THE USE OF SPATIAL AND NUMERIC DATABASES OF DIGITAL ORTHOPHOTOMAPS IN SOIL QUALITY EVALUATION PAPERS

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Abstract

In the period between 2003-2007, digital and analog orthophotomaps at a scale 1 : 10 000 were designed for a series of territorial administrative unities, based on aerial photogrammetric methods. The use of the digital support of the orthophotomaps facilitates the retrieval in real time of primary technical data for the cadastre general of the graphic fund of agricultural physical blocks and their contained plots.

Within the grounds of the administrative territory of Bilca, in Suceava County, 315 physical blocks have been identified, with a total area of 2000,43 ha. According to the nature of the physical blocks 189 agricultural physical blocks (AB), occupying an area of 1853,81 ha have been delimited in the unincorporated area of the territory and 126 physical blocks (SA), in the residential area, with a surface of 146,62 ha**.** On the digital format of the orthophotomap, at a scale 1 : 10 000 of the physical blocks, an overlap was carried out of the thematic layer with the graphic entities of the 24 soil unities (SU), at a scale of 1: 10 000, identified and mapped on an agricultural area of 1358,14 ha**.**

For the organisation, collection and validation of the technical data necessary for the cadastre general and the quality of the soils, has been considered an area of 100,4628 ha of an agricultural sector. The overlapping of the data layer of the soils map, one that included a spatial distribution for 10 soil units (SU) has been carried out on the digital support of the six agricultural physical blocks and the 228 cadastral plots, respectively. The interrogation of the relational model of the digital orthophotomap spatial and numeric database, according to the codes of the physical blocks and the cadastral plots respectively, enables the use of this type of data in various scopes. The informational model is based on the univocal relations between the graphic entities of the 228 cadastral plots and the specific attributes of the cadastre general entities and the descriptive and analytical data of the soil resources quality, respectively.

Key words: digital orthophotomaps, database, agricultural physical block, cadastral plot, soil assessment.

The unitary and compulsory system of a technical, economic and legal inventory of all the buildings from a territorial administrative unit represents the graphic and textual data support for the cadastre and real estate publicity. With this database one can put together a GIS - *Geographic Information System*, which allows the establishment of univocal relations between the graphic entities and the descriptive attributes associated with these (Băduţ, Mircea, 2004).

For the collection of the technical data essential to the projection of the specialised information systems of lands suitable for agricultural are being used the following cartographic basic documents: orthophotomaps, cadastral maps and plans, soil maps, correlative maps and others. The basic entities of the cadastre general: the plot, the building and the owner are identified and registered in the spatial and numeric database, following the field measurements. A series of measurement techniques and technologies are being used to this purpose. Among the methods used in the introductory works of the cadastre in Romania one can mention here: the technologies based on the *Global Positioning System – GPS,* modern surveying with total measurement stations and aerial photogrammetric technologies (Boş, N., Iacobescu, O., 2007; David, Viorica, 2007).

The database of the agricultural cadastre must include the following structure: the surface of the plot, the category of use, the average slope, soil quality class, suitability of the land for uses and crops. The sustainable use of the agricultural lands imposes the knowledge of the soil resources at the level of the current configuration of cadastral plots. The soil cover represents, together with the relief and the climatic conditions, an essential component of the geographic landscape, being at the same time, a basic indicative of the environment quality (Florea, N., 2010). The pedological study has to be carried out in a digital format for the graphic as well as for the descriptive and analytical part (Munteanu, I., 2002).

In the period 2003-2007 aerial orthophotomaps were designed, on the basis of the aerial photogrammetric methods, for a series of basic territorial units in Romania, at a scale of 1: 10 000, within the unitary 1970 STEREO projection system

(Moca, V., Bucur, D., Radu, O., Huţanu, Cr., Jităreanu, S., 2008). The digital and analog data layer of the orthophotomap comprises the identification data of the territory's boundaries, of the physical blocks and those of the component plots.

A relational model between the cadastre entities and those corresponding to the agricultural land-soil units was carried out on the digital orthophotomap of Bilca village territory (Moca, V., Ilioi, D., Radu, O., Huţanu, Cr., 2009).

MATERIAL AND METHOD

The aerial photogrammetric technologies of the administrative territory of Bilca village was carried out by *Estereofoto Geoengenharia S.A*. based on the flight from July 26 2006, having as the general beneficiary the *Agency for Payments and Intervention in Agriculture* from Romania. In a first stage, was retrieved, verified and stored all the numeric information on the graphic entities of the physical blocks identified on the digital support of Bilca territory orthophotomap, at a scale of 1 : 10 000 (code SIRSUP 147036).

The 315 physical blocks covering a total surface of 2000,43 ha were identified in the Bilca territory case study. On the 189 agricultural physical blocks graphic support, with a surface of 1853,81 ha was carried out the overlapping of the graphic layer of the 24 soil units mapped on a surface of 1358,14 ha agricultural land.

In order to design the relational model between the database of the digital orthophotomap and those of the soils maps respectively, data was used corresponding to an agricultural cadastral sector with a surface of 100,4628. The data layer of the orthophotomap corresponding to the agricultural sector comprised six agricultural physical blocks, identified by the codes: 225, 231, 243, 254, 255 and 275. On the area of the six agricultural physical blocks were discovered 228 plots resulting from the enforcement of the ownership law. Following the overlapping of the thematic layer of the soils map on this cadastral sector, 10 land-soil cartographic units with a spatial distribution on 32 areas were stored.

„*Thematic layers",* provided by the soil units map designed at a 1 : 10 000 scale as well as by the correlative maps, were overlapped on the raster images of the digital orthophotomap. Among the thematic maps used for the case study there are mentioned those referring to quality classes and/or favourability, concluded on the basis of the agricultural land assessment, at the level of the ecologically homogenous territory for the use categories: arable land, pastures and meadows.

The general structure of the relational model comprised both the scanned/digitized spatial data and the non-spatial data existing in the official records. The digital conversion of the soils and respectively assessment maps graphic support was carried out within the limits of precision with an error of graphic reference of ± 0,2 mm in the case of the numeric scale of 1 : 10 000.

RESULTS AND DISCUSSIONS

The administrative territory of Bilca village is situated in the extreme north region of Suceava County. The geographic placement of the territory includes the largest part of its surface in Dragomirnei Plateau, with a more restricted area in the Rădăuţi Depression.

a. The geographic placement and the cartographic framing on the plan sheets, at the scale 1 : 5 000.

The cadastral territory of Bilca village is situated between latitude 47°53′45′′ in the South and 47°57′30′′ in the North and longitude of 25°41′15′′ West and 25°50′37′′,5 East.

The cadastral framing included the following boundary limits: Romania′s state border with Ucraine in the North; Frătăuţii Noi village boundary in the East; Gălăneşti and Vicovu de Jos villages boundaries in the South and Vicovu de Sus village boundary in the West (*figure 1*).

The basic cadastral plans are realized in digital and analog format on trapeziums having the official nomenclature of the 1970 STEREO projection system. The cartographic framing of the Bilca village administrative territorial unit's boundary limits was performed with the scope of drawing the basic cadastral plan at a scale 1: 5 000. The distribution of the plan sheets frame Bilca territory on 13 sheets numbered with 1, ..., 13 and according to official nomenclature, respectively: 1/L-35-4-A-b-4-II, …. . (*figure 1*).

The plan sheets areas at the scale 1 : 5 000 were calculated according to the geographic coordinates of the trapezium's corners from the 1940 Krasovsky reference ellipsoid, as well as according to the rectangular coordinates from the 1970 STEREO projection plan. In the case of the present study was used the control area with the nomenclature L-35-4-B-a-3-III belonging to the trapezium that frames the graphic entities from the analyzed cadastral sector. The area of the geodesic trapezium from the 1940 Krasovsky ellipsoid of 540,9816 ha represents the intact size from the projection plan. The numeric database of the corresponding agricultural physical blocks and soil cartographic units respectively, was calculated, compensated and validated on the above mentioned control area.

b. Collection and validation of data corresponding to the land fund of the agricultural physical blocks.

On the digital orthophotomap reintroduced in the cartographic representation 1970 - STEREO projection system, at the scale 1 : 10 000, was carried out, in a first stage, the collection of the basic entities of the general cadastre and real estate publicity information system.

The structure of the spatial and numeric database of the graphic entities showed for the unincorporated area 189 agricultural physical blocks (AB) with a surface of 1853,81 ha and 126 physical blocks (PB) for the residential area respectively, with a 146,62 ha surface.

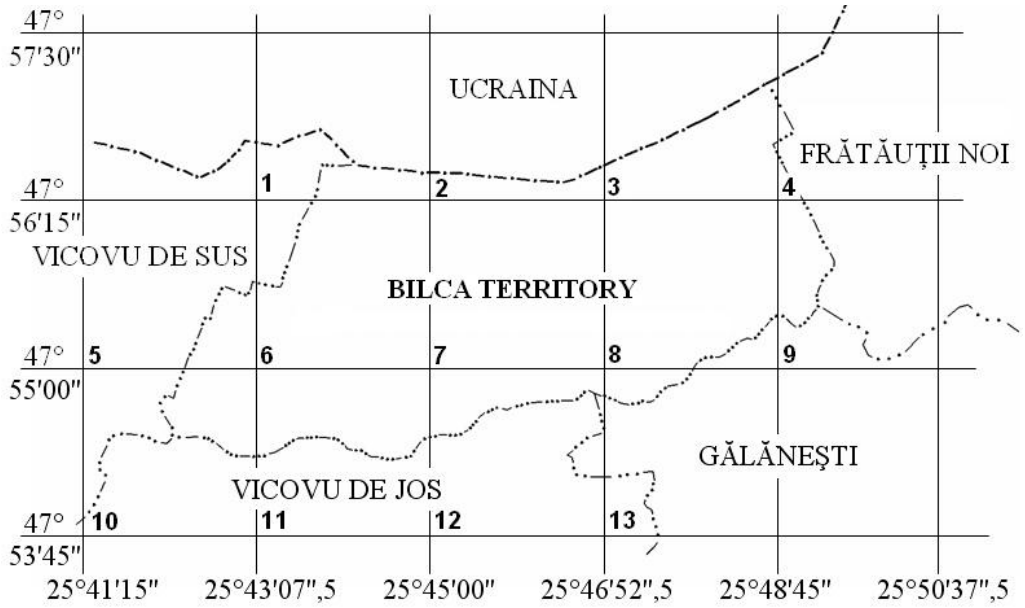

Figure 1 **Cartographic framing of the cadastral territory of Bilca village on the plan sheets (geodesic trapeziums), at the scale 1 : 5 000**

For the organisation, collection and validation of the cadastre general technical data was studied a cadastral sector resulted from the delimitation of the following six agricultural physical blocks: 225, 231, 243, 254, 255 and 275.

The selection of this cadastral sector was based on the fact that the corresponding area is represented by an homogenous surface, as far as the land use and its composing plots respectively are concerned. Within each agricultural physical block were delimited and clearly corrected the liniar elements of the component plots. On the digital support of the cadastral plan performed the numbering of the plots from each agricultural physical block. The numbering itself was realized through the code of the above mentioned physical block with the arab numbers 1, 2, 3, …, n, in a browsing course from the north-west to the south-east of the territory. Thus it is being exemplified the cadastral numbering of the 40 numbered plots within the physical block, identified through the code 147036-225, as following: 225/1, 225/2, …, 225/40 (*figure 2*).

The cadastral identification number of each plot in the database represents the connection between the cadastral plan, the cadastral records and the land registry book. The structure of the graphic entities from the cadastral sector studied included six agricultural physical blocks and a number of 228 component cadastral plots. The use of the digital plans in the „on-line" system involves the knowledge of available resolution affecting the graphic design and the multitude of interrogated data.

From the digital support of the orthophotomap, at the scale 1 : 10 000, was retrieved primary technical data corresponding to the agricultural physical blocks and the cadastral plots. After interrogating the code 147036 – 225, the following data resulted: the 23,2310 ha surface of the agricultural physical block; the agricultural use: arable land; destination group: agricultural land. In a similar way was retrieved the data from the other component physical blocks of the cadastral sector with a total surface of 100,4628 ha. The vectoring and the compensation of the surfaces on the control area of each agricultural physical block was carried out on the basis of rigorous delimitation of the plots from the six physical blocks.

The numeric database stored on each agricultural physical block and the cadastral plots from the analyzed agricultural sector included: the physical block code, the cadastral plot number, the total surface of the physical block and the size of the surfaces on each component plot (*table 1*).

In the case of the physical block with the cadastral number 147036 – 225 and with 40 component plots was highlighted the framing of the surfaces at the level of the plots between limits starting from 0,1496 ha and up to 2,4308 ha, with an average of 0,5808 ha. The distribution of the surfaces on the 228 component plots of the physical blocks synthetized their framing, overall, from very small values to relatively small ones. The framing limits of the minimum areas were 0,0940 – 0,2594 ha, the maximum 0,9197-3,7638 ha and the average respectively, of 0,3057-0,5808 ha (*table 1*).

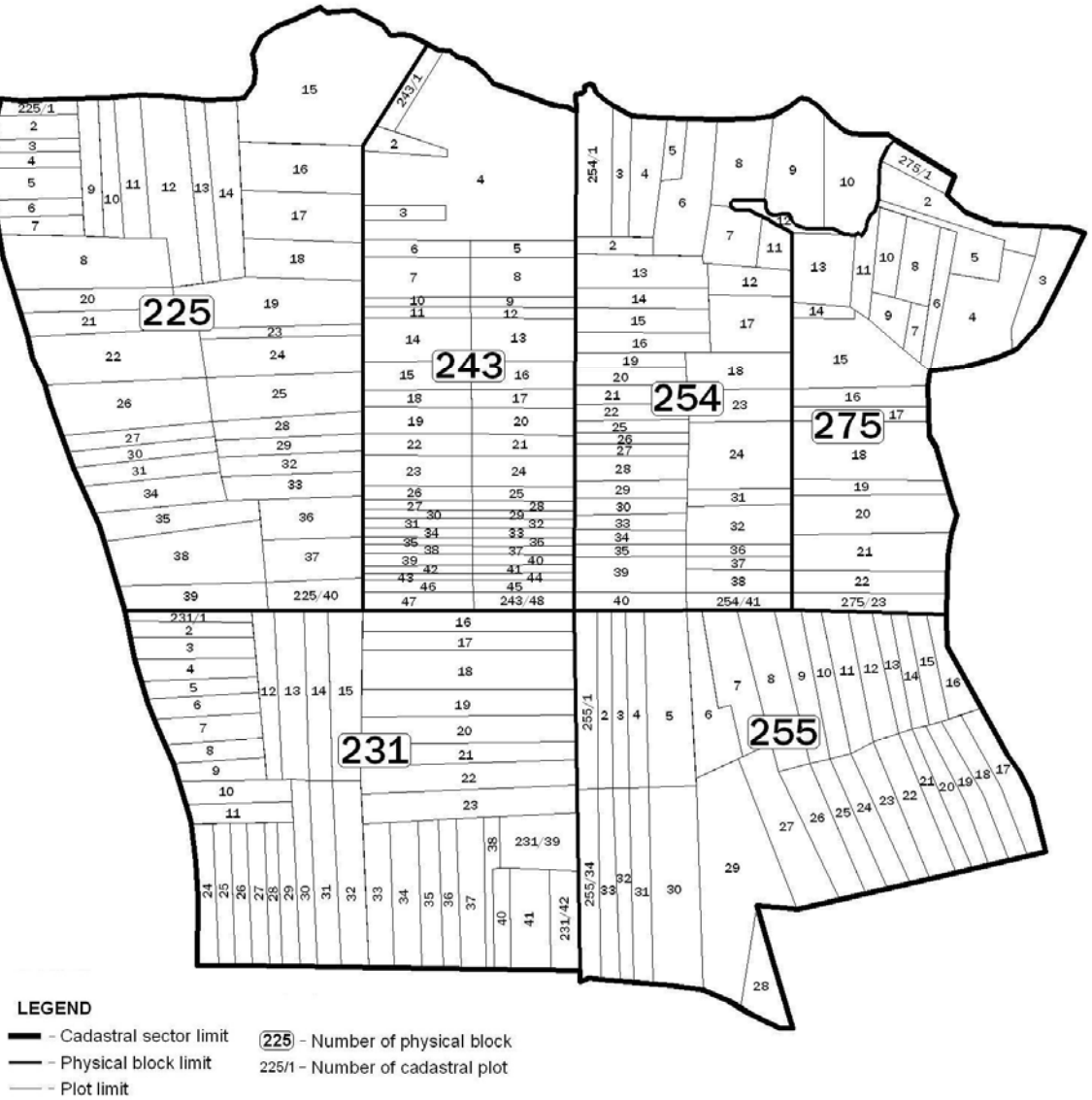

Figure 2 **Cadastral plan with the layer of the agricultural physical blocks and the distribution of the cadastral plots**

c. Collection and validation of data corresponding to the cartographic soil units organized in physical blocks and cadastral plots.

The information system of the agricultural cadastre should provide at any given time all the necessary data for the technical and qualitative inventory of the land resources. The pedological soil mapping studies and the assessment studies of the agricultural lands should contribute to the realisation of the spatial and numeric database of land-soil units. The database of the soil units informs on the limitation factors of agricultural production and implicitly of the fertility state.

Table 1

Numeric database for agricultural physical blocks (AB) and plots from a cadastral sector of Bilca territory

Agricultural Physical Block Code (AB)	Number of cadastral plot	Total surface of the agricultural physical block		Distribution of the areas in cadastral plots		
				minimum	maximum	average
		ha	%	ha	ha	ha
147036 - 225	225/1, …, 225/40	23,2310	23,1	0,1496	2,4308	0,5808
147036 - 231	231/1, …, 231/42	18,9481	18,9	0,1892	1,0911	0,4511
147036 - 243	243/1, …, 243/48	14,6729	14,6	0,0940	3,7638	0,3057
147036 - 254	254/1, …, 254/41	15,3496	15,3	0,1641	0,9197	0,3744
147036 - 255	255/1, …, 255/34	17,8740	17,8	0,2594	1,8650	0,5257
147036 - 275	275/1, …, 275/23	10,3872	10,3	0,1122	1,1089	0,4516
Surface of the cadastral sector		100,4628	100,0	-	-	-

The soil mapping study from the unincorporated area of Bilca village territory was carried out on an agricultural land with a surface of 1358,14 ha. The surface of the land-soil cartographic units was represented by the following use categories : 1096,34 ha arable land; 119,83 ha natural pasture and 141,97 ha natural meadow.

Among all the relief forms of the agricultural land were emphasized on the one hand a series of flanks with uniform slopes and horizontal surfaces on the table lands and on the other hand, terraced zones and alluvial plains. On the agricultural surface of the two distinct geo-morphological units, Dragomirna Plateau and Rădăuţi Depression, were identified and delimited 24 land-soil cartographic units. Based on the physical-chemical, morphological and fertility features of the soil units these were included into the soil class, type and subtype according to the Romanian Taxonomical Soil System – 2003.

In the analyzed case study of the agricultural cadastral sector corresponding to the six physical blocks were included 10 cartographic land-soil units. The territorial distribution of the 10 land-soil units comprised 32 areas, which were overlapped on the thematic layer of the physical blocks and their component plots (*figure 3*).

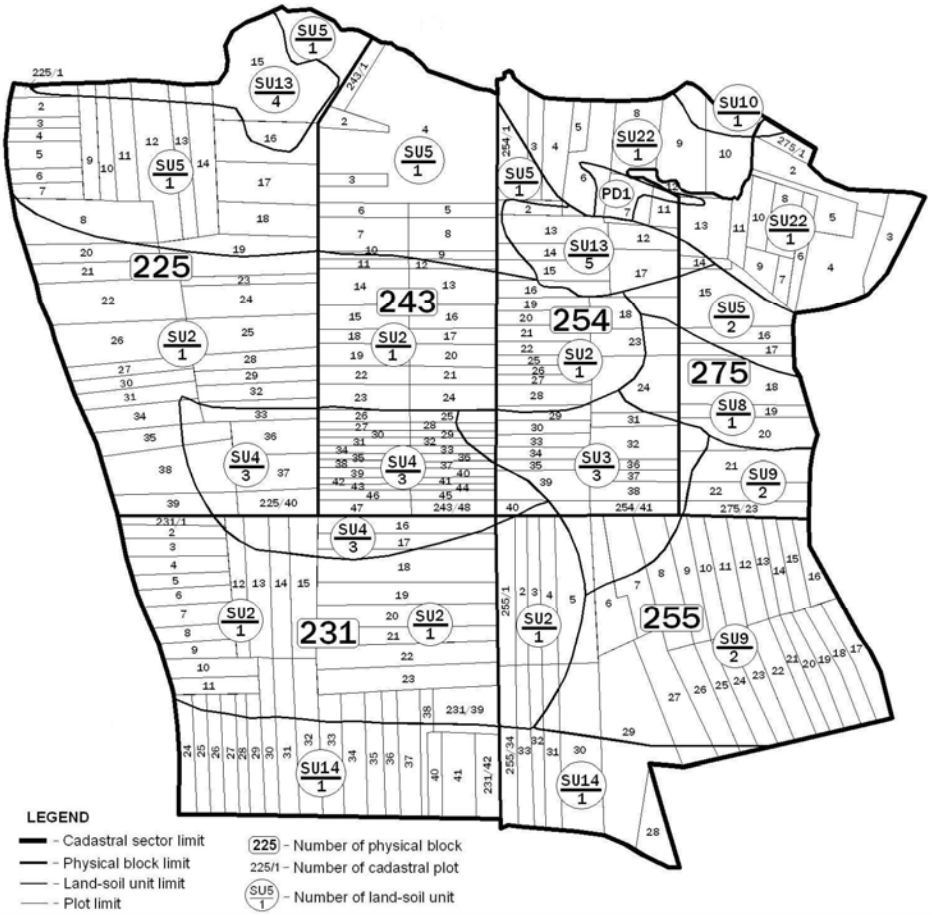

Figure 3 **Cadastral plan with the thematic layer of the cartographic soil units**

Within the agricultural space of the Bilca village territory were identified the following three soil classes: luvisoils, hidrisoils and protisoils, each distinctively different by means of specific properties and productive capacity.

Luvisoils class, with an area spreading on slopes and flat or slightly slanting terraces, includes soils with Bt textured horizon, and loam accumulation. In this class have been included, according to the specific classification indicators, two types (preluvosoil and luvosoil) with four subtypes and nine soil units: SU1, SU2, …, SU9. The luvisoils class covers a surface of 804,57 ha or 59,24% of the mapped area.

The hidrisoils class, spread in the alluvial plains and low terraces, is represented by two types: *gleiosoil*, with Gr and Gor horizons and stagnosoil, with the appearance of W horizon. Within this class there have been distinguished three subtypes with seven soil units: SU10, SU11, …, SU16. The hidrisoils class covers 294,14 ha (21,80%).

The protisoils class, spread in areas with everglades is represented by one type, *aluviosoil,* with two subtypes and eight soil units SU17, SU18, …, SU24. The protisoils class covers a surface of 257,43 ha (18,96%).

From the overlapping of the thematic layer of the cartographic soil units with the one of the physical blocks and the cadastral plots resulted the database spatial piece (*figure 3*) and the numeric one (*table 2*).

The graphic distribution of the spatial entities belonging to the 24 cartographic soil units, which was represented on the digital support of the orthophotomap, correlated with the specific relief units. The connection between the spatial data of the soil units and those of the agricultural physical blocks was based on the respective topological relations. For the calculation and compensation of the soil surfaces from the physical blocks and their component plots were used their control areas retrieved from the digital plan.

The achieved database for the considered cadastral sector consisted of the establishment of direct connections between the information from agricultural physical blocks and cartographic soil units respectively. By interrogating the identification code of the agricultural physical block one can visualise the plotting plan with the territorial distribution of the corresponding soil units (*table 2*).

In order to exemplify the above mentioned one can present the spatial and numeric database of the agricultural physical block 147036-225, with a surface of 23,2310 ha. The thematic layer of the soil units includes the following surfaces and plots.

- SU/2/1, with a surface of 9,9489 ha and a spatial distribution of 20 cadastral plots;
- SU/4/3, with a surface of 2,5575 ha and a spatial distribution of eight cadastral plots;
- SU/5/1, with a surface of 8,3265 ha and a spatial distribution of 20 cadastral plots;
- SU/13/5, with a surface of 2,3936 ha and a spatial distribution of 9 cadastral plots.

Table 2

Numeric database of cartographic soil units (SU) on the agricultural physical blocks (AB) from a cadastral sector of Bilca territory

Soil unit name (SRTS – 2003*)	Soil unit code	Spatial distribution of cartographic soil units on the agricultural physical blocks						Soil unit surface
		225	231	243	254	255	275	
		ha	ha	ha	ha	ha	ha	ha
Typical luvosoil, dusty clay / average loamy clay on loams	SU/2/1	9.9508	11.5435	4.9799	3.1538	2.8505	-	32.4785
Typical luvisoil, dusty clay / dusty-loamy clay on loams	SU/3/3	-	-	0.2801	3.2502	1.0744	0.2683	4.8730
Albic-stagnic luvisoil, dusty sandy clay / average loamy clay on loams	SU/4/3	2.5580	1.6673	3.2067	0.3043	0.0167	-	7.7530
	SU/5/1	8.3281	-	6.2062	0.8356	-	-	15.3699
	SU/5/2	-	-	-	0.3102	-	1.5068	1.8170
Albic-stagnic luvisoil, dusty clay / average loamy clay on loams	SU/8/1	-	-	-	0.7519	-	2.0612	2.8131
Albic-stagnic luvisoil, dusty clay / loamy-dusty clay on loams	SU/9/2	-	-	-	-	10.6499	1.5394	12.1893
Distric gleiosoil , dusty clay / average clay on loams	SU/10/1	-	-	-	0.4182	-	0.0626	0.4808
Luvic stagnosoil, average clay / average clay on loams	SU/13/4	2.3941	-	-	-	-	-	2.3941
	SU/13/5	-	-	-	2.1980	-	0.1394	2.3374
Luvic stagnosoil, dusty clay / average loamy clay on loams	SU/14/1	-	5.7373	-	-	3.2825	-	9.0198
Gleyc aluvisoil, average clay / fine sandy clay on fluviatile deposits	SU/22/1	-	-	-	3.6692	-	4.7785	8.4477
Forest plantation	PD	-	-	-	0.4582	-	0.0310	0.4892
Surface of cadastral sector	-	23.2310	18.9481	14.6729	15.3496	17.8740	10.3872	100.4628

*SRTS – 2003: Romanian Taxonomical Soil System.

d. Collection and validation of primary data of assessment in natural regime and framing of soil units on favorability classes.

The soil sustains the breeding of plants and represents the natural reservoir controlling the water flow, the nourishing elements and the energy through an ecosystem. As far as quality is concerned, the soil must be familiar as much for its best use and for its current fertility.

From all of the soil's properties determining the quality and productive capacity the following are particularly highlighted: texture, structure, water retaining capacity, porosity, useful edaphic volume, organic matter content and others.

The assessment of soil units at the level of the ecologically homogenous areas has been performed according to the *1987 Methodology for Elaboration of Pedological Studies*, with the later ammendments, based on the mapping of the 17 ecopedological indicators. The average assessment grades were calculated for agricultural uses of the 24 land-soil units with a total surface of 1358,14 ha. For the elaboration of the synthesis cadastral assessment maps was carried out the framing of the agricultural land on five quality classes (I-V), with a range of 20 points/class. In the case of detailed maps the grouping of the agricultural land is made on 10 favorability classes (I-X), with a range of 10 points/class. The database of the cadastral assessment for natural conditions was elaborated on the whole territory for these uses: arable land, pastures and meadows.

On the whole mapped territory resulted the framing of the agricultural land into the following quality classes.

- IInd class (61-80 bonitary points) - 43,39 ha;
- IIIrd class (41-60 bonitary points) - 90,21 ha;
- IVth class (21-40 bonitary points) - 766,34 ha;
- Vth class (0-20 bonitary points) - 548,20 ha.

According to the average assessment grade of the four quality classes and the corresponding surface the weighted average grade was obtained with 24 bonitary points for the mapped territory, which includes the soils from the IVth quality class.

The database for the three representative uses of the territory was elaborated for the cadastral sector corresponding to the six agricultural physical blocks. The average assessment grade of the arable land expressed according to the favorability of the first eight crops described a general state of low and very low natural fertility. The ten soil units of the analyzed cadastral sector were included into the IVth quality class, with an average assessment grade within the limits 21-26 points and respectively in the Vth quality class, with an assessment grade within 11-20 points limits (*table 3*).

For the uses of pastures and meadows, the average assessment grade in natural regime was generally characterized by superior favorability. The average assessment grades were included between the minimum value of 39 points (SU/22/1) and the maximum of 72 points (SU/8/1).

Table 3

Numeric databases of natural cadastral assessment and favorability classes, from an agricultural sector of Bilca territory

Soil unit name (SRTS – 2003*)	Soil unit code	Average assessment grade in natural regime			Favorability class (I-X)			Soil unit surface
		Arable	Pasture	Meadow	Arable	Pasture	Meadow	ha
Typical luvosoil, dusty clay / average loamy clay on loams	SU/2/1	26	65	65	VIII	IV	IV	32.4785
Typical luvisoil, dusty clay / dusty-loamy clay on loams	SU/3/3	24	65	58	VIII	IV	V	4.8730
Albic-stagnic luvisoil, dusty sandy clay / average loamy clay on loams	SU/4/3	20	65	58	IX	IV	V	7.7530
	SU/5/1	17	58	52	IX	V	V	15.3699
	SU/5/2	17	58	52	IX	V	V	1.8170
Albic-stagnic luvisoil, dusty clay / average loamy clay on loams	SU/8/1	18	72	65	IX	III	IV	2.8131
Albic-stagnic luvisoil, dusty clay / loamy-dusty clay on loams	SU/9/2	21	65	58	VIII	IV	V	12.1893
Distric gleiosoil , dusty clay / average clay on loams	SU/10/1	11	45	47	X	VI	VI	0.4808
Luvic stagnosoil, average clay / average clay on loams	SU/13/4	14	50	50	IX	VI	VI	2.3941
	SU/13/5	14	50	50	IX	VI	VI	2.3374
Luvic stagnosoil, dusty clay / average loamy clay on loams	SU/14/1	14	50	50	IX	VI	VI	9.0198
Gleyc aluvisoil, average clay / fine sandy clay on fluviatile deposits	SU/22/1	11	44	39	IX	VI	VII	8.4477
Forest plantation	PD	-	-	-	-	-	-	0.4892
Surface of cadastral sector	-	-	-	-	-	-	-	100.4628

*SRTS – 2003: Romanian Taxonomical Soil System.

The favorability of the agricultural lands for different uses and crops from the administrative territory of Bilca village has been determined by a series of ecological and edaphic factors. Among these, the one that stood out was the low temperature in particular, with an annual average of + 7,1°C and the heavy rainfall quantities, respectively, with a multi-annual average of 655 mm.

According to the nature of the edaphic factors that have determined the normal growth and development of the plants, the mapped soil units (SU) have been framed into the following categories:

- *Lands with fine soil texture on a 70-80 cm in-depth*(SU: 3, 4, 5, 9, 14, 15, 16, 24), with a total surface of 589,45 ha and a distribution on flat areas, from the Bilca and Ţigănuşi and hills;
- *Lands with harsh texture of soil profile* (SU: 17, 18, 19, 20, 22), with a total surface of 145,66 ha and a distribution in the Suceava River alluvial plain and those of Large and Small Bilca creeks;
- *Lands with high content of skeleton,* on the surface and in soil profile in-*depth* (SU: 17, 18, 19, 20), with a surface of 58,63 ha and a distribution in Suceava River alluvial plain;
- *Lands with periodic floods caused by overflow,* situated *in* the minor streambed of Suceava River and Large Bilca creek (SU: 17, … , 23);
- *Lands with excessive humidity of a temporary nivo-pluvial nature* (SU: 2, 3, 6, 7, 8, 9, 13, 14, 15, 16), with a surface of 814,70 ha;
- *Lands with excessive humidity of a permanent phreatic nature* (SU: 10, 11, 12, 22, 23, 24), with a total surface of 309,25 ha;
- *Acid lands,* such as: very acid on 39,57 ha; highly acid on 505,31 ha; moderately acid on 756,85 ha and low acid on 5,43 ha.

CONCLUSIONS

The geo-spatial information provided by the orthophotomaps and the soil maps ensure the coordination of services and decisions at the level of the local communities or the basic administrative units. The basic entities of the cadastre general and real estate publicity: the plot, the building and the owner, are being identified and stored into the geo-spatial and numeric database, following complete land measurements.

The qualitative evaluation of the agricultural lands and the establishment of any favorability for various uses and agricultural crops is a result of mapping and assessment studies that must be carried out down to the level of the cadastral plots.

The data layer of the digital orthophotomap realized by ortho-photo-restitution; stereo-restitution and geo-referencing included: the boundaries, the total surface of the Bilca territory of 2000,43 ha; the limits and the surface of a number of 315 physical blocks; the limits and surface of the cadastral plots.

The spatial database includes the graphic entities of detailed maps with a 10 points range on the favorability class and the attributes associated to those regarding the descriptive and the analytical data of the 24 soil units (SU), on a total surface of 1358,14 ha.

The experimental model of the technical and qualitative database of the general and agricultural cadastre, performed on a surface of 100,4628 ha included: six agricultural physical blocks with 228 component plots; 10 soil units with a distribution on 32 areas. The assessment of soil resources and the knowledge of the economic indicators represent the real graded tax basis of agricultural lands for each owner, according to the quality class.

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