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THE HOUSEHOLD INDEPENDENT CELLARS OF ORADEA HILLS, ROMANIA: A CHANCE TO CONTINUITY THROUGH THE HUMAN AND ENVIRONMENTAL CAPITAL

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Abstract: The current study aims to make an analysis of the human and environmental capital of Oradea Hills, notably the locations where the household independent cellars are found. For the human capital more indicators were analyzed such as the active and inactive population as well as a focused analysis of the population age category of Episcopia Bihor neighborhood where these household independent cellars prevail. For the environmental capital the land tenure of Oradea Hills was considered and analyzed through the perspective of forests, hayfields and pastures, arable land, built-up area, lithology and slope exposure. Thus more theme maps resulted (i.e. geological map, slope exposure map) from this study carried out through the ArcGis program meant to further help the interested investors to capitalize these storage cellars.

Key words: household independent cellars, hills of Oradea, environmental and human capital

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INTRODUCTION

Among the agricultural crops that showed particular interest for the population of Bihor were the vineyards which, along with the wine preparation technique, the traditional occupations specific to the cultural heritage of these lands should also be considered. Versus the last half century, the areas cultivated with vineyards in Bihor have narrowed considerably, as well as the importance of those who practiced this activity. The current research is the third part of a wider research dedicated to an ancient occupation (vine culture) and the infrastructure for the capitalization of wine and other agricultural products, namely the independent cellars of the Oradea hills. The origin of the importance of vine and wine for the inhabitants of this area has been materialized by the existence of many cellars dug into the slopes of the hills, either close to the households or outside the household perimeter (Dincă et al., 2017; Tătar et al., 2017).

The analyzed territory's area is in the proximity of Oradea, but the influence of urbanization has not been so strong as to inhibit the desire of villagers to dig cellars away from households (1-2 km). Being a well-individualized subunit of Crişana Hills, over Oradea hills overlap eight communes with 33 villages and partly the city of Oradea through the Episcopia Bihor neighborhood. For our research, we considered 14 villages and the Oradea neighborhood (figure 1), because here we also identified household independent cellars.

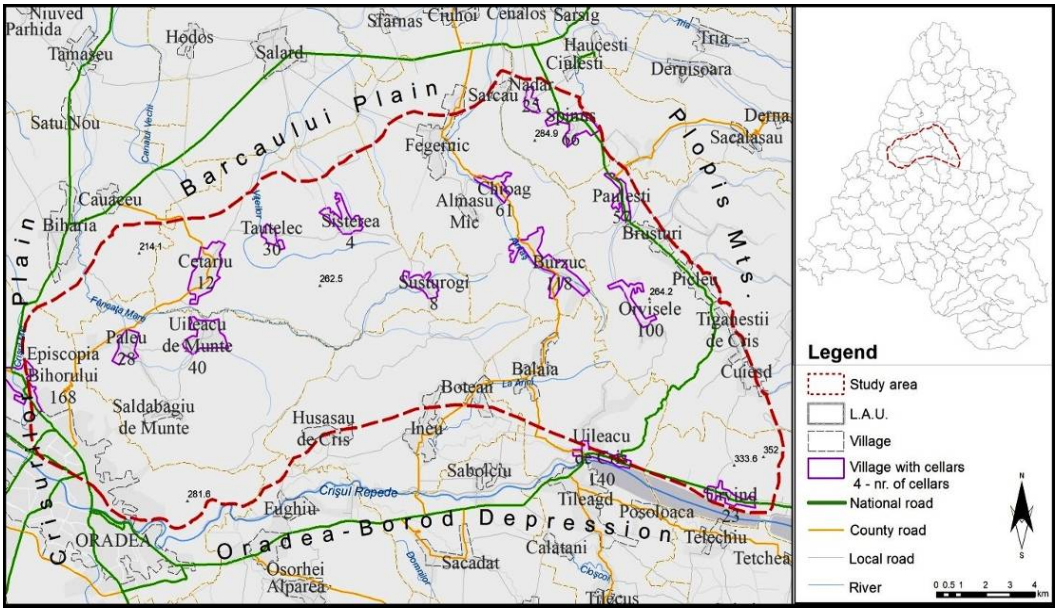

Figure 1. Human communities of Oradea hills with household independent cellars

The main focus of the study is on the analysis of some natural and anthropogenic components of the local rural socio-economic subsystem, under the name of human and environmental capital, which implies certain prerequisites that led to the excavation of these cellars away from the household, as well as the importance of associated tasks with the capitalization of independent cellars.

MATERIALS AND METHODS

In the course of the whole study, a methodological approach consisting of the study of the thematic references, a field survey and interviews with cellar owners from Oradea Hills were used.

The geographic literature has approached these hills, the existing works being rather geomorphologically oriented (Josan, 1993; Josan et al., 1998; Josan et al., 1999; Ionita, 2000;

Pop, 2005; Nistor and Linc, 2011). Tangentially, the subject of cellars in these hills was approached in a monographic work dedicated to the commune of Cetariu (Dincă et al., 2012). The studies on the vine and wine culture in the Crişana historical and geographical province are generally of a historical origin (Botezan, 1974; Şuta, 1976; Bandici, 2005; Dume, 2010) or appear only as references to works related to the territory of Romania (Bulencea, 1975; Teodorescu et al., 1987; 2003). Surveying these works, the idea of the vine cultivation age (with techniques preserved from antiquity, along with modern technologies) emerges, as well as the important role of the physical and geographical factors (hilly and plain relief developed on a lithology appropriate to this culture, with a mild climate which has favored the vine spread). Attention is also drawn to storage areas such as cellars.

In recent years, there has been a revival of interest throughout the country for some thematic routes, among which the *"wine route"* linking, above all, a series of wine cellars set in certain vineyards or wine-related areas (Anghel et al., 2006; Ungureanu, 2015; website 1, 2, 3, 4, 5).

Wine routes are most often also associated with aristocracy (Szabo, 2013), as also revealed by the qualitative interviews of wine cellars' owners from the Hills of Oradea. The specific hilly relief of this space has been exploited for wine harvest ever since medieval ages in Săldăbagiu de Munte since 1371; in Marghita since 1422; in Şisterea since 1501, which are attested as vinery centres (Biharea, 1979; Giurescu, 2007; Prodan, 1967).

The field survey is focused on the inventory of cellars (location, age, conservation status, building material, cellar morphometry, objects and products currently housed by cellars). For the human capital approach, we turned to some statistical data regarding the active and inactive population, and to highlight the environmental capital we approached natural resources (explored through land use) correlated with other features (lithological sub layer and slope exposure).

The ArcGis software was used to produce the cartographic material for the analysis of the human and environmental potential.

RESULTS

The human capital of the villages

A good capacity of community adaptation, as resilience fundamentals states, cannot ignore the energy, the force and the initiatives of the inhabitants.

The value of the human capital of the 14 villages it is expressed by the social, economic implication manner of the inhabitants, respectively by the active and inactive population categories (table 1). The motivation of selection for these two categories could be related to the logical implication which already has a good working and initiative capacity (the active ones). On the other hand, it counts the further, extended possibilities of implication of the inactive ones, as an important human resource for agricultural activities or for rehabilitation and touristic use of the cellars. The geographical and social data collection, including information related to the age and professional profile of the cellar owners, reveals interesting situations about the good or weak resilience of the inhabitants of Oradei Hills.

According to data from Table 1, the best situation regarding the active and inactive population category (40-51% of stabile population of 7 out of 14 villages) could be found in the villages located at the periphery of the study area (figure 1). The explanation is found in: the presence of trained, educated, adult and young mid-age population category; assumed perpetuation of agricultural traditions (including agricultural activities which support the existence of the cellars); presence of national roads, north and south of the villages from Oradei Hills; the supply possibilities with industrial goods and selling possibilities of agricultural products in the markets of Oradea. Although the percentage of the active population in these villages is not a significant one, it follows the national trend and pays the price of rural depopulation by leaving to work in towns or abroad and the ageing of rural population

However there are some positive signs in terms of economic revival and reactivation, which is reflected upon active population, in terms of some small businesses in service and

agriculture fields (in Paleu, Cetariu, Tăutelec, Urvind villages). These positive signs (along with new initiatives on short term) could be related to the fact that there is an inactive population category, insufficiently used for local activities. Other population categories are represented by mid-age pensioners who withdrew from the Oradea to live in these villages, the category of students (who can offer their labour capacity to their parents and grandparents in their spare time) and the category of socially assisted persons who receives financial support from city halls (without necessarily medical problems), all these population categories representing 40% of the overall population.

Table 1. Categories of active and inactive population from the villages belonging to Oradei Hills (Data source: D.J.S Bihor)

Village	Stabile population	Active population		Inactive population			
		Employees	Unemployed	Pensioners	House wives	Socially assisted categories	Students
Nădar	229	102	6	47	13	23	33
Spinuş	425	147	9	96	27	45	60
Păuleşti	296	96	8	78	23	14	50
Urvind	1053	373	44	182	53	162	131
Uileacu de Criş	843	298	22	224	44	84	138
Paleu	1242	597	24	206	31	193	165
Uileacu de Munte	508	247	11	108	18	27	62
Şuşturogi	264	85	7	85	16	33	30
Burzuc	776	284	13	245	38	52	129
Orvişele	376	183	6	44	39	33	59
Cetariu	1055	509	19	206	39	106	107
Tăutelec	249	111	10	77	8	14	21
Şişterea	597	205	14	161	27	64	86
Chioag	185	57	-	74	20	8	20
TOTAL	8098	3294	193	1833	396	1291	1091

The other villages, located mainly along the central axis of the hilly area (figure 1), are defined by values of 31-39% related to overall stabile population. Although the number of this category is not a significant one, they are represented by those who are employed in services (mainly administration). They are young adults, skilful in agriculture, being also owners of cellars or took over from their pensioner parents the exploitation of the cellars. Although the percentage of pensioners is quite high (23-32% from stabile population in Păuleşti, Burzuc, Şişterea villages) and they are included in the inactive population category, they own the skill and the initiative in agriculture, cellars conservation and traditional use. The young population category is enough represented numerically (14-17% from stabile population in Păuleşti, Burzuc, Şişterea villages), is educated with a high respect for the work and involved, together with their parents, in all agricultural activities. A special situation is found in Uileacu de Criş village which has a high percentage of all inactive categories. Beyond it stands a significant percentage of those which cannot be included on either active or inactive categories.

They are rather those who are linked by land (in terms of plot, limited as surface), by cellars located in the slopes facing southward, towards Oradea-Borod Depression (figure 1) and by small holiday houses built upon the cellars (figure 2, left), performing a weekly or seasonal commuting between Oradea and these villages.

Figure 2. Household independent cellars: top left (Tăutelec village), top right (Burzuc village), bottom left (Uileacu de Criș village), bottom right (Nădar village)

Table 2. Population data of Episcopia Bihor neighborhood
(Data source: D.J.S. Bihor)

	Age category of four streets (age group - population number)				
	Age category (years)	**Drumul Hotarului Street**	**Dealului Street**	**Valea Nucului Street**	**Valea Frumoasă Street**
		Nr. of inhabitants	*Nr. of inhabitants*	*Nr. of inhabitants*	*Nr. of inhabitants*
Episcopia Bihorului (neighborhood of Oradea)	15-19	8	10	7	0
	20-24	9	13	0	0
	25-29	14	19	5	0
	30-34	17	19	6	0
	35-39	8	16	7	0
	40-44	13	18	7	0
	45-49	11	10	3	0
	50-54	11	12	7	1
	55-59	5	18	2	2
	60-64	7	8	1	2
		Total: 103	Total: 143	Total: 45	Total: 5

Another special situation is the case of Episcopia Bihorului neighborhood, which belongs, from an administrative point of view to Oradea, but with an organized cellar system dug in the south-western part of the study area. Because of the lack of data related to the active and inactive population category of this neighborhood, the analysis was focused on the population age category but just for four streets, located in the vicinity of the cellars apart from households. These four streets host the most part of cellar owners. The analysis of the population of the four streets (table 2) is simplified and less limited to the land cultivation (small parcels cultivated with vegetables and less fruiters).

What is more important are the parcels with grapes which is the raw material for the wine, processed in the cellars, but also the associated leisure, socialization type activities which are made with friends/relatives/neighbours. These activities are made by adult and old population (70-80% of the total population) who live on Drumul Hotarului and Dealului streets. The young and very young population category, although being mentally open toward the possibilities of revitalization and rehabilitation of the cellars through regional wine or gastronomic tourism, just supplement the actions of their parents and grandparents.

The environmental capital of the villages

The study on household independent cellars also takes into consideration the environmental capital of the villages because it could reverberate at a certain level of resilience. We consider that explicit results in the analysis of the environmental capital lean on some basic elements. The importance the natural resources (as land use) but also other features such as lithology, slope exposition stand out. The land use starts from the premise that the inhabitants and the villages use the natural resources as components, the environmental resources having a direct or indirect influence upon the built-up area of the villages, including household independent cellars. In other words, the sustainable use of the environmental resources could lead to a good social and economic adaptation capacity of the communities, namely to resilience. The present study focuses not just on the analysis of these resources but also on the relationships between these resources and the cellars. These environmental resources are the forests, hayfields and pastures, arable land (including orchards and vineyards) and the built-up areas (figure 3).

The forests which occupy 6371 ha are relatively young (30-50 years), with a good mean density index (abundance-dominance index aprox. 0.6), the dominant species being the oak and hornbeam (figure 4) associated with acacia (figure 5), linden, maple. These forests provide most wood used for heating and other domestic use (usually the used volume is 1-1.5 trucks), another wood source being the dry wood which results from the cleaning of the underbrush which surrounds the arable land and the cellars. The forests are located in three main areas, in the southern part of Oradei Hills, generally quite far from the household independent cellar villages (figure 3).

In other areas the forests are fragmented, usually as clumps, in the vicinity of the villages. The main feature of these forests is that it provides the material (dominantly oak, rarely acacia) for battens used for fences, annex households but mainly for entrance doors (50-55% are made from oak) or for wine barrels (more than 90%). From an ecological point of view, the state of the forests is good, and starting from this premise, the future perspectives for the living community are quite good.

Hayfields and pastures occupies 5724 ha and covers large areas in the southern part of the study area, for the rest it appears as elongated surfaces (mainly in the eastern part, figure 3) but closer to the villages. The current state of this natural resource is problematic. One explanation could be related to the fact that the grassy surface was reduced because of the extension of the built-up area of the villages, the extension of the arable areas and the extension of the underbrush and sprouts. Another problem which led to the reduction of the bio productivity of the hayfields and pastures is related to the decrease of husbandry. Some of old and young families from the villages give up large cattle breed; sheep and goat number remains at an acceptable level.

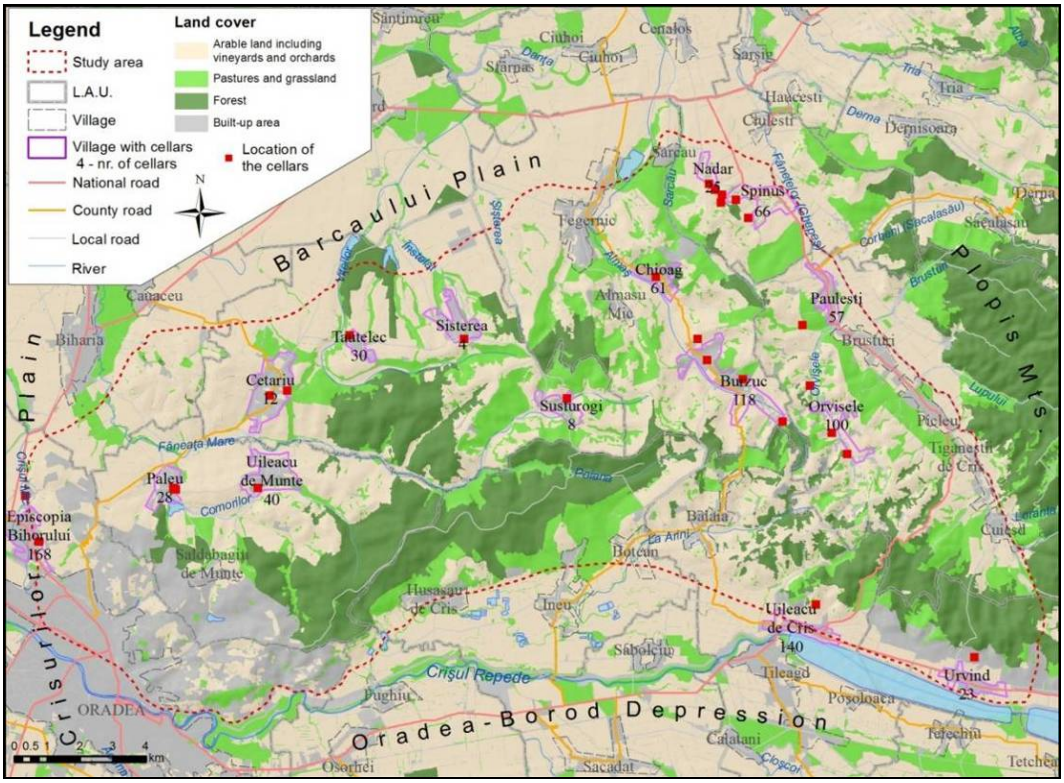

Figure 3. Types of environmental resources and the location of the household independent cellars of Oradei Hills
(map created over data processing based on the World Imagery, source: ESRI)

Figure 4. Cellars dug into the hill covered by oak trees in Orvișele village

Figure 5. Cellars dug into the hill covered by oak trees in Păulești village

Arable land, including orchards and vineyards, occupies the most important part of the study area (14 944 ha), mostly in the northern part (figure 3). The local agriculture shows positive signs, is almost entirely ecological in terms of technique, although it is made for family needs only and just in some cases for providing town markets or commercial centres. These positive signs are related to a new attitude of the small land owner, who is also cellar owner, which could store the excess agricultural products. The most cultivated crops are vegetables (which are almost entirely

stored inside the cellars) on surfaces between 300-500 sqm, parcels over such size being used for cereal cultivation (corn and wheat). The dominant fruit species, in the eastern part of the study area, are plums, apples and peaches respectively apples, sour cherry, sweet cherry, peaches, in the eastern part of the study area (hundreds of tons of apples and sweet cherry from Paleu village are sold in the supermarkets of Oradea). The grapes are cultivated on parcels of 100-200 sqm (figure 6) and are the fruit species which define the rural agricultural identity of Oradei Hills the fairest, consecrating the inhabitants by tradition, skill and vine culture.

Figure 6. Grape parcels (left - Nădar village), with cellars (right - Uileacu de Criş village)

The built-up area occupies 5732 ha and must be analyzed in terms of the quality of the individual habitat and the household independent cellars. The most part of the houses from Oradei Hills have a modern architectural style, with 3-5 precincts (rooms plus lobby), they are 40-60 years old, built from durable materials (bricks), with large courtyards but with annexes in a poor condition. The technical endowment of the villages was quite poor up to few some decades ago (unpaved streets, lack of water supply, sewage or modern communication systems) but significantly improved in the last years. This improvement raised the local life quality standards, including the chances for other persons to settle down in these villages or for other investments.

The location of the cellars (compared to the land use) indicates a higher rate of the cellars presence in or at the border of hayfields and pastures in the eastern part of the study area. In the western part of the study area the cellars are located dominantly inside the built-up area of the villages (along the streets or at the border of the built-up area). A special situation can be noticed in Chioag village, where the cellars are dug on the hill side of the household, the result being a double alignment: the household in the lower part of the slope, the cellar, on the slope, but apart from the household. Another situation is related to the location of the cellars, in Spinuş, Nădar and Burzuc villages, where the cellars are located at the edge of narrow forest strips (figure 3). The three placement situations of the cellars in relation with the land use clearly shows an advantage: the easy accessibility, during any weather conditions, for the owners, with their goods, or for the tourists to reach the cellars.

Other features directly influencing the environmental conditions are reflected in the location, construction and use of household independent cellars. The features of these cellars are directly influenced by lithology and slope exposition.

The lithological sub layer is responsible for soil bioproductivity, as well as for the structural and petrographic support possibilities offered to cellars as underground or aboveground constructions. Most of the Oradea Hills are located on Pannonian deposits (where most of the independent cellars are located), represented by sands in alternation with sandy pebbles and at their periphery there are terraces and meadows (pebbles and sands) of quaternary age (figure 8).

Much more suggestive is the role of lithology when one could correlate the surface support capacity of the lithology with the construction and maintenance of these artificial cavities. Almost all the owners of cellars apart from households, but also other inhabitants from the study area, unanimously recognizes a certain type of deposit in which the cellar was dug (it is called *"hămucă"*).

That would mean a uniformity of structure and petrography of the geological formations. The reality is slightly different, with minor differences, from village to village, the deposits having different granulometry, texture or type of sedimentary rock. Thus, the cellars from the eastern part of Oradiei Hills were dug into dominantly consolidated clayey sands deposits (Păulești, Orvișele, Burzuc villages - figure 7), which turn into dusty marls or consolidated sandy marls (Spinuș, Nădar villages - figure 7). The cellars from the western part are dug into more resistant deposits, dominated by clays (Cetariu, Paleu villages), even slightly consolidated sandstones (Șușturogi - figure 7). The collapsed, abandoned cellars can be correlated with the physical properties of lithology, the values being relatively low (table 3) compared to the total number of active cellars.

Table 3. Number of destroyed cellars by collapsing in the villages from Oradei Hills

Village	Păulești	Orvișele	Spinuș	Nădar	Burzuc	Paleu
Destroyed cellars (no.)	25	4	10	3	4	1

The basic aspect, despite the slight geological features, highlights the fact that the deposits of Oradei Hills are very suitable for cellars construction and use, there are durable (the *"youngest"* ones being 50 years old, the oldest being around 130 years). Furthermore inside the cellars are excellent microclimatic conditions (constant temperature values 100-120 C, relative humidity 75-80%) regardless the season.

Figure 7. Types of deposits (rocks) in which cellars apart from hosehold were dug: consolidated clayey sands at Burzuc (left), marls and consolidated sandy marls at Nădar (middle), slightly consolidated sandstones (Șușturogi)

The assessment of the suitable environmental conditions for cellars is based on slope exposition as a possibility to combine the light/shade ratio with the functionality of the cellars. The slopes facing South-West are the most used for cellars (in Tăutelec, Chioag, Burzuc, Urvind villages) followed by slopes facing South (in Orvișele, Cetariu, Burzuc).

The situation is also similar in case of the shady or sunny slopes (figure 9). In most cases the position of the cellars, within different slope categories, allows access to proper light conditions thus keeping dry the entrance or the first compartment of the cellars (for cellars with more than one compartment) combining proper micro-climatic conditions for goods' storage (mainly vine and vegetables).

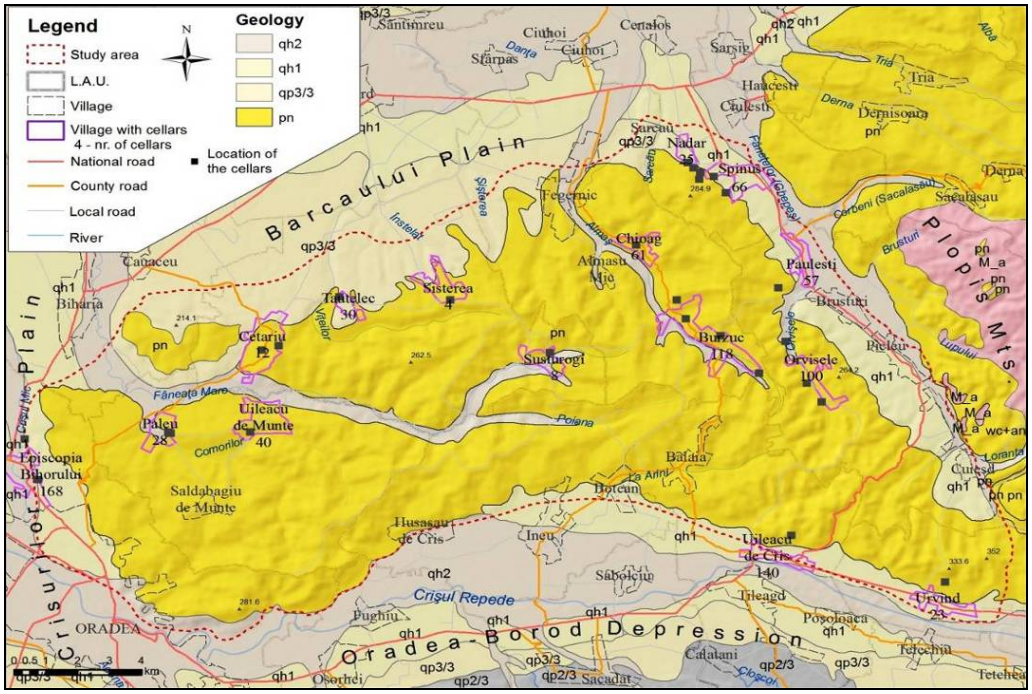

Figure 8. Geological map of Oradiei Hills and the position of the cellars related to different geological formations

Legend: qh1 - gravel and low terrace sands; gh2 - gravel and marsh sands; qp3/3 - gravel and sands pertaining to the lower terrace; pn - alternating sands with sandy clays

(Source: over processing based on the geological map 1:200.000)

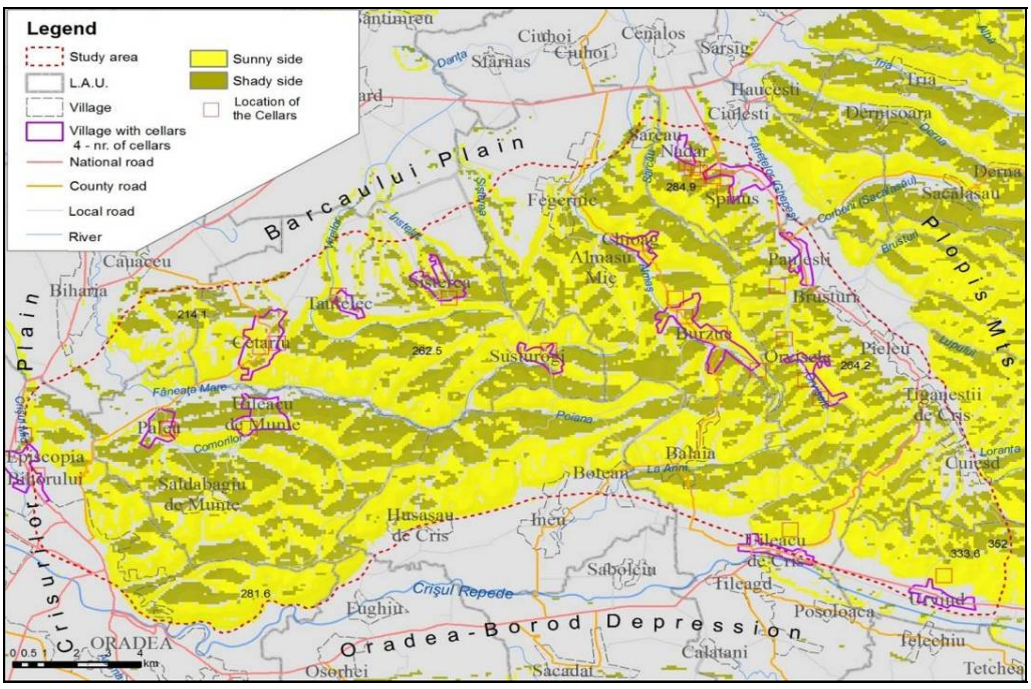

Figure 9. The sunny/shady slope distribution in Oradei Hills

CONCLUSIONS

Human capital in these villages is assessed by the active and inactive population. The best situation of the active population is held by the villages bordering the hills of Oradea (40-51% of the stable population of seven villages out of 14). The inactive population (pensioners still able for work, pupils and students, socially assisted persons) should be regarded as a labor force back up and represents a quota of at least 40% of the population of these villages.

The environmental capital was approached by way of land use/tenure and the in-built area. Young forests stand out (especially represented by oaks) with a density of trees from average to good and which mainly provides the material used to heat homes or for other household necessities. The arable land (including orchards and vineyards) occupy the largest areas of Oradea Hills. By the manner of working, farming here is essentially biological/ecological being mainly practiced for the family necessities and in a limited share, to supply markets in Oradea. Pastures and hayfields are facing a loss of the bioproductive quality due to the invasion of thickets of shrubs or by amputations of grassy areas due to the advancement of the villages' built-up areas. The built-up area should be regarded by the angle of the individual habitat quality. Most houses are built in a contemporary style of resistant materials, with 3-5 rooms, wide courtyards and visibly improved endowments after Romania's accession to the EU (mainly the access to the drinking water network, telecommunication, access roads modernization) which raises the local life quality standard.

Independent household cellars are frequently located on the outskirts of meadows and pastures in the eastern part of the hills and in the western side within the villages' hearth. In several villages (Spinus, Nadar, Burzuc) these cellars are located on the outskirts of elongated and thin strips of forests.

Regarding the lithology sub layer of the Oradea Hills, deposits are optimal for the cellar digging and use, that means basements are durable (the *"younger"* cellars have an age of around 50 years, the oldest are around 150 years old) and create excellent microclimate conditions (constant temperatures of 8^{o}-10^{o} C and relative humidity of 75-80%) regardless the season. The slope exposure in most cases allow optimum access to light, dry entrances into basements and first compartment and conjugation of suitable microclimate conditions for the produce storage within cellars (especially wine and root vegetables).

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