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CORRELATIONS BETWEEN THE QUALITY OF THE AGRICULTURAL LAND FROM LUGOJ HILLS AND ITS CURRENT WAY OF USE

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Abstract: The analyzed territory belongs to the southern sector of the Western Hills of Romania and it has an agricultural surface of 45,828 hectares. The main aim of this study is to evaluate the quality of the agricultural land from Lugoj Hills and also to spatially represent the obtained data. Based on the obtained results, the correlations between the grouping of the agricultural land according to its productive potential and the real way of space use were done. By this approach, for arable use, a graphic comparison between the real land use way and the obtained quality classes was made. Thus, it could be noticed to what extend the present land use modality fit to the resulted theoretic models. The analysis of the results must take into account as well the quantum of the surfaces distributed within each class. It has been observed that the Lugoj Hills area is generally characterized by subsistence agriculture, with low productivity, which does not capitalize in appropriate way the potential of the agricultural land. In the same time, the obtained results were used for advancing several recommendations for the optimization of the agricultural land production capacity in the study area. This was made by indicating the most favorable uses and crops, i.e. those which have the best performance, both from the point of view of quantity and quality of the yield, as well as the financial and technological efforts required for the agricultural land exploitation and the capitalization of the resulting products.

Keywords: agricultural land, quality classes, current land use, arable use, theoretic models, Lugoj Hills

1. INTRODUCTION

The action of empirically estimation and determination of the land quality is as old as the human activity of producing the basic goods necessary for living by using the land in this purpose (Ţărău, 2006). However, scientifically, only starting from the end of the '80s of the last century, concepts and methods on this issue started to be rapidly developed. Till then the researchers attention it was focused, especially, on the soil erosion and on the minimization of the negative effects on the productivity caused by the soil loss (Karlen et al., 2001, 2003; Wienhold et al., 2004).

In the last 25 years, there is a change in the perception of soil, greatly insisting that this resource is renewable only on a very large time scale. Also, if the soil resource is not properly managed, it can be lost in a very short period of time and with very limited regeneration opportunities (Faeth & Crosson, 1994; Pimentel et al., 1995; van der Knijff et al., 2000; De la Rosa, 2005). Thus, more and more studies target on the development of a sustainable agriculture, aimed to solve the food safety problem of the world population and also that of soil resources protection, topics rivaled perhaps only by those related to climate changes or biodiversity protection (Vasiliniuc, 2009). In these researches, the soils and land assessment were defined and appreciated in different ways, from the most simplistic ones to some very complex.

The terms *„soil”* and *„land”* are used, in current speech, referring to the surface layer of the Earth's crust, with similar or overlapping meanings. However, these two terms do not have the same meaning, they not being synonymous (Osman, 2013).

The concept *„land”* it is more comprehensive then the *„soil”* one, including it together with the environmental elements specific to the place where that soil is located. So, the soil represents only one element of the physical environment of the land, being influenced by all the other of its components (Tóth et al., 2007). Florea (1997) mentions that the term *„land”* complements that of *„soil”* when passing from considering soil as natural entity to that of natural resource and means of production. The soil must be considered as a morphological and functional component of the *„land”* system (Patriche, 2003).

Canarache et al., (2006) define the assessment of a soil or a land as a general term, used for any procedure aimed to estimate the quality of that soil or land. Florea & Rizea (2008) note the subjectivity and the relativity of the soils and land assessment due to their anthropocentric character.

Warkentin & Fletcher (1977) were the ones who introduced the concept of soil quality in order to complement the researches in the domain of soil science. Soil Science Society of America (SSSA) defines the soil quality assessment as the prediction process of the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plants and animals productivity, maintain or enhance water and air quality, and support human health and habitation (Karlen et al., 1997).

In 1976, FAO realized the initial action global applied for land use planning at local, regional, and national levels (Manna et al., 2009). FAO (1976) defines the land evaluation as „the process of assessment of land performance when used for specified purpose involving the execution and interpretation of surveys and studies of landforms, soils, vegetation, climate and other aspects of land in order to identify and make a comparison of promising kinds of land use in terms applicable to the objectives of the evaluation”.

Besides soil features, the land evaluation activity takes also into account climate resources and land use and its management (De la Rosa, 2005). Nonetheless, Rossiter (1996) emphasizes that the land assessment has commonly been *„pedocentric”*, namely accentuating the soil resource and being implemented by soil researchers.

Following soils and land qualitative assessments, they are assigned to different classes or categories according to certain criteria. The classification of soils and the land one are very different between them. The classification of soil units is based on their intrinsic physical, chemical and biological properties, and it derives from the nature of the analyzed object, generalizing the fundamental characteristics of the soil considered as a natural body. The land classification represents the grouping of the soils according to the environment conditions where they are found, and it is made for certain purposes such as the evaluation of the production capacity, the suitability of certain crops, the capability for some land improvement works, the necessity of some pedoameliorative actions and so on.

The classification of soils is only one and it has a scientific nature. Instead, the land classification has various forms, depending on the nature of the objective pursued, and presents a practical character (Florea, 2003).

Numerous studies on the qualitative assessment of soils and land were made over time using various approaches and methods (Sanchez et al., 1982; Smyth & Dumanski, 1995; Andrews et al., 2004; Gao et al., 2010; Rezaei et al., 2015). In the last period, once with the pronounced development of the geographic information systems (GIS) techniques and methods, these are used in many studies of agricultural land quality assessment (Mustafa et al., 2011; Biali & Stătescu, 2013; Obade & Lal, 2013; Pilehforooshha et al., 2014; Das & Sudhakar, 2014; Niacşu et al., 2015). However, there is as yet not a universal methodology which defines a set of clear indicators to assess the quality of land (Bouma, 2002). Bacic et al., (2003) points out that, yet the results are often disappointing. Karlen et al., (2001, 2003) emphasize that there is no ideal or magic soil or land quality index value, universally available, but what can be done in this regard is the development of an indexing framework that can be easily adapted to different local situations.

In Romania, on the basis of a series of previous studies (Cârstea, 1964; Teaci, 1980; Teaci et al., 1985), a proper methodology for land quality assessment was developed by The National Research and Development Institute for Soil Science, Agrochemistry and Environment Bucharest (INCDPAPM-ICPA) (Florea et al., 1987).

In the Romanian methodology, the primordial element from which the fields assessment starts is represented by the land unit (UT in Romanian) or ecologically homogenous territory (TEO in Romanian), considered by Florea (1997,) *„the basic cell in land assessment”*. The land units, together with the fundamental features of the environment in which they are found, commonly influence the land use potential.

The agricultural land qualitative assessment represents the grouping of the ecologically homogenous territories (TEO-s) from a certain area, based on their similar properties, in capability or suitability categories for certain uses, respectively, for some crops.

In Romania, the qualitative agricultural land assessment is legislative regulated by **Order no. 26** from 20 June **1994** of the *Ministry of Agriculture* *and Alimentation for approving the Indicative methodological norms for land rent calculating*.

Agricultural land classification in quality categories is made depending on its production potential, which is appreciated based on rating marks in natural conditions for arable use, into following 5 quality classes: class I (81-100 points), class II (61-80 points), class III (41-60 points), class IV (21-40 points), class V (0-20 points). The potential production is conventionally expressed in wheat, considered as a reference product, the value of a rating point being calculated equal to 40 kg wheat.

In rural areas, the agricultural land represents the most important local natural resource. That is way, the need to estimate its capability to support the basic human activities in these areas appears (Niacşu, 2012).

The main aim of this study is to evaluate the quality of the agricultural land from Lugoj Hills and also to spatially represent the obtained data. On the basis of the obtained results, the correlations between the grouping of the agricultural land according to its productive potential and the real way of space use were realized. By means of this approach, for arable use, a graphic comparison between the real way of land use and the obtained suitability classes was also made. Thus, it could be noticed the measure to what extend the present land use modality from the study area fit to the resulted theoretic models.

2. THE STUDY AREA, MATERIALS AND METHODS

2.1. The study area

The analyzed geographical space, mentioned under various names in the specialized literature, out of which the most appropriate one is Lugoj Hills (Zisu, 2010), belongs to the southern sector of the Western Hills of Romania, being entirely situated in Timiș County, in its eastern extremity (Fig. 1).

The territory of Lugoj Hills has 619.03 km^2, representing 0.25 % of the surface of Romania and 7.11 % of that of Timiș County. This relief unit is formed of 74 % agricultural land and approx. 21 % broad-leaved forests to which built-up perimeters and the surface of Surduc Lake must be added. The total surface of the agricultural land is 45,828 hectares.

2.2. Materials and methods

In the research stages of the present paper a series of cartographic materials already existing were used. Based on these, some new materials were made using GIS (Geographic Information System) methods which allow the integration of a wide variety of data for analyze and the presentation of the results as maps (Scott et al., 1991).

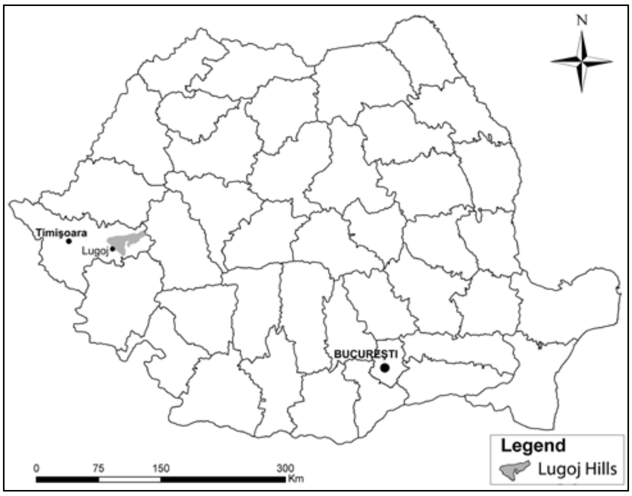

Figure 1. The geographical position of Lugoj Hills within Timiș County and in Romania.

Most of the information needed for the database was acquired in analogical format, being necessary its conversion into electronic format and the integration into a geographic information system using ArcGIS 9.3. software.

The map of the soil units from Lugoj Hills was made on the basis of *The Banat soils map*, realized on a scale of 1:100,000 by Gh. Ianoş in 1994 and published four years later in the form of 68 sheets (Ianoş & Puşcă, 1998).

The map of soils from Lugoj Hills was made by means of the information extracted from 7 of the sheets of *The Banat soils map* (18, 19, 20, 21, 27, 28 and 29). These sheets were scanned and cut, then they were assigned spatial coordinates in the projection system Stereo 70 (Romania's official cartographic projection), after that they were mosaicked, and further, the polygons representing the soil units were extracted from them by digitizing. At the end, the alphanumerical data were collected and integrated into a digital database. All these operations were executed in ArcGIS 9.3. software.

The taxonomic classification of soils with agricultural use from the Lugoj Hills area was made according to the newest version of soils classification system available for our country: Romanian Soil Taxonomy System – SRTS-2012 (Florea & Munteanu, 2012).

The maps showing the land units of Lugoj Hills and their main features were obtained on the basis of the soil units of this area, by processing a vast quantity of information from the Pedological and

Agrochemistry Studies Office Timişoara archive, by analyzing various available cartographic materials (pedological, topographical, geomorphological, geological) and by field research activities. The 101 ecologically homogenous territories (TEO-s) obtained, practically, identify themselves with the surface of the soil varieties.

The land assessment was made relying on the features of the ecologically homogenous territories (TEO-s), integrated into a spatial database containing their most important physico-chemical parameters.

The current way of land use in Lugoj Hills was analyzed on the basis of the data acquired from Corine Land Cover 2000 (CLC2000) and, partially, 2006 (CLC2006), which is the digital database of the European Commission for the modality of land use in the majority of the European states. The data sets are freely available on the European Environment Agency (EEA) site (http://www.eea.europa.eu/data-and-maps/).

The classification and the grouping of the agricultural land of Lugoj Hills, according to its capability and suitability for arable use, were made in accordance with the requirements contained in the second volume of the Soil Surveys Development Methodology, realized by ICPA Bucharest experts in 1987 (Florea et al., 1987).

The land capability classes for various agricultural uses are divided according to the restrictive or exclusive factor(s) with the highest intensity and they are noted with Roman numbers from I to VI, by descending from the best one to the worst one. The spatial representation of the obtained data by creating cartographical materials must take into account certain criteria required by the methodology currently in use in Romania. So, the next colors have been established for the capability classes: class I – yellow, class II – green, class III – blue, class IV – brown, class V – pink, class VI – red.

The repartition of the agricultural land in suitability classes for various uses or crops is realized on the basis of the land rating operations, made in natural conditions or with ameliorative anthropogenic intervention (enhancement). In natural conditions, the land quality is assessed ascending between 0-100 points, but some times it may exceed this value as a result of the enhancement actions. According to the Romanian methodology in use, the land rating results can be expressed in the tow modalities exposed in table 1. In the same time, this table shows the colors established by the methodology for cartographical representation of the land suitability classes.

The statistical analysis of the land modality use on the soil types, and also the correlation between the quality classes and the current way of agricultural space use, was made by means of the *Zonal Tabulate Area* tool from the *Spatial Analyst Tools* menu of ArcGIS 9.3. software and Microsoft Excel software.

Table 1. Land rating classes and groups resulting from the qualitative assessment of the agricultural fields

Land rating classes			**Land rating groups**		
Class	**Land rating mark scoring**	**Color**	**Group**	**Land rating mark scoring**	**Color**
XV	141-150	black	**A^+**	101 - 150	dark brown
XIV	131-140	grey			
XIII	121-130	dark brown			
XII	111-120	light brown			
XI	101-110	sepia			
I	91-100	yellowish green	**A**	81-100	bluish green
II	81-90	bluish green			
III	71-80	light blue	**B**	61-80	light blue
IV	61-70	dark blue			
V	51-60	purple	**C**	41-60	carmine pink
VI	41-50	carmine pink			
VII	31-40	brick-red pink	**D**	21-40	orange
VIII	21-30	orange			
IX	11-20	dark yellow	**E**	0-20	light yellow
X	0-10	light yellow			

3. RESULTS AND DISCUSSIONS

3.1. Taxonomy and spatial distribution of the soils with agricultural use

The present study focused only on the soils belonging to the agricultural land, because the soil mapping activity realized by the Romanian pedological county offices was only limited to it. Thus, the soils on the agricultural land of Lugoj Hills were grouped, according to their features, in 6 classes, 11 types (Fig. 2), 36 subtypes as well as 101 varieties, families or species.

The analysis of repartition of the soil classes on the agricultural land of Lugoj Hills emphasizes the predominance of luvisols, which occupy more than half of the agricultural surface (57.16 %) with a total of 26,195 ha. The following class, according to the share in the total surface, is that of hydrisols, occupying 7,232 ha, meaning 15.78 % of the agricultural area. The classes of cambisols and protisols hold similar shares of 10.67 % (4,888 ha) and, respectively, 10.58 % (4,848 ha). Anthrisols

(4.13 %; 1,893 ha) and vertisols (1.68%; 772 ha) are also present with smaller surfaces.

The largest surface, according to the soil types, is covered by luvosols, which occupy almost half of the agricultural surface of the researched unit (50.96%; 23,350ha). The types of soil with relatively high values, exceeding 10 percents of the study agricultural area, are gleysols (11.51%; 5,273 ha), followed by eutricambosols (10.67%; 4,889 ha) and alluvial soils (10.37%; 4,754ha). Slightly significant shares are assigned to stagnosols (4.27%; 1,959ha) and anthrosols (4.03%; 1,848ha) followed by preluvosols (3.75%; 1,715ha) and planosols (2.46%; 1,130ha). Vertosols appear on small surfaces (1.68%; 772ha), located mainly in the western part of Lugoj Hills. The smallest areas are occupied by lithosols (0.20%; 94 ha) and technosols, with only 44 ha (0.10%).

3.2. Land use in Lugoj Hills

The analysis of the current land use way in Lugoj Hills (Fig. 3) was realized on account of the classification system created on the basis of the Corine Land Cover 2000 and 2006 satellite data.

The correlation between the land use way and the soil types of the agricultural land of Lugoj Hills (Fig. 4) shows that arable areas occupy more than 50 % in the areas covered by vertosols, alluvial soils, planosols and eutricambosols. Hydromorphic soils also have a percentage close to the average.

The forest has the largest share within the fields occupied by lithosols, preluvosols and luvosols. The fields used for pasturing hold important shares in all soil types' categories. The orchards are predominantly situated in the areas of preluvosols, planosols, eutricambosols and gleysols. The vineyards are mainly cultivated on preluvosols fields. The predominantly agricultural land mixed with natural vegetation has a balanced distribution within all types of soil, with higher preponderance on anthrosols, preluvosols, gleysols and eutricambosols.

3.3. Analysis of the quality of the agricultural land from Lugoj Hills

The results of the land assessment can be characterized from two different perspectives: qualitative one, as in the case of the land classes determined according to the planning capability for a specific use, and quantitative one, as in the case of estimating the production potential by means of land rating marks. The two modalities of land assessment complete each other and give a complete perspective on the quality state of the analyzed fields.

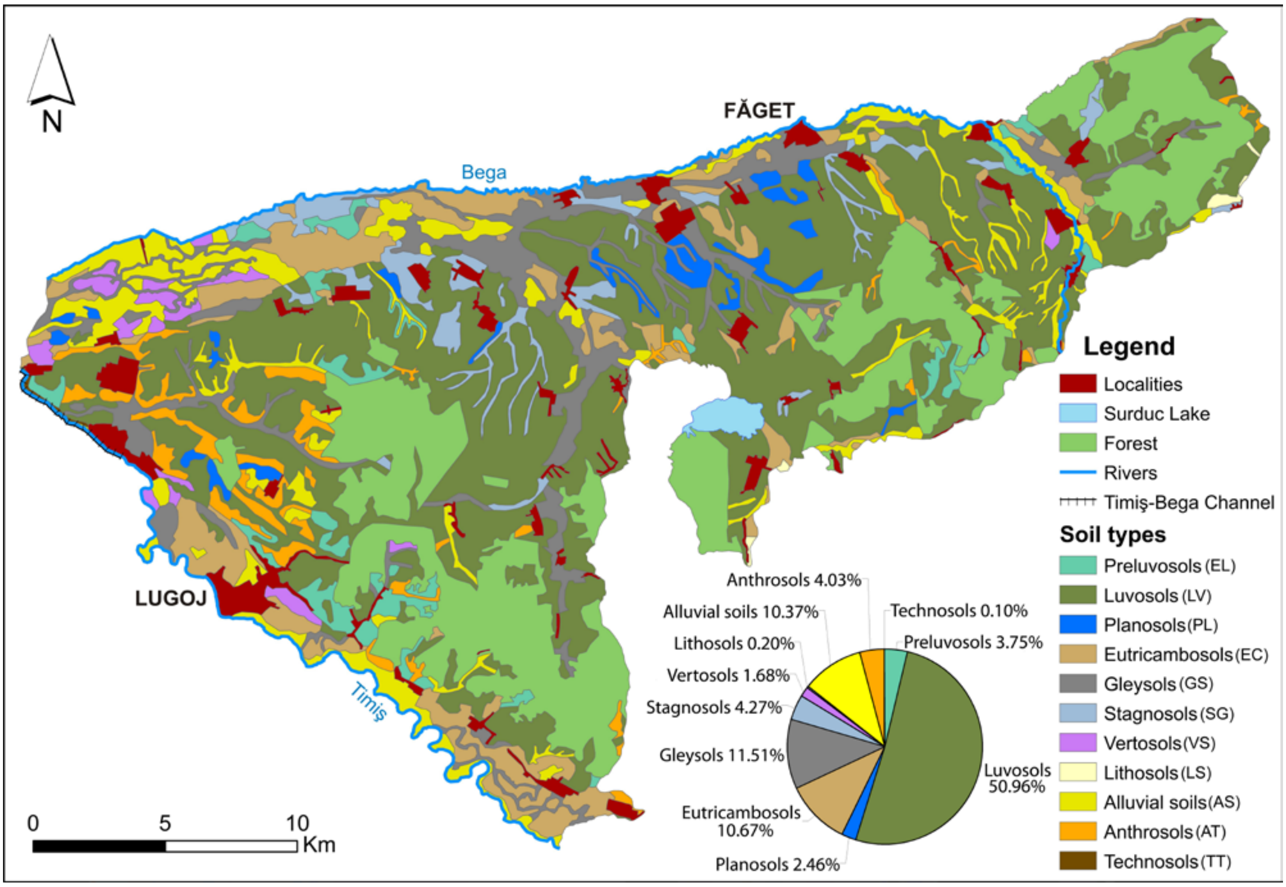

Figure 2. The map of the soil types from Lugoj Hills

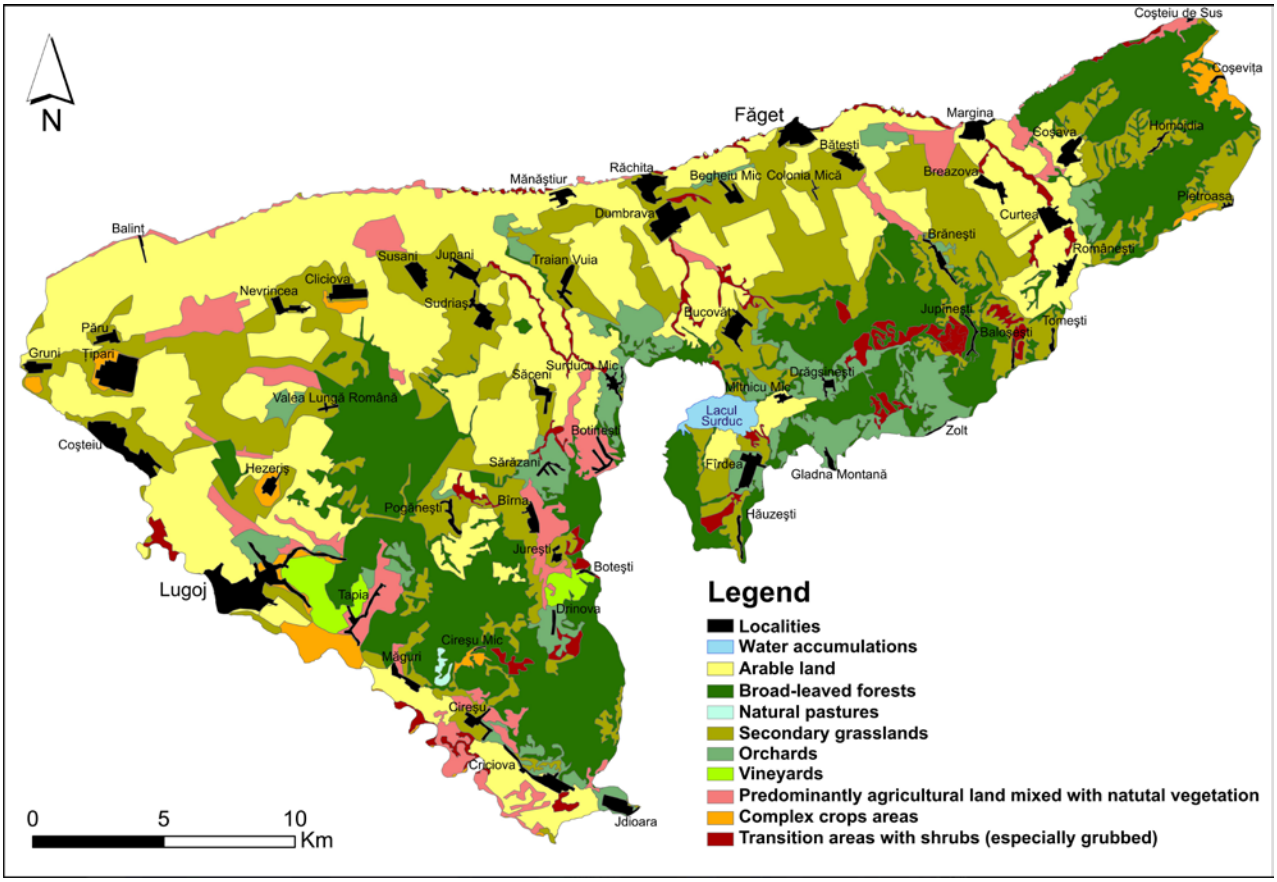

Figure 3. The map of land use in Lugoj Hills *(according to CLC2000 and 2006)*

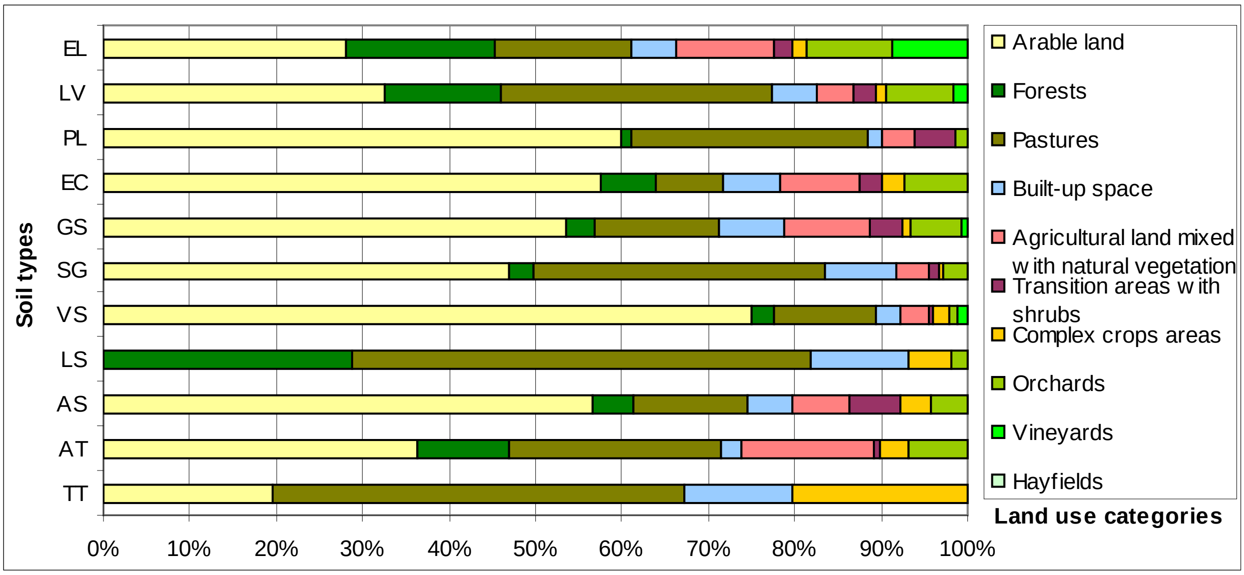

Figure 4. The share of the land use categories related to the soil types from the agricultural land of Lugoj Hills

3.3.1. Classification of the agricultural land from Lugoj Hills according to its capability for arable use

The agricultural land from Lugoj Hills was grouped according to its utility for arable use, because this is applied by the Romanian methodology as a standard for the other land use modalities which report to it, but also because it includes the largest number and the most representative types of agricultural cultures for the analyzed territory.

The grouping into capability units was made starting from the synthetic characterization of the ecologically homogenous territories (TEO-s) of Lugoj Hills, and the noting of the obtained categories was realized using capability formulas.

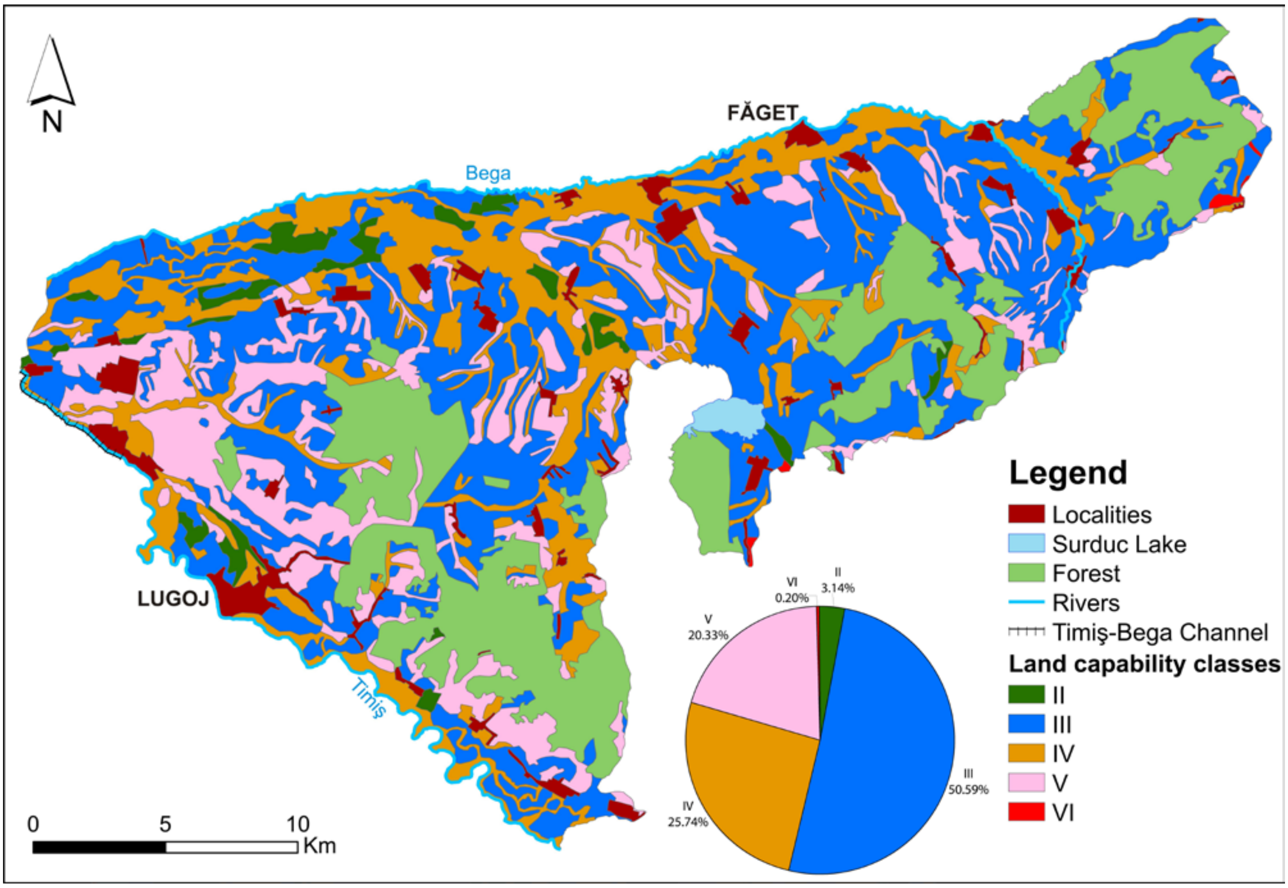

Figure 5. The map of capability classes of the agricultural land from Lugoj Hills for arable use

The analysis of the capability units' formulas reveals that the land units from Lugoj Hills can be grouped into **5 classes** (Fig. 5) and **90 subclasses** of capability. None of the land unit registered the total lack of restrictions, so that it can be included in the best capability class (Zisu, 2014).

The main restrictive factors which occur in the study area are determined by the soil moisture excess content, induced most of all by the gleyzation and stagnogleyzation processes, the level of pedo-phreatic water, which is situated at great depths in the higher areas and very close to the surface in the lower areas, the unevenness of the terrains and the fine texture, which in some areas has high values of smectic clay. For the areas situated in higher regions, high value slopes and low useful edaphic volume are also present.

In order to observe the degree of optimal use of agricultural land in the study area, a graphic comparison was made between the capability classes for arable use, in which this is included, and the current way of space utilization in Lugoj Hills. The resulting chart (Fig. 6) emphasizes a generally good distribution of the land use categories. Nevertheless, one must take into account the very different share of each class within the total agricultural space.

The arable land is majority in class II, but they have only approximately 40 % of the total of class III, which represents half of the study agricultural territory. In the class with severe restrictions (class IV), the arable land is found on almost half of the 11,796 ha which belong to it. Also, a high share (35.74 %) of the class with very severe restrictions (class V) is held by the arable land, but they need special development and improvement measures for being cultivated.

It is surprising that the pasture has 4.47 % of the fields classified in class II and more than a quarter from those belonging to the next class, cumulated resulting 6.127 ha (13.5 % of the total agricultural land). Another unsatisfactorily thing is also the fact that forests have a territorial distribution somehow similar with pastures. The forests have 4.29 % of the class with the best capability from the study area (class II) and more than 10 % of the next class, cumulated resulting 2.435 ha (5.31 % of the total agricultural land). In the same time, the orchards present an equilibrated share for the first four classes (more than 5 % in each one). However, they are present with almost tow hectares even if in class VI, which is entirely restrictive for fruit growing plantations. This fact is due to the placement, close to many households, of some very small orchards serving the familial needs and not for a commercial purpose production.

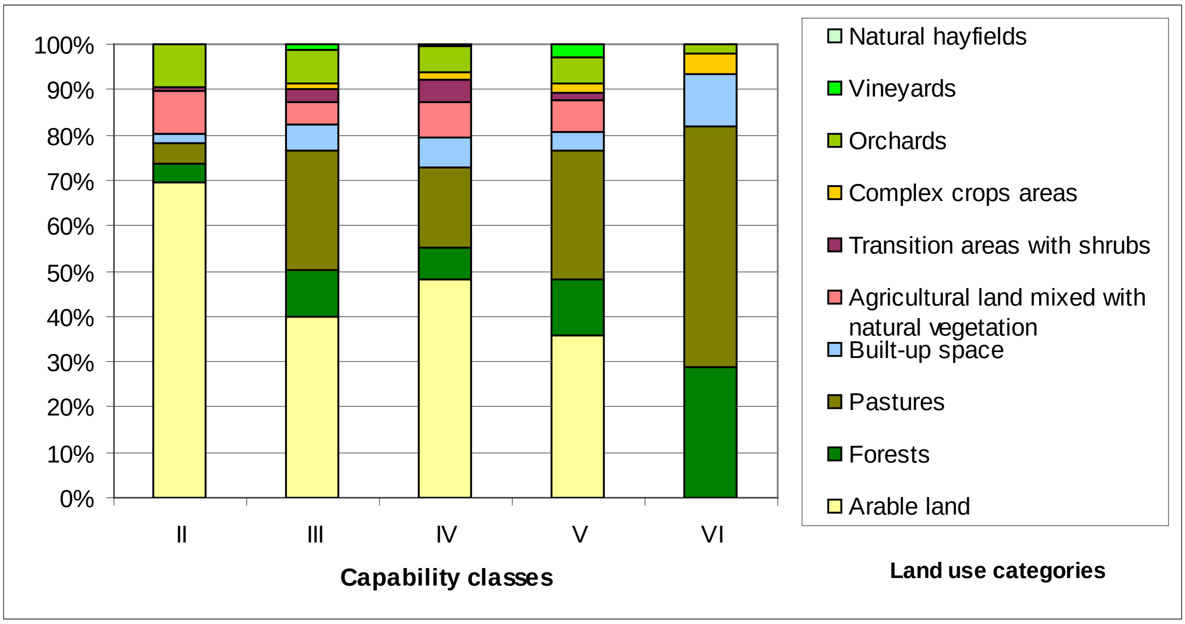

Figure 6. The distribution of the agricultural land use categories on capability classes for arable use

3.3.2. Assessment of the production capacity of the agricultural land from Lugoj Hills and its grouping in quality classes according to the suitability for various uses and crops

Land productivity can be assessed in natural conditions, when the inborn fertility of the soil and the native biologic potential of plants are evaluated, and under human interventions, taking into account as well the technologic level used.

The assessment of the production capability of the fields from Lugoj Hills and their distribution into quality categories was made by means of land quality rating in natural conditions, according to the national methodology in use (Florea et al., 1987). Table 2 presents all the uses and the crops contained by the methodology.

The analysis of the behavior of the 17 indicators interacting directly in the land quality assessment in natural condition of the agricultural fields from Lugoj Hills reveals that all the necessary conditions for an optimal productivity of a crop seldom occur. Nevertheless, for some TEO-s, several crops (pasture, plum tree, cherry-sour cherry tree, corn and vegetables) register all factors in maximal parameters, what is reflected in the land rating mark of 100 points. The indicators salinization/alkalization, pollution and $CaCO_3$ content show no restrictions for Lugoj Hills area for any of the analyzed land uses or crops, their coefficient value being always maximum.

The land quality assessment was made according to the detailed knowledge of the ecologic indicators features which occur in the 101 land units of the agricultural surface of Lugoj Hills, choosing the option to group them on suitability classes, namely from 10 to 10 land rating points.

Table 3 offers a general overview of the quality classes, revealing that the majority of the fields, regardless of the considered use or crop, can be classified into medium and inferior classes. Slight concentrations into superior classes can be noticed for pastures, hayfields and fruit trees. This fact is due to complex reasons, being determined by the intrinsic properties of the soils, as well as the environmental conditions.

In order to generally express the production capacity of the agricultural fields from Lugoj Hills, the weighted average land quality rating mark (1) for all the uses and crops contained in the methodology was calculated (Fig. 7).

Table 2. The uses and the crops utilized in land rating actions and their abbreviations

PS	Pasture	**PC**	Peach tree	**CT**	Potato	**LU**	Lucerne
FN	Hayfield	**VV**	Vineyard-wine	**SF**	Sugar beet	**TR**	Clover
MR	Apple tree	**VM**	Vineyard-table grapes	**SO**	Soy	**LG**	Vegetables
PR	Pear tree	**GR**	Wheat	**MF**	Peas-beans	**AR**	Arable land
PN	Plum tree	**OR**	Barley	**IU**	Flax-oil	**PO**	Pomiculture
CV	Cherry-sour cherry tree	**PB**	Corn	**IN**	Flax-tow	**VI**	Viticulture
CS	Apricot tree	**FS**	Sunflower	**CN**	Hemp		

These values give general information on the suitability of the land from the study area for all uses and crops considered by the Romanian methodology.

$$NB_{MP} = S_{TEO} \cdot NB_{TEO} / S \quad (1)$$

where:

NB_{MP} = the weighted average land quality rating mark;

S_{TEO} = the surface of each ecologically homogenous territory (ha);

NB_{TEO} = the land rating mark of each TEO for every situation;

S = the total assessed area.

The highest marks can be noticed to occur for pastures and hayfields, followed by plum trees, clover and wheat. The lowest suitability is for vineyard for table grapes and potato. The field reality illustrates this aspect, in Lugoj Hills the surfaces cultivated with vineyard or potato being very small.

Field crops, represented by arable use, have a general productivity which comes close to the average value.

Obviously, the results differ very much when the situation does not reflect the general view, but the land quality marks of each land unit, according to its features, are grouped on land quality rating classes.

In order to spatially represent the obtained results, in this paper, arable use was choose for exemplification, because it is the most eloquent. Figure 8 shows the suitability for arable use of the agricultural land from the study areas. The figure also presents the land rating class histogram.

As well as in the capability case, a graphic comparison between the real way of land use and the resulted suitability classes was done for the analyzed uses and agricultural cultures. This was aimed to emphasize the way in which the present use corresponds to the resulted theoretic models.

This comparative study between the real situation and the theoretically simulated one must take into account the fact that a soil unit may have the same suitability conditions or very similar ones for several uses or agricultural cultures in the same time (integration in the same suitability class). In such circumstances, the use of the agricultural land must be chosen according to some socio-economic factors.

Figure 9 shows the chart resulting from the comparison of the categories of land use in the study area to the suitability classes for arable use. Taking, obviously, into account the share of each resulted class, it is surprising the existence of a high utilization for arable use of some fields included in less favorable situations.Class VIII for instance, which has the largest surface (30.60 %; 14,022 ha), contains a high share (37.16 %) of land used for field crops, totalizing 4,291 ha.

Also, in classes III and IV, the fields utilized for arable use are less than 55 %, and the pasture has high values for these ones, about 15 %, respectively approximately 10 %. In class V, the third in terrain surfaces size, arable land occupy only 33.53 %. Class I, having a very small surface (0.15 %; 67 ha), is not very eloquent, taking also into account the inevitable errors occurring in this comparative analysis.

An explanation for the utilization of numerous fields for arable use, although they have a low suitability for this type of use, may be due to the still practice, for the most part of the analyzed agricultural surface, of the subsistence farming based on rudimentary tools.

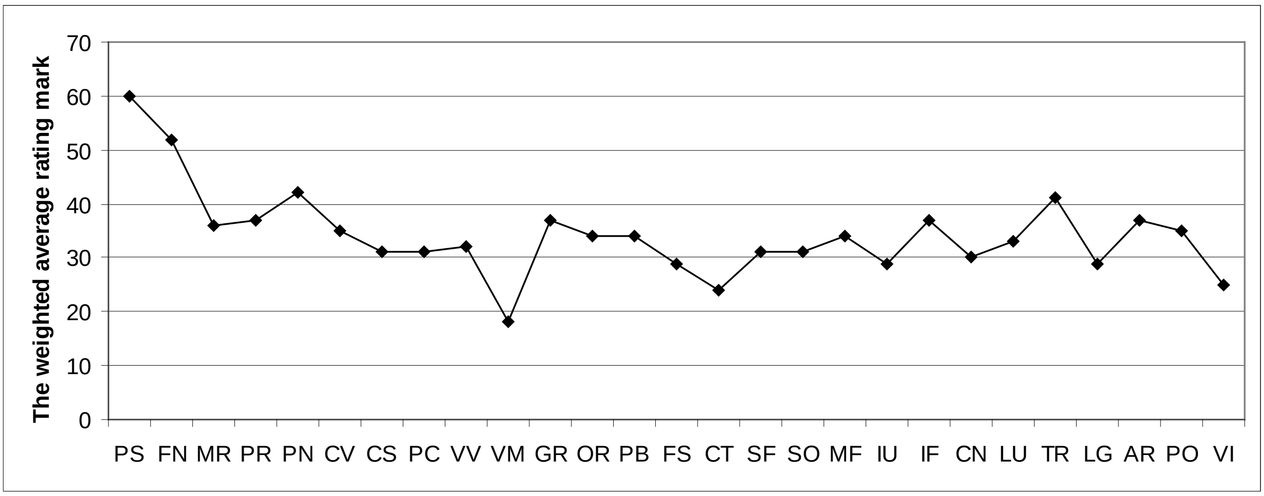

Figure 7. The weighted average land quality rating marks of the land units from Lugoj Hills for various agricultural uses and crops

Table 3. Land quality classes of the agricultural land of Lugoj Hills

No. crt.	Type of use/ crop	Class I	Class II	Class III	Class IV	Class V	Class VI	Class VII	Class VIII	Class IX	Class X
1.	AR	67 ha	1,040 ha	1,407 ha	2,556 ha	7,223 ha	3,754 ha	8,673 ha	14,022 ha	6,038 ha	1,048 ha
		0.15%	2.27%	3.07%	5.58%	15.76%	8.19%	18.92%	30.60%	13.17%	2.29%
2.	PO	1,106 ha	507 ha	970 ha	1,539 ha	7,563 ha	2,274 ha	11,177 ha	8,720 ha	10,344 ha	1,628 ha
		2.41%	1.11%	2.12%	3.36%	16.50%	4.96%	24.39%	19.03%	22.57%	3.55%
3.	VI	-	1,614 ha	404 ha	490 ha	1,584 ha	3,351 ha	6,253 ha	8,791 ha	12,006 ha	11,335 ha
		-	3.52%	0.88%	1.07%	3.46%	7.31%	13.64%	19.18%	26.20%	24.74 %
4.	PS	1,748 ha	5,281 ha	3,505 ha	10,139 ha	13,063 ha	8,009 ha	3,989 ha	-	94 ha	-
		3.81%	11.52%	7.65%	22.13%	28.51%	17.48%	8.70%	-	0.20%	-
5.	FN	-	3,106 ha	4,724 ha	3,848 ha	11,906 ha	9,710 ha	7,832 ha	4,608 ha	94 ha	-
		-	6.78%	10.31%	8.40 %	25.98%	21.19%	17.09%	10.05%	0.20 %	-
6.	MR	-	2,033 ha	1,598 ha	196 ha	6,946 ha	4,696 ha	9,419 ha	8,581 ha	10,980 ha	1,379 ha
		-	4.43%	3.49%	0.43%	15.15%	10.25%	20.56%	18.72%	23.96%	3.01%
7.	PN	1,161 ha	956 ha	865 ha	6,383 ha	5,589 ha	8,033 ha	8,987 ha	7,486 ha	5,663 ha	705 ha
		2.53%	2.08%	1.89%	13.93%	12.19%	17.54%	19.61%	16.33%	12.36%	1.54%
8.	CV	1,106 ha	849 ha	594 ha	1,387 ha	5,305 ha	6,344 ha	11,832 ha	8,521 ha	5,940 ha	3,950 ha
		2.41%	1.85%	1.29%	3.03%	11.58%	13.84%	25.82%	18.59%	12.96%	8.63%
9.	VV	-	1,656 ha	1,829 ha	436 ha	7,468 ha	2,151 ha	6,588 ha	10,112 ha	6,588 ha	9,000 ha
		-	3.61%	3.99%	0.95%	16.29%	4.69%	14.38%	22.07%	14.38%	19.64%
10.	GR	-	1,183 ha	869 ha	1,173 ha	8,051 ha	7,125 ha	8,655 ha	12,894 ha	5,618 ha	260 ha
		-	2.58%	1.89%	2.56%	17.57%	15.55%	18.88%	28.14%	12.26%	0.57%
11.	OR	-	1,106 ha	945 ha	1,079 ha	7,897 ha	3,668 ha	7,399 ha	15,898 ha	6,623 ha	1,213 ha
		-	2.41%	2.06%	2.35%	17.23%	8.01%	16.15%	34.69%	14.45%	2.65%
12.	PB	67 ha	1,394 ha	1,495 ha	2,137 ha	3,485 ha	7,295 ha	4,110 ha	11,859 ha	9,443 ha	4,543 ha
		0.15%	3.04%	3.26%	4.66%	7.60%	15.92%	8.97%	25.88%	20.61%	9.91%
13.	FS	-	1,106 ha	987 ha	442 ha	3,169 ha	3,901 ha	7,109 ha	12,091 ha	12,098 ha	4,925 ha
		-	2.41%	2.15%	0.96%	6.92%	8.51%	15.51%	26.39%	26.40%	10.75%
14.	CT	-	67 ha	1,040 ha	752 ha	2,006 ha	4,427 ha	4,984 ha	8,950 ha	12,821 ha	10,781 ha
		-	0.15%	2.27%	1.64%	4.38%	9.66%	10.87%	19.53%	27.98%	23.52%
15.	LG	67 ha	-	1,470 ha	1,419 ha	2,211 ha	7,236 ha	5,858 ha	10,190 ha	11,328 ha	6,050 ha
		0.15 %	-	3.21%	3.09%	4.83%	15.79%	12.78%	22.23%	24.72%	13.20%

4. CONCLUSIONS

The importance of the land qualitative assessment is given by the fact that, according to the resulting data, the measures of rational land use, protection and improvement of the fields for vegetal production can be established.

This data represent basic material for choosing the optimal uses and crops, for completing the projects of development and improvement fields works, for preservation and amelioration of soil quality and so on. The quality of the agricultural land of Lugoj Hills is generally medium.

Land units of very different qualities appear in the study area. The optimal situations are most of the time hard to be achieved due to the multitude and diversity of edaphic and environmental factors which condition the crops.

The Lugoj Hills area is generally characterized by subsistence agriculture, with low productivity, which does not revaluate in appropriate way the potential of the agricultural land.

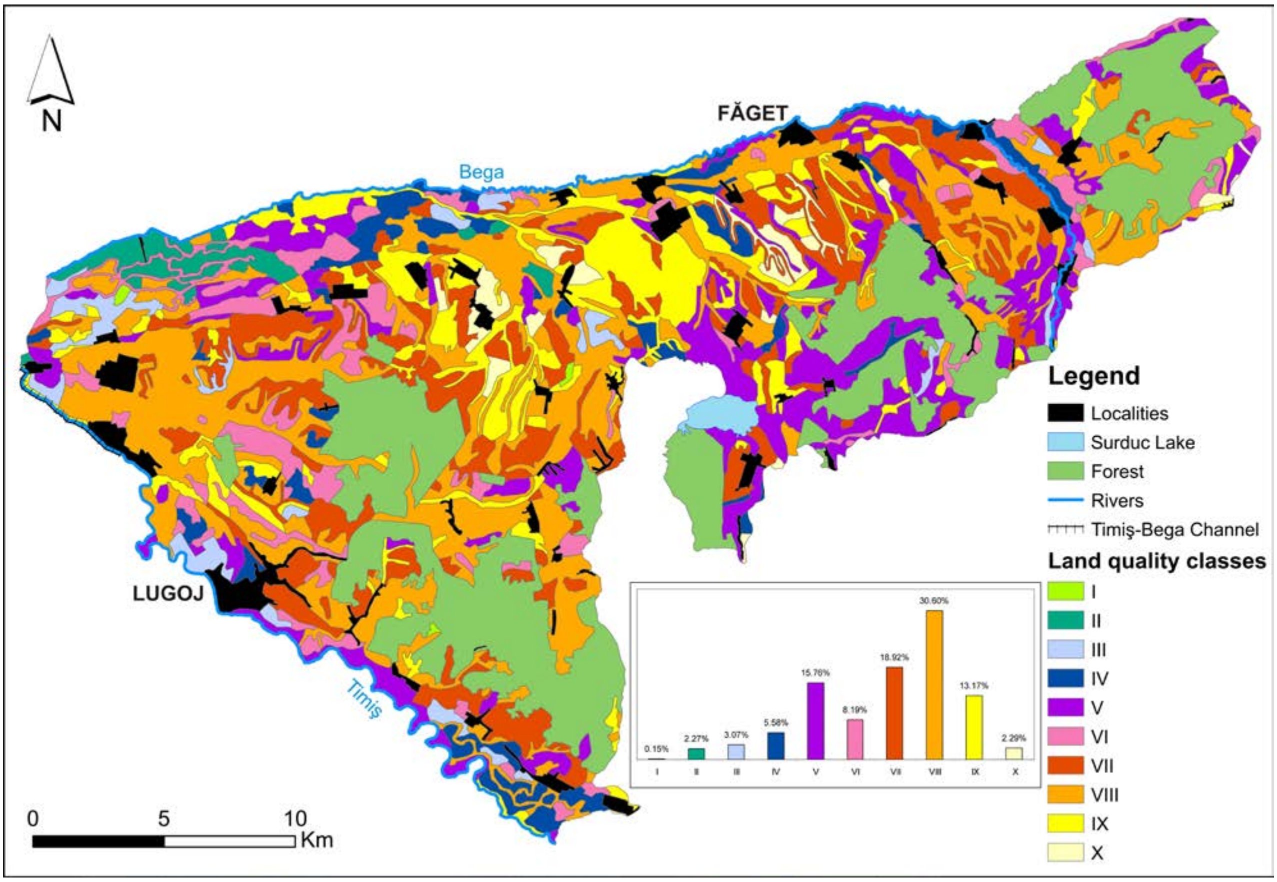

Figure 8. The map of the suitability for arable use of the agricultural land from Lugoj Hills

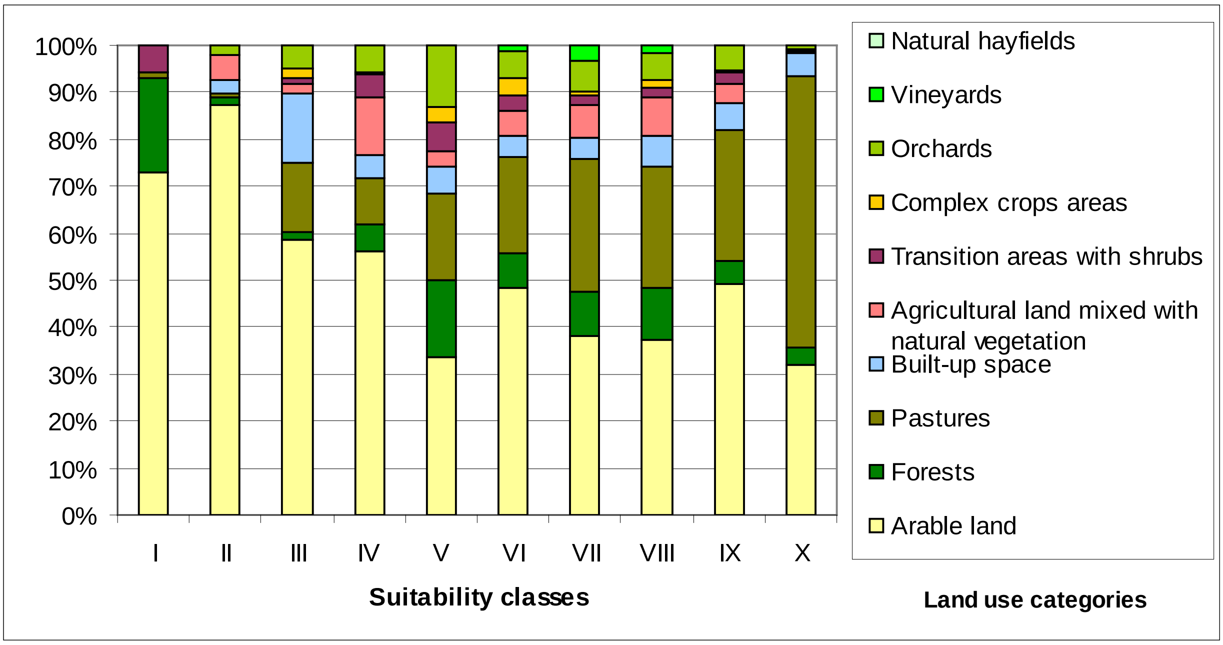

Figure 9. The distribution of the agricultural land use categories on suitability classes for arable use

The causes are very wide-ranging, being determined by the limited financial possibilities of the owners, the rudimentary agricultural infrastructure, the size and shape of lots, the lack of interest of the authorities etc. It is recommended the transition to some modalities of agricultural land use capable to bring an optimal capitalization of them to the detriment of the current activities which, presently, mostly support the domestic purposes.

This comparative study between the real situation and the theoretically modeled one must take into account the fact that one soil unit may be included simultaneously in the same suitability class for more uses or crops. In such situations, but not only, the use of agricultural land must be chosen according to several socio-economic factors, such as the needs of the local population, the agricultural infrastructure, the requirement and the needs of the served population, the products stocking capacity, the distance to the market etc.

All these themes may form the object of other future researches. In the present paper, we wanted to limit ourselves only to the identification of the most suitable uses and crops for the agricultural land of Lugoj Hills, to setup the most appropriate areas for their location and to identify some improvement methods in the means of capitalization of the production potential of the agricultural land from the study area.

The potential improvement measures can be performed by passing to more profitable modalities of agricultural exploitation, by making some soil improvement works or by implementing both means.

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