PEDOLOGICAL AND AGROCHEMICAL EVALUATION OF DEGRADED LANDS FOR THEIR RECOVERY THROUGH VINEYARDS, ORCHARDS AND FOREST MANAGEMENT PLANS

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Abstract: *The paper presents some aspects concerning the land quality in Banat. The addressed issues is relating to an area of 17216641 ha of which 1098520 ha of agricultural land, belonging to the Timiş and Caraş-Severin countys. The examination of ecopedological conditions, were setting in order and processing dates were made according to „ The Pedological Studies Elaboration Methodology ", (vol. I,II,III) of ICPA Bucharest, in 1987 and Romanian Taxonomic System of Soils (SRTS-2003). There are described, briefly, the physical and geographical conditions of the area and extensively the composition of soil cover, some restrictive land quality characteristics, characteristics that define them their vocation to some use. Studying the natural conditions (relief, lithology, hydrology, clime) and the antrophic ones it can be observed that the diversity of pedoclimatic conditions and the specific characteristics of the studied area have a great impact upon land resources and the way lands are used in general and in particular the agricultural ones (and also upon their actual and future productivity). Using the data obtained through out pedological studies and researches conducted by specialists from OSPA Timisoara and materialized in "Banat soils map", updated in 1999 and 2003 with new pedological studies (carried out by O.S.P.A. Timişoara,) and also with data gathered from the agricultural and forest sites of the national monitoring system (organized by I.C.P.A. Bucharest), the following aspects regarding lands' quality can be presented:the identification of land vocation (pretability) in order to establish their most adequate way of use ,the identification of land favorability for different crops, the identification of lands production capacity for different usings and crops when certain technologies are used, defining lands depending on the amelioration and conservation tillages. Finally are given the general and administrative restructuring measures which must be undertaken for the management of soil resources in the examined area. The Government and its institutions have the duty to promote protection, conservation and improving programs and other types of programs that regard the careful use of soil sources, by providing the necessary funds for these and also by stating exactly their destination.*

Key words: *study, land, organization, cadastral, territory*

INTRODUCTION

In the current social, economical and political juncture, in our country hopes to return to what he deserves in the civilized countries of the EU, it is necessary to know well offer both in absolute and in relative values.

In this process, the natural and anthropical resources, land fund, the forestry and social fund will determine the development direction of rural areas: agriculture, industry, services, rural tourism, etc..

Representing an important part of national wealth, natural resources consist of all existing resources such as: soil, water, air, flora, fauna, solar energy, etc., and are extracted from their natural environment and processed under technological, economic and social conditions, in goods whose use requires their direct consumption.

The use of these resources have to be carried in a comprehensive, coordinated maner, to achieve several goals simultaneously aligned with the requirements on environmental protection.

Concerning the south-western Romania, the agrochemical systematic soil studies conducted by OSPA Timisoara in several cycles (5 to 6), plus long-term experience with fertilizer from INCDPAPM and ASAS network and other incidental research on soil quality and environmental pollution, showing a drop in the state of soil quality and the agricultural dependence of certain circles of interest generated by an endless shift towards a market economy.

Based on these considerations, the authors try to present in the paper, based on data from research subjects, conducted over several years and based on an impressive volume of data accumulated in the archives OSPA Timisoara, some aspects status of soil quality and the evolution of the main factors that contributes to achieving it.

MATERIAL AND METHODS

The addressed issues is relating to an area of 1721641 ha of which 1098520 ha of agricultural land, belonging to the Timiş and Caraş-Severin countys (tab. 1).

Table 1

The structure of land on the land use categories

Specification	Arable	Pasture	Grassland	Vineyards	Orchards	Agricultural	Forests	Others	TOTAL
Timiş (ha)	531593	125684	29497	4457	9246	700477	109057	60131	869665
%	61.13	14.45	3.39	0.51	1.06	80.55	12.54	6.91	100
%	75.89	17.94	4.21	0.64	1.32	100	-	-	-
Caraş-Severin (ha)	127272	183461	74810	766	11734	398043	411276	42657	851976
%	14.94	21.53	8.78	0.09	1.38	46.72	48.27	5.01	100
%	31.97	46.09	18.79	0.19	2.95	100	-	-	-
TOTAL (ha)	658865	309145	104307	5223	20980	1098520	520333	102788	1721641
%	38.27	17.96	6.06	0.30	1.22	63.81	30.22	5.97	100
%	59.98	28.14	9.50	0.48	1.91	100			

OJCPI Timiş-Caraş Severin/ Statistical report on the situation of the land at 31.12.2006.

The examination of ecopedological conditions, were setting in order and processing dates were made according to „ The Pedological Studies Elaboration Methodology “, (vol. I,II,III) of ICPA Bucharest, in 1987 and Romanian Taxonomic System of Soils (SRTS-2003).

RESULTS AND DISCUSSION

Merits mention that the situation at the county level of affected soils by various natural or anthropical processes or of the restricted land was made according to the update of available soil studies.

To those specified, by the data processing have been identified following situations:

Table 2

Areas affected by different degradation processes in Timis County (ha)

Crt. No.	Process	Low	Moderate	Strong	Very strong	Excessive
1	Surface erosion	17850	16850	16120	15780	10580
2	Pollution by acidifying	182124	266182	14010	7005	3503
3	Gleyzation degrees of soil	132390	143598	125385	56038	43009
4	Stagnogleyzation degrees of soil	112076	34057	35024	28019	10507
TOTAL		**444440**	**460687**	**190539**	**106842**	**67599**

Restricted land situation in Timis County:

- Lands with surface erosion, deep erosion and landslides on an surface of 67080 ha.,
- Lands with permanenthly moisture excess on an surface of 53516 ha.,
- Lands occupied by mining dumps, industrial or household waste on a surface of 97 ha.,
- Lands with pollution from land on a surface of 3320 ha.,
- Other degradated lands on a surface of 338806 ha.,
- Acide lands on a surface of 290700 ha.

In Caraş Severin county we have the same situation (table 3)

Table 3

Areas affected by different degradation processes in Caras Severin County (ha)

Crt. No.	Process	Low	Moderate	Strong	Very strong	Excessive
1	Surface erosion	20160	22120	29680	28450	27560
2	Pollution by acidifying	74832	105083	95132	40282	4807
3	Gleyzation degrees of soil	19106	44518	64483	2388	398
4	Stagnogleyzation degrees of soil	17912	85578	51348	3582	796
TOTAL		**132010**	**257299**	**240643**	**74702**	**33561**

Restricted land situation in Cars Severin county:

- Lands with surface erosion, deep erosion and landslides on an surface of 107810 ha.,
- Lands with permanenthly moisture excess on an surface of 58512 ha.,
- Lands occupied by mining dumps, industrial or household waste on a surface of 980 ha.,
- Lands with pollution from land excavation on a surface of 780 ha.,
- Other degradated lands on a surface of 202273 ha.,
- Acide lands on a surface of 245304 ha.

To those listed, one of the major problems which have worried, concerned and will work many scientists is the development and implementation in production technologies capable of providing the highest returns in terms of consumption as low energy for which still present the following case study.

Case study on qualitative assessment of land plots with cadastral numbers:A 3304/1/1 (5,80 ha), A 3304/1/2 (2,43 ha), A 3304/1/3 (5,00 ha), A 3304/1/4 (4,33 ha), A 3304/1/5 (5,00 ha), A 3304/1/6 (4,50 ha), A 3304/1/7 (5,00 ha), A 3304/1/8 (6,87 ha), A 3303/1/1 (4,00 ha), A 3303/1/2 (1,00 ha), A 3303/1/4 (4,80 ha), A 3303/1/5 (1,50 ha), A 3303/1/6 (2,84 ha), A 3303/1/7 (5,52 ha), located in Jamu Mare village, Timiş county.

This study aims to obtain a fund of information on soil and agrochemical soil characteristics (morphological, physical, chemical and agrochemical) which to base scientific and technical status the defining elements of the land surface from the land parcels listed.

The orographical constitution of the territory sought is one of the main factors that have created a very varied soils cover a relatively small area. Conformation of the current landscape is the result of a lengthy development of the zone under the action of complex tectonic phenomena, geo-morphological processes and increasingly human action.

Hydrologicaly, the studied area is part of southwestern water systems group, Timiş basin, subbasin Moravița.

External drainage of the area studied is good because the land configuration and internal drainage is influenced by soil texture. Thus, due to fine texture, the water infiltrates with difficulty in soil horizon depth, favoring the emergence of excess of surface moisture.

Microclimatic peculiarities of the area studied are determined by his geographical position as it is characterized by a moderate temperate continental climate with mild and short winters, being under the influence of cyclonic activity and air masses which frequent are crossing the Mediterranean Sea and Adriatic Sea.

So closely interrelated with the variety of geo-morphological factors that determine the existence of diversified relief units, those geo-litologycal which led to a wide variety of parental materials (even if it is a small area), the hydrological or climatic factors and various anthropogenic interventions, has resulting a large population of soils having characteristics (related or totally different from each other) in constant evolution.

According to the Romanian System of Soil Taxonomy (SRTS 2003), in the investigated area have been identified 2 classes of soils, 5 types, 5 subtypes, 5 varieties and 33 detailed units, which differ distinctly from their property, productive capacity and maintaining and increasing fertility measures.

Under the influence of complex natural factors (climate, geology - lithology, geomorphology) and anthropogenic (draining, draining, leveling, clearing) were formed and evolved main soil types identified within the perimeter investigated, namely (Fig. 1):

1.01 Eutric Cambisol fluvic-stagnic, low stagnogleyed, medium loam/ medium loam, on colluvial middle materials, without carbonates, EC al-st, W_2 LL/LL $134_{03,}$ identified in the plots: A 3304/1/1, A 3304/1/2, A 3304/1/3, A 3304/1/4, A 3303/1/1,

2.01 Haplic Luvosol Chromic, vertic-stagnic, low stagnogleyed, silt loamy/ silty clay, on slop materials, without carbonate, middle-fine, EL vs-st W_2 LP/AL 132_{50}, identified in the plots: A 3304/1/1, A 3304/1/2, A 3304/1/3, A 3304/1/4, A 3304/1/5, A 3304/1/6, A 3304/1/7, A 3304/1/8,

3.01 Haplic Luvosol Chromic, vertic-stagnic, medium stagnogleyed, medium clay loamy/ medium clay loamy, on slop materials, without carbonate, middle-fine, EL vs-st W_3 TT/TT $132_{50,}$ identified in the plots: A 3304/1/3, A 3304/1/4, A 3304/1/5, A 3304/1/6, A 3303/1/1, A 3303/1/2, A 3303/1/4, A 3303/1/5, A 3303/1/6 ,

4.01 Haplic Luvosol Chromic, vertic-stagnic, medium stagnogleyed, Silt loamy/ Loamy clay, on slop materials, without carbonate, fine, EL vs-st W_3 LP/AL$132_{60,}$ identified in the plots: A 3304/1/6, A 3304/1/7, A 3304/1/8, A 3303/1/1, A 3303/1/2, A 3303/1/4, A 3303/1/5, A 3303/1/6 , A 3303/1/7,

5.01 Haplic Luvosol Chromic, vertic-stagnic, strongly stagnogleyed, medium loamy/ Loamy clay, on slop materials, without carbonate, fine, EL vs- st W_4 LL/AL 132_{60} , identified in the plot A 3304/1/8.

Based on field observations recently collected: the current relief layout, the soil aspect on surface and depth (achieved through the sampling and soil samples recently collected and analyzed) and the knowledge gained during time from OSPA TIMISOARA archive, each of soil units were characterized in accordance with the Methodology of the Pedological Study Elaboration (MESP) developed by ICPA Bucharest 1987, filled with items (on reference values for some chemical elements in soil or soil taxonomy) of the Romanian System of Soil Taxonomy (SRTS 2003), as evidenced by the data presented below (Table 4, 5).

The note of evaluation (table 6) for the orchards use category is calculated as the arithmetic average of the six tree species and for the vineyards as the arithmetic average of the two species.

For the arable use category, the natural note of evaluation is calculated as the arithmetic average of the eight notes of evaluation of given culture (GR, OR, PB, SF, CT, SF, SO, MOF), MAAP223/2002 Ord.

Table 4

Technical indicators of land evaluation

T.E.O	Type, subtype	Indicators of land evaluation										
		3C	4C	14	15	16	17	23A	23B	29	33	38
1.01	EC al-st	10.5	650	0	2	00	00	42	42	2	03	00
2.01	EL vs-st	10.5	575	0	2	00	00	43	61	2	12	00
3.01	EL vs-st	11,5	525	0	2	00	00	52	52	2	17	00
4.01	EL vs-st	10,5	575	0	3	00	00	43	61	2	07	00
5.01	EL vs-st	10,5	750	0	4	00	00	42	61	2	07	00

Table 5

Technical indicators of land evaluation

T.E.O.	Type, subtype	Indicators of land evaluation									
		39	40	44	61	63	69	133	144	181	271
1.01	EC al-st	7	2	+15	0	6,1	75	175	140	3	00
2.01	EL vs-st	15	0	+15	0	5,2	65	175	090	2	00
3.01	EL vs-st	15	0	+15	0	6,1	75	175	090	2	00
4.01	EL vs-st	15	0	+15	1	6,1	96	175	140	1	00
5.01	EL vs-st	15	0	+05	0	5,6	65	175	140	1	00

For each indicator, on each land use or culture there is tables which include concerned coefficients.

Table 6

Notes of evaluation in natural conditions

TEO	Type , subtype	PS	FN	MR	PR	PN	CV	CS	PC	VV	VM	GR	OR	PB	FS
1.01	EC al-st	65	52	35	46	45	35	36	35	40	35	41	41	47	47
2.01	EL vs-st	58	40	47	52	58	52	52	47	52	52	52	52	46	46
3.01	EL vs-st	52	36	34	34	42	38	37	31	47	31	41	41	36	31
4.01	EL vs-st	64	50	58	65	65	65	65	65	65	58	58	58	52	52
5.01	EL vs-st	58	45	50	64	50	56	48	48	40	29	64	58	45	45

Table 6 continuation

Notes of evaluation in natural conditions

TEO	Type , subtype	CT	SF	SO	MF	IU	IF	CN	LU	TR	LG	AR	LV	VV
1.01	EC al-st	47	47	47	47	52	45	41	52	47	41	46	39	38
2.01	EL vs-st	29	32	46	52	45	42	45	51	37	35	44	51	52
3.01	EL vs-st	16	18	33	41	36	26	33	41	26	23	32	36	39
4.01	EL vs-st	38	47	52	58	58	52	52	58	42	47	52	64	62
5.01	EL vs-st	26	35	45	50	48	45	43	48	41	40	46	53	35

The fertility classes will be those stipulated in the rules for the application of Law 16 / 1996 (Act lease), respectively:

- first class, from 81 to 100 points ,

- second class from 61 to 80 point,
- third class from 41 to 61 points,
- fourth class, from 21 to 40 points ,
- fifth class, from 1 to 20 points.

The next operation after defining map units is the overlapping over the land plan. The land plan is a thematic plan, wich made an inventory of lands (by use category and owner), recording the contour shape, configuration and land parcels limits and their surface.

To these is reported all the data and information collected, it is part of all processing (sorting and centralization) that establish the surface area of each unit of soil and terrain (UT or TEO), the overlapping of a certain plots and calculating the weighted average mark of evaluation (Σ NB x S_1TEO / S_{plot}).

In doing so, were calculated weighted average of evaluation notes for **arable** category of use, for each plot in part, finally achieving a weighted average mark of 42 points of evaluation, which ranks the area of 58.59 hectares in the III quality class (table 7).

Table 7

Weighted average of evaluation notes for arable and vineyard category of use

Crt. No.	Plot	Surface (ha)	Evaluation notes		
			Arable	Vineyard	Orchard
1	A 3304/1/1	5,80	44	50	49
2	A 3304/1/2	2,43	44	50	49
3	A 3304/1/3	5,00	42	49	46
4	A 3304/1/4	4,33	36	48	40
5	A 3304/1/5	5,00	35	48	40
6	A 3304/1/6	4,50	46	59	56
7	A 3304/1/7	5,00	50	62	61
8	A 3304/1/8	6,87	45	52	53
9	A 3303/1/1	4,00	35	48	39
10	A 3303/1/2	1,00	38	52	44
11	A 3303/1/4	4,80	40	54	47
12	A 3303/1/5	1,50	41	55	49
13	A 3303/1/6	2,84	40	54	47
14	A 3303/1/7	5,52	47	61	57
TOTAL		**58,59**	**42**	**52**	**49**

For **vineyard** (VV) were calculated weighted average of evaluation notes , for each plot in part, finally achieving a weighted average mark of 52 points of evaluation, which ranks the area of 58.59 hectares in the III quality class (table 7).

For **orchards** (LV) were calculated weighted average of evaluation notes , for each plot in part, finally achieving a weighted average mark of 49 points of evaluation, which ranks the area of 58.59 hectares in the III quality class (table 7).

CONCLUSONS

This study aims to obtain a fund of information on soil and agrochemical soil characteristics (morphological, physical, chemical and agrochemical) which to base scientific and technical status the defining elements of the land surface from the land parcels listed, located in Jamu Mare village, Timiş county and it is structured so offer to the owner dates on supply factors and environmental conditions and their manifest in territory.

Thus, in this paper, after a brief but comprehensive presentation of the landscape (relief, lithology, hydrographic, hydrological, climate, vegetation, anthropogenic influences), to explain phenomena that occur in soil and how these phenomena and processes may be influenced by human activity, as a farmer, were followed two distinct sides of production activities, agricultural land evaluation and the characterization of elements which contribute to defining the productive capacity of agricultural land.

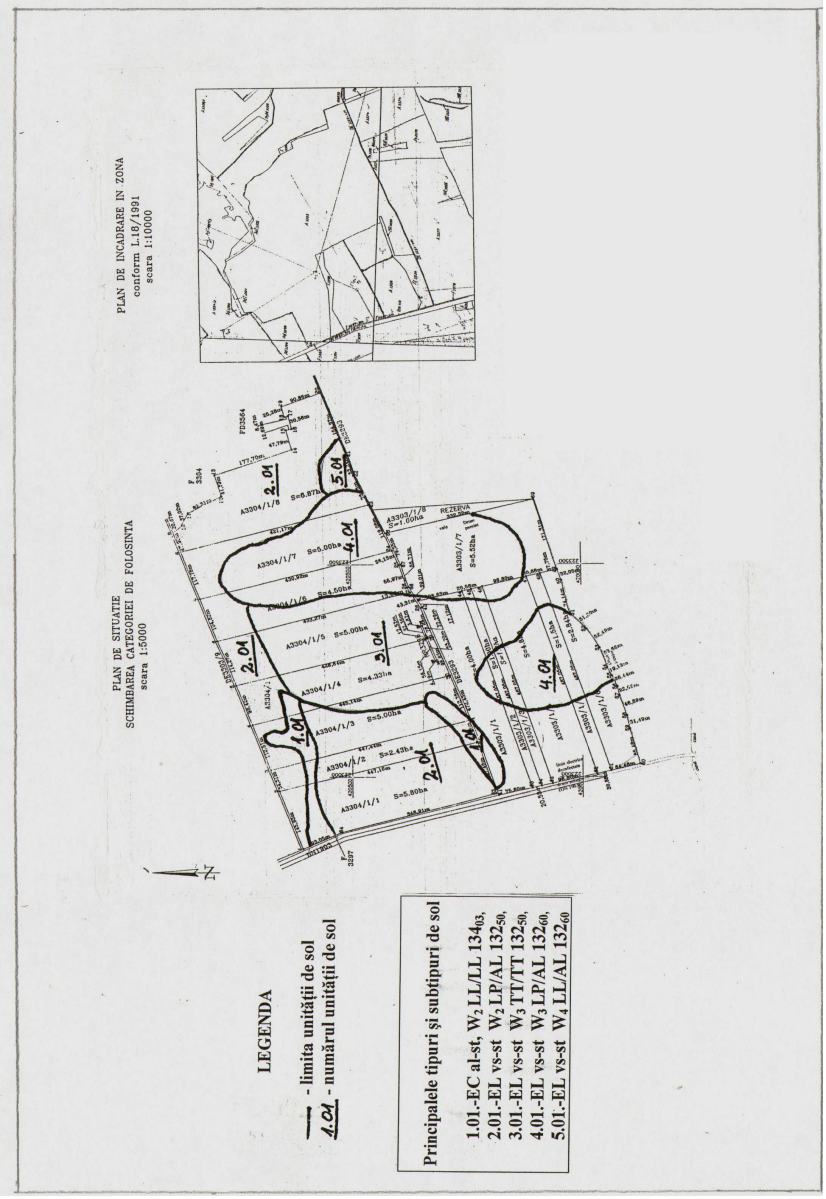

Figure 1 Situation plan of land plots

From economically point of view, the land evaluation consider the establishment of evaluation grade soil characteristics (physical, physico-mechanical, hydro, chemical, etc..), the natural characteristics (geomorphology, hydrology, climate), traits that lead ultimately to the soil fertility status is closely correlated with human activity.

The land evaluation, as part of the soil and land resource assessment is that quantitative but also qualitative side that a land, a farm or administrative area can be

distinguished from other areas with the same destination by the score awarded (from 0 to 100 points), it reflects the following aspects of land quality:

- determining the vocation (pretability) of each portion of land own the most appropriate use terms;
- determining the favorability of each piece of land for cultivation of certain plants;

Given the complex climatic factors (temperature and average annual precipitation values corrected) telurico-edaphic (terrain, groundwater, flooding, soil reaction in the first 20 cm edaphic volume, degree of base saturation, porosity, reserves of humus, calcium carbonate content), specific to the investigational perimeter, was finally obtained a weighted average mark of 42 points of evaluation for use Arable category, which covered the area of 58.59 hectares in class III of quality.

Weighted average mark of evaluation for vineyard use category, for the 58.59 hectare area, was 52 points which falls within the perimeter studied in class III category favorability for vines use.

The evaluation note for the orchards category of use, the averaged arithmetic those six tree species revealed that the area of 58,59 ha was obtained a weighted average mark of 49 points of evaluation, within the perimeter which studied in class III the category of suitability for use orchards.

It is characterized by a good favorability for plum and apple, respectively less favorable for peach and apricot.

Copies of ground walnut encountered on these lands emphasizes that walnut can survive but not grow well and give low yields and lower quality and does not justify the establishment of intensive plantations.

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