ASPECTS OF USING ORTHOPHOTOPLANS IN THE INFORMATIONAL SYSTEM OF FARMING CADASTRAL SURVEY IN THE ADMINISTRATIVE TERITORY UNIT OF BÂLCA – SUCEAVA

ASPECTE ALE UTILIZĂRII ORTOFOTOPLANURILOR ÎN SISTEMUL INFORMAȚIONAL AL CADASTRULUI AGRICOL DIN UNITATEA ADMINISTRATIVĂ TERITORIALĂ BÂLCA - SUCEAVA

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Abstract. *Making a modern cadastral survey, compatible with the one from the European Union, requires the continuous improvement of measuring methods. Based on the new technologies of terrestrial measurements, the determination of area size and configuration according to destination, usage categories and landowners was assured. During 2003-2007, by using aerophotogrammetrical methods, the orthophotoplan was made at scale 1 : 10 000, in the stereographical projection - 1970, on base territorial units. These topographical plans have included space (boundary limits, physical blocks and cadastral plots) and descriptive data. The cadastral territory of the Bâlca Commune was mapedited on two sheets of the orthophotoplan at scale 1 : 10 000. The total area of* ***2000,43 ha*** *was delimited and framed on* ***315 physical blocks.*** *The areas of physical blocks calculated in this case study were between* ***0.11 ha*** *(block 74) and* ***49,20 ha*** *(block 378). For checking the way of calculating the areas of physical blocks and cadastral plots, they used the control areas of geodesic trapeziums at scales 1 : 10 000 and 1 : 5 000, determined both on Krasovski – 1940* ***(Ka-40)*** *reference ellipsoid and in the stereographical projection system- 1970.*

Keywords: *farming cadastral survey, aerophotogrammetrical methods, orthophotoplan, space and descriptive data, physical block, cadastral plots, control areas.*

Rezumat. *Realizarea unui cadastru modern, compatibil cu cel din statele Uniunii Europene, implică perfecționarea continuă a metodelor de măsurare. Pe baza noilor tehnologii de executare a măsurătorilor terestre se asigură determinarea configurației și mărimii suprafețelor pe destinații, categorii de folosință și proprietari. Prin utilizarea metodelor aerofotogrammetrice s-a realizat, în anii 2003-2007, ortofotoplanul, la scara 1 : 10 000, în proiecția stereografică - 1970, pe unitățile teritoriale de bază. Aceste planuri topografice cuprind datele spațiale (limite de hotar, de blocuri fizice și parcele cadastrale) și descriptive. Teritoriul cadastral al comunei Bâlca a fost cartoeditat pe două foi ale ortofotoplanului la scara 1 : 10 000. Suprafața totală de* ***2000,43 ha*** *a fost delimitată și încadrată pe* ***315 blocuri fizice.*** *Ariile blocurilor fizice calculate în studiul de caz s-au situat între* ***0,11 ha*** *(blocul 74) și* ***49,20 ha*** *(blocul 378). Pentru verificarea modului de calcul al ariilor blocurilor fizice și ale parcelelor cadastrale componente au fost utilizate suprafețele de control ale trapezelor*

geodezice la scările 1 : 10 000 şi 1 : 5 000, determinate atât pe elipsoidul de referinţă Krasovski – 1940 ***(Ka-40),*** *cât şi în sistemul proiecţiei stereografice - 1970.*
Cuvinte cheie: *cadastru agricol, metode aerofotogrammetrice, ortofotoplan, date spaţiale şi descriptive, bloc fizic, parcele cadastrale, suprafeţe de control.*

The durable development of rural area of Romania requires development of a balance between economic growth and environment protection, depending on the soil quality and the possibility of using the land resources (2). Based on the present situation of using land resources it was worked out "**The National Program for Rural Development 2007-2013**" (5) of which we notice, first of all – the increase of competitiveness in the agriculture and forest sector. The implementation of rural developing strategies is based on the financing coming out from the **European Agriculture Fund for Rural Development (FEADR)** for period 2007-2013. At the local level, getting and managing of these funds is carried out by the **Payment Agency for Rural Developing and Fishing (APDRP)**, and respectively the **Payment and Intervention Agency for Agriculture (APIA – http://lpis.apia.org.ro/).**

The use by the Payment and Intervention Agency for Agriculture **(APIA)** of the digital plans in **"on-line**" system requires the knowledge of available resolutions affecting the graphic design and the data multitude (3). The multimedia elements determining the design and the content of the plan, influencing on their turn also the categories of multi-users beneficiaries (1, 4), where the information has to circulate and to be assimilated by each level.

MATERIAL AND METHOD

At the European Union level it was carried out a unitary reference basis of the regional statistics, named **Nomenclature of Statistical Territorial Units (Nomenclature des Unites Teritoriales Statistique – NUTS).** In Romania it was created **eight developing regions** by voluntary associations, without administrative status and without legal status. These regions make part of the European NUTS-2 system with an average population of 2.8 million inhabitants of each developing region.

In order to implement the rural developing measures that are financed by EU through the Payment and Intervention Agency for Agriculture (APIA) it was worked out at the territorial administrative units level of Romania the specific technical documentation. In this respect, in 2003-2007 it was executed aerophotogrammetric erections by the specialized company Estereofoto Geongenharia S.A., based on which the ortophotoplan was compiled in digital and analogical format with the resolution of map drawing representation to scale 1:10 000.

With the survey carried out on the content elements of the general plan on scale 1:10 000 of the Bâlca commune territory (**SIRUP code 147036**), Suceava district it was compiled a cadastral database. Of the digital plan content, the following primary data was extracted: physical block number, surface, usage category, medium slope and land destination.

RESULTS AND DISCUSSIONS

a. Geographical location and cartographic framing of Bâlca territory

The territorial administrative unit of Bâlca commune of Suceava district is geographically made up, mostly in Dragomirna Plateau and on a more restricted area in Radauti Depression. The territory under survey is bounded on the following administrative limits (figure 1):

- on the north, the border segment of the state frontier of Romania with Ukraine;
- on the east, the border segment with territory of Fratautii Noi commune;
- on the south, the border segments of the Galanesti and Vicovu de Sus communes;
- on the west, the border segment with territory of Vicovu de Sus commune;

Based on the technical norms of introducing the general land survey, the Balca commune territory can be framed on geodesic trapezes corresponding to the map and plan sheets of the official nomenclature of the Stereographic Protection System – 1970. In this way, for cartographical representation of general plan results the possibility of using the following trapeze categories: two map sheets for scale 1:50 000, 4 map sheets for scale 1:25 000; 5 plan sheets at scale 1:10 000 and 13 plan sheets at scale 1:5 000 (figure 1).

Topo-cadastral database of the digital orthophotoplans can be checked and compensated on the control areas of trapezes, of which it is exemplified the **plan sheet L-35-4-B-a-3-III** with surface of **540.9816 ha.**

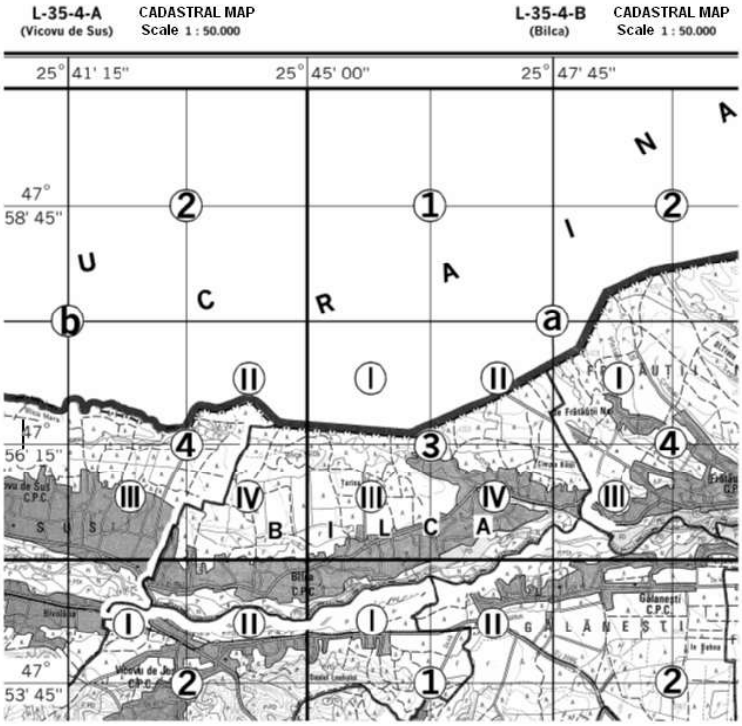

Fig. 1 – Geographical placement and cartographical framing on map and plan sheets of Balca – Suceava administrative unit territory

b. Land distribution on surface classes of physical blocks

In the survey carried out on general plan of Balca – Suceava territorial administrative unit there were accessed base data of 507 physical blocks, with full-empty surfaces between the considered territory and bordering territories.

Within the administrative limits of Balca territory there were identified a number of **315 physical blocks**, of which **189 physical blocks** outside the location land **(BA)** and **126 physical blocks** within the built-up area **(SA).** By taking out the information contained within each physical block numbered by codes from **147036-1** to **147036-507** resulted in primary base data of the agricultural cadastre. Of the digital support of the general plan at scale 1:10 000 accessed in **"on-line**" system, it is shown a sequence of graphical design with limits and numbering physical blocks, from outside Balca territory **(National Agency for Intervention in Agriculture-APIA**). For exemplification it is quoted the primary base data of physical blocks with code **147036-254** (figure 2).

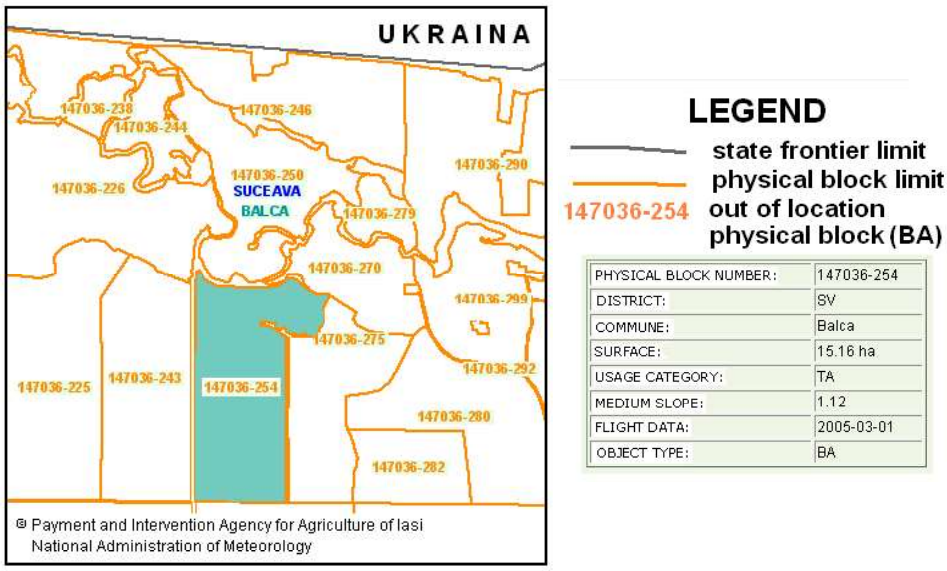

Fig. 2 – Sequence of general plan with limits and numbering of physical block of Balca Suceava administrative unit territory

Surface distribution covered on the **315 physical blocks** was analysed depending on their size on seven classes of framing. Of the resulted data it was remarked, first of all, the prevailing of physical blocks with very small and small surfaces, which on their turn cover the cadastral lots of the owners. In this respect, the existing situation of the carried out survey is presented: **112 physical blocks** with surface ranging within limits 0.10 – 1.00 ha; **83 physical blocks** with surfaces of 1.01 – 5.00 ha. In the surveyed case it were identified only six physical blocks with surfaces of 30.01 – 40.00 ha and **a block with surface of 49.20 ha** *(table 1)*.

Table 1

Land distribution on surface classes of physical blocks of the Balca-Suceava territorial administrative unit

Crt. no.	Surface class specification	Number of physical blocks on surface classes		Total surface on physical blocks classes	
	ha	-	%	ha	%
1	0.10 – 1.00	112	35.56	51.28	2.56
2	1.01 – 5.00	83	26.35	206.89	10.34
3	5.01 – 10.00	38	12.06	269.09	13.45
4	10.01 – 20.00	56	17.78	802.10	40.10
5	20.01 – 30.00	19	6.03	427.74	21.38
6	30.01 – 40.00	6	1.90	194.13	9.71
7	40.01 – 50.00	1	0.32	49.20	2.46
BALCA TOTAL TERRITORY		**315**	**100.00**	**2000.43**	**100.00**

c. Structure of usage categories of the land of physical blocks

Agriculture cadastre has the role to provide in any moment the economical and technical database on agriculture land resources on a national and local plane. By developing in the recent years of new digital maps one the entire agriculture surface of Romania it was obtained at the level of all territorial administrative units a base of primary data which provides land resources management.

The total surface of the administrative territory of Balca commune of **2000.43 ha** was distributed on the two distinct usages (out of location and within location) of the **315 physical blocks**. In this way, it was obtained a surface of **1853.81 ha** (92.7%) for out of location territory **(BA)** with usage on three usage categories and respectively **146.62 ha** (7.33%) for within location surface **(SA)** with usage of buildings and yards *(table 2)*.

Table 2

Land destination on usage categories of physical blocks of Balca-Suceava territorial administrative unit

Denomination and code of usage categories	Surface on out of location physical blocks (BA)		Surface on within location physical blocks (SA)		Surface on usage categories		Total of physical blocks	
	ha	%	ha	%	ha	%	-	%
Agriculture lands (TA)	1830.84	91.52	-	-	1830.84	91.52	180	57.14
Permanent pastures (PP)	21.68	1.08	-	-	21.68	1.08	8	2.54
Permanent cultures (CP)	1.29	0.07	-	-	1.29	0.07	1	0.32
Buildings and yards (CC)	-	-	146.62	7.33	146.62	7.33	126	40.00
GENERAL TOTAL	**1853.81**	**92.67**	**146.62**	**7.33**	**2000.43**	**100.0**	**315**	**100.00**

Of the current situation analysis of the way of usage the land in the out of location area resulted a percent of **91.52%** of agricultural lands **(TA)** that occupy a total surface of **1830.84 ha** distributed on **180 physical blocks**.

Area distribution on the **180 physical blocks** with the usage category of agricultural lands **(TA)** of the under survey territory showed up their framing within very small surfaces of **0.31 ha** (physical block **507**) and relatively large to **49.20 ha** (physical block **378**). Within these physical blocks with agriculture land usage would be identified and registered all the lots owned by the farmers. As for the other categories of usage of out of location land, the permanent pastures **(PP)** and permanent cultures **(CP)** it is remarked the fact that these occupy non-significant surfaces from the point of view of economical usage.

The cadastral technical documentation compiled based on the current primary data on a digital support level of the plain at scale 1:10 000, considering the system of "**land units – usage categories**" allows promotion of management and arrangement projects of agricultural land.

CONCLUSIONS

1. Based on the new execution technologies of aerophotogrammetric erections it was compiled the digital map of the entire agriculture surface of Romania covering the administrative limits of territorial units and those of the physical blocks necessary for agriculture land owners, aiming at identification and registering of the cadastral lots based on the data recorded by APIA.

2. Balca territorial administrative unit of Suceava district contains 315 physical blocks with a total surface of **2000.43 ha** which was framed on seven surface classes within minimal limits of **0.10-1.00 ha** with an area of **51.28 ha** and with a spatial distribution on **112 blocks** and maximal of **40.01-50.00 ha** where it was identified only the **block 378** with a surface of **49.20 ha**.

3. The surface covered by the agriculture lands is of **1830.84 ha** representing **91.52%** of the administrative unit territory, with a spatial distribution in **180 physical blocks** where to be identified cadastral lots on different owners, holders and users, in view of getting necessary funds for durable exploitation and development of agriculture farms.

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