wind can influence various aspects of an arthropod vector's life cycle, including survival, arthropod population numbers, vector pathogens interactions and vector distributions (Tabachnick, 2009).

There have been chosen two large areas in Romania, represented by the region of the Carpathian arch, geographically situated on 46º latitude North and 24º longitude East, and Western part of Romania, lying on 46 º latitude North and 22 º longitude East (fig. 2).

Romania has a climate which ranges from temperate to continental, the climatic conditions being modified by the country's varied topography, which inside the Carpathian arch proves milder winters and heavier rainfalls as a result of the Carpathian Mountains, which serve as a barrier to Atlantic air masses.

The second region of the study corresponding to the Western Plain of Romania, also known as the Banato-Crisana Plain has a warm temperate continental climate with moderate humidity during the year, without excessive dry season and relatively moderate summers.

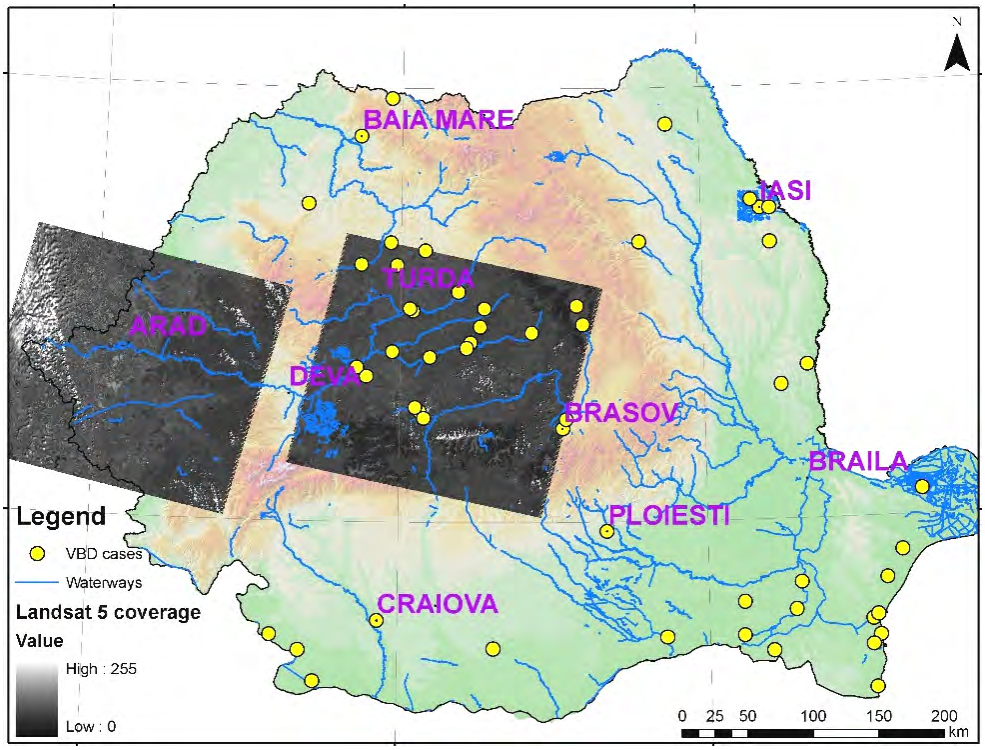

Figure 2. The study area represented by Landsat 5 scenes, July 2009

3. DATA ACQUISITION AND PROCESSING

Two Landsat – 5 TM images were acquired for July 2009 for path 184, row 28. The dates were chosen to reveal moisture, vegetation and temperature characteristics of the earth surface during summer. Data used in this research were downloaded from the relevant website of United State Geological Survey (USGS). Downloaded satellite data quality was highly acceptable. The first image from 7 of July 2009 overlap to the Carpathian arch, selected because of the inventory of several cases of vector-borne diseases come up in this region. The other image was acquired for one week later, in the Western part of Romania, which registered no cases of the indicated public health diseases, in order to provide the contrast with the other selected region in terms of EO data environmental indicators.

Of the seven bands available on the Thematic Mapper (TM) sensor, channels 1,3,4, and 6 were selected for each image. Bands 2, 5 and 7 did not significantly contribute to the analysis of extracting and analysing the indicators of interest and so were omitted. Therefore, the other bands were used for assessing the Normalized Difference Vegetation Index, a measure of the amount and vigour of vegetation at the surface. The index is defined by equation 1.

$$NDVI = band4\text{-}band3 \,/\, band4\text{+}band3 \quad (1)$$

The result of the NDVI calculation is given as a number that ranges from -1 to 1; no vegetation gives a value close to 0, while values close to 1 indicates the highest possible density of healthy vegetation. The premise behind NDVI is explained by the low reflectance in the visible red wavelength in the electromagnetic spectrum, representing healthy vegetation because photosynthetic pigments in plant absorb such light and reflect it strongly in the near-infrared wavelength (Patz, J. A., *et al.*, 1998). Generally, at 0.2 and lower the pixel is considered as bare soil and the emissivity is obtained from reflectivity values in the red region, while pixels with NDVI values higher than 0.5 are considered as fully vegetated, covered by forest, greenery or other vegetation.

Another remotely sensed factor is land surface temperature, an estimate of actual ground temperature, precisely, can be defined as the temperature of the interface between the Earth's surface and its closest atmosphere and thus it is a critical variable to understand land-atmosphere interactions, which involves energy fluxes (Valiente *et al.*, 2010). Estimation of land surface temperature can be completed by various formulas, but anyway in the first phase it should be calculated the emissivity, without considering it, estimation will be inaccurate for land surface temperature because emissivity represents surface variation.

The process of estimating land surface temperature consist of three steps, beginning by converting Digital Number (DN) values to radiance and estimating radiant temperature, following the equation 2.

$$L_\lambda = (LMAX\text{-}LMIN)/(QCALMAX\text{-}QCALMIN)x(QCAL\text{-}QCALMIN\text{+}LMIN) \quad (2)$$

where,

QCAL = quantized calibrated pixel value in DN
LMIN = the spectral radiance scaled to QCALMIN in watt / (meter squared x ster x μm) (1.238 for Landsat 5 TM)
LMAX = the spectral radiance scaled to QCALMAX in watt / (meter squared x ster x μm) (15.303 for Landsat 5 TM)
QCALMIN = the minimum quantized calibrated pixel value in DN = 1
QCALMAX = the maximum quantized calibrated pixel value in DN = 255.

The output of the above equation was converted into B6 – Surface Temperature (Kelvin).

$$T(Kelvin) = K2 \,/\, In\ ((K1 * E)/B6Rad + 1) \quad (3)$$

where,

T (Kelvin) = kinetic surface temperature in degree Kelvin, while K2 and K1 are constants
K1 = 607.76; K2 = 1260.56
E = thermal emissivity (typically 0.95)
B6Rad = radiance band

The third step consists in converting Kelvin degrees in Celsius by applying the following deduction: B6 – 273.15 K; 1˚C = 273.15 K.

The last remotely sensed factor considered in this research is soil moisture that can predict possible suitable habitats for mosquito eggs and larvae. Different types of remote sensing sensors are used to detect soil moisture, for example Landsat TM, Spot, NOAA-AVHRR, ENVISAT-1 ASAR, and RADARSAT.

Surface soil represents the amount of water in the top layer of the soil surface, determined as an important bridge between the land surface and the atmosphere with several impacts in weather and land cover/land use patterns. Estimates of soil moisture using satellite data have been conducted using various methods (Tucker, 1980; Crist and Cicone, 1984; Levit *et al.,* 1990; Seguin *et al.*, 1991; Nemani *et al.*, 1993; etc.) and can lead to significant cost savings in environmental management. The relationship between surface temperature (Ts) and vegetation cover (NDVI) has been widely used for soil moisture estimates (Nemani *et al.*, 1993; Gillies and Carlson, 1995), this interdependence relationship, being used and described to estimate soil moisture in this study.

$$SMI = T_{s\,max} - T_s \;/\; T_{s\,max} - T_{s\,min} \quad (4)$$

where,

Ts max, Ts min are the maximum and minimum surface temperature for a given NDVI;

Ts is the remotely sensed data derived surface temperature at a given pixel for a given NDVI.

4. DISCUSSIONS

The most important vector-borne diseases in Romania are infections transmitted by the bite of infected arthropod species, in particular, mosquitoes and ticks. Arthropod vectors are cold-blooded and thus especially sensitive to climatic factors. To that effect, climate is one of many important interacting variables that affect people's risk for vector-borne diseases, having a direct effect on physical conditions (temperature, rainfall, etc.) and an indirect effect on biologic conditions (plants, animals). Most arthropod vectors of disease are sensitive to physical conditions, such as levels of humidity, daily high and low temperatures, rainfall patterns, severity and snowpack of winter.

Romania is a country which has not registered extreme cases or situations with regard to vector-borne diseases. During the period of time studied, in Romania were registered cases of tick-borne encephalitis, Lyme diseases and West Nile, most of them tracked down on population from the localities situated in Transilvania region (inside the Carpathian arch), along the course of the Danube, and in north- western Romania.

As observed in figure 3, Lyme borreliosis disease is the most spread in Romania, having most of vector-borne disease cases, which has increased starting with 2009 (Vlad-Şandru, 2014).

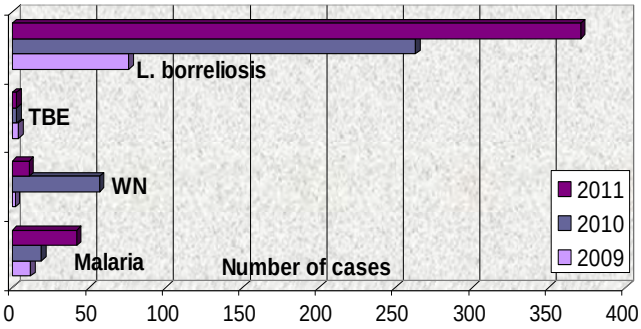

Figure 3. Distribution of vector-borne diseases 2009-2011 in Romania
Data source: National Center for Infectious Diseases Surveing and Control in Bucharest

It is well known that mosquito abundance is associated with the climate variables, mainly the amount of rainfall and thus the number of larval breeding sites, the spatial relationship between larval habitat availability and adult mosquito abundance (Palaniyandi M., 2014).

Ixodes ricinus, the tick that cause Lyme borreliosis, requires a relative humidity of at least 80% to survive during its off-host periods, being restricted to areas of moderate rainfall with vegetation that retains a high humidity. Rising temperature can accelerate the tick's life cycle and also these can adapt to sub-zero temperatures, a tick snow cover may facilitate tick survival over winter by preventing repeat freeze. Typically, habitats include deciduous and coniferous woodland, headland, moorland, rough pasture, forests and urban parks.

Tick-borne encephalitis (TBE), human viral infectious disease involve the central nervous system, caused by tick-borne encephalitis virus, a member of the family Flaviridae, occurring during the highest period of tick activity, between April and November.

This research study tries to assess the possible impact of a selected number of environmental indicators on the disordered distribution of vector-borne diseases. It can't be observed significant different characteristics (tab. 1) of the Normalized Difference Vegetation Index (NDVI), Land Surface Temperature (LST) and Soil Moisture (SMI), even if the two areas of interest present quite uncommon geographical attributes.

The vegetation in the two areas of study lay on differences regarding the structure of the vegetation steps. Within the Carpathian Arch the average of the NDVI Index reach the value of 0.37 generated by the submontane (foothills) belt chlorophyll of oak-hornbeam and mixed oak-pine forests which ranges from 400 to 650m. The Normalised Difference Vegetation index, which is the measure of photosyntetic activity of vegetation, is the most common index of vegetation growth. An important issue on NDVI condition is that a low reflectance in the visible red wavelength is the electromagnetic spectrum representing healthy vegetation because photosynthetic pygments in plant tissue absorb light and reflect it strongly in the near-infrared wavelength, constituting a phenomenon commonly found in vegetation. Having a value very close to 0.4, without in-situ evidence, it is thought that the area is almost entirely covered by forest and other vegetation (Nihei, N., 2002).

Table 1.

Average values of NDVI, LST and SMI for Landsat 5 image, July 2009

July 2009			
AOI in Romania	**Min**	**Max**	**Average**
NDVI Index			
Carpathian arch	-1	1	0.37
West	-1	1	0.24
Land Surface Temperature (˚Celsius)			
Carpathian arch	7.71	43.95	25.83
West	3.06	48.40	25.73
Soil Moisture			
Carpathian arch	0	1	0.47
West	0	1	0.46

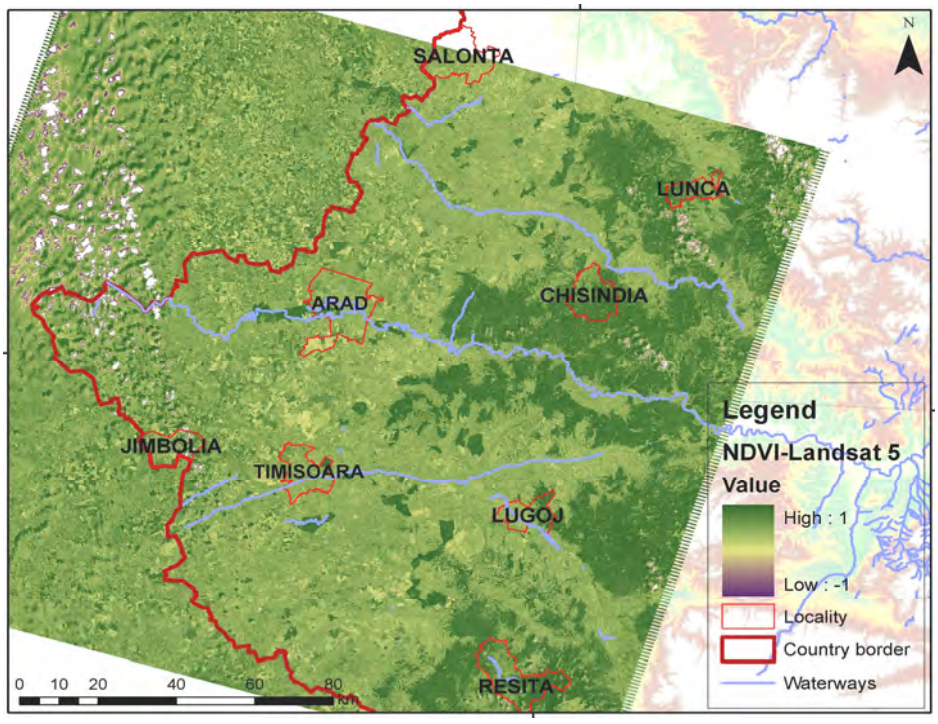

Figure 4. NDVI Index for the Western region

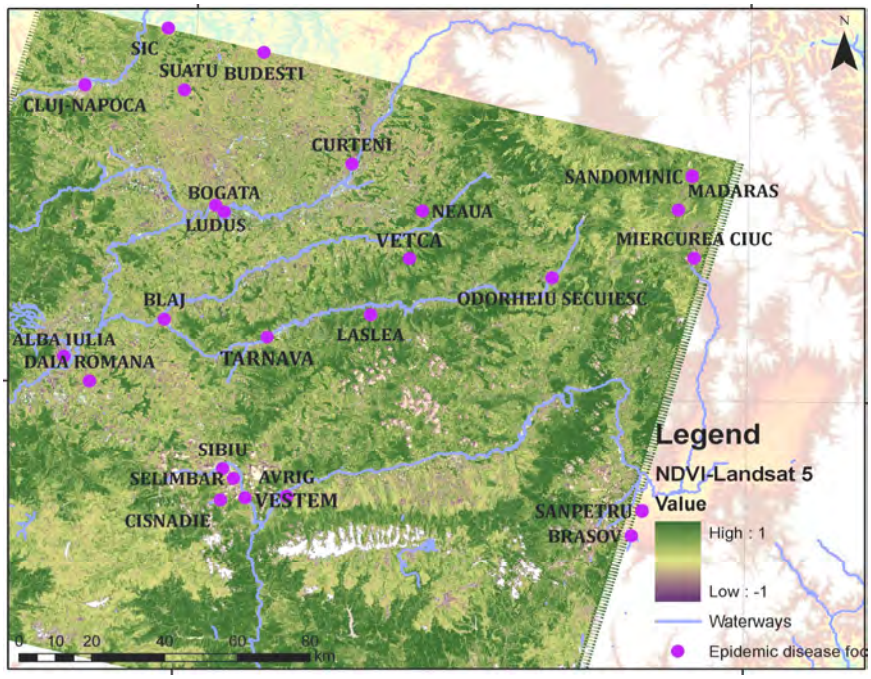

Figure 5. NDVI Index for Carpathian arch region

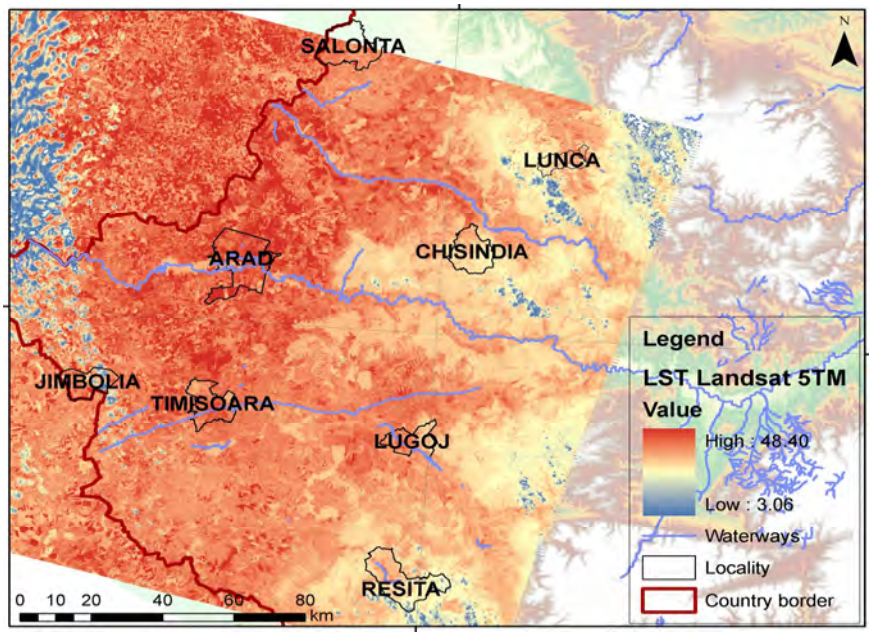

Figure 6. LST Index for the Western region

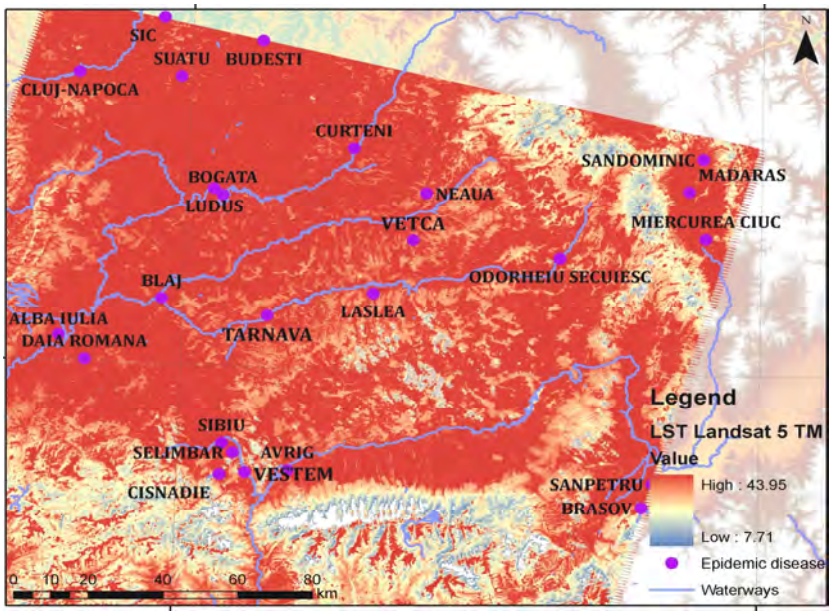

Figure 7. LST Index for the Carpathian arch region

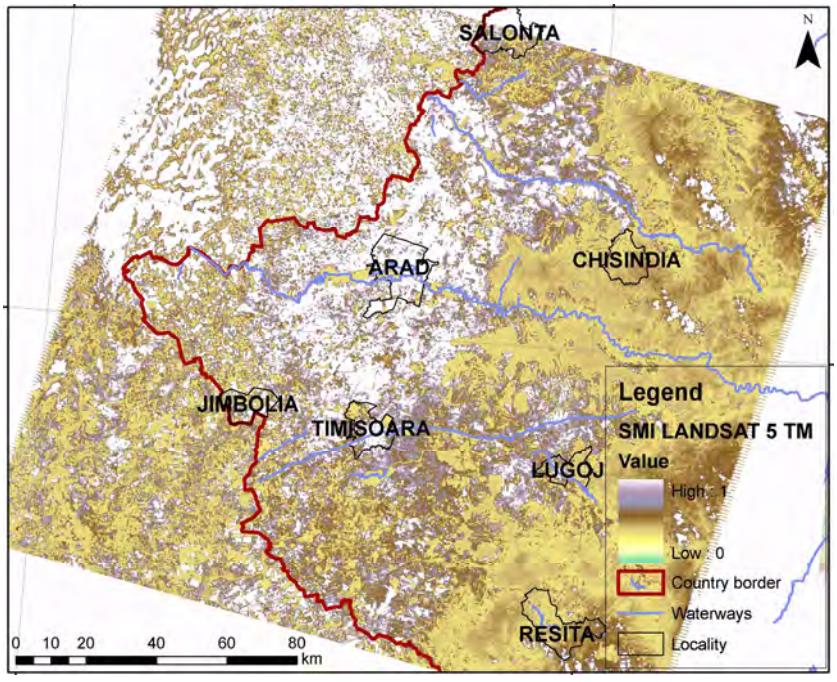

Figure 8. Soil Moisture Index for the Western region

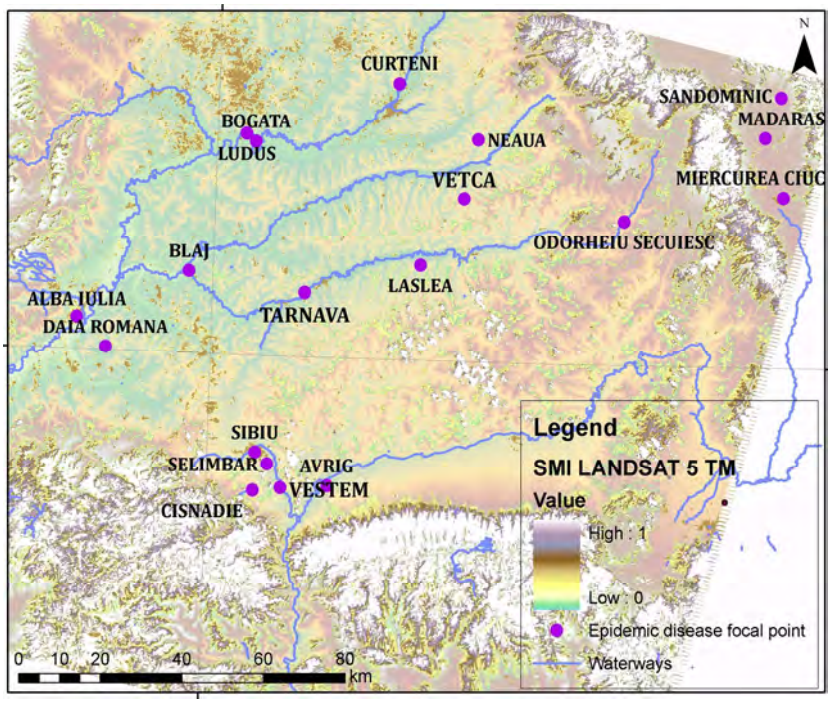

Figure 9. Soil Moisture Index for the Carpathian arch region

The second area of interest, the Western part of Romania, where no cases of vector-borne diseases were registered in 2009, geographically is divided between Western Plain and Carpathians with an average NDVI Index of 0.24, due to the reflectance of plain and steppe vegetation with a patches area of mesophilic-oak forest with submediteranean climatic influences. Applying NDVI Thresholds method which obtains the clorophyll emissivity values from the NDVI, considering the values within $0.2 \leq NDVI \leq 0.5$, it indicates the habitation of shrub, grassland and possibly bare soil on an 0.66% average.

By analyzing LST variable counted on Celsius degrees for the two area of study, it can be remarked quite the same average temperatures, around 25 ºC. The areas with high levels of LST (in red) can be correlated to urban areas, while the blue to white areas equate to either a vegetated or a water body. The LST map shows that the temperature ranges from 43.9ºC to 7.7 ºC within the Carpathian arch region and to 48.4 ºC to 3.06 ºC in the West part of Romania.

Soil Moisture is used to estimate the surfaces particularly relevant to mosquito borne disease but also to the breeding success of other vectors and tick species, the SMI map showing the variation of the values between 0 and 1. The areas with high levels of SMI are related to the white extents on the map associated to the high mountain peaks in

the Carpathians. The selected areas of study has approximately the same humidity average of 0.47, the epidemiological cases laying on areas with low soil moisture, but in close proximity to a water course.

The induced concept of Informational Health Platform generated within this research lie in presenting a detailed image of the vector-borne disease cases occurred in Romania and their relation with the environment, including variables as population densities, number of vector-borne disease cases, accessibility to health care and environmental parameters (NDVI, SMI, LST). By using, quantitative-comparative method is underlined the level of susceptibility in case of a vector-borne disease outbreak. Therefore, by using the Sustainability Dashboard analysis application, an analytical method, it is set up a susceptibility index, consisted of subindices areas, appropriate for inclusion in the Informational Health Platform. The subindices mentioned above were figured out by aggregating a number of points, when applying the formula: P = 1000*(x-min)/(max-min), where, P=points awarded, x=analyzed unit value; min=the value considered the worst ; max=the value considered to be the best.

For approaching vector-borne disease developing circumstances, they are pointed values that contributes to the aggregation of the susceptibility index, which consist in the best result (pursuant to this particular analysis): for example the minimum value of soil moisture index reflects the best result. Each analyzed unit indicator is automatically ordered on the range 0 – 1000, 0 points are going to the indicator with the lowest value (respectively, the highest value of soil moisture), while the maximum is going to the indicator with the highest value (respectively, the lowest unemployment rate).

Among the localities, where the population was affected by vector-borne diseases, Cluj-Napoca registered the lowest susceptibility rank, ruled by a critical LST Index of 26,6º Celsius and a good susceptibility rank concerning SMI Index of 0,152, beside an insignificant distance to the nearest hospital. On the other part, represented by the lowest number of points and the highest susceptibility rank, Sibiu is described by 88 cases of Lyme disease and a high LST Index.

As shown in figure 10, the average susceptibility category of localities prone to vector-borne disease outbreak includes examples which reflect high values of LST and more important, they are prevailed of difficult access to a health care departments or to a hospital, for instance having the population from Suatu locality, which reach the nearest hospital, on 36,3 km distance.

5. CONCLUSIONS

Earth Observation data issued from satellite images offers interesting perspectives for health-environment studies. Therefore, the purpose of this research was to demonstrate why several types of vector-borne disease occurred in a certain environmental area, while in another haven't been registered any cases. By analysing, three relevant EO parameters (LST, NDVI, SMI), connected to the vector habitat development, respectively within the Carpathian Arch region, it was obtained quite similar values as in Romanian Western part, where any cases of vector-borne disease were't registered, except NDV Index which inside the Carpathian arch met a higher value.

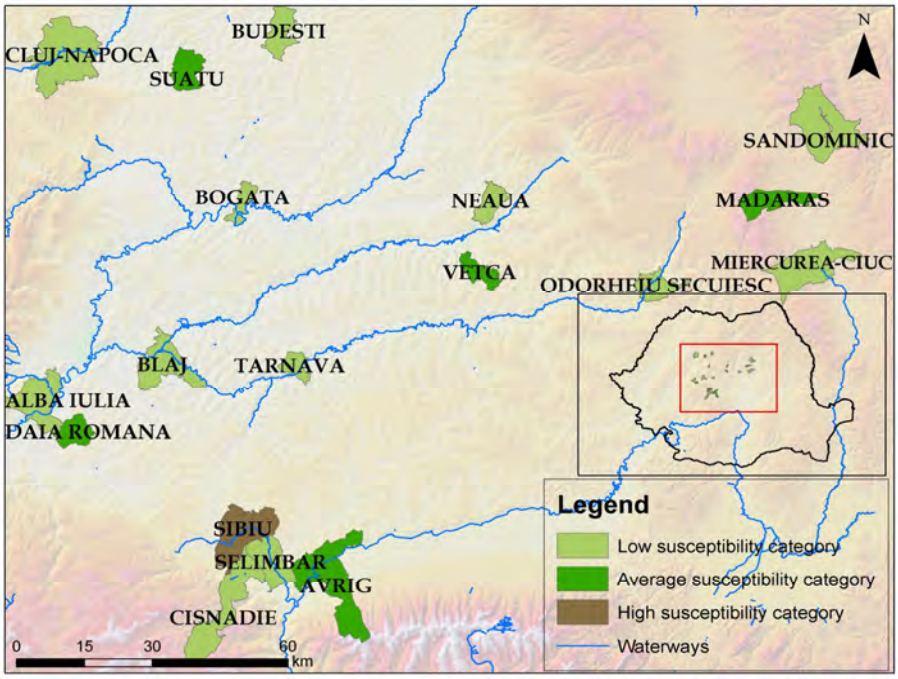

Figure 10. Susceptibility index categories distribution

Focusing on the vector-borne disease particular areas, it was accomplished a susceptibility index for analyzing the level of predisposition in each locality, on the chance of a vector-borne disease outbreak in the future. By aggregating the susceptibility index component indicators, Cluj-Napoca showed the lowest susceptibility, while Sibiu indicates the highest susceptibility.

Therefore, remote sensing environmental parameters can contribute to epidemiologycal decision support tools, by adding a spatial component in providing analysis and description of the geographic variations of the disease, which allows a more substantial health risk assessment for predicting future outbreaks. It is well-known that EO data have been available for over a decade by now, though spatial epidemiologycal observation field hasn't make use of a complete exploitation yet, epidemiologycal monitoring describing a promising research gate when thinking about preventing communicable diseases.

Abbreviations

VBD, vector-borne disease; WHO, World Health Organization; EVD, Emerging and Vector-Borne Disease; ECDC, European Centre for Disease Prevention and Control, USGS, United States Geologycal Survey, TM, Thematic Mapper, NDVI, Normalized Difference Vegetation Index, SMI, Soil Moisture Index, LST, Land Surface Temperature, TBE, Tick-borne encephalitis; EO, Earth Observation.

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HISTORY AND TOURIST VALORIZATION OF THE RUSCHIȚA MARBLE QUARRY (CARAȘ-SEVERIN COUNTY, ROMANIA)

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ABSTRACT. – History and Tourist Valorization of the Ruschița Marble Quarry (Caraș-Severin County, Romania). With an area of over 40 ha, the marble quarry located north of Ruschița village, Rusca Montană commune, Caraș-Severin County is the largest exploitation perimeter of this kind on the territory of Romania and one of the largest in Europe. Many works were written about the Ruschița marble quarry across time, especially regarding geology, but very little was talked about its tourism potential. If generally, the vast majority of the extractive areas are not at all attractive from the tourist point of view, having rather a repulsive appearance, the marble quarry from Ruschița proves the contrary, both by the greatness and sizes of exploitation and by the surrounding area, constituted of a very diversified mountain relief and an abundant forest vegetation. That is why, we consider useful an attraction and integration in the tourist circuit of this spectacular anthropogenic monument, unique in Romania, comparable to the Carrara (Italy) marble quarries. This paper makes a pleading in this respect.

Keywords: *Ruschița, marble quarry, history, tourist valorization*

1. INTRODUCTION

Rusca Montană commune is well-known and recognized at zonal, regional and national level due to the subsoil resources which are found on its territory: iron, lead-zinc ores, copper, silver, coals and last but not least, marble, this being the subject of the present study.

If over time the exploitations of metalliferous and energy resources (bituminous coals) were permanently closed, marble remained the only lithosphere resource which is extracted even now. The main activity of the inhabitants of Rusca Montană commune is the exploitation and processing of this type of rock. More specifically, at communal level function 38 (data valid for the year 2013) companies which have the object of activity *Quarrying of ornamental and building stone, limestone, gypsum, chalk and slate* (NACE Code 0811) or *Cutting, shaping and finishing of stone* (NACE Code 2370).

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Without any doubt, the most famous area on the territory of Rusca Montană commune is the marble quarry from Ruschița, which has become a national and international brand over the years and in our opinion, should be capitalized from tourist point of view as well. Thus, due to the marble quarry, Ruschița, although it is only a belonging village, has become even more reputed at national and world level than the commune seat Rusca Montană. This explains also why, especially in Romania, the word *marble* is very often associated with Ruschița locality and vice versa (Ruschița with marble).

It should also be noted that on the official coat of arms of Rusca Montană commune, approved by Government Decision no. 66 of January 19, 2006 (published in Official Gazette no. 87 of January 31, 2006), a marble block is drawn in the middle as a symbol for the basic economic activity and the main source of income of the population.

Regarding the name of the quarry and implicitly the name of the locality north of which it is located, we draw the attention from the very start that the correct name is *Ruschița* (with *s*) and not *Ruşchița* (with *ş*), as it wrongly appears in very many specialized works (including maps) and not only. *Ruschița* is practically the diminutive form of the toponym *Rusca*. In Hungarian the Ruschița marble is known under the name of *ruszkicai márvány* and in German, *Ruskitza Marmor*.

In conclusion, the purpose of this study is not only to make a general/historical presentation of the quarry from Ruschița and of the marble exploited here, information which was partially written in other works, but first of all, to bring or to come with viable solutions for the introduction of this anthropogenic monument in the national tourist circuit and why not, even the international tourist circuit. Because in 2013 there were 130 years from the official opening of the first marble quarry (Old Quarry), this work can be considered partially as one with anniversary character.

2. MATERIALS AND METHODS

The main research methods used in the elaboration of this scientific paper are: historical method, statistical method and analytical method. It should be mentioned that apart from the bibliographic research, for writing this study was also used the field research which is indispensable in geography.

The historical method was obviously used in the chapter dedicated to the history of the marble exploitations from the territory of Rusca Montană commune, chapter which comprises various information (generally, time intervals) concerning the evolution of the quarry over the years. We also used more images, both from archive and some more recent in which are surprised the development stages of the marble quarry and other aspects regarding it.

As for the second method, the statistical one, we used it in the exposure of numerical data, mainly regarding various characteristics of the Ruschița marble.

In some situations these two research methods (historical and statistical method) were jointly used, for example in case of the presentation of evolution of the marble quantity exploited in certain periods of time.

Finally, the analytical method was used to prepare the tourism SWOT analysis of the Ruschița marble quarry.

3. OVERVIEW OF THE RUSCHIȚA MARBLE QUARRY

To better understand why it is so important to introduce the Ruschița marble quarry in the tourist circuit, it is necessary to give an overview of this objective. Thus, in the following subchapters will be offered various geographical, geological and especially historical information concerning the marble quarry.

3.1. Localization

The marble quarry analysed in this work is located in south-western Romania, more exactly in the north-eastern extremity of Caraș-Severin County, on the territory of Rusca Montană commune, at a distance of 12 km from the homonymous commune seat and 2 km north of the belonging village Ruschița. The geomorphological unit where is located is the Poiana Ruscă Massif (in its central part) and the historical province is Banat. It should be also mentioned that from the geological point of view, Poiana Ruscă Mountains and implicitly the marble quarry from Ruschița, belong to the Southern Carpathians; on the other hand, under geographical (geomorphological) aspect, Poiana Ruscă Mountains are considered a subdivision of the Western Carpathians.

As for the tourist area where is located, according to the classification of tourist areas from Mountainous Banat presented by Popovici (2013), the Ruschița marble quarry, just like the whole territory of Rusca Montană commune, is integrated in the *Scorilo* tourist area. According to Surd (2008), Rusca Montană commune (including the Ruschița marble quarry) belongs to the *Poiana Ruscă* tourist area.

According to the forestry organization of the territory, the quarry is located in the Production Unit (U.P.) IV, *Stânga (Left) Ruschița*.

The geographical coordinates which define the localization of the Ruschița marble quarry are:

- 45°38'54" northern latitude;
- 22°24'20" eastern longitude and
- 600-850 m altitude.

The nearest city to the Ruschița marble quarry is Oțelu Roșu (27.2 km) and the distance to the county capital Reșița is 91.2 km. The road distances between the marble quarry and the main urban centres of Romania are: Bucharest – 478 km; Cluj-Napoca – 242 km; Timișoara – 142 km; Iași – 562 km; Constanța – 699 km; Craiova – 274 km; Brașov – 338 km; Galați – 607 km (https://www.google.ro/maps/).

Initially the marble quarry was located in the vicinity of the confluence between Pârâul cu Raci Mari (En. *Large Crayfish Creek*; on the right bank of the stream) and Padeș River (name given to Rusca River upstream), in the southern tip of the interfluve between these two streams. Seen from above, the quarry had the shape of a triangle or a delta.

Later, the quarrying perimeter gradually extended, developing east of Pârâul cu Raci Mari (on its left bank), more exactly on the interfluve between this stream and Pârâul Morii (En. *Mill Creek*), in the area Dealu lui Ionel (En. *Ionel Hill*).

Nowadays the marble extraction complex from Ruschița consists of 3 quarries: Old Quarry (45°38'45.2" N, 22°24'07.8" E) dubbed *Gropan* or *Steinbruch* (now closed), Dealu lui Ionel Quarry (45°38'46.3" N, 22°24'22.8" E; also referred in other works as

Pârâul cu Raci Quarry) and Dealu Maria Quarry (45°38'54.3" N, 22°24'38.3" E; the newest), to which adds a dense network of exploitation roads, more abandoned mine waste dumps and an area where are crushed a part of the tailings and the marble blocks with defects (usually cracked). The total surface area of this complex is according to Marmosim S.A., 43 ha (46 ha after http://www.digi24.ro/), being the largest and most important exploitation perimeter of ornamental rock (implicitly marble) on the territory of Romania.

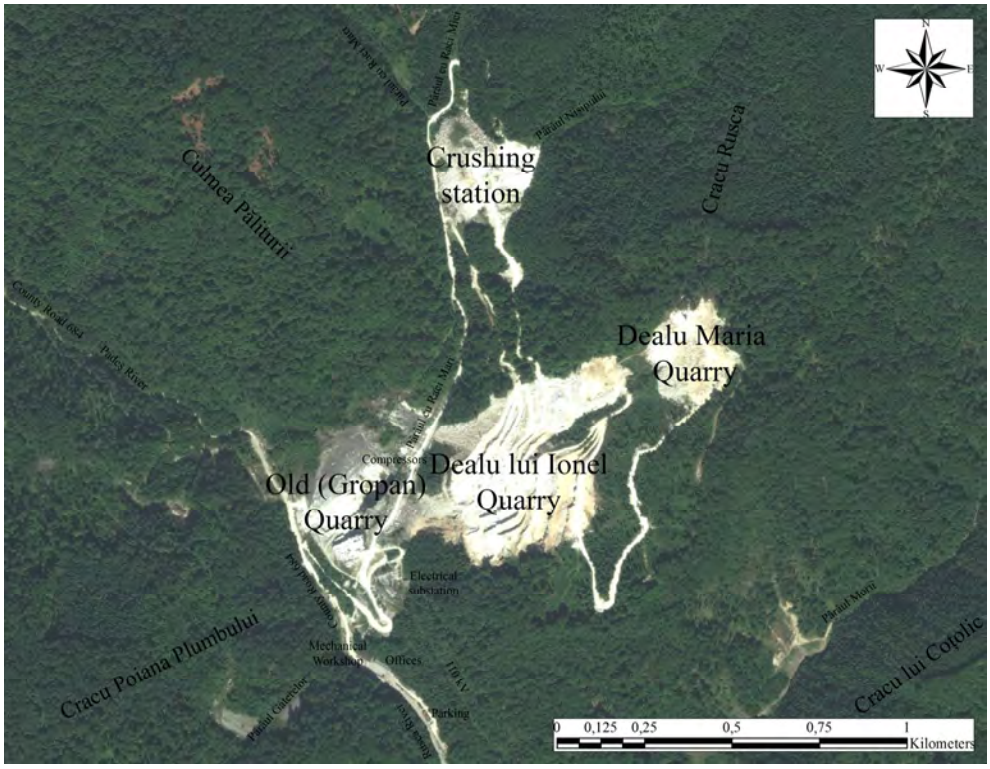

Fig. 1. Satellite image of the Ruschița marble quarry and its surroundings (processing after https://www.bing.com/maps/)

3.2. Geology

According to geologist Kräutner (1984), the Ruschița marble was formed by the metamorphosis of reefs and Devonian perireef limestones, these being developed on a submarine relief composed of basic volcanic rocks.

After Sencu and Băcănaru (1976), this deposit presents itself under the form of marble lenses which are intercalated in layers of chlorite schists and amphibolites.

Under tectonic aspect, the marble deposit develops in an area with a complex system of tectonic dislocations.

From the stratigraphic point of view, the marble reserves from Ruschița belong to Ghelari Series (Crystalline), from the Supragetic Domain (Upper-middle Devonian), being located in the Hercinic epimetamorphic unit (Gherasi *et al.*, 1968, quoted by Benea, 2008). Hence, the Ruschița marble is an epimetamorphic rock, which means that it was formed against the background of a regional (dynamo-thermal) metamorphism, in this case being epimetamorphism. Thus, the rock extracted at Ruschița is an epizonal crystalline limestone or an *epimarble* (formed in epizone, at depths of about 4-6 km inside the Earth's crust and temperatures of 200-400 °C, under the influence of a weak lithostatic pressure and a strong stress).

Following surveys and geological studies carried out, was revealed the existence of three marble levels of different colours, as follows:

- level of grey marbles (with a thickness of 40-70 m);
- level of white marbles (with thicknesses between 80 and 400 m);
- level of pink marbles (50-90 m thick) (Benea, 2008).

Depending on their chemical or mineralogical composition, these marbles are present under various colour intensities, to which are added often stripes of different hues. Thus, grey marble presents white stripes, and white marble, grey, green, violet-blue or pink stripes, the last one (white marble) being in some cases homogeneous from the coloristic point of view, similar to the colour of milk. Because it is ideal for the execution of sculptural works, white marble is often called *statuary marble*. As for pink marble, it is found in pale and dark pink, usually having stripes which vary from light grey to dark grey to black. Apart from the above, there are also reserves of white-yellowish and orange marble.

The structure of Ruschița marble is granoblastic and the texture is compact, sugar-like. The hardness is about 3-4 degrees on Mohs scale, pink marble being somewhat harder than the white one.

Also, according to Marmosim S.A., the only marble type which has the property to be translucent, is the Ruschița marble.

Due to its higher quality, the marble exploited at Ruschița competes with the famous marbles from Carrara (Italy) or Paros (Greece), some experts considering it even harder and more resistant in time than the other two (Carrara and Paros).

As for the chemical composition of the three types of Ruschița marble, it is shown in the table below.

Table 1.

Chemical composition of Ruschița marbles (after Mărunțiu *et al.*, 2011)

No.	Marble type/ colour	Chemical composition (%)	
		CaO	SiO_2
1	grey	54.70	0.50
2	white	55.23	0.25
3	pink	53.65	0.82

Other marble characteristics are the physical-mechanical ones, such as: density, porosity, water absorption, resistance to compression etc. This information is also displayed in tabular form.

Table 2.

Physical-mechanical characteristics of Ruschița marble (average values) (after Florea and Fodor, 2000)

No.	Physical-mechanical characteristics	Values
1	Density (kg/dm^3)	2.72
2	Apparent density (kg/dm^3)	2.70
3	Compactness (%)	99.50
4	Total porosity (%)	0.50
5	Water absorption at normal pressure and temperature (%)	0.12
6	Water absorption by boiling (%)	0.15
7	Fracture strength to compression in dry state (daN/cm^2)	900
8	Fracture strength to compression in saturated state with water at normal pressure and temperature (daN/cm^2)	850
9	Fracture strength to compression after 25 cycles of freezing-thawing (daN/cm^2)	800
10	Softening factor after saturation with water at normal pressure and temperature (%)	5
11	Softening factor after 25 cycles of freezing-thawing (%)	11
12	Wearing resistance by friction (Böhme) to 440 revolutions (g/cm^2)	0.58
13	Strength under mechanical shock (daN/cm^2)	27

The Standard Numbers used for Ruschița marble were between 1984 and 2004, STAS 3415-84 and 2004 to 2012, SR EN 1467:2004. Since September 2012 the Ruschița marble is identified with the Standard Number SR EN 1467:2012 (*Natural stone. Raw blocks. Specifications*).

3.3. History

Regarding the exact opening date or period of the first quarrying perimeter of Ruschița marble, the bibliographical sources contradict themselves.

Thus, archaeologist Boroneanț (2000) considers that the marble deposit from Ruschița was exploited since ancient times (Roman Age), but also in Middle Ages. According to Opruț (2008), the first exploitations go back to 1852, being started by a person named *Ladiszlay*. Most likely, Ladiszlay lived in Rusca Montană or Ruschița, knowing that at the level of these two localities, there were many inhabitants with this surname. Other authors think that the marble exploitation began in 1864 (Jancsó and Szekernyés, 2004). However, in most works it is mentioned that the first quarry was officially opened in 1883, this being the most credible version/information. There are also some sources which claim that the exploitations started after 1883, more exactly in 1884 (Wollmann, 1996, quoted by Luca, 2006) or 1886 (Turnock, 2000; Muşu-Coman *et al.*, 2006).

Although the systematic exploitation began only in 1883, Ruschița marble was discovered long before this year.

The first person who draws the attention to the high quality of Ruschița marble is considered, according to the most bibliographical sources, the Hungarian sculptor István Ferenczy (1792-1856). The person who informed Ferenczy about the existence of the marble reserves from Ruschița was Zacharias Hofmann (one of the former owners of the metallurgical complex from Rusca Montană commune); in 1828, the two met in Luncani locality (now located in Timiş County). After he began to sculpt in Ruschița marble, István Ferenczy compared it due to its higher quality, with the famous Italian Carrara marble. It must also be added that the carver István Ferenczy used white marble from Ruschița in quite a lot of his works, among other things for the decoration of the basilica from the Hungarian city Esztergom (Jancsó and Szekernyés, 2004).

Returning to the exploitation of 1883, it was opened/started by the construction engineer Johann Bibel (written sometimes *Biebel*) senior (1817-1900), who became the first owner and manager of the Ruschița marble quarry. He also dubbed the quarry, *a magyar Carrara* (En. *Hungarian Carrara*). So, we can say that starting from 1883 began an organized exploitation of the marble reserves, being used modern extraction technologies and equipment for that period of time (19th century).

In order to be able to exploit the crystalline limestone from Ruschița, Johann Bibel senior received as concession the land where the deposit is located, from the Hungarian State, to which it belonged at that time. After the death of Bibel senior, the business was taken over by his son, architect Johann Bibel junior (1858-1937), who developed increasingly more the extraction perimeter through the purchase and introduction of state-of-the-art machinery. From 1922 until 1947 (25 years), for the company owned by Bibel junior was extended the right of marble exploitation (Puiu Mărgineanu, 2005). At that time the quarry had a total area of 15.5385 ha.

The marble was processed both in the workshops located in the vicinity of the quarry and in a workshop owned by Bibel in Caransebeș.

Even if Bibel junior died in 1937, the company owned by him continued to function under the name of *I. Bibel S.A.R.* until 1948, when it passed to the state ownership, according to Law no. 119 of June 11, 1948.

After the death of Johann Bibel junior, the administration of the company *I. Bibel S.A.R.* is taken over by Alexandru Ienchi, who in 1943 takes the necessary steps for the inauguration of a new marble exploitation platform, north-west of the Old Quarry (Puiu Mărgineanu, 2005). This was not materialized however.

Later, based on Decision no. 5746 of April 28, 1947 (published in Official Gazette no. 111 of May 17, 1947) issued by Ministry of Industry and Commerce, Valeriu Anghel is appointed administrator of the company *I. Bibel S.A.R.*.

In 1960, with the foundation of the marble processing factory from Simeria (which later became S.C. Marmosim S.A.), the marble deposit began to be exploited by this company, which at that time belonged to the Romanian State. In 1997 (as other sources 1998), S.C. Marmosim S.A. Simeria was privatized, being taken over by the company from Bucharest Titan Mar S.A. So, now the Ruschița marble quarry is owned by the group Titan Mar-Marmosim, which is the holder of the exploitation licence.

Fig. 2. Archive images of the Old (*Gropan*) Quarry

3.3.1. The marble quarries

From the opening until 1960, the marble was extracted on vertical (in steps), which generated a quarry (Old Quarry) with a depth of 130 m, for this reason being dubbed *Gropan* (En. *Pit*). The shape of the Old Quarry (also named by some locals *Steinbruch*) was quite similar to a cone trunk with the small base down or to a *capsized bell*, as many authors mention in their works.

Fig. 3. The Old (*Gropan*) Quarry nowadays

In 1960 began the exploitation on horizontal. The *Gropan Quarry* is located between the streams cu Raci Mari (on its right bank) and Padeș (on the left bank). In 2005 it is started for the first time for the quarry from Ruschița (in Old Quarry), the underground marble extraction, which was later abandoned. For this type of exploitation method two galleries were dug at the base of the Old Quarry. Now marble is no longer extracted from the Old Quarry, this being currently closed. 2016 or 2017 is expected the reopening of exploitation in this quarry (Ciolpan, 2014). The marble extracted here was mainly white, with different hues and stripes.

In 2000 (Valentin, 2006) or 2001 (Tibar, 2006) it is inaugurated the New Quarry from Dealu lui Ionel (Ionel Hill), which appears in some works under the name of *Cariera Pârâul cu Raci* (En. *Crayfish Creek Quarry*). According to other sources (Benea, 2008), the marble extraction in this quarry started since 1990. After the opening of

the new mining platforms, the material resulted from the deposit uncovering was thrown in the Old Quarry, being plugged a large part of the deep pit created over the years. The marble extracted here is pink (with various hues) and the exploitation is done in terraces of about 10 m wide.

In 2010 the steps were taken for the inauguration of a new extraction perimeter: Dealu Maria (Maria Hill) Quarry. According to environmental studies performed, the marble from this quarry will be exploited until 2023. Following the Government Decision no. 45 of January 25, 2012 (published in Official Gazette no. 85 of February 2, 2012) to the beneficiary S.C. Omya Calcita S.R.L., it was assigned an area of 17.0756 ha coming from the national forestry fund, for the opening of the marble exploitation in Dealu Maria (Maria Hill) Quarry.

Both Dealu lui Ionel and Dealu Maria quarries are located east of Pârâul cu Raci Mari, more exactly between this one and Pârâul Morii.

Fig. 4. Dealu lui Ionel (Ionel Hill) Quarry

Regarding the number of employees of the marble quarry, at the end of the 19th century, it was about 200-300 (by other sources 350). At the level of 2001 the staff of the Ruschița marble quarry was composed of 178 employees, of which 4 in management, 14 in the execution sector and 160 in the operational sector (Arion, N/A; Eremia, N/A).

As diverse fact, in the past, some of the inhabitants of Rusca Montană commune who worked in marble exploitation and processing were of Italian ethnicity, being a well-known fact that the Italians were the best quarry men or stone carvers. A few surnames of former Italian quarry workers and stone carvers from the villages Rusca Montană and Ruschița are: Cichini, Deleomini, Gussetti, Martini, Montresor, Segatto etc.

3.3.2. Marble exploitation and processing technologies

Regarding the marble exploitation technologies, various methods were used over time.

Initially the explosive was used, afterwards it was passed to the wire cutting method after Belgian system, this being introduced either in 1888 (Hillinger, 1977), or in 1906 (Opruț, 2008). At a certain moment it was also applied the American technology of compressed air drilling and stone grooving (Hillinger, 1977). According to Radu (2007), for the extraction of large marble quantities, during the period 1960-1965 were used explosive materials (dynamite and astrolite), which led to the whole cracking of the rock massif where the quarry is located.

Nowadays for the marble extraction, the company Marmosim S.A. which manages the quarry, uses state-of-the-art methods and equipment, such as: kerving (chain saw) machines, diamond wire saw machines, drills, excavators etc. Most of the machinery which is used for cutting the marble blocks is of Italian production, the following brands: Dazzini Macchine, Fantini, Korfmann and Pellegrini Meccanica. After they are cut, the dislocation/detaching of the marble blocks from the massif is done with Japanese Komatsu and South Korean Hyundai excavators.

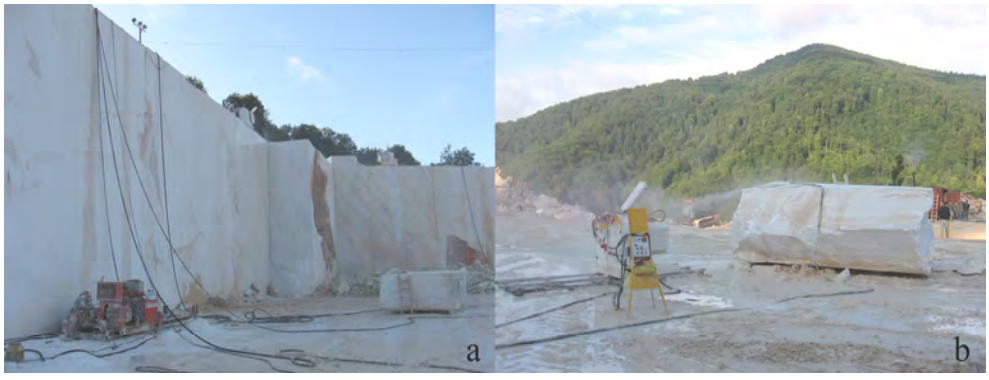

Fig. 5. Marble exploitation equipment in Dealu lui Ionel (Ionel Hill) Quarry
(a. kerving machine and b. diamond wire saw machine)

In order not to disperse in the air the powder resulted during the extraction process, it is used a large quantity of water. Apart from that, water also has the property of cooling the cutting machines, protecting them from overheating.

In the marble processing are used the following tools and machinery: frame saws (sawmills), circular saws, crushers, lathes, milling and engraving machines, drill presses, grinding and polishing machines etc. and can be obtained/manufactured a wide variety of products, such as: art monuments, funeral monuments (tombstones), commemorative plaques, veneers, floor tiles, treads and risers, balusters, handrails, sills, columns, mosaic, dust, fireplaces, artesian fountains, tables, reading lamps, vases, ashtrays, holders for writing instruments, knick-knacks and many other. More recently, for the cutting of marble slabs and tiles, the company Titan Mar uses modern water jet cutting machines (with water and quartz sand), which function at a pressure of 3500 bar (https://www.youtube.com/watch?v=AXV_CZ-Pdgo). This processing method allows the cutting of marble slabs in any possible way or form.

Fig. 6. Marble processing equipment (a. circular sawmill; b. blade sawmill; c. circular saw; d. grinding and polishing machine)

Concerning the tailings resulted from the extraction process, it was stored in the past in several mine dumps: Pârâul cu Raci (En. *Crayfish Creek*; 18 ha), Cariera Veche (En. *Old Quarry*; 2 ha), Compresoare (En. *Compressors*; 0.7 ha), Dealu lui Ionel (En. *Ionel Hill*; 1.5 ha) and Dealu Maria (En. *Maria Hill*; 0.9 ha), all of them totalizing 23.1 ha. Now the activity of these dumps is suspended.

In view of recycling the tailings (including the marble blocks with defects), in the second half of the 2000s, a crushing station of large capacity was arranged in the close vicinity (north) of the quarry. After the crushing of the tailings, the resulting material is transported by truck to the factory of micronized calcium carbonate powders (mineral pigments), which is located in Voislova village. This factory was inaugurated in July 31, 2007 and is owned by the company Omya Calcita S.R.L. from Bucharest (member of the Swiss company Omya AG). The marble powder with a granulation of 1-130 microns produced here is intended for various industrial branches, such as: industry of varnishes and paints, industry of cellulose and paper, industry of glass and ceramics, industry of construction materials, plastics industry or pharmaceutical and cosmetic industry (***, 2007).

Fig. 7. Dump in the Ruschiţa marble quarry

3.3.3. Marble production

Regarding the annual marble production, it is around 15,000 m^3 blocks/year, often exceeding this quantity. Hence, it results that every month are extracted on average about 1250 m^3 marble blocks. At the same time, it is estimated that the remaining marble reserves totalize about 1.8 million m^3, which means that in approximately 120 years, they will be exhausted. Apart from cubic meters, the exploited marble is also

evaluated in tons. In the next few years (until 2019) is expected to be extracted about 43,000-45,000 tons of marble blocks and 300,000 tons of marble for crushing (Ciolpan, 2014).

Going back to the past, between 1883 and 1947 a volume of about 70,000 m^3 of marble was exploited and the annual average production varied between 1000 and 1300 m^3 (Hillinger, 1977). According to Jancsó and Szekernyés (2004), at the end of the 19th century, the monthly production capacity was about 700 tons, which means 8400 tons in a year.

3.3.4. Marble transportation

Different means of transport were used for the marble transportation since 1883 until now.

In the beginning the marble blocks were transported to the marble warehouse or to the railway station from Voislova by carts specially built for this activity, one of them being the so-called *Caru' Mare* (En. *Big Cart*), which, because of the very heavy load, was pulled by 24 (12 pairs of) horses. Companions were Romanian peasants from Voislova village. According to Kutscherak (2001), for the pulling of the *Big Cart* oxen were also used. Even if there is a relatively short distance between the Ruschița marble quarry and Voislova marble warehouse/train station (about 19 km), because of the high tonnage and very low speed, this route was travelled in 10 hours. Although there is no precise information, according to Opruț (2008), the marble transport with the *Big Cart* was carried out between 1920 and 1947.

Fig. 8. Marble transportation by cart (*The Big Cart*)

After the renouncement to the marble transport by cart, was used the narrow gauge train (760 mm), known in Romanian under the name of *mocăniță* or *trenu' mic* (En. *small train*). Most likely, the marble blocks were transported by train until 1976, when the narrow gauge railway from Ruschița to Voislova was closed and later dismantled. From the quarry to the place where they were loaded on the means of transport, the marble blocks were descended on an inclined plane (funicular).

Fig. 9. Marble transportation by narrow gauge train (source: http://foto.arcor-online.net/palb/alben/42/537242/3338653631383064.jpg)

Later, marble began to be transported to the warehouse and factory from Voislova or to the factory from Simeria by trucks, which are still used today (the brands Volvo and Mercedes-Benz). The loading in trucks is done by cranes, front loaders (the brands Caterpillar, Komatsu and Hyundai) and excavators. For the marble transport to be carried out in optimal conditions, in 2006 the County Road 684 was rehabilitated between Voislova and the place where the offices of the company Marmosim S.A. are located.

Fig. 10. Marble transportation by truck

3.3.5. Ruschița marble in Romania and in the world

Even if Ruschița marble is of high quality, in the beginning it was not known and sought on the external market. However, in 1912, after 29 years from the official opening of the first quarrying platform, the Ruschița marble got to be exported in 12

European countries (Jancsó and Szekernyés, 2004). Later, the marble exports have increased significantly. Nowadays, the products made of Ruschiţa marble can be found on almost all continents.

In Romania, the most famous buildings where Ruschiţa marble was used, are: The Parliament Palace (former *Republic House* or *People's House*), Cotroceni Palace, The House of the Free Press (former *Casa Scânteii*), The Palace Hall, Royal Palace, Palace of Justice, Palace of Telephones, the building of the National Opera, National Theatre, the building of the National Bank of Romania, the office of the Romanian Football Federation, the State Circus, Bulevard Hotel, Capşa House, JW Marriott Grand Hotel, Crowne Plaza Hotel, Vernescu House (Palace), all located in Bucharest, the new terminal of the Henri Coandă (Otopeni) International Airport, Ioan N. Roman County Library from Constanţa, The Holy Trinity New Orthodox Cathedral from Arad, Culture House from Reşiţa, various hotels from the Black Sea and Prahova Valley resorts etc.

Also, Ruschiţa marble was used in the execution of various monuments (including tombstones) and sculptural works.

Outside the Romanian borders, the products manufactured of Ruschiţa marble were exported/used in:

- **EUROPE: Austria:** building of the Austrian Parliament from Vienna, Palace of Banks from Vienna, villa of Empress Elisabeth of Austria; **Germany:** BBC office from Mannheim, Friedenspalast Erfurt; **Hungary:** building of the Hungarian Parliament from Budapest, Gresham Palace from Budapest, Esztergom Basilica; **Italy:** The Milan Cathedral (it was restored in the early 1970s with Ruschiţa marble); **Monaco:** villa from Monte Carlo of Formula 1 pilot Michael Schumacher;
- **ASIA: Brunei:** Sultan's Palace; **Hong Kong:** Kowloon Railway Station; **Japan:** Marunouchi Center from Marunouchi, office of TV corporation Asahi from Roppongi; **Singapore:** Ardmore Park;
- **NORTH AMERICA: United States of America:** White House from Washington, D.C. (it is assumed that the eagle located on the ceiling of the Oval Office was sculpted in Ruschiţa marble), House of Gianni Versace, Villa Rebeca, both in Miami etc.

Other countries where Ruschiţa marble was exported over the years are: Belgium, Bulgaria, former Czechoslovakia, Denmark, France, Netherlands, Switzerland, United Kingdom, China, North Korea, Qatar, Saudi Arabia, Taiwan, United Arab Emirates, Canada, Argentina, Egypt etc.

4. TOURIST VALORIZATION OF THE RUSCHIŢA MARBLE QUARRY

Even if, generally, the mining perimeters have a repulsive appearance, making them unattractive from tourist point of view, the Ruschiţa marble quarry proves the contrary, on one hand due to the spectacularity of the rock walls, extended surface and modern exploitation methods, but also due to the surrounding landscapes (various relief forms, mountain streams, forests etc.), on the other hand. That is why, we consider it is very important to introduce this authentic anthropogenic monument (element of the mining cultural landscape) in the national and international tourist circuit and we come with a series of proposals in this respect.

4.1. Tourism SWOT analysis of the marble quarry

Strengths:

- Spectacularity (impressive marble walls, extended area of the quarrying perimeter, belvedere/lookout points, modern and novel exploitation technologies
- etc.);
- Limitrophe natural framework with great ecological and landscape value (Habitats Directive Sites of Natura 2000 network: ROSCI0219 - Rusca Montană and ROSCI0355 - Podișul Lipovei-Poiana Ruscă);
- Possibility of practising a wide range of types and forms of tourism;
- Tradition of over a century in the marble exploitation;
- Chromatic diversity and high quality of the exploited marble;
- Location of the marble quarry in the vicinity of the County Road (D.J.) 684 (0.65 km) and of the Ruschița village (2.2 km);
- Location of the quarry at a distance of 17.9 km to the National Road (D.N.) 68 and 18.7 km to the Voislova train station (since January 1, 2013 closed for passenger traffic);
- Location of the marble quarry at a distance of 138 km to the Timișoara Traian Vuia International Airport and 44.4 km to the Caransebeș Airport (currently closed for passenger traffic);
- Existence at the level of Rusca Montană commune of about 40 companies which have the object of activity the marble processing;
- Large number of specialized staff in exploitation and processing of marble;
- Diversified offer and high number of buyers for marble products;
- Export of raw and finished marble (marble products);
- Dense network of exploitation roads within the quarrying perimeter;
- Fences and slope stabilization works along the main roads within the marble quarry;
- Mobile phone signal inside the quarry.

Weaknesses:

- Interdiction or limitation (restriction) of visitors access (including tourists) within the quarrying perimeter;
- Poor or insufficient promotion of this objective on the domestic and foreign tourist market;
- Lack of a museum dedicated to the Ruschița marble or to the marble quarry;
- Absence of a ticket booth and a souvenir shop in the vicinity of the quarry;
- Lack of an official Facebook page dedicated exclusively to the marble quarry and/or a non-governmental organization for the tourist promotion of this attraction;
- Lack of a tourist management plan or a tourist development/planning project of the marble quarry;
- Reduced number of tourism promotion materials regarding the marble quarry (postcards, leaflets, brochures, trinkets, mugs etc.);
- Absence of road signs towards the marble quarry;

- Absence of tourist arrangements inside the quarry (marked tourist routes, various signs and markings, information and warning boards etc.);
- Lack of cooperation or partnerships between the company which administers the marble quarry and the travel agencies;
- Lack of an integrated tourism development strategy of Rusca Montană commune;
- Absence at communal (local) level (implicitly in the vicinity of the marble quarry) of tourist reception structures with accommodation functions and tourist reception structures with public nutrition functions, in accordance with the norms of the Romanian National Authority for Tourism;
- Absence of a tourist information centre in Rusca Montană commune;
- Lack of qualified staff in the field of tourism;
- Absence of a vocational school with the profile of exploitation and processing of marble;
- Lack of a direct modern road connection between the localities Rusca Montană and Ruschița (implicitly the marble quarry) and the administrative-territorial units from the neighboring counties, Hunedoara and Timiș (Lunca Cernii de Jos and Tomești communes); including the absence of a connection with the A1 motorway (Deva-Lugoj sector);
- Lack of a railway connection between the localities Voislova and Ruschița because of decommissioning in 1976 of the narrow gauge railway between these two villages;
- Decommissioning and dismantling of the inclined plane (cliff railway) intended for the lowering of marble blocks from the quarry;
- Particulate matter emissions resulted from the marble exploitation and transportation process;
- Noise pollution caused by machinery used for the marble exploitation;
- Unavailable statistical data regarding the number of tourist arrivals at Ruschița marble quarry.

Opportunities:

- Revaluation of the natural and anthropogenic tourist potential of the marble quarry (the transformation of the marble quarry into a national and international tourist brand);
- Accessing of European Funds (2013-2015) for the renewal of machinery for exploitation and transportation of marble;
- Increase of marble production with about 30-35 % in the next few years (until 2019-2020);
- Reopening of the marble exploitation in the Old Quarry in the next years (about 2016-2017);
- Rehabilitation of existing roads and arranging of new roads inside the extraction perimeter;
- Steps regarding the modernization of County Road 687 D on the territory of Rusca Montană commune up to the border with Hunedoara County (Lunca Cernii de Jos commune) and County Road 684 between the offices of the marble quarry and Luncanii de Jos village from Timiș County;

- Realization of reports and documentaries about the Rusca Montană commune and the Ruschița marble quarry and posting them on the internet or broadcasting them on the national television channels;
- Launch by S.C. Marmosim S.A. of an official website (http://ruschita.com/) dedicated to the Ruschița marble;
- Promotion of Ruschița marble at various fairs or shows of profile from Romania and outside its boundaries;
- Concerns regarding the arrangement of accommodation units in Rusca Montană commune;
- Supported steps of the local authorities for the attraction of as many tourists as possible from Romania and abroad to the Rusca Montană commune;
- Continuous development of marble processing companies;
- The introduction of the marble quarry in the tourist circuit will implicitly lead to the medium and long-term socio-economic development of the Rusca Montană commune.

Threats:

- Great competition with other tourist areas and attractions from Romania and all over the world;
- Accelerated exhaustion of the marble resources;
- Declining of the marble quality with the advancing of the extraction process;
- Degradation of the landscapes under the influence of exogenous agents or factors (weather phenomena, water, uncontrolled growth of vegetation etc.) in the abandoned extraction perimeters (for example the Old Quarry);
- Practising of disorganized tourism (mass tourism for instance);
- Risk of injury (landslides, collapses, rock-falls etc.).

4.2. Types and forms of tourism practicable in the marble quarry

In our opinion, in the Ruschița marble quarry it can be practiced several types and forms of tourism, among which we enumerate: scientific and research tourism, cultural historical tourism, industrial tourism, recreational and entertainment tourism, sports and adventure tourism, polyvalent tourism etc.

Inside the perimeter of the marble extraction, **scientific and research tourism** could be practiced by specialists in fields, such as: geology **(geological tourism)**, geography, mining industry, industry of construction materials, architecture, plastic arts (stone carving) etc. The access of persons who study or work in one of the enumerated fields, should be free of charge, only based on a study or job identity card.

Event tourism could be developed by the regular organization of scientific events (conferences, symposiums, congresses, seminars, workshops) having as subject the Ruschița marble and its exploitation and processing technologies. In addition, **cultural** and **event tourism** might also develop by organizing inedited or unconventional cultural events (festivals) on the former mining platform of the Old Quarry, such as: book launches, music concerts, dance performances, visual arts exhibitions (e.g. exhibitions

of sculptural works made of Ruschița marble) and contests, theatrical plays, photography and film screenings (about the marble quarry for instance) etc. It is also recommended, to establish a celebration or a commemorative day dedicated to the marble quarry (e.g. *Doors Open Day at Ruschița Marble Quarry* or *Anniversary Day of The Ruschița Marble Quarry*), after the model of *The Tourism Monument's Day* from Rusca Montană, which is celebrated every year, on a given date.

In relation to **cultural historical tourism (heritage tourism)** and **industrial tourism**, these two forms of tourism are addressed to persons interested in the history of the quarry, but also in the marble exploitation technologies. This category of tourists could also be interested in the marble processing process, not only its extraction. In this respect, it would be very useful to organize visits to the profile companies which carry out their activity on the territory of Rusca Montană commune. Once arrived at a marble processing company, some tourists may be interested in buying or ordering marble products made here and, thus, would develop the **business** or **shopping tourism** as well. In other words, it could be created a tourist route called *The Marble Road*, thus, allowing tourists to follow the entire technological process, from the marble exploitation (in raw state) until its transformation into finished products.

Fig. 11. Marble processing plants in Rusca Montană village

An important role in the development of economy and implicitly tourism **(educational tourism)** of the Rusca Montană commune would play the establishment at local level of a vocational or an arts and trades school which has as basic profile the exploitation and processing of marble. In this way could be attracted a large number of students, both from the neighboring and more remote localities, who are interested in studying the technologies of marble exploitation and processing.

For those interested in going outdoors **(recreational and entertainment/ leisure tourism)** and want to visit a novel objective from all points of view, one of the attractions could be the Ruschița marble quarry. For this category of tourists it would be advisable to arrange during the summer in the vicinity of the quarry, a summer terrace, where they can serve a variety of drinks: coffee, tea, juice, alcoholic beverages etc. A good alternative would also be the arrangement of a picnic area nearby the marble quarry.

Sports and adventure tourism (including **extreme tourism**) is intended for those persons who are passionate about equitation, bicycling or motorcycling, rock climbing, zip-lining etc. Thus, in certain closed or abandoned perimeters, such as the Old Quarry or some former dumps, the practicing of climbing should be allowed. At the same time, between Dealu lui Ionel Quarry and the Old Quarry could be practiced zip-lining. On certain (bumpy) roads within the quarrying platform it could be practiced equestrian tourism, cyclotourism, enduro-tourism and off-road. In this regard, it would be useful to arrange in the vicinity of the quarry, a place where tourists can rent bicycles, mopeds or all-terrain vehicles (ATVs), specifically designed for moving inside the extraction perimeter. Another important aspect in the development of adventure tourism and not only would be the reconstruction of the former inclined plane (Fig. 12) which was used in the past for lowering the marble blocks to the old loading place. Moreover, it would be useful to construct a funicular or an elevator, such as those from the cities Deva and Brașov, to transport the tourists upwards in the quarry.

Fig. 12. The former inclined plane used for the lowering of marble blocks

Polyvalent or **complex tourism** could be practised by combining several forms of tourism previously presented.

For those persons who for some reason can not visit *live* the Ruschiţa marble quarry, it would be necessary to launch a virtual tour platform of this tourist attraction, after the model of the Google Street View application. In this way, the marble quarry might be *visited* in detail in front of the computer. Thus, could be developed the **virtual tourism** as well.

Finally, it is very important that the visiting of this tourist attraction to be done in a rational, organized way and disorganized or mass tourism must be fought as much as possible because it leads most of the times to the degradation of the geographical landscape or of the environment (throwing garbage in unarranged spaces, destruction of tourist markings, accidents etc.).

4.3. Measures and proposals for the tourist development of the marble quarry

Nowadays the access of strangers within the marble exploitation perimeter is restricted, the quarry being closed to the majority of visitors. For the resolution of this problem, we propose and consider necessary the instatement of an entrance fee accessible to any tourist (regardless of the country of origin) and the hiring of qualified staff, preferably geologists, geographers or mining engineers, to train and guide the tourists inside the extraction platform. For the tourists who want to take pictures and/or to film within the quarry, these activities should be allowed either free of charge or after the payment of an additional fee. Thus, these fees can be a new source of income for the company which exploits the marble deposit or why not, for the Rusca Montană and Ruschiţa localities. In exchange, as it was already mentioned, the access of students (including MA and PhD students), researchers and teaching staff from institutions with geographical, geological or mining profile who want to visit or to investigate the quarrying perimeter, should be free of charge, based on a special identity card issued by the unit to which they belong.

In the space intended for the purchase of tickets for the access into the quarry, a stand could be arranged, to put up for sale small souvenirs made of Ruschiţa marble, such as: ashtrays, vases, reading lamps, pencil and pen holders, knick-knacks, statues, various engraved plates, small tables etc.

Apart from the marble objects, it could also sell postcards, leaflets, brochures, books, maps, CDs or DVDs with documentary films, all with and about the Ruschiţa quarry.

For the potential tourists to be better informed about this attraction, we consider imperatively necessary the launch of an official virtual tour platform and a Facebook page, dedicated exclusively to the Ruschiţa marble quarry, where it should be promoted from the tourist point of view. It would be ideal even the editing of magazines or books in which are presented different aspects regarding the marble quarry. At the same time, it should be elaborated a tourism development strategy with strict reference to the marble quarry. In order to promote this objective as tourist destination, it is also very important to be concluded partnership agreements between the company that manages the marble quarry and the travel agencies or the Mayoralty and the Local Council of Rusca Montană Commune.

For the prevention of accidents, tourists could wear personal protective equipment (PPE) made of overalls, jumpers, rubber boots, safety glasses, helmet etc., all these being provided by the company which manages the quarry. In the areas that have a high degree of danger, such as some deep excavations, it should be mounted both fences and protection rails and warning signs.

It would be also useful to be mounted explanatory signs (including a detailed map of the quarry), on which the information is written in several international languages.

A special importance has the mounting on the main public roads (National Road 68 and County Road 684) of multilingual road signs which indicate the route to the Ruschița marble quarry. Thus, these signs would be very useful for the tourists who do not know the route to this tourist attraction and do not have maps or modern navigation equipment, such as GPS.

Always, in order to attract more tourists, it is very important that the infrastructure to the objectives which are to be visited should be in an excellent condition. Otherwise, the tourists will prefer other destinations. Therefore, we consider obligatory the modernization of the County Road 684 on the sector between Luncanii de Jos village (Tomești commune, Timiș County) and the place where are located the offices of the marble quarry (total distance of 22.1 km), but also the County Road 687 D (*Trans-Rusca*) between the limit with Hunedoara County and its intersection with the County Road 684 (close to the area Gura Ciotorogului), located on the territory of Rusca Montană commune (total distance of 6.3 km). Thus, the road between the municipality of Hunedoara and its neighbouring localities, but also the road from the eastern side of Timiș County (Făget city and its surroundings) towards the Rusca Montană commune and implicitly to the Ruschița marble quarry, will be considerably shortened and it would generate a greater flow of tourists, among other things. With the modernization of the County Road 684 between the counties Caraș-Severin and Timiș, the villages Rusca Montană and Ruschița will be connected to the National Road 68 A (European Road 673) and to the A1 motorway (Deva-Lugoj section). Thus, the foreign tourists who come from Central and Western Europe countries to Rusca Montană and Ruschița, on the A1 highway (from Nădlac direction), could leave it at Margina interchange/exit and continue their journey on National Road 68 A and County Road 684. In another train of thoughts, if the County Road 687 D would be asphalted between the intersection with County Road 684 and the border with Hunedoara County, respectively the Lunca Cernii de Jos commune, the route of trucks which transport marble blocks to Simeria, will be shortened with about 11 to 12 km and the traffic will be also considerably reduced in Rusca Montană locality.

Within the marble extraction platform, it could be arranged and marked more routes (roads or footpaths) intended exclusively for visitors; including the rehabilitation or modernization of the driveways to the quarry.

Certainly, if the narrow gauge railway (760 mm) would not have been disused in 1976 between the villages Voislova and Ruschița, the tourists flow would have been even higher.

In relation to the tourist infrastructure of today, at the level of the Rusca Montană commune, there is no accommodation unit which complies with the decisions of the Ministry of Regional Development and Public Administration. Thus, this administrative-

territorial unit obtained 0.00 points concerning the accommodation options/units. However, the tourists who arrive in Rusca Montană commune, can accommodate at *Kolping House*, which is located in the homonymous locality (Rusca Montană). Although, it is not a unit with accommodation function in the true meaning of the word, having another object of activity, the *Kolping House* has today the following facilities: more bedrooms with 3 to 5 beds, bathrooms, a kitchen, a dining hall and a conference or seminar room with a capacity of 50 seats. The tourists who visit the Rusca Montană commune can also accommodate at the *Pleşu Negrii* (*Gura Negrii*) hunting chalet (22 km away from the marble quarry), which is located in the Şoimu (also named *Pleşu* or *Lozna*) Valley, at the confluence of the streams Şoimu and Negrii (the place called *Între Râuri*). This chalet is managed by the Rusca Montană Forest District.

Hence, in order to supplement the accommodation places, a good variant would be the complete rehabilitation of the abandoned or partially decommissioned blocks of flats or former industrial buildings located in Ruschiţa village and their transformation into accommodation units such as hotels, hostels or guest/boarding houses. According to the Prefect's Institution of Caraş-Severin County (http://www.prefcs.ro/), the buildings from Ruschiţa which are available to be offered to local and foreign investors are: Block no. 62 (1800 m^2), Block Cichini (3000 m^2), the building of the former Mechanical Workshop (500 m^2) and other spaces covering an area of 2000 m^2, all of them being owned by the Local Council of Rusca Montană Commune. Therefore, if all these buildings would be bought and rehabilitated by a few investors, it could be created accommodation units with a total area of over a half hectare.

It is also very important to set up a local tourist information centre in the commune seat village Rusca Montană. At the same time, it would be necessary to establish an association or a non-governmental organization which aims at promoting the tourism potential of the Ruschiţa marble quarry.

Returning to the marble quarry, in its immediate vicinity or in Ruschiţa village, it should be arranged a museum dedicated to this tourist attraction, after the model of the Gold Museum from Brad (Hunedoara County). In a future *marble museum*, the following could be exposed: photographs and various archive documents of the quarry, maps and detailed plans of the quarry (including orthophotomaps), models and dioramas, tools and machines used in the exploitation and manufacturing process, samples and various marble objects etc. For certain exhibits of large sizes, for example certain machinery which would be impossible to introduce inside of the building or would take a lot of space, it could be created an open-air museum section. With the foundation of a museum dedicated to the Ruschiţa marble, the Old (*Gropan*) Quarry could be declared historical monument with industrial (mining) character. In addition, a good option would be the conversion of the marble quarrying complex into an *ecomuseum* (Iancu and Stoica, 2010).

Finally, it would be also very helpful arranging a library, where tourists and researchers can consult various documents and publications relating to the marble quarry.

5. CONCLUSIONS

From those presented in the previous chapters we conclude that the Ruschița marble quarry meets almost all the conditions and criteria for its tourist valorization.

Even if at a certain moment the marble reserves will be exhausted and the extraction perimeters will be permanently closed, it is very important not to be abandoned, but to try to integrate them into the tourist circuit.

Due to their spectacularity, we feel that some quarrying platforms (even still active), should be also valorized on tourist level. So, it is important not only to capitalize the subsoil (marble) resources, but also the tourist ones (the tourism potential of the quarry). It should be also noted that, if all lithosphere resources will run out at a certain point in time (marble in this case), the tourist resource will never be exhausted, especially if it is exploited in a rational way and respecting the basic principles of sustainable development.

At the same time, with the capitalization of the tourism potential of the Ruschița marble quarry, would develop/revitalize under socio-economic aspect inclusively the entire territory of Rusca Montană commune (Rusca Montană and Ruschița localities).

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FEMALE EMIGRATION. FROM RURAL ROMANIA TO THE ADRIATIC COAST: WOMEN ON THEIR JOURNEY BETWEEN OPPORTUNITY AND SOCIAL VULNERABILITY. "THE ITALIAN SYNDROME"

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ABSTRACT. – Female Emigration. From Rural Romania to the Adriatic Coast: Women on Their Journey between Opportunity and Social Vulnerability. "The Italian Syndrome". The twenty-first century can be called the "age of migration", in fact since the de-colonization and markedly since the eighties migration affects the entire planet, qualifying as a global phenomenon. Comparing it with it in the past today prevails new elements and in fact, in addition to a geographical change of the phenomenon, it has turned its composition, showing a growing feminization.

Keywords: *female emigration, opportunity, social vulnerability, italian syndrome, rural romania, adriatic coast*

1. INTRODUCTION

Looking at Romanians' migration, we can observe that more and more women are creating a migration project venturing towards the uncertainty of the so-called "trips of hope", done to improve their economical and social living conditions.

In Italy the greatest number (more than a fifth) of foreigners is represented by Romanians. The analysis that I have proposed to this Congress, the 6th International Conference "Rural Space and Local Development. Peripheral Rural Areas between Certain Existence and Uncertain Development" (Babeş-Bolyai University, Cluj-Napoca, ROMANIA. July, 23-27, 2014), is the result of a study which I partly did during the research for my still ongoing Ph. D. – *Faculty of Geography* of UBB – and partly in collaboration with my professor of "Sociology of cultural and communicative processes" – *University G. D'Annunzio* of Chieti in Italy, where I also teach.

The intervention involved specifically the migration of women from rural areas of Romania, from the areas of Muntenia and Moldova mainly, including Bacau, Galati, Braila, Neamt, Suceava counties to Abruzzo.

Once they arrive in the country of immigration, a significant part of them find a job in the domestic sector, usually improvising as domestic helpers and carers.

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These jobs are characterized by particular conditions of work exploitation, conditions that have somehow been permitted by the women themselves because of their migration project and the limited time they have to achieve their goals. Their migration way, is also characterized by the constant contact with the country of origin. One of the most relevant phenomenon which can be noticed in the migration processes in Italy is the creation of the mixed couples in which, at first sight, there is the identity of the partners to suffer the changes. The dominating identity will therefore be born from this process, which can open up spaces and borders and in which the different identities brought by the partners, will origin the final shared one.

Italy is also one of the main areas of destination of the flow of prostitution from Romania.

The presence of women in the sex trade is very complex and differentiated; this kind of activities takes place in apartments, public or private, or on the streets. It's manifestation which, on the one side, can express the will of many women to achieve fastly the Western wellness and lifestyle. On the other side, in case it is subject to violence and exploitation, it reflects injustices and exploitation already there prior to emigration and sadly present on a global scale.

This work outlines the salient features of the experience that characterizes the process of women's migration. It has been observed that normally women who migrate move through strong relational circuits, created by other women who preceded them. Many of them start looking for new life opportunities, in a country where the work is a clear pattern of attraction, in order to maintain the family they left back in the country of origin, and to earn a better life for themselves also.

A special consideration deserves those women who leave alone, without a strong network of social contacts which can help them during the migration and the integration in the foreign country.

These women, called *Pioneers*, are the same ones that create the networks. They are women with a strong personality and a great determination, undoubtedly determined mostly by the conditions of their family from their country of origin. They are strongly focused on the economic well-being of their families. The misery and the difficulties they face are firmly stood because it is considered a temporary situation.

Analyzing those women, the tenacity strikeout and the determination which leads them to accomplish their project and their simplicity and naturalness, which makes the story of their lives original and full of authentic meanings.

The migration of women and mothers often brings with it dramatic lacerations in the families, which sometimes have tragic consequences. Since 2008, according to Associations, 40 Romanian children (30 according to official figures) committed suicide.

The pain of the children and mothers that were forced to move away from home to find a job is identified in what psychologists call the "Italian syndrome". It is a severe form of depression that is highly spread among the migrants and among their children. These children are called "white orphans" who grow up with their grandparents and are put to bed via Skype by a mother who lives thousands miles away. "It's painful to take care of other person's children while your own are thousands miles away," said Silvia Dimitrache, president of Adri (Association of Romanian Women in Italy).

In Romania approximately 750.000 children, out of a total of 5 million, have at least one of parents working abroad and many of them are aged between 2 and 6 years; 15% of the Romanian family have at least one member who emigrated for work. 80% of the children left home, miss their mothers so much that they get seriously ill with heavy consequences on growth and personality. Since 2005, the international medical jargon uses the diagnosis of "Italian syndrome" to indicate a deep and insidious form of depression which threatens the health and sometimes the life of the children. At the Congress, it was presented a video it made in Italy and played by a young Romanian boy, who tells in rhyme, his own story of emigration (Spoke - Amintiri in rime), according to the canons of rap music.

The word Immigration today is very current and represents a varied universe, as well as a phenomenon which was always present in the lives of the human beings. It is defined as a permanent transfer or temporary movement of people in a different country like the one of origin. The immigration affects the entire planet, although the states of origin and destination have changed along with the succession of historical epochs. Even the immigration is characterized by numerous and various reasons, as any phenomenon.

The present work focuses particularly on the immigration phenomenon from Romania to the Italian peninsula, specifically to the Adriatic Coast.

This phenomenon has assumed a considerable resonance when the Romanians citizens obtained the right to move freely in the countries of Europe, after the accession of Romania to the European Union. They used this opportunity to migrate more and more.

The true reason for which the Romanian men and women have left their homes is caused by economical problems. Thus, they decide to go to foreign countries where they earn more, including Italy and Spain, the countries preferred by them, due to the linguistic similarities and the temperament of the people.

Before the fall of the Berlin Wall, there were about 300,000 people to emigrate from Romania, German and Jewish minorities most; after 1989 the migration flows have increased significantly and if in the first moment they went only to the neighbouring countries, afterwards they expanded their migration area farther. In the end, even the women and the people who lived in the rural areas were involved in this process.

The Romanian migration in Italy has increased considerably since 1994 and its structure has suffered many changes over the years. From 1999 to 2002, the migration of women was increased thanks to the reunification of many families or due to the tourist visas. The feminization of the migration process in Romania in this period is numerically the most significant and it affects the entire country.

The emigrants face a lot of sacrifices in order to beautify or build their houses or to afford to pay the studies of their children. We have to pay special attention at the precious role that the Romanian women who are inside the Italian families, fulfilling domestic tasks, at the fact that they have left their families home, entrusting the care of their children to other family members and exposing themselves to the danger of the family disintegration, being disposable to marry Italian persons.

The Romanian women's migration is a recent phenomenon, which have developed in the last years and it is particularly interesting because the women are spokesmen of change. This phenomenon have increased mainly since the fifties, representing 50% of the migration movements worldwide.

The reasons of the immigration can be various:

- the need of the Romanian women to escape from their role of psychological subjection and/or physical conflict which can occur in their marital relationships, with authoritarian men which sometimes can be violent too;
- searching for a solution for a failed marriage in the origin country;
- the earnings from the western country, which comes to be 30-40 times higher comparing to the one that they used to receive in the country of origin;
- the poverty.

Therefore, the women who decide to emigrate improve their standard of life. When they arrive in Italy, they want to be part of the host society, to participate to the social life and to different events. They want to have equal opportunities with the women from the country where they migrated too, but this remains very often just a wish. The discrimination which they live can be divided in three levels: gender, ethnicity and social class.

The occupation of the Romanian immigrant goes into the direction of care services, particularly since the '90s when it was been a slow but gradual dismantling of the Welfare State. Those women, therefore, work like domestic helpers, caregivers, domestic workers mostly and they don't change jobs in years, despite the qualification they possess because of the rigidity of the labor market. Due to the fact that a care job is not very known and "important", it can be said that the work done by foreign women in our houses is made by "invisible hands".

The help provided by the Romanian women had a strong resonance in the traditional way of conceiving the family in the Italian culture.

The arrival of a new person of foreign nationality has brought with itself a review of the balances and schemes of the classic Italian family. The women who practice this type of service need to learn the Italian language and other expressions which belong to the context where they operate.

The origin of the Romanian women was analyzed by regions: as for the Muntenia region, the percentage of women that immigrate is 32.72% as can be seen in Table 1.1; In Transylvania instead there are only 9.39% (Table 1.2); In Maramures region, the percentage is 2.04% as reported in Table 1.3; in Crisana the percentage is equal to 2.64% (Table 1.4); in Oltenia is 6.98% as shown in Table 1.5; the Banat region recorded a rate of 2.11% as shown in table 1.6; in Bucovina there is a migration of 4,97% (tab.1.7); In Moldovia 29,13% of women went abroad for working (Table, 1.8); Finally, from the Dobrogea 4.72% of women decided to go in another country to work, as shown in Table 1.9.

Analyzing the phenomenon of migration from every county, we can notice that the migration flows are higher in the areas of Braila, Bacau, Galati, Neamt, Suceava.

The main part of the Romanians present on our territory (province of Pescara, Adriatic coast) are those who have graduated the secondary school (50.12%). The lowest percentage of migration is constituted by those who have graduated the university (1:24%) as shown in Table 1.10 and figure 1.1.

Table 1.1

Phenomenon of migration in Muntenia (%)

Muntenia	**%**
Braila	14.93%
Ilfov	0.31%
Bucarest	5.58%
Buzau	2.63%
Teleorman	0.49%
Lalomita	1.37%
Dambovita	0.69%
Prahova	2.96%
Calasi	1.84%
Arges	0.92%
Giurgiu	1,00%
TOTAL	32.72%

Table 1.2

Phenomenon of migration in Transylvania (%)

Transilvania	**%**
Cluj	2.40%
Mures	0.96%
Harghita	0.25%
Alba	1.11%
Hunedoara	1.57%
Bistrita Nasaud	0.76%
Sibiu	0.51%
Brasov	1.45%
Covasna	0.71%
TOTAL	09.39.00

Table 1.3

Phenomenon of migration from the Maramures region (%)

Maramures	**%**
Maramures	0.80%
Satu Mare	1.24%
TOTAL	2.04%

Table 1.4

Phenomenon of migration from the region Crisana (%)

Crisana	**%**
Arad	1.08%
Salaj	0.12%
Bihor	1.44%
TOTAL	2.64%

Table 1.5

Phenomenon of migration from the region Oltenia (%)

Oltenia	**%**
Gorj	1.25%
Mehedinti	0.88%
Dolj	3.03%
Olt	1.14%
Valcea	0.68%
TOTAL	6.98%

Table 1.6

Phenomenon of migration from Banat region (%)

Banat	**%**
Caras Severin	0.75%
Timis	1.36%
TOTAL	2.11%

Table 1.7

Phenomenon of migration from the Bucovina region (%)

Bucovina	**%**
Suceava	4.97%
TOTAL	4.97%

Table 1.8

Phenomenon of migration from Moldova region (%)

Moldova	**%**
Vrancea	3.94%
Galati	6.20%
Bacau	12.26%
Neamt	5.26%
Iasi	1.95%
Botosani	2.51%
Vaslui	2.27%
TOTAL	29.13%

Table 1.9

Phenomenon of migration from the region Drobogea (%)

Drobogea	**%**
Tulcea	1.81%
Costanta	2.91%
TOTAL	4.72%

Table 1.10

Title of qualification possessed by the Romanian Women from the area of Pescara

Qualification	%
Elementary	9.27%
Secondary School	50.12%
High School	8.57%
University	1.24%
No one	17.92%
Not know	12.90%

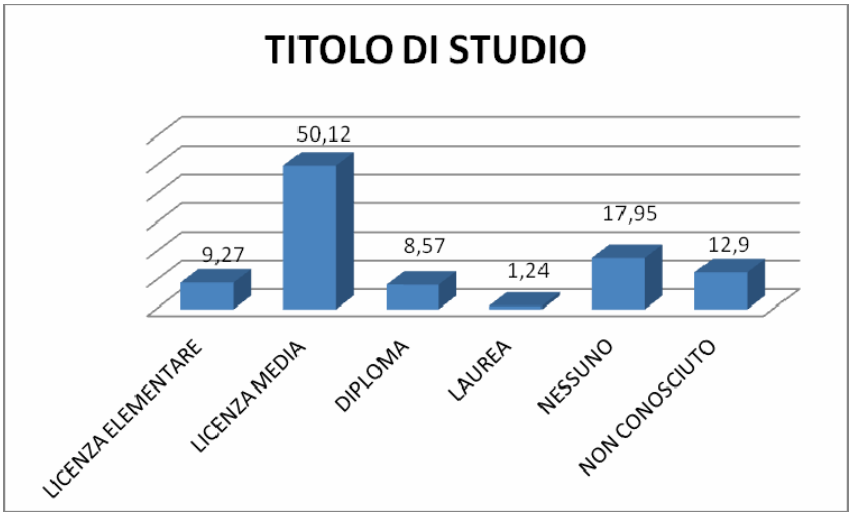

Figure 1.1. Qualification Romanian women (%)

This figure allows to observe that the migration flows are represented mostly by members whose study degree is not so high. Those who possess a university degree is obvious that want to migrate to other locations.

Since the early nineties, not only the foreign presence on the Italian territory were increased, but there have been important changes of migratory flows also. The high diversity of the origins and the diversity in the increment of the foreign population by country of origin are among the main features of foreign immigration in Italy: for example, in 1994 in the first ten countries of citizenship for immigration there were included the 50% of foreign residents in Italy; in 2011 the 50% of the foreigners came from five countries of origin: Romania, Albania, Morocco, China and Ukraine. In the period 1994-2011, have changed not only the weight of the main nationalities, but the ranking also changed: Morocco is always located in the first three countries, but it was exceeded by Albania during the nineties and then, by Romania, arriving at the point that in 2011 more than one-fifth of foreigners who live in Italy are Romanian.

After mentioning the presence of the foreigners who are residents in Italy divided by the main countries of citizenship, insisting on Romania, narrowing the field of research, we move in the region of Abruzzo. It can be noticed that between 2005 and 2008, the highest number of residents with Romanian citizenship are found in the province of Aquila, passing then since 2009 till 2011 in the province of Chieti. In addition, it can be seen that since 2005 to 2011 the presence of the Romanian population is constantly increasing in different provinces of Abruzzo (Table 1.11).

Table 1.11

Residents in Abruzzo region with Romanian citizenship on 1st of January of each year

Province	2011	2010	2009	2008	2007	2006	2005
Chieti	6995	6302	5658	4098	1390	1194	930
L'Aquila	6297	5551	5161	4233	2135	1844	1632
Pescara	4114	3718	3143	2077	954	812	635
Teramo	4979	4543	4011	3093	1440	1221	1050
Total Region	22385	20114	17973	13501	5919	5071	4247

On the territory of Abruzzo, the number of the Romanian women is higher like the men's number, not only in the entire region, but in different provinces of reference also (Chieti records 3798 immigrants; L'Aquila 3534; Teramo - 2823, Pescara - 2468. In all Abruzzo region the number of the Romanian women was amounted to 12623, as shown in Table 1.12).

Table 1.12

The presence of the Romanian women on the territory of Abruzzo

Province	Romanian Women
Chieti	3798
Aquila	3534
Teramo	2823
Pescara	2468
Tot. Region	12623

In Pescara city, on the 1st March 2014 there were about 1657 Romanian women. The prevalence is represented by those who still reside in Pescara city (940), followed by those who have immigrated from Pescara city and then, at their turn, they have re-emigrated (394), those who have immigrated and then have "disappeared", thus untraceable (254), and those who have immigrated and then later have moved to neighboring towns, and therefore they are considered non-residents (62), these data are shown in Table 1.13.

Table 1.13

Marital status of the Romanian women from the city of Pescara

State Register	Number	%
Resident	940	56.73%
Don't residente	62	3.74%
Not to be found	254	15.33%
Emigrant	394	23.78%
Deceased	1	0.06%
Canceled	6	0.36%
TOTAL	1654	100

Since March 2014, considering the Romanian women only who are residents and those who have emigrated, it can be observed that only 30% of the immigrants from Pescara city, decided to emigrate in another city, while the remaining 70% decided to remain and to assume the status of resident as shown in the figure 1.2.

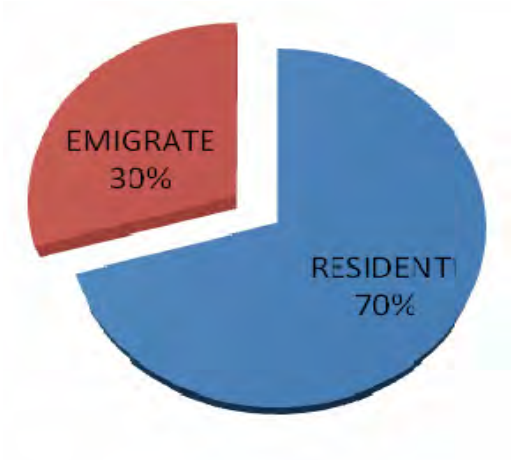

Figure 1.2. Residents and emigrants in the city of Pescara

Since 1990, it can also be evaluated how varied is the frequency of the migration phenomenon of the Romanian in Pescara town in the last years. There is a gradual increase of the phenomenon until 2004. Since 2005 to 2007 there was a sudden culmination which was, however, followed by a gradual descent to 2010 and then arriving to 2013, when an evident decline can be observed. The evolution of the phenomenon, thus, expresses a gradual recovery, followed by a disproportionate increase of the phenomenon and then inevitably ends in a sharp decline. It could be assumed therefore, that in the next years probably the phenomenon will be directed toward a further decline or to the achievement of a long-term constancy (Figure 1.3).

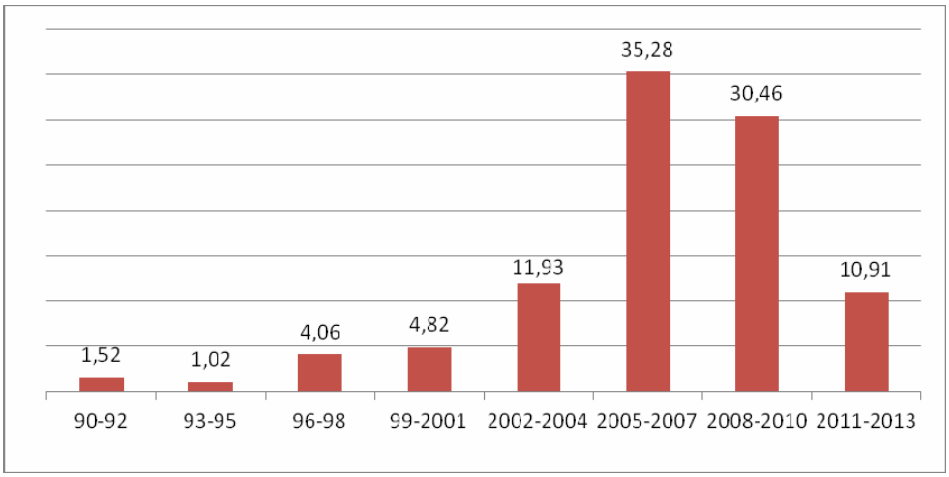

Figure 1.3. Performance migration

By analyzing a sample of women starting from a minimum age of 18 years, to a maximum age of 72 years, we founded out that the most part of the Romanian women that we considered are aged between 43 to 47 years old, followed by those who have ages between 33 to 37 years old, then 38 to 42 years old, and so on as shown in the table 1.14 and Figure 1.4.

Table 1.14

The presence of the Romanian women in the city of Pescara divided by age

AGE Romanian Women (From 18 to 72 year old)	**%**
From 18 to 22 year old	2.86 %
From 23 to 27 year old	6.46 %
From 28 to 32 year old	11.39 %
From 33 to 37 year old	14.66 %
From 38 to 42 year old	12.59 %
From 43 to 47 year old	**19.85 %**
From 48 to 52 year old	11.26 %
From 53 to 57 year old	11.33 %
From 58 to 62 year old	6.40 %
From 63 to 67 year old	2.47 %
From 68 to 72 year old	0.73 %

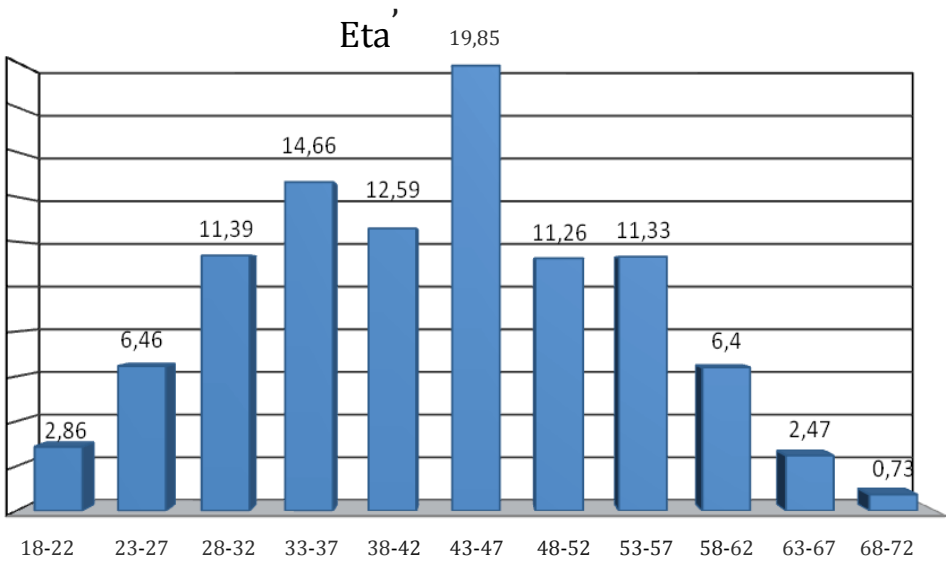

Figure 1.4. The presence of the Romanian women in the city of Pescara divided by age

One of the most significant changes which affects the migration processes of our country is the **"phenomenon of mixed couples."**

Among the mixed unions different types of marriage can be identified:

- marriage cohabitation (to legalize the presence on the territory of the Italian foreign person);
- wedding facilitator (to facilitate the insertion into the country of immigration);
- shotgun wedding (occurs after the birth of children);
- wedding elective (based on the love that unites the couple);
- marriage rights (the immigrant partner wants to learn things about a new culture);
- Marriage Agency (husbands who choose his own wife from a catalog);
- marriage of care (between caregivers and the assisted persons);
- marriage support (an isolated individual native, marries an immigrant of the opposite sex who is isolated too).

Italy is also one of the main destinations of the flow of **prostitution** from the Balkans and in particular from the south-eastern part, namely Albania, Moldova and Romania. In these countries there are many flows of women that are violently used for prostitution. The more we penetrate in these traffic flows, the more we can identify the trading cycles of the women, the "trading cycle" meaning the full range of the

active criminals to accomplish their objective of exploiting women coercively on the market of paid sex; this process involves the recruitment, the journey, the process of progressive enmeshment in the practice of forced prostitution.

Romania is one of the countries of the Balkan region that in the last ten years has been the most affected by the formation of mixed migration flows, as well as by persons who decided to emigrate for work purposes, even by significant groups of very young women unaccompanied by adult family members. These elements, under specific environmental conditions and existential, increases the degree of vulnerability of these immigrants section. In fact, the risk of being intercepted and involved in criminal circuits dedicated to trading and exploitation, seems rather high. In many cases the trading of women for prostitution determines and gives rise to the phenomenon of child trading, between which we find strong interactions.

What affects deeply these women and relate them to us, in our families and Services, is the fact that their countries of origin often enact behaviors of blame towards these women, accused of having broken up their family that they abandoned. This "blame" serves to their countries of origin, because in this way they do not take care of their children, but only take the benefits from their remittances. This leads to the emergence of a new form of depression that is haunting Europe, which is called "Italian Syndrome." It's not about the schizophrenia of finance or the risk of a new recession.

The syndrome which takes its name from the beautiful country affects the workers, or better the women workers, or, in a few words, the invisible carers from the East. The typical symptoms are recognized in their years of activity (they are in a bad mood, persistent sadness, loss of weight, loss of appetite, insomnia, fatigue, and suicidal fantasies) and they establish in a different fracture, which mixes the weakening of the sense of motherhood with a deep loneliness and a radical split identity. Those young mothers do not know anymore to which family they belong or to which part of Europe, as if it were an ancient harmony that has suddenly broken. The first to notice this were two psychiatrists from Ivano-Frankivsk, a city of two hundred thousand inhabitants in western Ukraine, marked deeply by the tragedies of the twentieth century. In 2005, Andriy Kiselyov and Anatoliy Faifrych noticed that two women in their care department have a clinical situation different from the others; they had a bad mood, persistent sadness, loss of weight, and suicidal fantasies. The "dark evil" has clear social origins. It was thus called the "Italian Syndrome", named after the most "badantizzato" country of Western Europe and perhaps of the world. The women who are affected of this syndrome are caregivers abroad, assure for long periods the company to the Italian women, they are nurses, or handyman in Italian houses. They do this for years, 24 hours daily, they are far from their home, and they have left their children alone, to take care of old people alone too, on the other side of the continent. They hold on their fragile shoulders two delicate transformations: on one side, the aging of Italy and the disintegration of its families; on the other side– because of their remittances, that often are the only source of income for their families left there - the tumultuous

transition of the eastern countries. They remain alone for a long time and no one perceives their increased stress. And in the end they can resist anymore and collapse. The first cases have been diagnosed in 2005, just three years after the great 2002 amnesty that allows to regularise tens of thousands of domestic workers.

In Romania, some psychiatrists began to study the other side of the coin, the children left in the country of departure, extending the new term " Italian syndrome " to them, calling them "white orphans" of an absent mother, children who have grown up with their grandparents and who are put to bed via Skype from a mother who is thousands miles away.

"It's a pain to take care of other people's children while their children are thousands miles away," said Silvia Dumitrache, president of Adri (Association of Romanian Women in Italy).

The association has developed a program to help these women and their children, it was called "Mom loves you!" and which involves the network of libraries in Romania, where children and teenagers can find acceptance and a computer to talk via Skype to their mothers apart. There are more than 300 children so far who have used this system to communicate with their distant parents. Even in Romania, the phenomenon is not far behind. According to the FONC (the National Federation of the non-profit organization for children of Romania) 1 million children are left home alone by parents who are abroad to work. EUROCHILD has confirmed that about 350 thousand of 700 thousand "white orphans" in Europe come from Romania and 126 thousand of them have both parents working abroad. 16% of them do not see their parents for more like one year, while 3% of them haven't seen their parents for more like four years. In the north Italy o n l y, there are more like

130 thousand workers Romanian women with an average age of 40 years who have left children in Romania in the care of grandparents or relatives or just by themselves. Approximately 750 000 children in Romania, out of a total of 5 million have at least one parent working abroad and many of them are aged between 2 and 6 years old; 15% of Romanian households have at least one member who emigrated to work. 80% of the children left home become seriously ill with nostalgia for parents with serious consequences on education and personality. A heartbreaking laceration, which sometimes has tragic consequences: there are forty, according to the associations (30 according to official figures), the Romanian children who have committed suicide since 2008 due to the remoteness of their mothers.

How can this European evil be cured? It seems almost to follow the severe economic (and geopolitical) downturns of the new global job market? Often, it is enough to reconstruct the household, and suddenly all the malaise vanishes. But the situations sometimes are more complex. When they return to their country of origin, many women find themselves in a new limbo. They find themselves in a country which no longer consider as their own; and in the meantime, their children have definitively turned their backs to them.

Two constants, which affects women, seems to return. They leave often a skilled job as a teacher, doctor, engineer, and they come to Italy to practice disqualified tasks, for which there was not been formed. In addition, over time, they are perceived as card-women: the only relationship with their family is sending them money. They become the only source of the income. These women need just to break the cage of loneliness. It is not normal to work 24 hours daily, absorbing upon themselves the problems of the new family, forgetting their own.

The "Italian Syndrome" is cured with warm, with community work, developing new forms of self-help. The mass migration will not stop, because the caregivers serve like the bread. It is unrealistic to think that the return home is the only solution, they need a better life here. The carers need to be considered women, not machines. Even here in Italy they are the subjects to be favored them the interventions for integration are designed. They are the key figures for the mediation between different worlds and cultures.

2. CONCLUSIONS

The twenty-first century can be defined as the age of migration, in fact since the decolonization and after, more emphatically, since the eighties of the twentieth century, the migration has affected the entire planet, being qualified as a global phenomenon par excellence. To prevail today are the new elements compared to the past, in fact, in addition to being changed the geography of the phenomenon, it has also transformed its composition, showing a growing feminization. As described in the article, the migration of Romanian nationality, are more and more women to create a migration plan and to venture into what are called "voyages of hope" with the objective of improving their conditions of life, both economic and social.

On the national level the higher presence among the people of foreign nationality, in Italy, is represented by Romania, in fact more than one fifth of the foreign nationals is Romanian. As we show the tables in the article, in Abruzzo region the most interested by immigration Romanian is the province of Chieti; Pescara city has, since 1 March 2014, 1657 total Romanian women and of these 70% live in a stable manner in Pescara. The Romanian women present on the Adriatic coast are aged between 43-47 years old, have children and is in possession of a degree (Junior High 50.12%). These women come mainly from the areas of Muntenia and Moldova.

These immigrant women, once that they arrive in our country are part of the household sector, by working as domestic helpers or carers.

One of the more significant change which affects the migration processes in our country is that the phenomenon of mixed couples, which first of all will be the partner to be changed. Dominating will be therefore an identity, seen as a process that can open spaces of the border, in which a series of different identities brought by the partners, to arrive at a shared identity. Italy is also one of the main target areas and landing daily flows of prostitution from Romania. The presence of women in the sex trade is very complex and differentiated, in fact the pursuit of such activities can take

place in apartments, public or private, or in the street. Its manifestation, on the one hand therefore expresses the willingness and ability of many women who aspire to wellness and life style Westerners, on the other hand, when it is subject to violence and exploitation, and once again reflected in our country imbalances, inequities and exploitation prior to emigration and present on a global scale. Many of these women start looking for new opportunities in life, where the work is a clear pattern of attraction, as it allows they to create your own project and they contributed to the maintenance of the family by sending remittances they acquired a fortune. Special consideration must be made for those women who depart alone, leaving behind their lives, their homeland, their children.

The name "Italy syndrome" comes from the fact that our country is the one with the highest number of carers in Europe. It is set up as a great form of depression originated from at least two factors, both related to an identity crisis; these women do not perceive themselves more as "good mothers" for the prolonged absence from their children, and an identity crisis of their nationality due to the dismemberment of the land of origin. With the work of carers look after a family, often elderly, that isn't their own, in a land that isn't theirs, with the inability to be reunited with his family for many years and therefore often forced to leave their children with grandparents.

The return to the land of origin means the inability to recognize; then also feel alien to a country that floats like identity and doesn't guarantee nor a primary sense of national belonging. Depression is a psychosomatic disease and these diseases are always born from a fracture, most often unconsciously. They are alone women, who do a hard job and it isn't qualified as are their actual qualifications, women also slowly dying inside because they can not be mothers.

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ASPECTS OF POPULATION EVOLUTION IN THE METROPOLITAN AREA OF BRAŞOV DURING THE POST-COMMUNIST PERIOD 1992-2011

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ABSTRACT. – Aspects of Population Evolution in the Metropolitan Area of Braşov During the Post-Communist Period 1992-2011. The metropolitan area of Braşov is an important polarizing center in Transylvania. Throughout the years this metropolitan area suffered not only the territorial, industrial, economic, political transformation but also demographic transformation due to the changes in the demographic structure of population. In this order, first of all we focus on demographic structures and population dynamics emphasizing actual social phenomena such as migration and population ageing. Our study reveals the existence of a similar framework at the national level: migration and ageing of population process. Secondly, we analyze the demographic structure of population in the post-communist period between 1992-2011 emphasizing the evolution of population by age and sector of activity. In our approach we will build a theoretical framework by using statistical data to indicate the demographic tendency of the population in the metropolitan area of Braşov. In the third place we consider the possibility to revitalize the studied area by proposing a few necessary measures for development and change in the mentality of the inhabitants.

***Keywords*:** *Metropolitan area, Braşov, population dynamics, natural growth of population, the migration*

1. INTRODUCTION

The urban development has always been a combination of city extension, urban regeneration and structural transformation varying during different decades. Through the years, cities are dynamic, being part of a system known as urban system define by "different urban settlements which established with other settlements relation of economic social and cultural cooperation, landscaping and environmental protection but also a distinctive administrative autonomy" (Beaujeu - Garnier, 1971).

The urban settlements are parts of an urban system in which they have a precise position and function as an urban area, metropolitan area or metropolitan region (Surd, 2003).

Metropolitan areas can be regarded as economic areas comprising various sub-economies with different forms of economic and spatial organization (Kratke, 2000). The metropolitan area is a large urban center consisting of a metropolis and its

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adjacent area of influence. In the area, one or more cities are centers of development for the whole area which are interconnected at the territorial level with municipalities, cities and villages.

The metropolitan region can include large urban conurbations in which are concentrated many added-value services. At European level, the number of metropolitan regions is steadily increasing, being the "engines" of creativity, development and economic growth.

From the metropolitan point of view, Romania recognizes that is important to develop functional territories. For the implementation of the national strategy of polycentric urban development and its connection to the European policy, the Romanian ministerial authorities designated funds from European and national programs to seven national growth poles (PIDU PC Braşov). These national growth poles are formed around 7 large cities as cores of these poles (one in each Development Region, such as: Iaşi, Constanţa, Ploieşti, Craiova, Timişoara, Cluj-Napoca, Braşov). The identified national poles correspond to accumulations of dynamic industry where the investments have important effects trained on regional economy. Also these growing poles generate interregional effects modifying not only the social and economic structure of the region in which they are located but also the proportions and the intensity of interregional exchanges, including the territorial repartition of population and economic activities (Borbély, 2011).

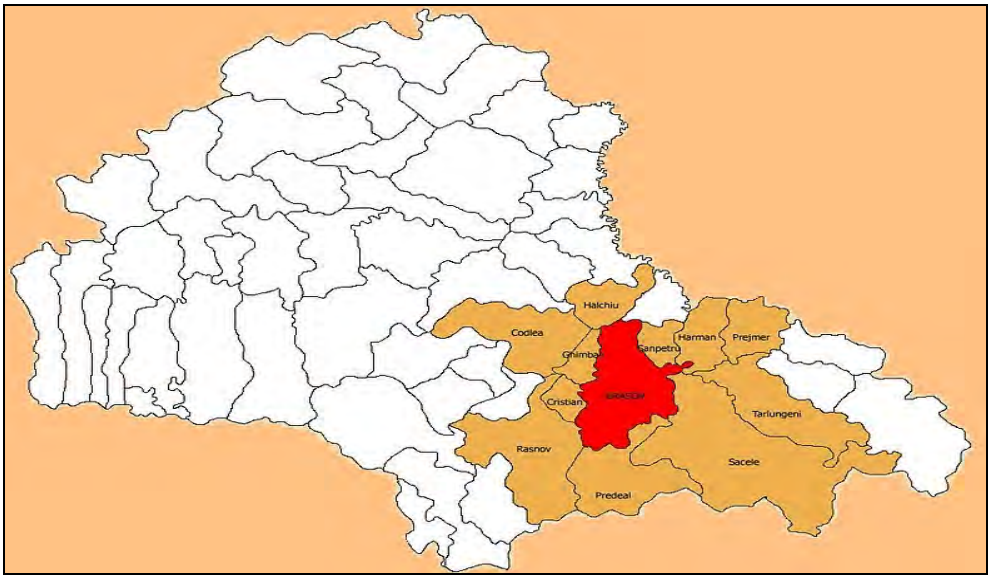

Fig. 1. Metropolitan Area of Braşov. *Source: Braşov Metropolitan Agency*

In Braşov case, the national condition of growing pole is fulfilled by the Metropolitan Area of Braşov established in compliance with the law (Law 215/ 2001). The inter-community associations of the metropolitan area are recovering their

historical evolution. Their potential is confirmed as developed poles with diverse influence in the territory regarding their role and their competitive level. The Metropolitan area of Braşov is important for Romania development and for the Development Region 7 Center (counties Alba, Braşov, Covasna, Harghita, Mureş and Sibiu). The metropolitan territory is comprised of 3 cities (Braşov, Săcele, Codlea), 3 towns (Ghimbav, Predeal, Râşnov) and 10 rural communes (Crizbav, Hălchiu, Bod, Hărman, Prejmer, Sânpetru, Tărlungeni, Cristian, Vulcan, Feldioara) which reunite a number of 410,121 inhabitants and covers an area of 141,229 hectares.

At European level, Braşov and its influence area are defined as being a functional urban area, participating as a key actor at the national and regional cohesion policy (Popescu, 2005).

2. MATERIALS AND METHODS

In general, the study on population can be addressed from two main methodological directions: the first one, the induction path, beginning from the cause and proceeding to the effect or the second one, the deductive path when we already know the effect. In our case, the evolution of the population helps to trace the causes and to explain the phenomenon at the end. In a logical way, we can admit the fact that the evolution of a total population has two trajectories: a positive one characterized by a natural growth of the total population and a negative one characterized by a decrease of the total population. The methodological directions and trajectories emphasize the essential use of statistical instruments which ensure the evolution study of the demographic structure of the population.

The methodological framework depends on available statistical information such as demographic indicators: population change, birth rate, mortality rate.

This study presents the main demographic structures within the metropolitan area of Braşov. The research investigates a large number of aspects or tendencies regarding the evolution of population in the metropolitan area of Braşov, which are in turn inter-related.

The first phase of methodological approach was to identify and delimitate the analyzed territory. Before starting the research, a bibliographical study was conducted for a comprehensive list of existing literature, internet platforms and databases on metropolitan areas. The second phase of our research is the desk research consisting in consultation of the specialized scientific sources and cartographic sources. To these sources was added document-research and the field research materialized through the collection of quantitative information from Municipality of Braşov city, the County Direction of Statistics of Braşov. The statistical data collected shows relevant aspects related to the evolution of population in the metropolitan area of Braşov and demographic tendencies. In the third phase we analyze and classify the collected information, interpreting the phenomenon and geographical process using graphics. On the one hand, this research made it possible to reconstruct the evolution of population and the development of the metropolitan area of Braşov constructing a chronological overview for the Braşov County.

The analysis of demographic indicators facilitated the analyses of demographic trends and the demographic structure of population in the metropolitan area of Braşov. The demographic indicators such as population change, birth rate, fertility rate, natural growth of population, and mortality rate set up the positive or negative trend of the total population. The statistical information is indicating the increase, decrease or stagnation of total population from metropolitan area for a long or short period of time. The statistical analysis shows similar aspects at the national level regarding the birth rate, mortality rate and natural growth of total population but also reveals some particularities related to administrative and industrial reorganization of urban and rural settlements.

The information from the field research, bibliographic resources but also the statistical data from the Municipality of Braşov city and the County Direction of Statistics of Braşov contributes essentially to illustrate the demographic characteristics of the studied area.

3. THE DEMOGRAPHIC STRUCTURE ANALYSIS

3.1. The population evolution of the Metropolitan Area of Braşov

The population is one of the most important resources for the development of the metropolitan area of Braşov. This variable holds a central role on the morphology, physiognomy and social unity that binds the demographic reproduction fund and reproduction of the labor force. This fact is an essential requirement for shaping the existing human potential and identifying strategic directions of development (Haupt, 2006).

In the past 20 years the demographic structure of the metropolitan area of Braşov registered modifications through time and space for the values such as natural growth of population, the structure of population by age, territorial mobility which is expressed as a necessity in today's population perceptions. The causes of modifications in demographic structure are attributed to the evolution incurred in political, economic and social sector. In this conditions is manifested an accentuate tendency of decreasing and ageing of population due to increase of mortality and external migration which affects all the aspects of social life.

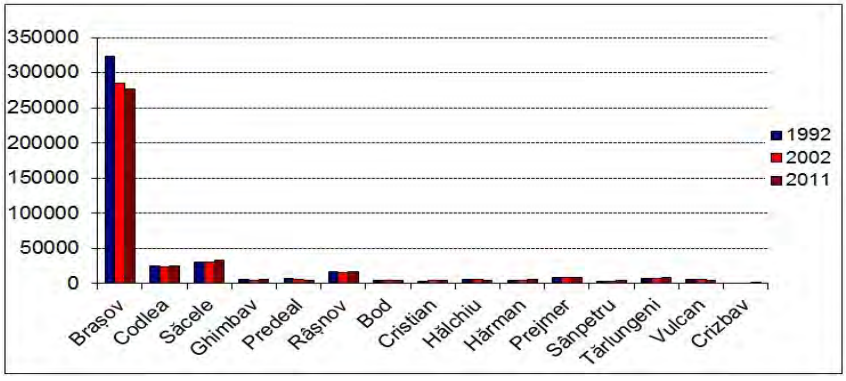

Fig. 2. The evolution of population in the Metropolitan Area of Braşov.

In the period 1992-2011 the population of the metropolitan area decreased by 8.71% from 449,257 inhabitants in 1992 to 410,116 inhabitants in 2011. In 1992-2002 the total population of the metropolitan area registered a decrease regarding the number of population by 9.14% (fig. 2). The causes of decreasing number of population are several but we will mention just a few such as the out-migration and decrease of life quality which determinate a drastic decrease of the birth rate. Through the years, the industry in the metropolitan area of Braşov decreased its function, with many industrial units in Braşov city being restructured, especially those representing the main factors of attractiveness.

A sensible growth of the population took place in the period 2002-2011, as a result of reflowing economy and state support for young families in order to increase birth rates. In the metropolitan area of Braşov the most significant increase of the total population were recorded in Sânpetru 30.76%, Hărman 23.11% because of the migration and residence changing for a substantial part of the population from Braşov city. The following localities also recorded an increase of total population such as Tărlungeni (21.67%) because of natural growth of Roma population; Cristian (21.55%), Bod (13.43%), Prejmer (11.77%), Săcele (9.31%), Ghimbav (1.91%), Râşnov (0.58%), Codlea (0.42%). At the opposite pole there is a decrease of total population in Predeal by 28.87%, Hălchiu by 16.40% because of the administrative reorganization. Also a decreasing trend of population is registered in the city of Braşov by 14.46% and in Vulcan by 11.97%.

Between 1992-2002, the town of Predeal experienced the largest decrease of total population. In this order, between 1992-2002 the population decreased by 23.10%. This decreasing tendency continued after 2002 and in 2011 the town of Predeal has reached a decrease by 28.87% of the number of inhabitants compared to 1992 because of the spatial movement. Unlike Predeal, in the rural space, Sânpetru recorded between 1992-2002 a population growth of 4.23% and up to the year 2011 an increase by 30%.

3.2. Population dynamics

3.2.1. The natural growth of population

Declining living standards, economic restructuring, unemployment, low income and freedom to travel beyond country's borders dominate the population evolution of urban space in Romania.

The natural growth of population means the difference between two demographic indicators: the birth rate and the mortality rate. After 1990, especially 1992-2007 the natural growth registered negative values accentuating the population ageing but also a decrease of active population when compared to the inactive population. For this period the demographic tendency shows that the mortality rate was higher than the birth rate.

In 1992 the natural growth of population in the Metropolitan Area of Braşov reached an average of 1.03‰. According to *County Direction of Statistics of Braşov* the highest values of natural growth of population were registered in Vulcan (6.84‰), Codlea (4.3‰), Râşnov (2.07‰), Tărlungeni (1.88‰). Negative values have been recorded in Sânpetru (-2.67‰), Hălchiu (-1.73‰), Hărman (-0.72‰). After the year 1992 the

natural growth of population decreased and until 2002 has reached a value of -1.36‰. The lowest values of natural growth of population were recorded in Sânpetru (-6.43‰), Bod (-3.07‰), Braşov (-2.63‰), Predeal (-1.95‰), Cristian (-1.55‰), Ghimbav (-1.39‰). A positive natural growth was registered in Hălchiu (5.02‰), Codlea (4.9‰), Vulcan (2.5‰). The positive values registered are the results of an early phase of the fragile balance of economic structures. Due to the fact that the population accepts economic and social changes, adapting new objective conditions for restructuring with all its difficulties (fig. 3).

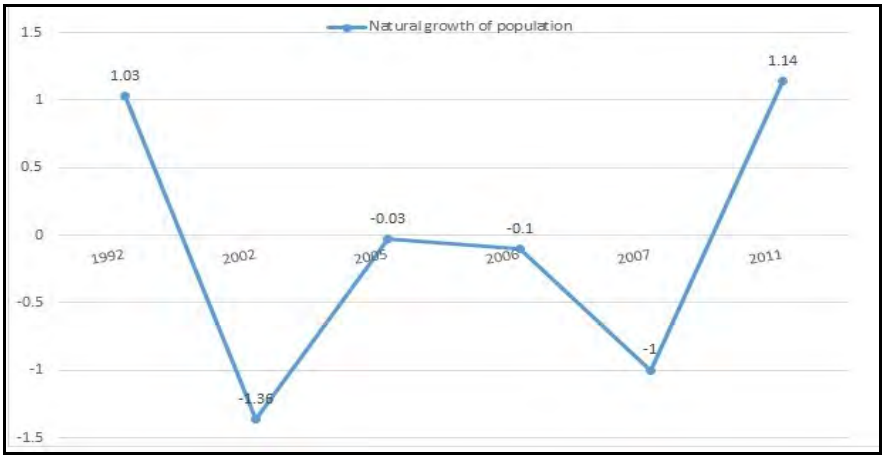

Fig. 3. The natural growth of population 1992-2011.

In 2007 the Metropolitan Area of Braşov registered a positive value of natural growth of population with 0.3‰, a birth rate of 4.2‰ and a mortality rate of 3.7‰. In 2011 the natural growth of the Metropolitan Area of Braşov increased by 1.14‰. The localities which have a positive high value of natural growth of population in a descending order are: Tărlungeni (7.37‰), Săcele (6.57‰), Vulcan (4.62‰), Codlea (4.50‰). The high values are the result of the presence of an important segment of Roma population for which the birth rates registered high values. On the other side, the constant negative values of natural growth of population are registered in Braşov (-0.21‰), Predeal (-2.50‰), Bod (-2.19‰). At the local level in 2011 the majority of the settlements from the metropolitan area have a positive natural growth from a demographic point of view assuring conditions for the sustainability of the Metropolitan Area.

3.2.2. The structure of population by age group

The structure of population by age group is an important demographic indicator from the perspective of demographic and socio-economic planning but also in terms of the volume and structure of consumption. The structure of population by age is considered a social-demographic classification of the total population for the Metropolitan area of Braşov.

For a comprehensive picture of the evolution of population structure by age groups we take into consideration the age group 0-19 years; the age group 20-64 years is representing the category of the working and active population and the age group over 65 years representing the inactive population (children and retired people).

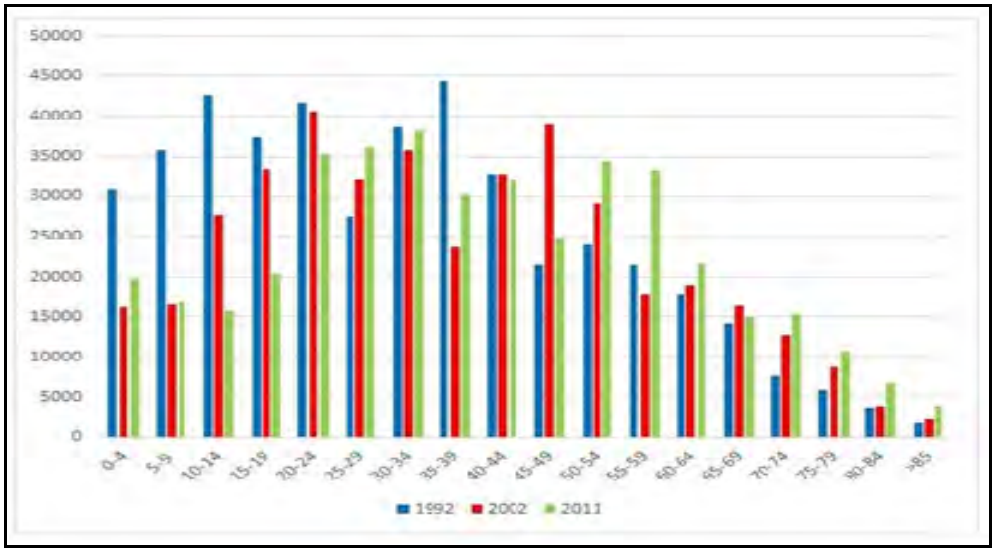

Fig. 4. The demographic structure of population by age group in 1992-2011.

In 1992 the age group 0-19 years gathered a total population of 33%, the age group 20-64 represents 60% of the total population, while the age group over 65 years gathered only a total population of 7%. In 2002 the age group 0-19 years recorded a decrease to 23% mostly represented by children from primary and secondary schools; the age group 20-64 years increased to 66% represented by working people and the age group over 65 years increased slowly with 11%, represented by elderly people with mobility and health problems. Between 2009-2011 the demographic structure of population by age underlines the fact that the age group 0-19 years recorded a constant decrease up to -1% from 18.84% in 2009 to 18.21% in 2010 and 17.73% in 2011 due to the low fertility rate and decrease of young population. The age group 20-64 years known a slight increase from 68.88% in 2009 to 69.36% in 2010 and 69.74% in 2011 related to the existence of a varied sum of local services provided to inhabitants. The age group 20-24 years has a particular important role in the future for the labor force and work resources regarding a medium and short term. The lowest value is registered in the age group over 65 years which has a slightly tendency of increasing from 12.28% in 2009 to 12.43% in 2010 and to 12.53% in 2011. The age group over 65 years has a great social implication of degradation for demographic structure of population by increasing the process of ageing

population (fig. 4). The low values of fertility rates and birth rates determine the demographic structure of population by age to continue modifying its composition by reducing the number of young people and increasing the number of elderly people.

The ageing of population is a complex phenomenon which influences the evolution of demographic structure of population by age, increasing the number of elderly people, influencing directly the proportion of active population and the relationship between ageing dependence and demographic sustainability in the Metropolitan Area of Braşov.

The demographic ageing rate (the number of elderly people of 65 years and above) which correspond to 1000 young people (0-19 years) recorded high values of 651.69‰ in 2009, but in 2010- 682.61‰ and 707.04‰ in 2011. In this case, an important role has the dependence ratio of elderly people (65 years and above) to the 100% active population (between 15-64 years) which had an ascending evolution also, from 16.30% in 2009 to 16.56% in 2010 and 16.78% in 2011. The increase of the dependence ratio indicates an increasing pressure over the active population which needs to assure the necessary resources (material, pensions, social and medical services) for people who are preparing to exit or already exited the labor market. In the Metropolitan Area of Braşov the ageing process is gradual with accentuate tendencies in cities (Braşov, Predeal) as a result of internal, external and international migration.

To combat the ageing of population it is mandatory that the local and national governance take measures to create a favorable environment for young families.

3.2.3. The structure of population by sector of activity

This structure offers information about the social-economic stage of development in urban settlements. The economic profile of the Metropolitan Area of Braşov has known major changes in the last 20 years with important structural mutations of the labor force. The demographic evolution in the Metropolitan Area of Braşov has a strong effect on the dynamics of the labor force. The decrease of population imposes the necessity to extend the active period of the labor market and also to increase the productivity adapted to the evolution of the labor market. The labor force concentrated in buildings and infrastructure, industry services was elevated during periods of economic growth and on the opposite side disadvantaged the people which work in the industry. Also as a result of the urbanization of the metropolitan area, the share of the population employed in agriculture remained low.

The active population in the Metropolitan Area of Braşov is represented by young and skilled people seeking opportunities for employment or already working to provide supply and goods. In 1992 the total active population of metropolitan area of Braşov was 218,683 inhabitants. During the 2009-2011 the total active population of metropolitan area decreased with 73.31% in 2009 on behalf of economics crisis and a high rate of unemployment then followed with 75.09% in 2010 and 74.70% in 2011.

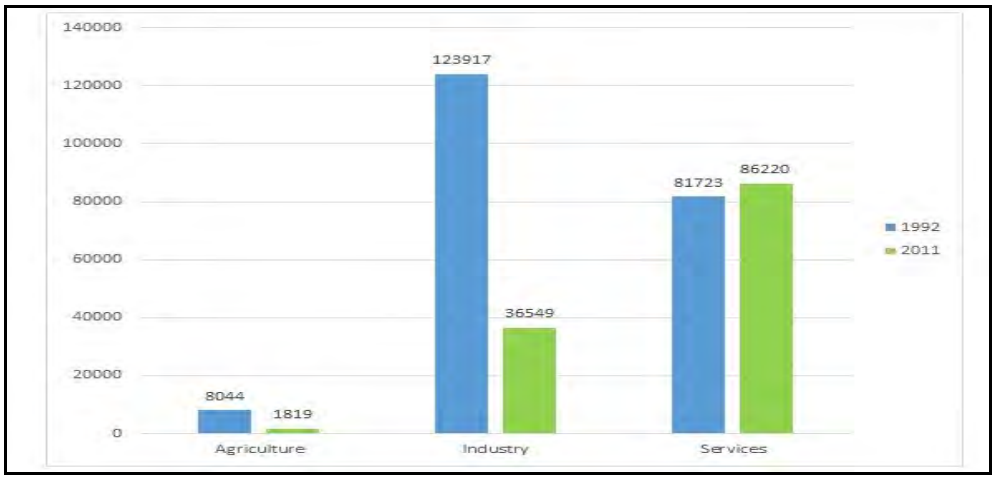

Fig. 5. The structure of population by economic activity between 1992- 2011.

The main cause of active population decreasing is the reduction of the average age of retirement imposing an early retirement. Also we mention an increase of the people that follows a high education and in this way extend their period of inactivity.

In the last years the employed population has followed an ascending trend of active population. During the past few years, the unemployment rate in Braşov has been usually higher than the national average. The social and economic problems of the Braşov area would have become even more severe if part of the unemployed people would not have been absorbed by various activities in service sectors (Marinescu, 2011).

The decrease of employed population was emphasized by the economic crisis existing at the global level. In 1992 the population accounted 213,684 people, in time this number of inhabitants decreased to 144,129 people in 2009, to 128,440 employed people in 2010 and in 2011 there were only 124,558 employed people.

According to the 1992 census, 8,044 people worked in the primary sector (agriculture), 123,917 people in the secondary sector and a high value of 81,723 people was registered in the tertiary sector (services).

From the dispersion of employed people in the metropolitan area, in 2011 the main suppliers of economic activities and jobs are: Braşov with 97,874 people, Săcele with 5,697 people, Codlea with 5,215 people, Ghimbav with 3,049 people, Cristian with 3,812 people, Predeal with 1,473 people, Râşnov with 1,811 people, Prejmer with 1,367 people, Sânpetru with 1,114 people, Hărman 1,029 people.

The distribution by activity sectors in 2011 indicated higher values of population in agriculture, in the cities and towns: Braşov 872 people, Codlea recorded 380 people, Râşnov reached 115 people, Hălchiu-109 people, Predeal-71 people and Săcele-65 people. The lower values of population in the agriculture activity sector are in the localities Prejmer with 12 people and Cristian with 24 people. In industry the major part of population are concentrated in the city of Braşov 22,392 people, in Cristian 3,207 people,

Săcele 2,771 people, Ghimbav 2,356 people, Codlea 2,237 people, Prejmer 868 people, Sânpetru 638 people, Râşnov 620 people. The service sector reached highest values in the city of Braşov with 74,610 people, 2,598 in Codlea, 2,861 in Săcele, Predeal 1,276, Râşnov 1,076 people, Ghimbav 636, Cristian 581, Prejmer 487, Sânpetru 476, Hărman 437 (fig. 5).

The services sector acquires a significant importance, while the agriculture sector and industry sector recorded a slight decrease trend in parallel with a slight increase in the share of the population employed in services. Despite this, the Metropolitan Area of Braşov holds the polarizing role for the entire region. The center of metropolitan area highlights a diversified economic profile with two strengths: industrial tradition and tourism potential.

3.2.4. The migration

The migration is a significant component of population dynamics with two components such as internal migration and external migration. The migratory balance of the Metropolitan area of Braşov has fluctuated from year to year. The population flows before 1990 were held from rural space to the urban space because of vacant jobs in secondary and service sector. After 1990 these flows of population were reversed to a new phenomenon known as urban-rural re-emigration as a result of economic, social problems determinate by the process of industrial restructuration. The population from urban settlements moved to rural settlements because of the reduction of the economic activities in urban space and in order to access services provided by a municipal infrastructure. Externally, a large part of the population migrated to other developed countries due to the scarcity of some economic functions in the country, better work benefits and higher life standards.

In this context, in 1992 the migration balance had a positive value of 4.50‰ (fig. 6).

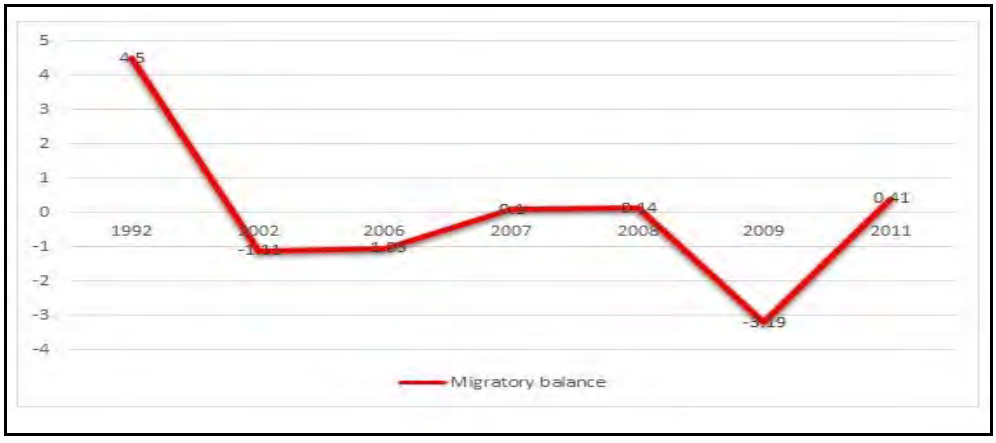

Fig. 6. The evolution of migratory balance 1992-2011.

The town of Ghimbav registered the highest value of the migration balance of 61.02‰, followed by the municipalities of Prejmer 22.31‰, Codlea 12.36‰, Râşnov 8.16‰ and Braşov 4.27‰. The lowest migratory increase was registered in the city of Braşov (4.18‰) due to the external migration to the Metropolitan area of Braşov. In the period 2006-2008 the migratory balance had a positive evolution due to a period of economic growth. In 2006 increased values of migratory balance reached a value of -1.03%, in 2007 – 0.10% and in 2008 -0.14% seconded by the aspects of financial crisis. During the period 2008-2011 one can notice a decrease of the resident inhabitants in the metropolitan area and a moderate reduction of departure of residents from this area. The existing economic crisis at the global level affected the population of the metropolitan area so that in 2009 there was a dramatic level of migration of -3.19%. In 2011 the migratory balance known a return of a positive, ascending trend reaching a value of 0.41‰ .

In the population dynamics the age of migrants plays an important role. In the last years, a common age of migrants is represented by young people of 25-29 years and 30-34 years reaching 34.60% until 2011. From 2007, after Romania become a part of EU space the migration become more intense for young people migrating abroad.

4. RESULTS AND DISCUSSIONS

In the Metropolitan area of Braşov, the population represents a dynamic and essential element which organizes the geographic space through the potential intervention of the habitats, but also through its settlement systems and their functions considered as agents of transformation of the territory.

The territorial dynamic of the metropolitan area of Braşov is similar at the regional and national level where we point out that the population of Romania has decreased roughly with 10% compared to the total value recorded in 1992. During the period 1992-2011 the total population of Metropolitan Area of Braşov changed by -8.71%. Although the natural growth of the population registered positive values from 1.03‰ in 1992 to 1.14‰ in 2011 this is insufficient to compensate the phenomenon of population ageing.

As a result of the decrease in revenue and elimination of some incentive measures dedicated to young mothers, the birth rates are following a tendency of decrease. The mortality rate follows the same tendency of decrease due to the increase of life expectancy. The migratory balance had a positive trend correlated with periods of growth in 1992 of 4.50‰ but lately we can notice a decrease by 0.14 ‰ due to the negative values recorded being correlated with the global economic crisis. In the last years, the internal migration in the Metropolitan area of Braşov reached an increase from 9.28% to 11.69% of the total population. Despite the other metropolitan areas from Romania, the metropolitan area of Braşov is noted with a high degree of urbanization (almost 90% of the total population lives in cities and towns) generating an urban territorial cohesion.

The demographic structure of population by age shows for the age class >65 years a prominent tendency of ageing population while the young age class 0-19 is characterized by decrease in the birth rates with 46.27% during the post-communist period 1992-2011.

The social-demographic phenomenon of ageing population manifests as reduction of the young people simultaneous with the increase of the elderly people causing negative consequences for the labor force and market in all activity sectors. In the same time, the proportion of the active population in post-communist period 1992-2011 decreased by 24.6% affecting mainly the dependence imbalance in the metropolitan area.

The possibilities for the revitalization and development of the metropolitan area of Braşov are real but this process requires significant investments for demographic revival.

In the metropolitan area of Braşov there can be applied measures to redress the demographic indicators. The case study regarding the metropolitan area of Braşov represents a territorial analysis of major importance in order to pursuit an effective policy and a sustainable development. Through its geographic position, Braşov can play an important role in the territorial and economical cohesion, by developing along with other functional urban areas (like Constanţa, Bucharest and Ploieşti) and can became an integrated part of an economical development axis at national level formed by Bucuresti, Ploiesti and Braşov. The forecasts regarding the economical, social and territorial cohesion made by EU indicates that by 2020 Braşov can have a major importance in the metropolitan areas of Romania, along with Bucharest and Constanţa (Popescu & Corbos, 2010).

5. CONCLUSIONS

The population is the most important resource for the state and the only one that can generate production and consumption, constituting one of the main subsystems of the national economy. The relation between the population and the production-consumption system is particularly complex because selectively the population influences the production subsystem. This influence of population is taking place by participation of active population which ensures the workforce resources, volume and structure of consumption. The population is shown as a system by its structure and its number and can be considered a resource ensuring by its number the quantity of labor force and by its structure the quality and variety of labor force. Furthermore, these aspects influence the size of the population, the natural increase of the population and the economic growth. In this order, it is necessary to implement policies and measures to combat the causes and the effects of demographic indicators as population change, birth rate, mortality rate. These measures and actions will counter the gradual process of migration and ageing of population preventing degradation of demographic structure of population. The efforts need to be oriented in rehabilitation of infrastructure and creation of jobs, the modernization of communication network, easy access for quick transmission of the characteristics of the urban territory. Also these

efforts are completed by the construction of social facilities at an appropriate level (health care, education and development), investment for development and modernization of technology transfer centers, logistic centers, and business centers of cluster type, creating jobs for attracting the population of middle-aged group or young people.

The other measures required are support policy and diversification of economic activities which assure the development of settlements and increasing quality of life, health and social policies aimed at the protection of the family. We mention also about economic and social policies in order to increase the attractiveness of young population stabilization, and actions for the protection and assistance of the elderly population. This kind of actions for elderly people includes health services at home, new social houses for less mobile elderly people.

In order to attract in the metropolitan area highly qualified people we need measures of stabilization using the scientific potential of University center from city Braşov for the promotion of activities based on high technology and creating the economic environment and adequate physical-spatial environment. We need to enforce the countering measures for the process of depopulation and other demographic negative process which generate imbalances in the living environment by increasing the employment opportunities and entrepreneur initiatives, diversification of economic activities. It is necessary to reinforce the role of the polarizing center by supporting the development and diversification of economic activities, use of the potential of existing restructured industry, creation of IMMs (small and medium-sized companies); improvements to public facilities and services with the territorial role of urban infrastructure and transport. The economic policies are in order to increase the attractiveness for young population by offering job opportunities in the industrial parks of the metropolitan area.

These policies and measures will counteract the out-migration of young people, the increase of elderly people and in the end will reduce the process of depopulation in urban settlements. Following these strategies and measures the Metropolitan area of Braşov will gain a superior level in urban hierarchy of settlements and will become a true economic and social space.

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MARGINAL AREAS OF THE ROMANIAN BANAT

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ABSTRACT. – Marginal Areas of the Romanian Banat. Banat region is historically located between the rivers Danube, Tisa and Mureș, on three sides, and the Carpathians. This analysis focuses only on the Romanian Banat. After the December 1989 Revolution which started in Timișoara, the regional capital of Banat, the transition to the market economy and the recent economic crisis has severely struck the pillars of local economy in many parts of the region: agriculture and mining. According to a number of well-known criteria, the paper identifies and analyzes the marginal areas of the region: rural isolated areas such as Lipova Hills and Almăj Land, mining and industrial regions like Reșița-Bocșa-Anina, Poiana Ruscă Mountains and Bistra Valley. The rural areas lack accessibility and have an autarchic economy based on agriculture. The former industrial regions are characterised by high rates of unemployment and a decline in the living standards. The consequences are mainly the same: emigration, low birth rates, demographic ageing, socio-economic instability.

Keywords*: Banat, marginality, rural isolated areas, declining industrial areas*

1. INTRODUCTION. MARGINAL AREAS IN A MARGINAL COUNTRY: ROMANIA

Romania is a member of the European Union since 2007 but it still ranks among the least developed countries of the European Union according to various socio-economic criteria, such as the GDP / inhabitant (Ibolya Kurkó, 2010, J. Benedek, Nóra-Csilla Veress, 2013) or the Human Development Index (Ibolya Kurkó, 2011). There are numerous causes for this underdevelopment. The communist rule was harsher in Romania than in other communist countries of Central and Eastern Europe and left deeper scars on the Romanian society and economy (A. Sterbling, 1997, D. Turnock, 1997, A.U. Gabanyi, 1998, S.D. Roper, 2000, W. Heller, I. Ianoș, 2004, H.F. Carey, 2004, T. Gallagher, 2005, W.E. Schreiber, R. Rusu, 2014). The period of transition from the centralized system to the market economy was also a difficult process, marked by ambiguity and setbacks (D. Turnock, 2007, J. Benedek, P. Jordan, 2007, D. Turnock, 2009, Anita Szojnik, Kinga Ivan, R. Rusu, 2012). The EU membership, seen by many people as the end of all problems, brought further issues, especially due to the economic crisis which started in 2008-2009 (J. Benedek, Ibolya Kurkó, 2010, H.J. Bürkner, 2011, R. Rusu, W. Schreiber, 2013, J. Benedek, M. Cristea, 2014, Ibolya Török, 2015).

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Geodemographic and socio-economic disparities within Romania have been analysed in detail by Ibolya Kurkó (2010) and focus on the subject has also been provided by Claudia Popescu (2003), M. Bakk and J. Benedek (2010), J. Benedek and Nóra-Csilla Veress (2013), R. Rusu and W. Schreiber (2013). It comes out that Bucureşti-Ilfov is the only Romanian region whose development is slightly higher than the EU average, as it is a small region around the national capital and it actually reflects the development of the capital city and its immediate surroundings. All the other regions are well below the EU average but there are still important differences between them.

While the mentioned regions are the official development regions (NUTS 2 level), there are also other smaller or larger areas which have been addressed and discussed. Special attention has been given to border and even crossborder regions which are marginal both in location and socio-economic terms: Maramureş (N. Boar, 2006), the Romanian-Bulgarian crossborder area (Georgiana Toth, Alina Huzui-Stoiculescu, 2014), the Hungarian-Romanian border region (E. Nagy, 2014). This is also the case of Banat and the paper focuses on the internal disparities within the Romanian part of this geographical-historical region.

2. METHODOLOGY

The criteria used to delimit marginal areas in Banat are quite various and they might be differentiated according to the type of marginal area. Two different types of marginal regions in Banat have been taken into consideration:

- Poor rural isolated areas. Among the rural isolated areas, one should emphasize the Lipova Hills and Almăj Land (including Bozovici Basin and Almăj Mountains, until the Danube Gorges);
- Industrial areas severely struck by economic recession. The industrial areas in recession are those centered on Reşiţa, whose metallurgic industry recorded a strong decline manifested in higher unemployment rates and affected the entire county, and Oţelu Roşu, a smaller metallurgic town on Bistra Valley. The privatization of these two giant factories represents one of the most widely known cases of failure in capitalist Romania. More than that, the other industrial enterprises located in Bocşa, Anina or Nădrag, followed the same pattern of decline and unemployment. This finally led to their former status of "critical area", where a number of facilities were given to potential investors.

Some criteria have been used for both types of marginal areas. However, most of them apply only for one of the above-mentioned types. Such criteria are:

- difficult access to the main communication lines;
- lack of basic modern needs: electric power, water supply, communication lines (telephones), gas supply;
- high or very high unemployment rate;
- repeated states of total isolation during winter;
- autarchic economy based on agriculture and forestry;
- the former status of "critical area" given by the Romanian Government;
- lack of any other choice for a job in the case of the unemployed;
- demographic decline due both to natural causes and high migration rate;
- low sanitary standards;

- the region's economy is based on only one factory or economic activity which has become unprofitable and/or is about to cease its existence.

The criteria were selected according to the recommendations of the best-known international and national examples regarding the subject of marginality (W. Leimgruber, 2004, Ibolya Kurkó, 2010), taking also into account the specificities of Banat region.

3. RESULTS AND DISCUSSION

Banat was in itself a marginal region throughout the centuries, and even its name means "border region" or "mark" according to linguists, who considered it to be a place name of Slavic origin. Hungarians borrowed the name from the nearby Slavs and applied it to no less than five Southern border regions of their medieval kingdom; but only today's Banat retain this name. It is located between the Danube, Mureş and Tisa rivers, and the Carpathians (R. Rusu, 2007, N. Popa, 2008).

It was inhabited by Dacians when the Romans conquered it in 106 AD. For more than 150 years it was part of the Roman province Dacia, and its borders were the same with those of the Empire on two sides (Mureş and Tisa). When the Romans left around 271 AD, the local inhabitants (Romanians) suffered the passage of nomad migratory tribes for hundreds of years. Among those who settled were the Slavs (today Serbs) around the 7th century, and the Magyars, who established their Hungarian kingdom in former Pannonia and conquered the Banat around the year 1000. It was then when the region received its name, as it was a buffer zone between Hungary and the nearby medieval states of Wallachia, Serbia and later the Ottoman Empire. The Hungarian rule lasted until 1552, when the expanding Turks conquered Hungary, including Banat. Still, the region was again a buffer zone between the Ottoman Empire and the autonomous Transylvanian Principality. Parts of mountainous Banat were even integrated within the Principality until late in the 17th century. The Austrians succeeded in reconquering the former Hungarian kingdom from the Turks. The Karlowitz Treaty (1699) recognized their authority of all the territories North of Mureş, while the Passarowitz Treaty (1718) gave them full powers over Banat region. Until 1778, Banat region was considered as the property of the Austrian Emperor. The Austrians, taking into consideration the depopulation of the Banat Lowlands, colonized the region with Catholic Germans ("Schwaben") and even other Catholic people (Czechs, Slovaks, Bulgarians, Hungarians and even French, Italians and Spaniards). Due to the continuous pressures made by the Hungarian aristocracy in search for new lands and properties, Banat was incorporated in Hungary in 1778, and it was then part of the Austrian-Hungarian Empire until the First World War. New waves of colonists (Hungarians mostly) arrived and mixed with the local inhabitants, the Romanians and the Serbs. Although the Romanian population formed a large majority throughout the centuries, Banat region is one of the most interesting examples of ethnic mixture and tolerance in Europe. After First World War, its territory (covering 28,526 km^2) was split into three: Romania received about two thirds (18,966 km^2), Serbia (Yugoslavia) about one third (9,276 km^2) and Hungary about 1% (284 km^2).

The historical limits of Banat region tend to decrease in importance, as some of them are now central axes of the region (Tisa and Mureş rivers). Romanian Banat

comprises two counties entirely: Timiș and Caraș-Severin, an important part of Arad County and small parts of Mehedinți and Hunedoara counties.

The main city of Banat is Timișoara. It has about 320,000 inhabitants and it is a large industrial and cultural metropolis. At the same time, it is the city of the 1989 Romanian Revolution against communism and dictatorship. Reșița is the seat of Caraș-Severin, a county severely struck by economic recession and the transition from a centralized economy to a free market economy and globalization. Its metallurgic industry fails to compete on the market and its population dropped from about 100,000 in 1990 to about 80,000 at present. Other important towns are Lugoj and Caransebeș, both located on Timiș River along the E 70 road and the railway linking Timișoara to Southern Romania and Bucharest. They have between 20,000 and 50,000 inhabitants. All the other towns have less than 20,000 inhabitants, many of them between 5,000 and 10,000. Several settlements have been raised to town status since 1990: Făget (1994), Recaș, Ciacova and Gătaia (April 2004).

The main communication ways are along the rivers. The E 68 road and the international railway from Budapest enter the country near Arad and head eastwards along the river Mureș. Similarly, the E 70 road and the railway from Belgrade pass the border at Moravița and head to Timișoara and then towards Lugoj and Caransebeș along the river Timiș. Other important transportation routes link the main cities of the region, Timișoara and Arad, and then they go northwards to Oradea. Other national and secondary roads make the connection with the other towns.

Lipova Hills

The area located between Mureș and Bega rivers is formed by hills, no more than 300 m high. They have gentle slopes and can be used in agriculture. The villages of this region had a very steep decline in population numbers during the 20th century, and some of them became uninhabited at the end of the century.

The analysis takes into consideration nine communes forming the core of the area, four of them in Arad County: Șiștarovăț, Dorgoș (Ususău), Bata and Birchiș, and five in Timiș County: Bogda, Brestovăț, Secaș, Bara and Ohaba Lungă. One may also include several other villages, belonging to communes from outside the region, such as Chelmac, Belotinț, Lalașinț (in Arad County), Nadăș, Sălciua Nouă, Topla, Bunea Mare, Bunea Mică, Groși and Bulza (in Timiș County).

Their population increased in numbers until the beginning of the 20th century, when they reached their peak. Since the First World War, they began to decrease in numbers, a decline that severely accelerated after the Second World War. Extremely low numbers have been recorded at the 1992 census, and the 2002 and 2011 censuses showed no improvement of their situation. Most of the villages have below 100 inhabitants, and some even below 20 inhabitants.

The main causes of this significant decline are the emigration of the young and adult population to the cities throughout the 20th century, the lack of connection to the main means of transportation and the autarchic agriculture, oriented for the subsistence of the dwellers, not towards a competitive market. All these causes and factors are linked one to the other in a number of ways.

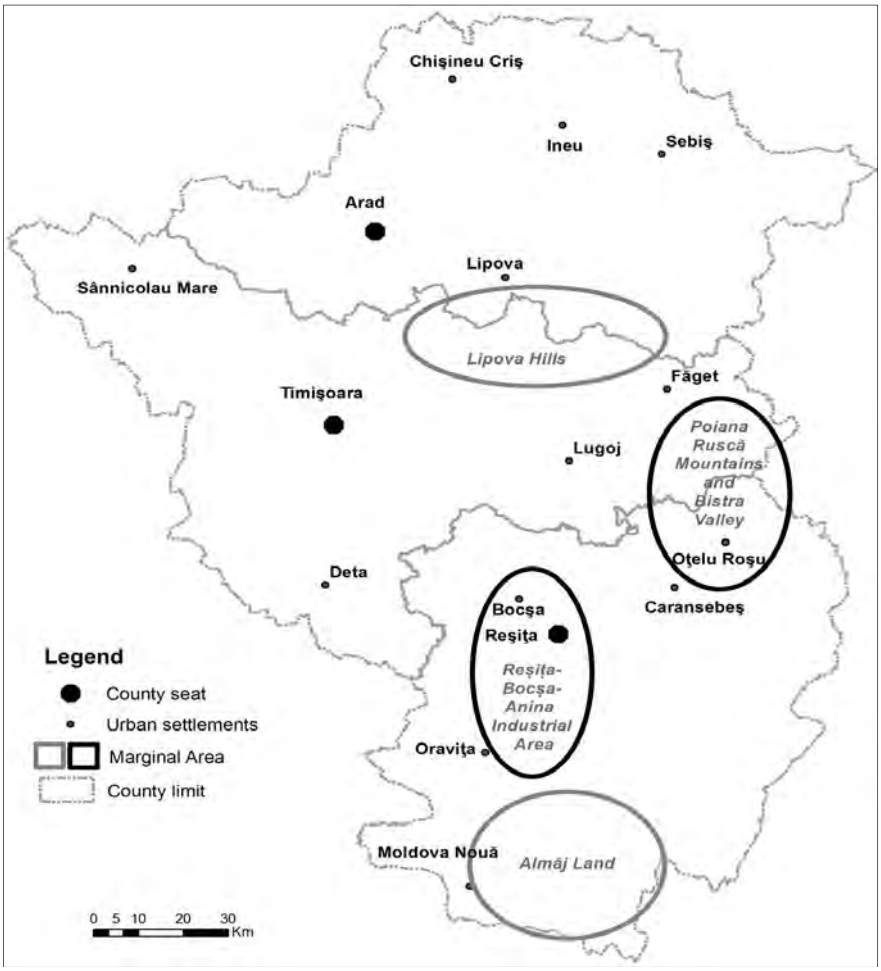

Fig. 1. The location of the marginal areas in the Romanian Banat

For instance, no large city is located nearby. The only town, which lies at the edge of the hills, is Lipova, but it was never a developing urban centre. Two other towns have been only recently declared as such (Făget, Recaş) or they still wait for a decision to become such (Săvârşin). However, all of them failed to attract the population from the hills, who migrated in large numbers to the main cities of Banat (Timişoara, Arad, Lugoj). Because of the distance, daily commuting was not possible, so they finally established themselves in the city. The communist government even encouraged this rural emigration by providing cheap accommodation in blocks of flats for the migrants.

The Lipova Hills are not crossed by any railway, and no national road passes nearby. The only partly modernized road is the one relating Lipova and Făget, while stretches of modernized roads link the commune centres to the above-mentioned small towns.

A very important issue is the lack of bridges over the river Mureş between Lipova and Săvârşin. On its North bank, the river is followed by the international E 60 road and the most important Romanian railway. Only a few hundreds of meters away, on its South bank, the villages of Lipova Hills have no connection to this communication axis. The passage by boats is sometimes dangerous and even impossible, especially during winter (because of the ice floating on the river) and during spring (because of the high level of the waters).

The lack of schools is another problem for the few inhabitants of the hills. Although general education (8 years, to become 9 years) is compulsory for everyone, there are only four communes that have such schools (Birchiş, Ususău, Brestovăţ and Ohaba Lungă), while the pupils from the other five communes have to commute to the nearest general school available. Many villages have no school at all, not even for primary education. This is a very unusual situation, as at least one general school should exist in every commune.

Agriculture is the main occupation of the inhabitants. It has a subsistence character, as no markets are available nearby. Because of the population decline and the high weight of people aged over 60, large portions of land remain fallow ground. Fruit tree growing is a traditional occupation, now also in decay. Forestry is the second activity, but forests are to be found only in a few patches on the highest hills.

Almăj Land

This name usually describes the Bozovici Basin, but we will also make reference in this paper to the nearby Almăj Mountains, which separate the Basin from the Danube Gorges area.

Bozovici Basin is one of the most isolated Basins of the Carpathians (Ana-Neli Ianăş, 2011). It is completely surrounded by mountains; the river Nera, which drains it, makes its way out through absolutely impenetrable gorges. The mountains around it assured the protection of its inhabitants, so the Romanians form a vast majority of the population in this area. However, as a part of the Austrian Empire, it also received emigrants who formed new settlements on the mountains nearby. It were the Czechs who accepted the harsh conditions of the mountainous environment and formed a number of villages as they were employed in forestry and later in coal mining, the most important economic activity of Almăj Mountains. The Romanians also colonized the mountains at the same time, as the Danube became a more important communication axis and the Danube Gorges (the Iron Gates) could be reached and surpassed (although with great difficulty).

The present situation of Bozovici Basin has not changed too much. Although, unlike in Lipova Hills, there are quite a number of big and middle-sized villages, their inhabitants live in a literally state of isolation. The nearest railway station is at 20 to 60 km away, and the same is true of the European road. A national road passes through the Basin and links it to the areas nearby; however, this link relates it to other marginal areas (Reşiţa-Anina area).

There is no town in Almăj Land, though Bozovici might become one in the future. The nearest towns are Anina, Oraviţa and Băile Herculane, all of them small in size. As no markets are available at a reasonable distance, the economy is mainly based on autarchic agriculture, breeding and forestry. Fishing is a traditional occupation for the

inhabitants of the villages on the Danube shores. The most famous occupation of the inhabitants of the Bozovici Basin is fruit-tree growing (plum trees and apple trees, mostly). In the past, the markets of all the major cities of Banat and even farther were provided with fruits by the inhabitants of Almăj Land. Today, only few of the orchards' owners have the financial possibilities to make this kind of deal, and sometimes they record financial losses.

For those living in the mountains, the situation is much more difficult. Many of the villages of Şopotu Nou, Sicheviţa and Berzasca communes are extremely small in size and they have few inhabitants (up to 100). Some villages became uninhabited (Drencova, for instance, on the Danube). The main reason is the lack of proper conditions for a living, as for example no electric power, although they are less than 100 km from the biggest hydroelectric power plant in South Eastern Europe, the "Iron Gates" ("Porţile de Fier")! Such hamlet-like settlements have not been considered important enough to benefit from the resources that they actually have nearby. There are only minor roads and footpaths, while the "national" road along the Danube is in a poor state, although it is now modernized.

A short period of economic recovery was during the war in nearby Yugoslavia. It was a flourishing time for the illegal commerce over the Danube between Romanians and the Serbian "brothers". Due to this commerce, some people got very rich over night, as it happened in Coronini (Pescari). However, this wealth did not positively affect the region on a long-term. Today, the navigation on the Danube has been resumed but few ships pass by; this seems to be the long-term effect of the war.

Reşiţa-Bocşa-Anina Industrial Area

It is one of the Romanian industrial areas that have been mostly hit by recession in the past ten years. The area comprises the Romanian oldest mines connected to metallurgic devices that can be surely described as belonging to a new era, that of the Industrial Revolution. In 1717, the Austrians, who took Banat region out of the Turkish hands, quickly resumed production at Ocna de Fier iron mine and established a first metallurgic primitive furnace at Bocşa, where Bârzava river makes its way out of the mountains. Later, as more resources were discovered in the area, they decided to move the entire industry up to Reşiţa, considered to be a better location. It was in 1771 when metallurgy started to change the life of the inhabitants of Reşiţa, by then a village of only 62 households. Emigrants came in from all over the Empire and the metallurgic factory grew to such an extent, that it owned a third of the land of Caraş county by the end of the 19th century, including forests, mines of all types and all the communication means (railways and roads). Even the first railway in Romania was built to make the connection from the town of Oraviţa (1854) to Baziaş, on the Danube, and a few years afterwards, Anina coal mines were linked by railway to Oraviţa, from where the coal reached the Danube.

The STEG Company changed its name into UDR after the First World War, but major changes became apparent only after the Second World War, when all industrial properties were nationalized by the Communist Government. As Communists thrived for industrialization, all the factories and plants of the area were even more extended; new factories were created at Bocşa and Anina. In 1968, Reşiţa became a county seat for the first time and it received administrative functions. The town grew to reach even about 100,000 inhabitants in 1990. It has now only around 70,000.

After 1990, recession hit the mining industry and the connected heavy industry. Mines all over the area had to be closed or at least reduce their activity. At Anina, the Power Plant built on coal schists never even produced energy, as the costs of its opening would not have been covered by the energy produced. Dramatic efforts have been made in the 80s to build this power plant, similar to one in China that so much impressed Ceauşescu; however, it was completely unprofitable. Anina became the first town to decay in the region, as it is also located deep in the mountains, and the railway to Oraviţa has been closed down.

Bocşa economy was based on CMB factory, producing all sorts of industrial machinery and metallic constructions (R. Creţan, 2004), but it became bankrupt in 2005. The rate of unemployment in this small town has reached a very high figure. Like Anina, Bocşa together with Ocna de Fier were also considered as "critical areas" by the Government. This status allowed potential investors to have a number of financial facilities but it turned out that not too many real investors came in.

However, the most dramatic incidents took place in Reşiţa, the county seat of Caraş-Severin County and the centre of the entire area. The metallurgic plant here, CSR, was sold by the Romanian Government in 1999 to an American company, Noble Ventures. This company should re-started production at CSR, but they failed to do that, and the workers did not receive their wages. While the number of unemployed grew as a consequence, street protests followed. The remaining workers organized a strike, which became violent and they thrown the American managers out of the factory, then blocked the roads in order to force the Romanian Government to intervene. The American managers did not come back and they sued the Romanian Government in 2001. However, the dying CSR was finally sold to the Russian Group TMK for 1 (one) Euro in 2004 and most of the debts accumulated by the former metallurgic plant were erased to allow a new start for the factory.

Because CSR/TMK was not the only employer in a town that is also a county seat, Reşiţa was not included in the large "critical area" designed by the Romanian Government from Moldova Nouă on the Danube to Bocşa. Nevertheless, this status given to this industrial area has not improved the situation, as the rate of unemployment remains high.

Poiana Ruscă Mountains and Bistra Valley

Bistra Valley provides a communication line between Banat and Hunedoara County, historically belonging to Transylvania. It was used even since Roman times, as the capital of the Roman province Dacia was established at Sarmisegetusa, not far away from the pass ("The Transylvanian Iron Gate") over the mountains. Poiana Ruscă Mountains are rich in mineral ores, which allowed an early industrial development of the area.

Smaller than the one in Reşiţa, Oţelu Roşu (Ferdinand) metallurgic plant started its development in 1796 based on the iron ores from the nearby Poiana Ruscă Mountains. The communists accelerated its development. After 1990, the factory (SOCOMET SA) encountered the same problems as Reşiţa and the entire Romanian metallurgic industry. Its privatization by an Italian enterprise, Gavazzi Steel, was also a failure. Thousands of workers from Bistra Valley lost their jobs, without any other opportunity to work. In 2002, they protested along with the workers from Reşiţa. In 2004, Ductil Steel company from Buzău (Romania) partially restarted the factory, employing 350 workers after investments of more than 3 million Euro. However, due to the crisis, in 2012 the metallurgic works were closed and are to be sold but there is no buyer yet (in 2015), although the price has been reduced at each auction.

Deep inside the Poiana Ruscă Mountains, the small metallurgic factory in Nădrag provided a job for the dwellers of this village since the 19th century. Humorously called "CIOCANUL", it continued its activity until 1997, when it became bankrupt. No investors were interested in buying it and it is now partly demolished and it may be used only for scrap iron.

Except for forestry and tourism, no other activities are possible in the area. The unemployment rate is very high so Nădrag received the status of critical area, as the nearby Rusca Montană commune, once famous for Ruschiţa marble. This status did not bring any essential upgrade to the socio-economic life of the inhabitants.

4. CONCLUSIONS

The paper describes several marginal areas of Banat, in itself a marginal region of Romania. The peripheral character of these areas, is it is usually the case in Romania, is due to their condition either as a rural isolated area or a declining industrial area. The causes of their underdevelopment have only been sketched and further investigation is needed. Isolation and lack of funding is the main issue in the rural areas while economic recession and decline in mining and heavy industry hit hard the (former) industrial areas. All this happened in the wider context of the Romanian transition to the market economy, the political problems of a postsocialist nation-state, the global economic crisis. However, the effects are rather similar: low living standards, unemployment, demographic ageing, emigration, low birth rates, social tensions.

There is definitely a need for long-term strategies that should be directed towards these kinds of marginal areas, that exist everywhere throughout Romania and other Central and Eastern European countries. In Romania, the eighth section of the National Masterplan, called "Rural Areas", has not been yet finished, although work is theoretically in progress for a few years now. The declining industrial regions do not have any strategic document directed to themselves but their more "urban" character make them eligible for several types of structural funds. For example, the industrial architectural heritage may be turned into a tourist attraction if managed properly and not sold for scrap iron.

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DISTANCE AS KEY FACTOR IN MODELLING STUDENTS' RECRUITMENT BY UNIVERSITIES

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ABSTRACT. – Distance as Key Factor in Modelling Students' Recruitment by Universities. In a previous paper analysing the challenge of keeping up with the current methodologies in the analysis and modelling of students' recruitment by universities in the case of some ECE countries which still don't register or develop key data to take advantage from the state of the art knowledge on the domain, we have promised to approach the factor distance in a future work due to the extent of the topic. This paper fulfill that promise bringing a review of the literature especially dealing with modelling the geographical area of recruiting students of an university, where combining distance with the proximate key factors previously reviewed, complete the meta-analysis of existing literature we have started a year ago. Beyond the theoretical benefit from a practical perspective, the meta-analysis aimed at synthesizing elements of good practice that can be applied to the local university system.

Keywords*: university recruiting, distance modelling, recruiting area, higher education marketing, recruiting modelling*

1. INTRODUCTION

The obviously growing inter-university competition in student's recruitment clearly stimulated the research literature on student recruitment. Usually the studies focus on the demand for education and enrollment dynamics characteristics, the student's profiling of some universities and changes in demand, universities policies linked to the dynamics of state educational policies. A considerable number of studies focus on geographical areas of student's recruitment. The analysis of the spatial and volumetric changes of geographical areas for recruitment, of the cost-benefit ratio (tuition fees, the scholarship offered and the quality of the university), the socio-demographic variables of students recruited comparing them to the demographic characteristics of area of origin remain the main topics of those studies. A rapid development had the studies on areas for recruiting students from 90's decade after development registered by (Arc)GIS as a tool for analysis and processing data, although field studies that take into account the spatial dimension were early (60'sand 70's decades) and thematically diversified (see Schöfer, 1975, with implications of the

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C*entral Place Theory* in assessing the level and the strategic location of the institution, and also the gravity model in shaping students' preferences).These developments allowed the spatial relationship modelling and plot a lot of data, collating data on enrollments of the university or higher aggregate entities with existing census data on the stock of general population and its characteristics. In a previous paper (Mălăescu, Speranza, 2013) analysing the challenge of keeping up with the current methodologies using (Arc)GIS in the analysis and modelling of students' recruitment by universities in the case of some ECE countries, we have analysed several factors shaping the student recruitment area configuration such as *reputation, prestige* and *financial policies regarding tuition and scholarships offered, district data on school population* and *student status* variables such as *age, gender, type of education, level of study, outcome* and *postcode*. Due to the amount of studies taking into consideration and modelling the factor *distance from the place of residence of the student* in shaping the student recruitment area configuration of the universities we have promised to approach this factor in this future paper.

2. "*THE PROXIMITY EFFECT*" VERSUS "*UNIVERSITY OF CHOICE*" IN MODELLING STUDENTS' RECRUITMENT BY UNIVERSITIES

As expected, the first factor investigated by the expert studies, more than three decades ago, and, at the same time, intuitively the most obvious variable, which matters for explaining the variance of decision on enrolling in the university –*distance* – currently, remains the key factor statistically highlighted by expert studies. Alm and Winters reconfirm, that, at the level of 2009 as well, the most important indicator of the variability of the number of recruited students, apart from the sublimated traditional factors (hidden, already integrated) in *cost-benefit ratio* (*tuition fees, the scholarship offered and the quality of the university*), is represented by *distance to the place of residence.* The results of their study highlight the dramatic decrease in number of recruited students as the distance from the university increases gradually. But, this decrease occurs unevenly, the outcome being very different from one state to another and also depending on the type of higher education institutions – the most elitist ones having a larger recruiting area, fact which comes as a confirmation of the previous results (Viterio, 1989 in Alm and Winters, 2009).

J. Spinelli' s study (2000), using GIS in analysing data, explains the variance in students' choice of the universities as follows: the geographical distance represents the most important factor that dictates the choice (what the authors label as „*the proximity effect"* (Spinelli, 2000; Smith, Spinelli and Zhou, 2002, p.35)), followed by the *universities status* (90%); the university statute matters the most when choosing the university – situation labelled as *"university of choice"* (Spinelli, 2000; Smith *et al.*, 2002, p.35) – in 50% of the situations. Other factors such as *the highest level to which graduation diploma are offered, universities reputation and their prestige,* as well as *the statute (private versus state/ state-assisted)* slightly modulate the results (factors that are also brought into attention in Smith *et al.,* 2002). On the basis of the gravity model, McConnel (1965, in Smith *et al.*, 2002) and Kariel (1968, in Smith *et al.*, 2002), have

highlighted, even since the 60s, the importance of the volume of population being of appropriate age for enrolling in the university and distance, as key factors in designing recruitment areas. Using a representation method based on GIS, in distance bands of recruitments (resumed with modifications in Smith *et al.* (2002)), Spinelli (2000) has assigned concentric circles around Ohio universities ranging between 0-32 km, 33-64 km, and 65-97 km, respectively. Based on evaluating the band in which an administrative unit is situated and also on assigning the distance to the central city of the administrative unit, several situations have been emphasized:

- *Universities from large urban agglomerations* – which recruit their students form these important urban demographic areas and generally attract students from within the 0-32 km distance band.

- *"Commuter universities"* are considered to be those institutions that draw over 70% of their enrollees from outside their administrative units. These ones record a decrease in enrollment once the distance becomes greater at the level of each band (Smith *et al.,* 2002).

- *"Rural commuter university"* is the label for those situations in which the university under discussion is located outside a major urban center – a relevant example in this respect being Shawnee State University which is not situated within an urban center and where 82% of the students are recruited from the local administrative unit. In some cases, such "rural" universities attract more students from the larger area (the 64 km one), than "commuter universities" (CU), being considered *"regional universities"* as a consequence. These are less affected by the distance regarding enrollments (Smith *et al.,* 2002). In the case of CU, geographical distance is, at its turn, the one that dictates the size of recruiting area and the distance band.

The simple representation of enrollment figures by districts in the case of Ohio universities, carried out by Smith *et al.,* (2002) highlights, at the level of 2002 study as well, the proximity effect, the representation and the analysis in distance bands of the intensity of recruitment (the second method used in the two studies), fact that brings to the fore the same importance of geographical distance, but with subtle differentiation as compared with the study carried out by Spinelli in 2000. The attention is drawn upon the importance of university being in spatial proximity to *major urban centres*. Smith *et al.* (2002) also suggest the introduction of other indicators such as: the competence in offering high-level diplomas, reputation, prestige, the statute of state-assisted universities versus private universities.

Three types of exceptions to the proximity effect are highlighted in the study of the authors (Spinelli, 2000; Smith *et al.*, 2002):

- situation in which two universities that are in competition for recruiting students are located close to each other (the authors exemplify with Butler County situation where 37% of the students choose an university in their local area, enrolling at Miami University, while 35% go to University of Cincinnati, situated within proximity (Hamilton County);

- situation in which two non-contiguous administrative units are situated at long distances from a state-assisted university, and, as a consequence, students choose between state-assisted universities and private universities;

- situation in which a mission stated by the university comes into action, which nuances school option patterns imposed by distance (in the case under analyse by the author, the ethnic diversification of central state-assisted university).

Johns (2002 quoted in James, Baldwin, Coates, Krause and McInnis, 2004, p.27) proposes the taxonomy of seven classes in the case of areas of origin used in Australian system recording the enrollment in the university. This classification would be achieved depending on the geographical area of residence in order to observe the remoteness and isolation characteristics by reference to an university center (used in assessing the equity of access to higher education) arguing that the current system, based on postal codes needs improvements (codes are subject to modifications etc.): metropolitan (with two subcategories: *the capital* and *big cities)*, provincial (with the subcategories: *major provincial center, small provincial center and others), provincial* and, respectively, remote with subcategories: *remote* and *very remote*. The benefit aimed at by the study of James *et al*. (2004) is represented by the potential university programmes better focused on the beneficiaries, on a certain target group of beneficiaries. James *et al.*(2004) argues that measuring the distance from the campus proposed by Western *et al.*(1998) (quoted in James *et al.,* 2004) with the categories*: long, medium* and *short* is inadequate, because, on the one hand, people living in proximity to a single regional university center, have limited forms of access and *limited possibilities to choose in matters of fields of interest and enrollment possibilities*, and on the other hand, the taxonomy based on proximity is based on the assumption that distance represents the main cause generating lack of favorability. The authors quote the report by Stevenson *et al*. (2001) in support of the statement that reality is not supportive in this respect. The above-mentioned study proves that the differences regarding the distance from one campus to another play a minor role in the participation patterns in higher education because the factors that really differentiate the participation according to the backgrounds (rural/urban) are the value placed on having an higher education degree among isolated rural communities "significantly heightened by the additional costs of attending university" (James *et al.*, 2004, p.27).

C. Hanewicz (2009) has employed students' address data to find out if spatial analysis reveals geographical differences among those students who used to withdraw, remain enrolled or successfully graduate from Midwestern and Western University, after six years of study. It has been revealed, in the study, the fact that distance has not been relevant in the differentiations between the drop-out group and those who completed their studies, but spatial proximity from university has been important for those who were and remained in the system. However, GIS may be used in identifying new off-campus locations as close as possible to large pools of students.

Alm and Winters (2009) have carried out a review in which they have also mentioned other early studies that have highlighted distance: Gossman, Nobbe, Patricelli, Schmid and Stear (1968, with an elasticity between -1,5 and -2.0), McHugh and Morgan, 1984 (elasticity of -1,3), McConnell (1965), Kariel (1968), Ullis and Knowles (1975), Leppel (1993), Ordovensky (1995), Desjardins, Dundar and Hendel (1999); Ali (2003). Previous studies have focused on the relationship between distance and other factors such as: *age, ethnicity, and social class* regarding enrollment patterns and

the necessity that universities should take into account these factors in their marketing strategies and their initiatives of enlarging participation (Farr, 2001 quoted in Read, Higgs and Taylor, 2005) and should consider the role of geography in the process of recruiting and retaining students (Croot and Chalkley, 1999 in Read *et al.*, 2005).

3. THE GRAVITY MODEL USED IN MODELLING STUDENTS' RECRUITMENT

Alm and Winters (2009) have employed the gravity model of students' mobility for estimating the elasticity of enrollment demand at the level of university system in the state of Georgia, where the determination of student migration flows has been achieved on the basis of the population from the area of origin, population of the area of destination, the distance between origin and destination and a certain number of attraction and rejection factors. Ayad (2007) has quoted a series of authors (Huff, 2003; Marting, 2001, Martin, 2002, Dramowicz, 2005) who have employed gravity model for estimating the probability of a student being attracted towards a certain university using the applicability of the model in marketing studies (aiming at the same probability in the case of a potential customer situated between two shopping malls, who travels to one of the malls considering the model of utility of each of them and the travelling distance). In this case the gravity model, according to Ayad (2007, p.10), is represented as follows:

$$I_i = G_i \times \frac{NSATi}{Di\ 2}$$

Ayad (2007) used the gravity index (I) calculated for every school district (i), emphasizing the weigh for every school district (i) counting on the number of college-bound students (NSAT) in the concerned school district and the corresponding distance (D) to the university that is subject to analysis. Variable *G* is emphasizing the impact of other factors such *as the targeted median household income* or a certain *average performance* based on *average SAT score* in the designated school district (i). On the basis of this formula, a district with a high number of SAT takers and which is situated at short distance from the university will receive a higher weight than a remote one with fewer SAT takers (Ayad, 2007).

For measuring the distance, the actual driving distance to the university has been employed. Data regarding the enrollees have been represented by using SAT (ox) and the average median household income (oy). Ayad's (2007) study highlights the fact that the number of *college-bound students (SAT takers), the median household income* and *the distance to the university* play an important role in influencing the results of students' recruitment. The author claims that, although there are opinions according to which in certain situations the potential students prefer to travel, in the case of Clarion University (Pennsylvania) the distance proved to be a limitation regarding the number of enrolled students. The recommendation of increasing the number of scholarships or *the offering of some incentives for those recruited from long distances* might be a solution in this case. The *median income* factor is more or less important depending on the target group. *SAT,* also represents a factor whose importance in the formula should have more weigh if the objective is a qualitative improvement of the group of students.

Alm and Winters (2009, p.730) use the formula:

$$M_{ij} = AijP_j{}^{\alpha 1} P_j{}^{\alpha 2} d_{ij}{}^{\beta}$$

Where P_j represents the student population from the institutions in district (i) (area of origin); P_j represents student population from institution j (area of destination), d_{ij} represents the distance i-j, $Aij = \Pi_k(z^{\gamma k}{}_{kij})$ represents a multiplicative term that allows the inclusion of variable k that measures *"push" factors* of the institution within district and "pull" factors Z_{kij} which impact on student migration, and γ_k, $\alpha_{1,}$ $\alpha_{2,}$ $_{\beta}$ are the parameters.

The results of the quoted study highlights the fact that increasing distance to the nearest college determines the decrease in the probability that a graduate would enrol in any regional or state institution (elasticity of -0, 12) or, at least, there is a decrease in the probability that the student would enroll in college (increasing thus the probability to enroll in an university), while the increasing distance to the nearest university does not determine any impact on the probability of enrolling in any regional or state university. Once taken, the decision to enroll in the training system following upper-secondary education, future students could choose between universities and colleges. In the situation when colleges offer study programmes of lower qualitative standards, specialists designing strategic policies encounter the following dilemma: *increasing the accessibility to colleges* generates two categories of consequences: *the number of students enrolled in the system increases and on the other hand, a large number of students who would have enrolled in the universities are taken over by colleges*. On the contrary, in the case of universities, a higher degree of accessibility will not bring more enrolled students in the system, but will increase the qualitative level of those attending the university.

4 THE GAP IN DATA COLLECTION AND SPATIAL GEOCODING AVAILABLE IN THE CASE OF ROMANIA IN ORDER TO CATCH UP WITH THE GOOD PRACTICE METHODOLOGIES

In the case of the Romanian Higher Education System a different solution was carried out soon after the fall of the communist regime: the most prestigious universities with regional or even national recruitment area as a *university of choice* (Spinelli, 2000; Smith *et al.*, 2002) have opened several branches located in middle sized cities, in order to moderating *the proximity effect* (Spinelli, 2000; Smith *et al.*, 2002).

The universities branches offer the same academic programs and graduate diplomas as the core-center university and are usually located in the main urban center of the administrative unit (county). Prospect students still have to choose between universities' branches by the reputation of their training programs and still having the option to go and study in the main university center (see the case of Babeș-Bolyai University direct recruitments compared by the number of students studying in its academic extensions in figure 1). Although the total amount of students choosing Babeș-Bolyai University is gradually decreasing with the increasing of the distance to the place of residence, the number of students choosing to study in an academic extension is not increasing. For some of the administrative units near Cluj-Napoca (like Bistrița Năsăud for example) the number of students choosing to follow the university's academic programs in their home

town is not necessarily explained by the distance. This configuration is leading to the conclusion that recruiting models wich take into consideration a greater number of factors will better aproximate or explain the present situation as revealed by the pilot study conducted in 2013.

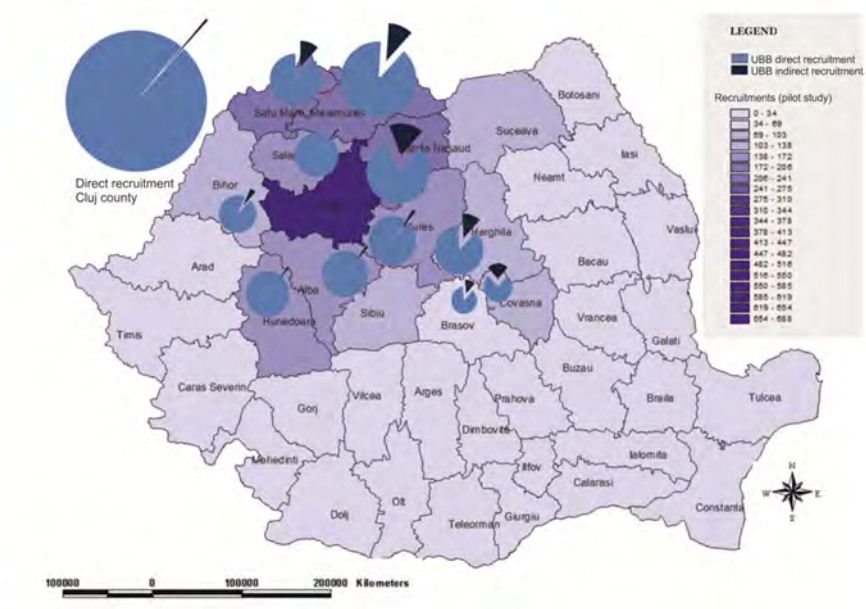

Fig. 1. Direct and indirect recruitment (throughout academic extensions) in the case of Babeş-Bolyai University (bachelor level, pilot study, 2013)

In a previous study (Mălăescu, Speranza, 2013) stressing on the difficulties and the constraints that countries such as Romania have to deal with in order to chatch up with the use of current methodologies used in student recruitment modelling we have presented the type of geographycal data on the students recruited that universities such Babeş-Bolyai University, used to collect before the application of the Ministerial Order No. 164/13.03.2012 (requiring collecting a much larger number of data on students enrolled from admitted candidates). Even if declaring the home address (street and number) is mandatory now according to the M.O. 164/2012 for all students enrolled in university, the pinpointing of the addresses is still something to reach for due to the incomplete representation of the entire national space allowing automatic mapping using GIS based on the geocoding of each of the recruited students. Considering the pilot study of 2013, the first year after implementing the M.O. 164/2012, the amount of not declared data on address is also considerable. Considering these limitations the more refined variable processed in order to give a spatial image of the geographical recruitment area of an university is still the "county" (the middle-level administrative unit).

The benefit of spatial approaches focused on the use of GIS in educational marketing is in mapping and analysing participation rates in relation to specific recruitment campaigns and expansion strategies for identifying changes in enrollment patterns or the shaping of profiles of certain areas in terms of students recruited, in order to develop a range of courses designed to be attractive to that segment of the market area (Read, Higgs and Taylor, 2005). If for several decades higher education marketing has concentrated on how to attract a certain type of student for its academic programs now the paradigm is shifting to design the matching academic program for the needs of a particular area with a socio-economic profile.

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QUALITY ASSURANCE COURSES IN VET (VOCATIONAL EDUCATION AND TRAINING) FOR TOURISM ORGANISED BY THE CENTRE FOR TOURISM TRAINING

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ABSTRACT. **– Quality Assurance Courses in VET (Vocational Education and Training) for Tourism Organised by the Centre for Tourism Training.** The article seeks to give utterance to the findings of the pilot course on quality assurance designed and organised by the Centre for Tourism Training (CTT) as part of the AQUA.TS European Lifelong Learning project.

The CTT has become involved in research and exchange of experience in the field of *quality assurance* driven by the educational policy-related background set out by the European documents and tools, including EQARF, EQAVET, the principles of lifelong learning and adult education. The main theoretic background to the present paper was assured by the European Commission documents regarding quality assurance in VET, while the experience and good practices acquired by the CTT have profoundly marked its quality assurance–oriented policy. Against this background, The Centre for Tourism Training (CTT) of the Faculty of Geography, University Babes-Bolyai, Romania, delivered a pilot training course on *Quality Assurance in VET* during 16 March and 10 April 2015. The training consisted of a theoretical knowledge-building module (16.03. 2015 - 27.03. 2015) and a practical module (30.03.2015 -10.04.2015), the latter focused on the use of the AQUA.TS TOOLKIT, an IT device aimed at the self-evaluation of the quality of performance of trainers and training providers, whose efficiency was tested during the organised training program.

Keywords*: quality assurance, course design, self-evaluation, Aqua.Ts Toolkit, survey results*

1. BACKGROUND

Quality assurance systems have become crucial to guarantee effective, usable and sustainable standards in Vocational Education and Training (VET), to enhance the recognition of the learning outcomes, the transparency of the qualifications and to foster the mobility of learners, trainers and workers in Europe. In this regard, one of the main objectives of the EU educational policy is to assist national systems in the implementation of common instruments and indicators. In the Copenhagen process, Member States and social partners have defined a series of common tools and principles, among them the *European Quality Assurance Framework for Vocational Education and Training (EQAVET) (*European Council, 2009*)*.

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Continuing this direction, one of the strategic goals that the Bruges Communiqué on enhanced European Cooperation in Vocational Education and Training for the period 2011-2020 (European Commission, 2010) has established is fostering the excellence, quality and relevance of both initial VET (I-VET) and career-oriented continuing VET (C-VET). The central aspects of this provision are the quality of teachers, trainers and other VET professionals and the labour market relevance, with a view to providing a better match between its needs and the development of knowledge, skills and competences. The document recommends that the curricula should be outcome-oriented, more responsive to the labour market needs, integrate the key competences and should develop appropriate means of assessment.

Seeking to make VET an attractive educational option, the European 2020 strategy emphasizes the major role played by practical activities and of work-based learning. Providing learners with access to appropriate up-to-date technical equipment, teaching materials and infrastructure, with information and communications b (ICT) skills, and encouraging flexible training arrangements have become very important means of promoting VET.

Greater involvement of VET stakeholders is one of the most important transversal objectives of the 2020 VET strategy, which promotes partnerships between social partners, enterprises, education and training providers, employment services, public authorities, research organizations and other relevant stakeholders.

Based on the 2020 VET strategy and on the findings of the 2012 'Education and Training Monitor, the European Commission developed Rethinking Education (European Commission, 2012), a document that outlines several recommendations. The document's main provisions are the following:

- A stronger focus on developing transversal skills and basic skills at all levels, especially entrepreneurial and IT skills, which are mostly needed
- Improving foreign language learning skills
- Building world-class vocational education and training systems
- Increasing the role of work-based learning
- Improving the recognition of qualifications and skills
- A more consistent exploitation of technology, in particular the internet
- Well-trained, motivated and entrepreneurial teachers
- Funding needs to be targeted at maximising the return on investment
- A proper partnership approach, with both public and private funding, aimed at boosting innovation and increasing cooperation between academia and business.

The *Automatic Quality Control Tool System* (AQUA.TS) project aims at raising the awareness of trainers, training providers and stakeholders of the relevance of EQAVET for an effective implementation of quality assurance systems. At the same time, it seeks to supply the providers with an IT device, an automatic quality control toolkit, capable to help them self-evaluate the quality of their training.

From an operational point of view, AQUA.TS is particularly consistent with the Program priority in that it aims to "design concrete guidelines usable by those involved in VET, in particular by training providers." In fact, the project activities develop and test an integrated system for the improvement of training quality in VET through the experimentation of EQAVET indicators and approaches, and yet, focusing on tourism training.

The European partnership is, henceforth, involved in a two-year roadmap whose milestones are:

- designing and experimenting operational criteria for the implementation of EQAVET indicators, sharing the process with target groups and stakeholders, particularly in the field of tourism;
- drafting 'friendly' guidelines, ensuring the usability of criteria, tools and instruments.
- testing the instruments and approaches in real vocational training activities, according to collaborative methodologies and "job shadowing" methods.

The Centre for Tourism Training (CTT) of the Faculty of Geography, University Babes-Bolyai, Romania, delivered a pilot training course on *Quality Assurance in VET (Vocational Education and Training) for Tourism* as part of the AQUAT.TS Lifelong Learning Program during 16 March and 10 April 2015.

2. THE PILOT COURSE ON QUALITY ASSURANCE. PRELIMINARIES TO THE IMPLEMENTATION OF THE COURSE PLAN

2.1. Course Design

The pilot course was developed in compliance with the provision of the European Commission. All the educational aspects: (1) the curricula, (2) the target population, (3) the theoretical teaching-learning process, (4) the practice-based activities, (5) the outcomes' assessment and the evaluation methods and criteria, (6) the flexibility of the schedule, (7) the use of professional trainers, and (8) the involvement of the stakeholders – were very consistently and responsibly approached by the CTT organisers.

The training course was designed to cover 80 hours, 40 hours representing theoretical courses and 40 hours accounting for the practical activities focused on the use of the AQUA.TS TOOLKIT, an IT device aimed at the self-evaluation of the quality of performance of trainers and training providers, whose efficiency was tested during the organised training program. It targeted VET providing organisations' managers and staff, VET trainers and teachers, especially those functioning in the tourism sector, representatives of the national authority (The National Authority for Qualifications - ANC), managers of tourism enterprises, academic staff who deliver tourism courses, and, finally, staff members of the Centre for Tourism Training.

The *trainers* were either quality assurance experts (Ms Alexandrina TEODORESCU – senior counsellor, National Authority for Qualification, Ms Adriana ŞERBAN – senior sociologist, Centre for University Development and Quality Management, BBU, Ms Roxana NICULAE, a trainer qualified in QA and Ms Silvia IRIMIEA, a trainer and the project coordinator, editor of two books on VET and QA in Europe).

2.2. Curricula development

The curricula development was a multi-step process, which included VET professionals, tourism employers and managers, beneficiaries, national authorities and stakeholders. The decision of involving all these categories of people was made based on the European provision and on the good practices presented at the European conference on quality on VET, that took place in Brussels, between 17 and 18 January 2013 *EQAVET implementation: "A European goal to be achieved through national approaches" (*European Commission, 2013*).*The partnership of the projects presented at the conference reached to some empirical solutions for the implementation of EQAVET challenges. One of the solutions proposed by for creating a shared culture of quality assurance and improvement in VET is designing of a proper curricular framework, which is developed in terms of needed knowledge, skills and competencies for those who are holding positions in quality management. Also, for the challenge of involving the main stakeholders (and keeping them involved in the process), one of the proposed solution is to implicate them at the very beginning.

Therefore, the steps for developing the curricula were:

1. Gathering data and information on the European and national provision concerning the legal and methodological requirements regarding the certification / accreditation of the course.
2. Studying several professional standards linked with quality assurance in VET, for establishing the needed knowledge, competences and skills.
3. Interviews with representatives of the national authorities.
4. Conducting a focus group with VET providers in tourism, employers and representatives of the national authority.
5. Developing a workshop were the draft of the courses content was presented.

The curriculum addressed major issues in educational quality assurance, starting from a more general perspective on quality and management and ending with the toolkit designed by Dimitra, Greece, for the assessment of the quality assurance performance of trainers and providers.

As compared to the project operational plan, the curriculum of the courses has not been substantially modified. As a result of the entire process, the modification regarded its expansion to include more theoretical issues related to quality assurance, in general, quality assurance at EU level, and, finally, the implementation of the quality assurance policies and strategies in Romania. The trainers insisted on these issues as they considered them necessary for a comprehensive understanding of what quality assurance means. The presentation of the EQAVET indicators received consistent focus, as most of the attendees were unfamiliar with them. Fig.3 includes the revised curriculum in more detail along with the educational materials and supplies used.

The course designers included a basic course on *Basics of the quality management* and *Quality assurance models and standards* for the attendees who were unfamiliar with the notions of *quality* and *quality management.* The next necessary steps in understanding and mastering the management of quality policies were to teach them *The quality of products and services* and then move on to what quality assurance means for

education. An important issue, perhaps second in importance after the adoption and use of the *automatic quality control toolkit*, was analysing and evaluating the level of EQARF implementation in Romanian VET, especially in tourism. Finally, the major purpose of running the pilot courses was to test the toolkit in order to assess its usability and efficiency. In addition, the level of implementation of the European provision regarding the quality assurance in a VET organization was also on the course agenda.

2.3. Expected results

Course planning was accompanied by the estimation of appropriate results. Pursuing the project objectives, the course curriculum was redesigned to incorporate results in terms of knowledge, skills and attitude, which are provided in the table below.

Module	Content	Expected results		
		Knowledge	**Skills**	**Attitude**
EQARF for VET	Quality management. Basic points. Quality assurance models and standards The quality of product and the quality of services Quality assurance in education The European Quality Assurance Reference *Framework: Quality Criteria and Indicative Descriptors* The Reference Set of Selected Quality *Indicators for Assessing Quality in VET*	- concepts, their functions, use, and characteristics - the characteristics of quality assurance regarding the products and services. Differences - the content of the European provision regarding the quality assurance in VET	- quality planning - elaborating quality assurance and evaluation instruments - analysing and evaluating the level of implementation of the EQUARF in VET	responsible attitude regarding the quality planning and evaluation - responsible and proactive attitude towards the implementation of the European provision regarding the quality assurance in VET
The implementation of the EQARF for VET	Specific aspects of the quality assurance process in VET for tourism Specific issues for implementing EQARF in VET for Tourism	- the characteristic of the quality assurance in VET for tourism	- elaborating specific quality assurance and evaluation instruments for VET in tourism	- responsible and proactive attitude towards the implementation of the European provision regarding the quality assurance in VET for tourism
The Assistance Toolkit	The utility of the Assistance Toolkit The structure and the functionality of the AQUAT.TS Assistance Toolkit	the structure of the toolkit	providing the appropriate information regarding the implementation of the EQARF in VET organizations	- critical and comprehensive attitude towards the structure and the functionality of the assistance toolkit

Specific national issues	The implementation of the EQARF in VET in Romania The quality assurance system in VET in Romania Specific aspects of the quality assurance system in VET for tourism in Romania	- the content of the Romanian provision regarding the quality assurance in VET, especially in tourism	- analysing and evaluating the level of implementation of the EQARF in Romanian VET, especially in tourism	- responsible and proactive attitude towards the implementation of the EQUARF in Romanian VET, especially in tourism
Testing the Assistance Toolkit	Practical activities of testing the AQUT.TS Assistance Toolkit	the toolkit structure and requirements	using the toolkit in order to evaluate its functionality using the toolkit in order to evaluate the level of implementation of the European provision regarding the quality assurance in a VET organization	- critical and comprehensive attitude towards the structure and the functionality of the assistance toolkit

Fig. 1. Expected results of the AQUA.TS *Quality Assurance* course

The results were estimated in realistic and achievable terms taking into consideration the objective, the attendees' cognitive capacity and their interest in acquiring thorough knowledge and skills which could conduct them to working out their own quality assurance policy and strategies in a fast and friendly way.

3. IMPLEMENTATION

The **teaching methods** used by the trainers throughout the face-to-face classes were: power point presentations and interactive methods, including case studies, job shadowing, debates, simulation and problem solving. The participants took part in the discussions and activities actively. The discussed issues turned into springboards for further discussions regarding situations which arose in the participants' organizations. The teaching methods which were used created a friendly and inspiring atmosphere for the participants, who enjoyed the presentations and the discussions.

The participants received (1) the course support materials for each theoretical activity, (2) the AQUA.TS Guidelines and Toolkit in both Romanian and English, (3) an updated reference and a bibliography list. The trainers made themselves available for further tuition, discussions and clarifications both during the class time and outside the classes.

The **practical component** (lasting for 40 hrs) was approached in a more flexible way, allowing the participants to carry out individual activities. The purpose was to enable them to become acquainted with the toolkit through individual study and practice. The practical activity followed the trainer's presentations and explanations.

The **evaluation** of the attendees was geared towards the evaluation of their competences regarding the elaboration of quality assurance plans and assessment instruments. Thus, the attendees were requested to complete the following tasks:

- To carry out a SWOT analysis of the quality assurance activity developed in their own organization
- To design a strategic plan for the implementation of one of the ten EQARF indicators (at their own choice) in their organization
- To fill in the toolkit and provide comments on the toolkit, mentioning 3 strengths and 3 weakness thereof.

The tasks were duly fulfilled by most participants who provided evidence of:

- their understanding of the quality assurance principles and
- ability to design a quality assurance strategy for their organization.

The attendees were distributed feedback questionnaires which they handed in before they received their attendance certificates. The questionnaires were processed by the quality assurance expert and their results are provided in subchapter 4.2. of the present study. The course attendees were awarded attendance certificates, whose template was designed by the project lead organization, Superficie 8 SRL, Italy, and which comprised the logos of all project partners.

After the completion of the pilot course, the examination and interpretation of the results, and, as a result of the acquired training experience in the field of *quality assurance*, the team of experts involved in the project, decided to accredit the course nationally on behalf of the Centre for Tourism Training. It will submit the curriculum along with all due documents to the National Authority for Qualifications (ANC) and will apply for the accreditation of the course, which will, thus, enrich the CTT training offer.

4. ASSESSMENT OF THE COURSE

The assessment of the training course on Quality Assurance developed under the aegis of the AQUA.TS project relied on a few forms of which we mention and discuss two: (1) the validation protocol and (2) the feedback questionnaires distributed to the attendees. Both were designed by the quality assurance expert of the project, Ms Adriana Şerban, senior sociologist and quality assurance expert of the Babeş-Bolyai University.

4.1. Validation protocol

A first form of assessment of the training courses was through the *validation protocol*. Its usefulness consists in its reflecting the achieved results in terms of acquired *knowledge, competences* and *skills*.

Module	Teaching contents	*(Please evaluate them in comparison with expected results)* Achieved results in terms of			Used evaluation methods
		Knowledge (to know)	**Skills (to do)**	**Attitude (behaviours)**	
I. Introduction in management	A brief introduction to management Definitions and approaches to management Functions of management Strategic management and operational management	The content of concepts, their functions, utility, and characteristics	To identify the functions, and the utility of strategic planning and of operational planning and the relationship between this two forms of planning.	Responsible and proactive attitude towards the strategic and operational planning of the activity.	Test - exercises on the examples delivered by the trainer.
	Methods, techniques and instruments used in management Vision, mission, scope, objectives Criteria, standards and indicators	The content of concepts, their functions, utility, and characteristics	To identify and to use different methods and techniques of management. To use, to elaborate and to evaluate management instruments.	Critical and comprehensive attitude towards the structure and the functionality of different management methods, techniques and instruments.	Test - exercises on the examples delivered by the trainer. Group or individual project: elaborating a SWOT analysis and a strategic plan.
II. Quality management	Brief historical overview, approaches and definitions of Quality assurance Strategic and operational quality management	The main theories and their role in the QA history	To use planning, implementation and control techniques	Responsible and proactive attitude towards the strategic and operational QM.	Debate, group and individual exercises
	Organizational culture Product and services quality Internal audit and performance indicators	The content of concepts, their functions, utility, and characteristics	To develop audit techniques, according to their specific organizational needs	Comprehensive attitude towards employee engagement in quality goals	Debate, group and individual exercises
	Quality assurance in education	The specific content of concepts regarding the quality assurance in education (especially in VET), their functions, utility, and characteristics	Quality planning and evaluation in education, especially in VET. Elaborating quality assurance and evaluation instruments for education area, specially for VET.	Responsible, critical, comprehensive and proactive attitude regarding quality planning and evaluation in education.	Test - exercises on the examples delivered by the trainer. Group or individual project: elaborating a SWOT analysis and a strategic plan.

Module	Teaching contents	*(Please evaluate them in comparison with expected results)* Achieved results in terms of			Used evaluation methods
		Knowledge (to know)	Skills (to do)	Attitude (behaviours)	
III. Quality Assurance in VET	The European Qualification Framework EQARF guidelines, criteria and indicators – an overview	The content of the European provisions regarding quality assurance in VET	To understand, analyse, interpret the provisions of EQARF, their importance, for training providers, trainers, stakeholders, etc	Pro-active attitude regarding awareness about the European recommendations (EQAVET) and their relevance for organisational activities	Question-answer, debate
	Specific aspects of the quality assurance process in VET for tourism Specific issues for implementing EQARF in VET for tourism	Specific issues that characterise VET in tourism and which contribute to the elaboration of QA strategies The adaptation of QA strategies to particular contexts of use	To understand, analyse contexts of use and adapt the QA framework indicators to the peculiarities of the context, specific needs etc	Responsible, substantial involvement in the design, implementation and evaluation of QA strategies	Summary of the discussions Drawing up a flow chart for the specific activities
III. Quality Assurance in VET	The Romanian Qualification Framework Specific issues for implementing EQARF in VET in Romania The Romanian National Quality Assurance System for VET and 2020 objectives	The content of the Romanian provision regarding the quality assurance in VET	Analysing and evaluating the level of implementation of the EQUARF in Romanian VET and the 2020 objectives	Responsible, critical and proactive attitude towards the implementation of the EQUARF in Romanian VET	Test-exercises (trainer asked examples from the participants' organisations)
	The utility of an automatic quality control toolkit for the VET activity The structure and the functionality of the AQUAT.TS Assistance Toolkit – theoretical aspects	The structure of the toolkit	Providing the appropriate information regarding the implementation of the EQARF in VET organizations.	Critical and comprehensive attitude towards the structure and the functionality of the assistance toolkit	Simulation-debate regarding the implementation of the EQAVET indicators 1 and 2.

Module	Teaching contents	*(Please evaluate them in comparison with expected results)* Achieved results in terms of			Used evaluation methods
		Knowledge (to know)	Skills (to do)	Attitude (behaviours)	
IV.AQUA.TS TOOLKIT	Testing the AQUAT.TS Assistance Toolkit (practical activities)	The toolkit structure and requirements	Evaluating the functionality of the toolkit. Using the toolkit in order to evaluate the level of implementation of the European provision regarding the quality assurance in a VET organization.	Responsible attitude towards the data required for the completion of the assistance toolkit.	Filling in the toolkit EXCEL model.

Fig. 2. Validation protocol for the training course on Quality Assurance (LLP AQUA.TS)

As it may have been understood from Fig.4, the assessment of the participants was carried out by means of exercises, individual project activities, debates and simulations. In comparison with the expected results, the reached performances of the participants can be qualified as *good* (overall average of 3.68 on a five scale steps, where 1 means *unsatisfactory* and 5 means *very good)*. These results were calculated based on a points-scale developed by the examiner. The assessment of the participants' performances included the following tasks.

Task 1

Elaborate a SWOT analysis, mainly regarding the quality assurance activity in your organisation.

Goal: to evaluate the participants' knowledge and competences regarding

- the elaboration and use of a SWOT analysis, as an evaluation/self-evaluation instrument of quality management;
- the content and the significance of the four elements of the SWOT analysis (Strong points, Weak points, Opportunities, Threats).

Task 2

Elaborate a strategic plan for the implementation of one of the three EQAF indicators (at your own choice) in your work institution/organisation.

Goal: to evaluate the participants' knowledge and competences regarding

- the steps needed for the implemention of an EQARF indicator;
- the elaboration and use of a strategic plan as an evaluation/self-evaluation instrument of quality strategy;
- the elaboration of SMART objectives;
- the use of a correct quantification of objectives and its importance for the evaluation/self-evaluation process.

Task 3

Fill in the EXCEL model of AQUATS TOOLKIT for your institution/organization. Please indicate your comments and/or concerns at the end of row cells.

Goal: to evaluate the participants' knowledge, competences and attitudes of

- a critical and comprehensive thinking regarding the content and the requirements of the toolkit, as an evaluation/self-evaluation instrument of the quality assurance system;
- a responsible and proactive attitude regarding the implementation of the EQARF indicators in the participants' institutions/organisations.

Task 4

Please indicate 3– 5 strong points and 3 – 5 weak points of the AQUATS TOOLKIT regarding its use for the evaluation and/or self-assessment of the quality assurance system in your organisation.

The most frequent **strong points** and **weak points** that the training participants have mentioned are presented below.

Strong points

- ✓ Facilitates the integration of the European principles and recommendations, and it is appropriate to the European and national objectives.
- ✓ Creates a structured framework for quality assurance in VET.
- ✓ Encourages the development of a result-based research and analysis at the system level.
- ✓ Enhances an in-depth monitoring and analysis of the quality assurance process in VET organizations.
- ✓ Tackles, in a detailed manner, multiple issues and situations of the quality assurance process.
- ✓ Enhances a clear and specific definition of the concepts and categories of quality assurance in VET.
- ✓ Highlights the obligations of every VET-involved person, especially the socio-economic responsibilities of the management and decision-making staff.
- ✓ Provides support for the identification and analysis of the trainers'/ students'/ employers' expectations.
- ✓ Contributes to the identification of possible partnerships in VET.
- ✓ Provides support and information for further development of training programs.

Weak points

- ✓ Some items are not applicable to any type of VET organization; especially to smaller, newly established VET organisations or newly initiated/accredited programs this approach is not totally appropriate.
- ✓ The *learners' employability* indicator is a little too high at the moment because this is a sensitive situation on the present unstable labour market. Therefore, presently, more emphasis should be put on the quality of teaching and on evaluating indicators.
- ✓ Some items are difficult to be implemented in some countries because of the gaps inherent in the systems, and not due to the shortcomings inherent to organizations.
- ✓ Some questions are unclear, confusing, or do not specify the requirements.
- ✓ Some items have not enough answering options to cover all possibilities.
- ✓ Some answering options are unclear or do not specify the option.
- ✓ The answering options are irrelevant for some items.
- ✓ In general, it is an elaborate, branching out and difficult to use assessment tool.

4.2. The results of the feedback questionnaires

The assessment of the activity was based on a satisfaction questionnaire, which was elaborated by a quality assurance expert in education (Ms. Adriana ŞERBAN) and was applied to the participants after the final evaluation. In addition, during the training module, free discussions and interviews with the participants were initiated by Ms. Silvia Irimiea and Ms. Adriana Şerban.

The participants' level of satisfaction with the training courses was assessed through a questionnaire-based survey. The participants were asked to evaluate, on a five steps scale (from 1 – Very displeased to 5 – Very pleased), their level of satisfaction with 21 issues regarding the structure and the content of the courses, the teaching and the evaluation methods used by the trainers, the learning resources, the working atmosphere and the learning experience as a whole. They were also asked to mention three aspects that pleased them most and three aspects which unpleased them. At the end of the questionnaire, they had the opportunity to express other opinions.

All the attendees who completed the questionnaire (the 18 participants who received the attendance certificates -ten women and eight men) were pleased or very pleased with all the 21 presented issues. The most well appreciated aspects of the courses were *The general work atmosphere* and *The usefulness of the examples presented in the theoretical presentations* (average 4.83). They were also very pleased especially with *The newsworthiness of the presented information* and with *The acquired theoretical knowledge* (average 4.78).

At the other end of the scale, *The usefulness of individual work tasks*, *The specificity of the acquired information regarding QA in VET for tourism*, and *The assessment methods* were situated (average 4.39, meaning that the participants were pleased but not very pleased with).

The satisfaction regarding the participation in the course, in general was very highly scored by the participants (4.72). All the participants except one brought up the aspects that they found *positive*. The most frequently mentioned issues were: the professionalism of the trainers and the general, work atmosphere. Half of the learners (9) also noted some aspects of the training that, according to their opinion, could have been improved, such as, in particular, the poor advertising campaign and the low number of attracted participants.

The final questionnaire box was used by six persons. They expressed their appreciation for the initiative of organising QA courses in VET and of presenting the EQARF criteria and indicators. Some of them underlined their intention to attend other training courses organised by CTT in the future.

These results show that the more appreciated aspects were those related to the trainers' professionalism and to the content of the curricula.

5. CONCLUSIONS

Making VET a more attractive and inclusive learning option is one of the main goals of the European education system. This purpose requires significant efforts for improving the quality of the provided services, in all its aspects - the curricula, the target population, the theoretical teaching-learning process, the practice-based activities, the

assessment of outcomes and the evaluation methods and criteria, the use of the information and communications technology (ICT), the flexibility of the schedule, the professional trainers, and the involvement of stakeholders. In this regard, the EU educational authorities, the Member States and social partners have defined a series of common tools and principles, among them the *European Quality Assurance Framework for Vocational Education and Training (EQAVET) (*European Council, 2009*)*. The EQAVET system is not a self-sufficient, closed system, but can integrate other quality assurance models with a set of criteria and indicators contributing not only to a shared vision but also to a better operational connection between different national educational systems.

The *Automatic Quality Control Tool System* (AQUA.TS) project aims at raising the awareness of trainers, training providers and stakeholders of the relevance of EQAVET for an effective implementation of quality assurance systems and seeks to supply the providers with an IT device, an automatic quality control toolkit, capable to help them self-evaluate the quality of their training. The pilot courses delivered by the Centre for Tourism Training (CTT), Faculty of Geography, Babeş-Bolyai University between 16 March and 10 April 2015 as part of the AQUA.TS European Lifelong Learning project was developed closely following the EU provisions.

The training course was designed to cover 80 hours, 40 hours representing theoretical courses and 40 hours accounting for the practical activities which were approached in a very flexible manner, allowing the participants to be more responsible for their own achievements, including the use of information and communications technology (ICT). The curricula design and development stages consisted in a multi-steps process, involving all stakeholder categories – beneficiaries, VET providers in tourism, employers, trainers and representatives of the national authority. The evaluation of the participants' activity was outcome-based, namely it mainly rested on the evaluation of the knowledge, competences and skills needed for the implementation of a quality assurance process and of the EQAVET criteria and indicators, which were all compared with the developed or expected results.

The results of the survey regarding the attendees' level of satisfaction with various aspects of the training course indicate a high level of the trainers' professionalism, and an appropriate content which included very current, useful and applicable information, presented in an attractive way. This feedback allows us to conclude that the responsible and creative use of the local provisions and resources in a European context and manner can be successful and very beneficial for all those involved.

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WESSELÉNYI DOMAIN OF JIBOU, A MODEL OF MULTISECULAR ARRANGEMENT

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ABSTRACT. – Wesselényi Domain of Jibou, a Model of Multisecular Arrangement. Nowadays the nobiliary domains arouse the interest of specialists from various field and tourists. The typical nobility constructions are attractive both by their residential function –including curias, castles and palaces in Transylvania - and by the economic function of annexes composed of: mills, barns, stables, riding houses etc. These domains functioned as command centres of territorial arrangements from Medieval Age, pre-modern and modern ages with implications on the economic and social progress of ages and administrative structures, but also subsequent development. Our study aims to make a presentation of the nobiliary domain Wesselényi in Jibou, aiming to the identification of functions and strategic arrangements for valorisation of the domain as irradiation models of welfare and multiple values, which became a multisecular standard by: emblematic characters, decisive actions carried out by these characters, in Transylvania, Hungary and the Habsburg Empire, to which the Principality of Transylvania belonged until the Great Union of 1918. The management of Jibou domain of Wesselényi family was carried out by various state institutions after the nationalization of 1945, stipulated by Law 187/1945, occasion of new arrangement and valorisation strategies which will also be presented.

Keywords*: arrangement, nobiliary domain, Wesselényi castle, Jibou, economy, botanical garden, brand*

1. INTRODUCTION

Following the Romanian accession to European Union, the main vectors of development directions in Romania are generated by the strategies elaborated and proposed to Ministry of Development and Public Administration by the National Territorial Development Commission, being the "scientific, consultative and advisory committee[3]". The main objectives of these development strategies projected for a period of 20 years are set out in the Territorial Agenda of European Union, presented in 2007, in Leipzig, following the territorial cohesion by a"...polycentric development.., for a more efficient

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[3] ***, Ordinance, 27/2008, for amendment and supplementation of Law 350/2001, on territory arrangement and urban planning

use of available resources..., from cultural, social, environmental and economic point of view[4]", in a sustainable manner. The Commission's document encourages the achievement of cohesion objectives by focusing the development strategies in global context on the consolidation of "regional identity"[5] and local identity aspects, engaging in this approach all the categories of public or private developers.

The implementation of Territorial Agenda desiderata at national level is outlined by the Law 350/2001, regarding the arrangement of territory and urban planning, amended and supplemented by Ordinance 27/2008, being normative acts which are at the basis of elaboration of strategic development and arrangement documents by transposing and checking the strategies, policies, and programmes approved at national, regional, county, local, zonal and general urban level (PUG).

Starting from these considerations, the Wesselényi nobiliary domain in Jibou represents an incontestable landmark of development and multisecular identity at crossborder, regional and Sălaj County level. The castle and Dendrological Park are remarkable by age, architectural and geographical uniqueness, functions held in time, combined by collective symbolism.

The first information on the Wesselényi family and nobiliary domain in Transylvania is provided by the ennoblement act of the ancestor by the first name of Ferenc, dating back to 1584, who received Hodod walled city to which Jibou domain belonged, as reward for his bravery, devotion and his merits, from Stephanus Báthory, King of Poland and Prince of Transylvania, between 1576 -1586[6].

The skills of leader, his bravery and nobility status, supplemented by the fine education from which benefited the descendants of Wesselényi Ferenc, facilitated the occupation of important functions in management and military administration in Transylvania and Hungary. Among the family members there were captains, palatines, governors, administrators or diet presidents.

It is worth mentioning that the autonomy of Principality of Transylvania[7] dates back to 1541, being recognized and protected by the Ottoman Empire for the purpose of dividing the Hungarian Kingdom, and in 1699 it entered the Habsburg Empire, maintaining its status along with Croatia, Slovenia and Hungary.

The Hungarian society from Transylvania had the following structure: nobility, free peasantry, craftsmen, intellectuals and bondsmen.

The management regime of these domains with right of inheritance was specific to feudalism, in which the nobleman, vassal of sovereign, had the obligation to participate in

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[4] ***, *Territorial Agenda of the European Union*, Informal Meeting of European Ministers responsible for Urban Development and Territorial Cohesion, Leipzig, 24-25 mai, 2007, p.2, URL: http://www.mdrl.ro/_documente/dezvoltare_teritoriala/amenajarea_teritoriului/Agenda_teritoriala.pdf

[5] *Ibidem*, p.3

[6] Benedek Vasile, The life and political activity of Wesselényi Miklós, in Acta Mvsei Porolissensis, Zalău, Editura Porolissum, 2012 p. 215

[7] Teritorial, Principatul Transilvaniei se referă nu doar la Depresiunea Transilvaniei, cuprinde, inclusiv, teritoriile situate la vest de Carpaţii Orientali, Parţiumul, iar în anumite perioade Banatul, sau chiar comitatul Bihor

nobiliary insurrection, in the service of the emperor and the agricultural labour was assured by the work of bondsmen, who had the possibility to receive and work for their own use the serfdom lands, for which they paid quitrent every year.

2. RESEARCH METHODOLOGY

The investigation of the arrangement model of a nobiliary domain implies a thorough bibliographical and cartographical documentation in order to obtain a large volume of scientific and technical information. Along with these research methods for obtaining the information necessary for the development of the theme proposed we resorted to the:

- Analysis and interpretation of archive documents, the Wesselényi family fund in Jibou;
- Comparison of information from different bibliographical sources;
- Use of interview as a method of obtaining original information;
- Photographic documentation on the spot in the field trip visit;
- Observation and confrontation of information from bibliographical documentation with geographical reality.

3. HISTORICAL LANDMARKS OF SUBSTANTIATION AND GUIDING GEOGRAPHICAL DATA

In its long life in Transylvania, the Jibou branch of Wesselényi family was founded by the marriage of baron Wesselényi István (born 1674- died 1734) with Bánffy Kata (born 1684-died 1734), daughter of governor Bánffy György, who had as heirs of the domain: Wesselényi István (b. 1708- d. 1757), Wesselényi Miklós senior (b. 1750- d. 1809), Wesselényi Miklós jr.- boatman on the Danube (b. 1796- d. 1850), Wesselényi Béla (b. 1847- d. 1904), Wesselényi Ilona[8].

Located in the perimeter of Solnocul de Mijloc County, the nobiliary domain of Jibou can be reconstructed based on archive documents, which contain along with the current administrative perimeter of Jibou town, ten neighbouring settlements in the North-East of Sălaj County.

The landform units which lay at the basis of development of nobiliary domain include the basins of Guruslău and Almaş-Agrij, at the confluence of Almaş and Agrij, and the main river, Someş, on the sector between Var and Jibou, completed by Someş corridor and Sărat brook, on the route Zalău-Jibou. The basin areas developed along North-South and East-West directions, represent a contact space framed by the "internal and external components of Someş Platform, make the passage from Someşan Plateau

[8] Kardos Samu, *Báro Wesselényi Miklós élete és munkái*, Budapest, Editura Légrády testvérek, 1905, p. 2.

to the East towards Silvano-Someş Hills, in the West, separated by Jugul Intracarpatic[9]", subdivision, Culmea Prisnelului. Sărat brook represents a demarcation area between Silvano-Someş Hills in the North and Meseş Mountains in the South. This sector is also mentioned in the scientific literature by the name "Poarta Someşană" (Someş Gate) as it is on the path of penetration of oceanic air masses in the Transylvanian Basin, but also for an easier access by development of communication lines, railways and roads - DN 1H (Surduc), DJ 108A (Baia Mare).

The extension in area of the domain changed in time because of several factors such as:

- Release of serfs and their apportionment of property in 1848, with the serfdom lands by Wesselényi Miklós jr;
- Division of domain by inheritances;
- Agrarian reform of 1921;
- Confiscation of fortunes by nationalization after 1945, expropriated areas were occupied by the industrial platforms under development, or distributed to the new C.A.P. and I.A.S while the Dendrological park of the castle was later turned into a botanical garden;
- Retrocessions which include a part of lands and Wesselényi castle, which were given back in 2011.

4. ARRANGEMENT AND IDENTITY ASPECTS OF NOBILIARY DOMAIN

The first clues of presence of organization forms in the current urban perimeter of Jibou are provided by the archaeological investigations which showed the presence of artifacts and specific housing arrangements, "... from Bronze Age[10]", but the archive documents report in 1219[11] the town with the name of „villa Chybur"[12], a small village which suggests the presence of households specific to that age, and since 1387[13], it is mentioned with the graphology and phonetics of Hungarian similar to the nowadays pronunciation "Zsibotelke"[14].

Having in view the archive sources available, the research is oriented to the identification and illustration of arrangement options of feudal property analysed.

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[9] Pop P., G., *Depresiunea Transilvaniei*, Cluj-Napoca, Editura Presa Universitară Clujeană, 2001, p. 121, prelucrat

[10] *** (2010), Ordonanţa. Nr. 2361/2010, Annex-List of historical monuments 2010- Sălaj county, Ministry of Culture and Cultural Patrimony, in Official Gazette of Romania,year 178 (XXII), no.670 bis, 2010

[11] Chende-Roman, G., *Dicţionar etimologic al localităţilor din judeţul Sălaj* (Etymological dictionnary of towns from Sălaj county), Zalău, Editura Silvania & Caiete Silvane, 2006, p. 192

[12] *Ibidem*

[13] *Ibidem*

[14] *Ibidem*

In over two centuries of direct management of domain by the descendants of spouses Wesselényi István and Bánffy Kata, "Jibou, of Wesselényi nobiliary family" became a true polarization centre not only at physical geographical level, but also from economic, cultural, social and ideological point of view.

Multiple polarity is generated by natural factors, but also by anthropogenic potential as a result of management and reformatory vision which will finally restructure the economy and the whole society, creating a solid base for the future development strategies.

The reasoning for arrangement of Jibou domain served the quality and nobiliary brand of Wesselényi family.

The historiographic research of nobility family of Jibou highlights two characters, outlining the character and temperament of Wesselényi Miklós senior, with Wesselényi Miklós jr., as two political personalities, cultured persons and reputed horse breeders.

In the light of our research, the nobiliary brand of Wesselényi family is described by their intellectual activity, highlighting the European Enlightenment to which adhere the two illustrious noblemen from Sălaj, keeping the general character of contemporary Hungarian nobility characteristic of the period between the last decades of the 18th century and the first decades of the 19th century.

The suppression policy adopted by the Austrian Court generated opposition among Wesselényi family, perpetuated from one generation to another.

Wesselényi Miklós sr. was one of the initiators of Cluj theatre, supporting materially and technically the step of cultural emancipation, translating and writing plays and organizing tours in Transylvania and Hungary.

During the life of Wesselényi M. sr., the residence of Jibou was turned into a cultural centre being visited to meet the reputable baron who recited in Latin, listened to csárdás, organized hunting parties and trained horses in his own stud farm.

In 1805, the writer and poet Kazinczy Ferenc, on the occasion of his first trip in Transylvania, was the guest of Wesselényi family. In Jibou, the writer met the painter Franz Neuhauser The Young[15], who painted paintings which contained hunting scenes from the forests of Jibou and Maramureş Mountains.

The huntings of Jibou became so famous that they remained a brand for the family and the town, having continuity among the latest generations.

Wesselényi Miklós jr. participated in the hunting with his father, from a tender age. On one of the paintings made by Neuhauser, a hunting scene is captured in which Miklós jr. stands with the group formed by the hunting noblemen.

At maturity Wesselényi Miklós jr. resumed the tradition of his father, organized large hunting sessions, which lasted a period of three or four weeks, gathering around him the Transylvanian liberal nobility, with whom he formed an opposition group to the Government of Transylvania, appointed by Vienna.

Wesselényi Miklós jr. is known as a promoter of liberal Hungarian reformism in Transylvania, starting as an ideologist in his work "On Prejudice", in which he criticized the misconceptions of his contemporary society, opening the path to modernity. Thus, on the

[15] B. Nagy Margit, *Reneszánsz és barokk Erdélyben*, Bucureşti, Editura Kriterion, 1970, p. 198

level of development of liberal nobiliary ideology by which he pursued the dissolution of serfdom and formation of a new status of the citizen, the residence of Jibou would become a brand of development, serving as the first nobiliary domain from Ardeal where serfdom was dissolved in 1848.

The nobiliary family brand is composed of elements characteristic of the Middle Ages, but due to the activities between the Enlightenment currents of Europe and the generation of liberal reforms, the arrangement model of Jibou domain becomes a sustainable project which may become a tourist attraction in Sălaj.

4.1. Premises of arrangement from the natural perspective

The implications of natural elements on the organization of activities and arrangement of material base necessary for a good administration are distinguished by introduction of zonality by altitude in the valorisation of geographical space from the management of the domain, and the following elements are decisive: landforms, climate, drainage, biogeographical and pedological aspects.

The first step in the selection of the ideal location for a "nobiliary household" consisted in the identification of the most favourable areas for assurance of vital functions in various ages of history, starting with the housing and defence functions, continuing with economic functions and adding the status and role functions.

Thus, the geographical space of Jibou domain is defined by hills with average altitudes which fall between 300 and 350 m, the maximum height is 437.4 m, recorded at Piscul Ronei, component of Prisnel Range. The depression areas, interspersed between the hills, have an average altitude of 200-250m, the marshes are present here and there, in meander sectors which accompany Someş River, which changes suddenly its flowing direction by the loop related to the section Cicomani - Turbuţa-Husia, from North-East, South-West to South-North direction.

The depression corridors are aligned in East-West direction, Sărat Brook - Someş Corridor, allowing the movement of oceanic air masses in this direction, and the North-South alignment of Almaş-Agrij basins, that separate Meseş Mountains in the West and Simişna-Gârbău Hills in the East, continuing to the North with Guruslău Depression. The depression is surrounded by: Prisnel Range in the East and Sălaj Range in the West, Sărat Brook in the South and Ţicău Gorge in the North, an area which has a sheltered climate with annual average temperatures[16] of 9-10ºC, while across the domain the annual average temperature is 7-8 ºC. The annual average rainfall quantities range between 650-700 mm/year or even below these values in the basin areas, while the amount of annual average precipitation is 750-800 mm/year in the higher landform units.

From a biopedogeographical point of view, we can see the presence of oak and beech forests mixed with other deciduous species on hills, being interspersed by secondary meadows. The soils are dominated by spodic soils suitable for the culture of cereals and clayish soils. The floodplains have alluvial soils with high fertility, suitable for vegetables with large extension in Someş flood plain in Jibou-Ţicău sector, and terraces from the valley with natural typical hygrophilic flood plain vegetation, such as: willow, osier, alder tree etc.

[16] Morariu, T., Sorocovschi, V., *Judeţul Sălaj*, Bucureşti, Editura R.S.R., 1972, p.36

The extrapolation of information resulted from the examination of archive documents shows that in the domain a special attention was paid to territorial systematization, by making perimeter arrangement plans. The methods used and morphological aspects of towns and agricultural lands were cartographically recorded. The cartographic materials studied offer information on the structuring of built-up area and the method of use of agricultural space in Mirşid, and it illustrates for the vineyard of Rona, the size of vineyard plots from the climax of economic development of the domain, started by Wesselényi Miklós jr. between 1818 and 1850.

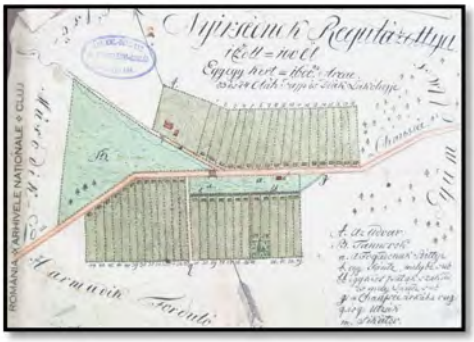

Fig.1. Arrangement plan of Mirşid village, 182*1*
(*Source:* A.N-S.J.Cj, fondul nr.250, dos. 33, f.7)

Fig.2. The vineyards of Rona, 1840
(*Source:* A.N-S.J.Cj, fondul nr.250, dos. 33, f.12)

The systematization plan of Mirşid village (fig.1), dating back to 1821, captures the display of households on the two sides of Zalău-Jibou traffic axis, forming a linear village composed of 44 households.

Mirşid domain presents a nobiliary arrangement similar to Jibou model where the annexes for breed horses are built in the vicinity of the mansion and a vast pasture stretches outside the nobiliary household, which illustrates the passion of the family and nobiliary brand.

The street layout located in the South of the main road, with 26 households, contains two central buildings with social functions, the church and the inn. The map shows that each household was surrounded by a fence and the existence of parish house and the Romanian priest shows that Mirşid was inhabited by a Romanian community, outlined by the existence of a single church with cemetery, behind the priest's garden and Mirşid administrator's garden, noted by the households with numbers 23 and 24. Their connection to the main road was made by a path. In the vicinity of the main road there is the inn which holds a pasture for the animals of travellers, spanning on an area as wide as 13 households, being crossed in North-West, South-East direction by a small brook which connects the two pasture fields.

The analysis of maps, including the Theresian ones, but also the archive documents inform about the use of lands, cereals (wheat, rye, oats), hemp and vegetables were cultivated in floodplain areas, the sloped lands were used for fruit-bearing trees (plum trees, apple trees etc), and the sunny slopes of Rona and Sălaj hills were areas with a sheltered climate, covered by the vineyards of the domain from where they obtained wines and champagne of good quality even for export. The viticultural map (fig. 2) of 1840

shows the earthmoving works on Rona Hill, which included 26 plots from where they obtained a production of"2000 wine buckets[17]" every year. The vines were permanently renewed. Interspersed with the vineyards, Rona Hill areas were delimited for the orchards of cherry and sour cherry trees, valorized under the form of fruits.

The secondary meadows of hilly areas resulted from deforestation because of the need for new areas of pastures and agricultural lands.

The floodplain and terraces of Someş River are developed on the left side of stream, concentrating most of the settlement towards Sălaj Hills. The former residence of Jibou domain was positioned and developed at the contact between the two landform units.

The vertical arrangement strategy of domain sets out the location of administrative centre, respectively the nobiliary curia and castle after the modernization on a high terrace of Someş River, which triumphantly emerges over the village, across Piscul Ronei (Rona Peak), offering at the same time a fairy tale landscape and protection from the floods and from possible attacks. In time the nobiliary residence was witness to the Ottoman attacks, the kurucz revolution of Rákóczi Ferencz II, in 1705, or even scenes of the 1848 revolution.

4.2. Optimization of the agrarian economy in the arrangement model

The functional organization of nobiliary domain implied a series of actions and techniques for efficient valorisation of available resources, targeting first of all the consumption and building of an administrative model according to liberal principles promoted by Wesselényi Miklós jr., by which the work of bondsmen became negligeable, being substituted and completed by the work of day-labourers and specialists employed.

The militantism of Wesselényi Miklós jr. in Hungarian reformist liberalism of Transylvania, aimed at the gradual change of organization of feudal domains according to the English model, in capitalist domains based on market economy. By the modernizations carried out in Jibou, the baron managed to obtain higher productions in quantity and quality so that the annual wool production got to be delivered for export, to the Wodiner company in Vienna based on agreement in „...quantity of 100-120 măji, ... and conditioned that the whole quantity should be transported to Pesta...[18]".

The increase of economic yield of the domain generated the necessity of modernization and arrangement of the road system, which had to deal with the heavy traffic of carriers with cereals and other merchandise for domestic and foreign markets.

The road ways separated the plots in exploitation, which represented a new landscape arrangement model in Transylvania in the first part of 19th century, being protected by ditches and plantations of fruit-bearing trees such as: apple trees, plum trees and mulberry trees, which were valorised in the breeding of silkworms. Thus, Wesselényi Miklós jr. managed to export a substantial quantity of silkworm cocoons on the Western Europe markets.

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[17] Benedek Vasile, *Aplicarea principiilor liberale pe domeniul Wesselényi din Jibou*, în Acta Mvusei Porolissensis, XXXVI, Zalău, Editura Porolissum, 2014, p 64.

[18] Benedek, V., *Aplicarea principiilor liberale pe domeniul Wesselényidin Jibou*, în Acta Mvsei Porolissensis, XXXVI, Zalău, Editura Porolissum, 2014, p. 65

4.3. The Castle – an arrangement model

Prior to the ennoblement act of 1584, for the Transylvanian branch of Wesselényi family, Jibou domain was the "property of noble family of Jakcsi de Coşeiu, entered in state treasury[19]".

In „oppidum" Jibou, fairs were organized and required the presence of an administrative centre or supervisory centre of activities, knowing that salt was transported on Someş.

By correlating the systematization plan of Mirşid village (fig.1), with the archive information and the revealed reality in the field research, we infer that on the hill of Jibou castle there was a curia with thirteen rooms. In 1719, the central body of Jibou castle was completed. It was later changed at certain intervals and received the final shape in 1879, date marked on the wall of B building.

With the second renovation of the old curia on the domain, in 1755, the "imposing stable[20]" was built (fig. 4), being now located in the perimeter of the Botanical Garden, ornamented with the coat of arms of the family, exposed on the Eastern side of the masonry while the Southern wall was ornamented with the sculpture of Johannes Naghtigall, which represents a small stallion (fig. 3.), the passion and faiblesse of the family from ancient times.

Fig. 3. Sculpture of Johannes Naghtigall, external ornament

Fig.4. Inner image of D building

The inside room is spacious due to Romanic arches and the eight support pillars, sized for 28 horses.

[19] Fejér Tamás, *AWesselényi család iratöröksége és az Erdélyi Nemzeti Múzeum Levéltára (Zestrea documentară a familiei Wesselényi şi Arhivele Societăţii Muzeului Ardelean),* în vol. 277 a Caietelor Ştiinţifice din Transilvania - A Szilágyság és a Wesselényi család (14-17. század), Cluj-Napoca, Editura Societăţii Muzeului Ardelean, 2012, p.296

[20] B. Nagy Margit, Reneszánsz és barokk Erdélyben (Renesans şi Baroc în Transilvania), Bucureşti, Editura Kriterion, 1970, p.191

In parallel with the continuation of renovations of the nobiliary assembly of national interest and historical monument of architecture[21], the works also include the renovation of the achievements of 1799-1810, such as the hothouses, the Dendrological Park, the penthouse and the riding house etc.

The castle was built in baroque style, having as architects people like Eberswhart Blauman, Franz Wrabetz and other local craftsmen, who obtained an architecture characterized by pavilions, a balcony carved in stone, an arch embellished with gliding pilasters and windows covered with window shutters.

Nowadays the external shape is kept in general, but there are small changes by incompliant repairs made before 1990, and other physical destructions.

The interior of the castle itself was defined by 40 rooms with different sizes, 21 on the ground floor and 19 on the upper floor. The knights' room and the ballroom are more special. With reference to the interior design we have information from the expense diary of Cserei Heléna, mother of Wesselényi Miklós jr., who ordered wallpapers from Vienna, contracted gold craftsmen and painters to achieve the interior architecture.

4.4. Arrangement and tourist functions

The castle and dendrological park, along with the hunting yards arranged in the forests nearby attracted cultured people, priests, politicians and foreign travellers because of the recreational and entertainment activities organized by the family for the guests. As recreational and mass cultivation activities, Wesselényi Miklós senior used to organize theatre shows which were carried out on a stage arranged in the dendrologic park. The idea of turning the English park of the castle into a botanical garden belonged to biology professor Vasile Fati, who rediscovered the microclimatic potential of the town favourable for the acclimatization of species from various areas of the world and started this activity in 1959. The first hothouses were built in 1801 by Wesselényi Miklós senior who purchased "120 lemon trees[22]". Nowadays the botanical garden bears the name of Professor Vasile Fati and represents one of the most visited tourist attractions in Sălaj County.

It is noteworthy that now the castle is separated from the botanical garden and cannot be included directly as a tourist attraction open to the public, but the architectural splendour reflects on the landscape attracting amateurs of history and art or other visitors who take pictures in front of the architectural monument.

Among the future plans of Vasile Fati Botanical Garden, there are the purchase and integration of the castle in the circuit of tourist programmes offered to visitors.

The activities carried out in the botanical garden have a multisecular tradition, having in view the innovative preoccupations of Wesselényi Miklós jr. regarding the acclimatization of species, the grafting of fruit-bearing trees, experimentation and

[21] *** (2010), O. Nr. 2361/2010, Annex-List of historical monuments 2010- Sălaj county, Ministry of Culture and Cultural Patrimony, in Official Gazette of Romania,year 178 (XXII), no.670 bis, 2010
[22] *Ibidem*, p.197

wide scale spread of cultures with productive yield, that is why he trained staff from different domains. These issues are found in the activity of botanical garden founded by professor Fati and his collaborators by transforming the Centre of Little Naturalists into a Biological Research Centre, assuring the continuity of multi-secular arrangement and establishing new objectives for the future.

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