GEOMATIC APPLICATIONS IN THE SILVO-PASTORAL SYSTEMS

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Abstract

Information technologies applied in the terrestrial measurements currently represent an effective use of spatial data and information, with applications in various fields. Geomatic applications currently represent opportunities for a range of effective technological activities in the agro-forestry practice. After restoring ownership of land and/or forest vegetation, a number of areas which returned to its rightful owners, have not solved the problem in tabular or registration in the land registry records.

As a result, the silvo-pastoral systems represented various pastures and/or a wooded pasture, which currently occupies a considerable area of land fund national and belong to various owners, land records, need to be identified, positioned spatially and mapped appropriately to effectively manage and administrate it. This article presents a series of features related to the process of locating and mapping of silvo-pastoral systems details of geomatics technologies available. Stages of the case study were conducted between November 2014 - May 2015, and the results will be used to achieve clear objectives set in projects to execution and service respectively.

Key words: geomatics technologies, silvo-pastoral systems, spatial positioning, mapping, database, thematic maps, spatial information system.

INTRODUCTION

Silvo-pastoral systems currently existing in our country are mostly included in the localities ownership association (compossessorate) existing land records during these associative forms of property were established (Chezan M. et al., 2006). The data-bases can be made with specialized programs, depending on the logistical base of ownership association by the manager of the forest management (Marton H., 2007). For the management and administration of the silvo-pastoral systems, the identification of papers, positioning, definition, mapping and description are necessary.

The case study was conducted by analyzing the ortho-photo-map and respectively the reality on the ground. On the ground there were identified compossessorate boundaries across which there are indications offered by older people who had to use that land.

The characteristic contour point has been materialized with timber terminal, and their mathematical shaft with metallic nails. For positioning of silvo-pastoral systems demarcated access roads and watercourses that are permanent and temporary, representing different categories of use.

For a description of adequate silvo-pastoral systems previously required their mapping, according to the reality on the ground. Therefore, it is imperative to establish the land use categories (Sabău N. et al., 2006).

MATERIAL AND METHOD

The case study was conducted within the village land records Nădălbeşti Ownership Association, Igneşti Town, Arad County (Fig. 1), in 2014-2015. To develop the case study, observations were made en route to the site observations, bibliographic study, and simulation.

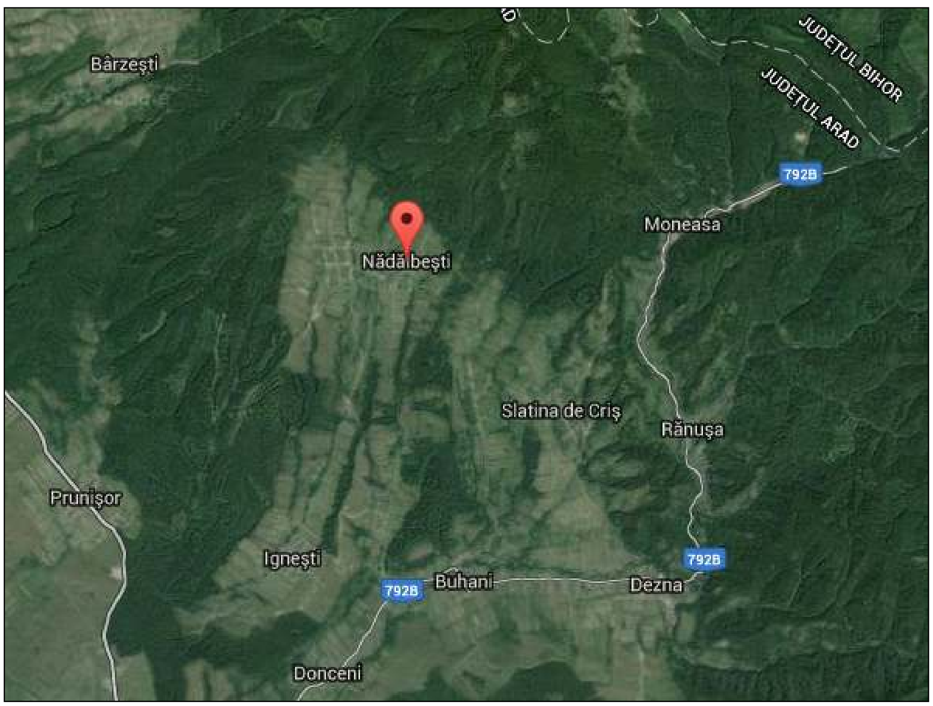

Fig. 1. Locating the case study
(Source: https://www.google.ro/maps/place/N%C4%83d%C4%83lbe%C5%9Fti+317197/@46.4371109,22.1327549,14128m/data=!3m1!1e3!4m2!3m1!1s0x474f520f8cc31cdb:0x998ba535c93654dd)

Field data were recorded with G.P.S. systems and G.N.S.S. technology and respectively with conventional technology – T.S. (total station). G.P.S. Trimble R3 receivers and Trimble Total Station 5503 were used.

Data collection with G.P.S. receivers was done by static (traditional and fast version) and semi-kinematic method (Stop & Go), requiring primary processing of data recorded after their transfer and check with Trimble Total Control Programme.

The transformation of global coordinates in final coordinates, related to national system STEREO-1970 MN-1975 was achieved with the TransDatRO 4.04 application proposed and agreed by A.N.C.P.I., using for this purpose G.N.S.S. data provided by the Permanent Station G.N.S.S. in the Gurahonţ town, Arad County which is positioned at a distance of approximately 25 km of the location of the study.

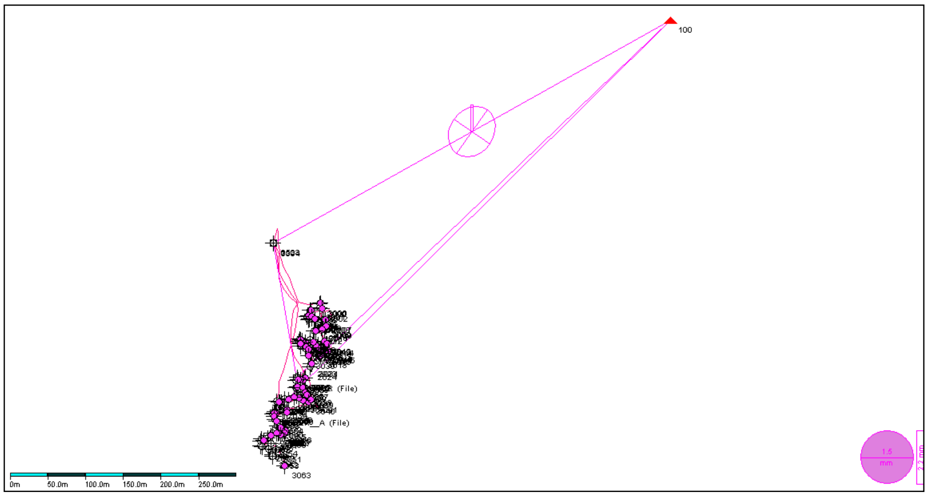

Fig. 2. GPS data collection with semi-kinematic method (Stop & Go)

The usage of Trimble R4 receivers, for topographic points positioning through kinematic method (R.T.K.) in real time, has been restricted by the lack of G.S.M. signal, to transmit data from permanent stations G.N.S.S. near the location of the study.

For positioning in optimum conditions (accuracy and time) to certain landmarks (inflection points watercourses excessive meandering) using the total station, combine the free-station method of locating the details by radiation (Tămâioagă Gh., Tămâioagă D., 2009). Data recorded by total station were analyzed and processed with TERAMODEL10.52 program and points with known coordinates were positioned with G.N.S.S. technology, G.P.S. system.

The final coordinates of points positioned with two technologies were implemented in 8.0 MapSys program, realizing the geographic information system (G.I.S.) for the silvo-pastoral system, respectively database and related thematic maps.

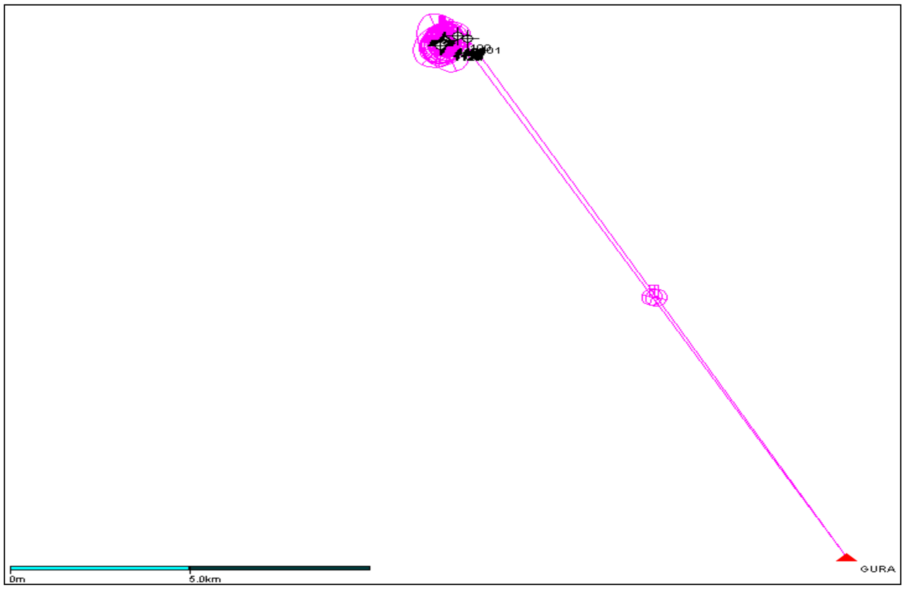

Fig. 3. The locations of points that will be positioned with GPS System and GNSS Gurahonţ permanent stations

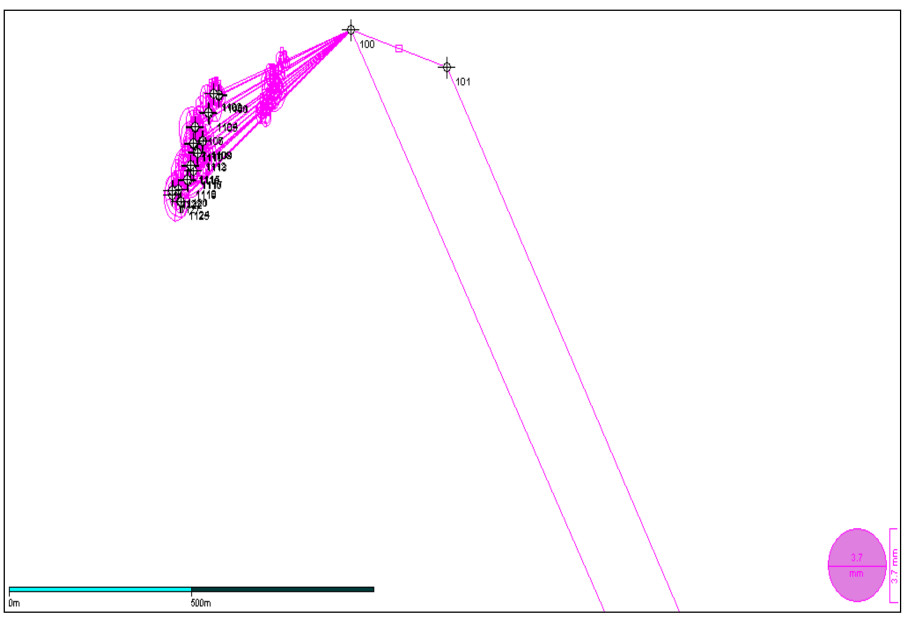

Fig. 4. Processing of GPS recordings made by using the static method with Trimble Total Control program

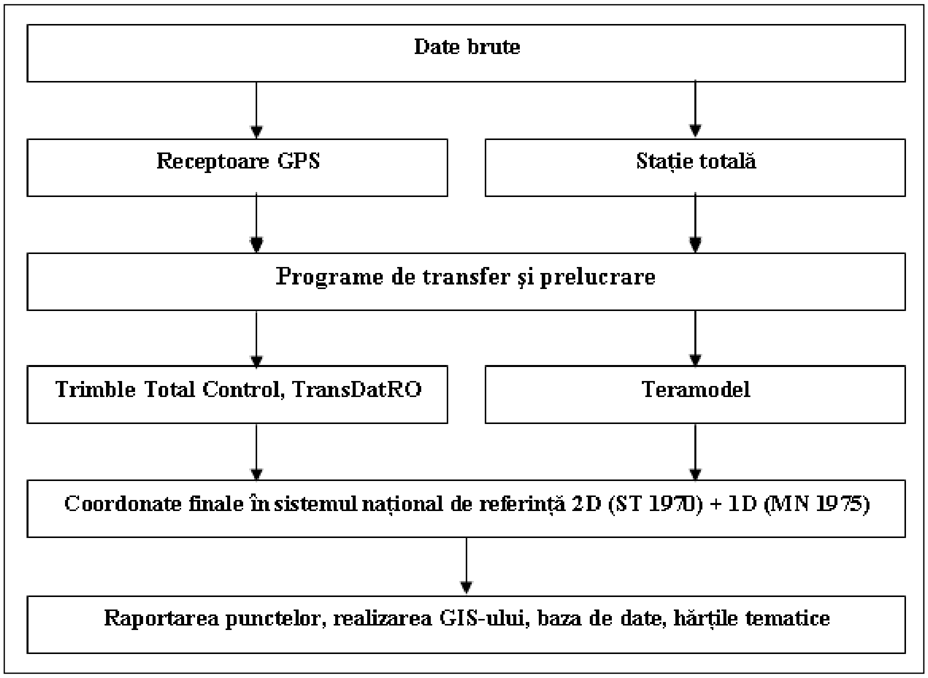

Fig. 5. Block diagram of Geomatic Applications related to the case study

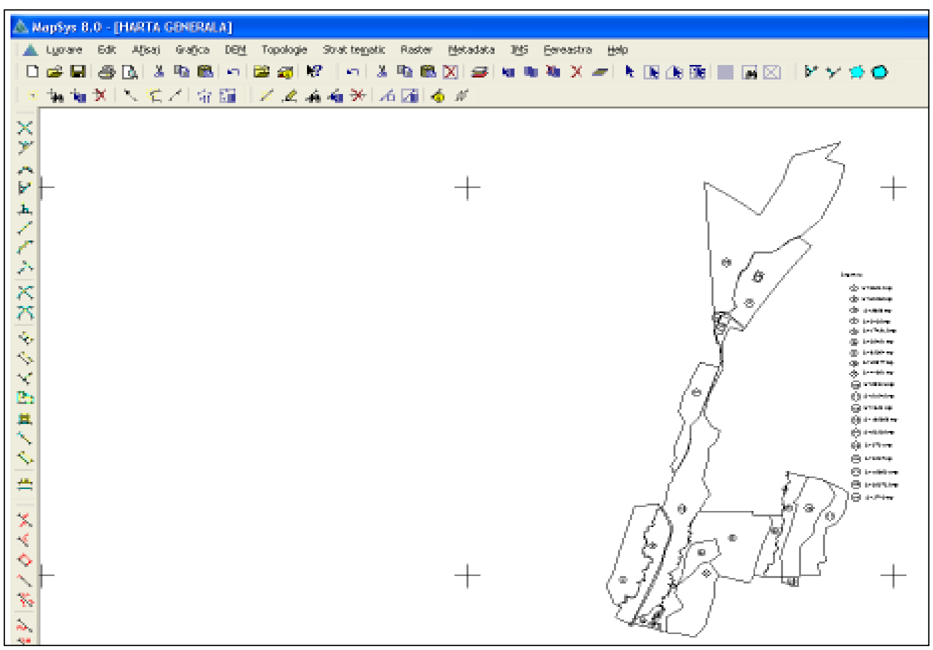

Fig. 6. The Interface of 8.0 MapSys Program with the situation plan of use categories

RESULTS AND DISCUSSION

After processing the data recorded by GNSS technology and conventional one, going through the steps shown in the block diagram in Fig. 3, yielded some results (represented by the final coordinates of the points that have been positioned and that the statistical parameters of accuracy related), which can be found in the reports of the final data processing.

Fig. 7. Extract from the processing report of data performed with Trimble Total Control Program

A part of the final co-ordinates can be found in the Table 1.

Table 1

Points Coordinates of free-station positioned method

Nr.	X(m)	Y(m)	Z(m)	Cod
0	*1*	*2*	*3*	*4*
110	553057.226	284365.443	188.720	1
111	552926.921	284370.504	192.099	1
112	552879.280	284350.239	186.888	1
113	552831.970	284337.266	185.574	1
120	552567.610	284260.006	180.249	1
202	552995.771	284350.540	188.702	1
203	553164.101	284382.710	191.580	1
400	552510.068	284245.416	178.651	1

Table 2

Evidence of actual use categories within the forest-pastoral system studied

Crt. no.	Location	Current use category				Total (m^2)
		Pasture (m^2)	Wooded pastures (m^2)	Forest (m^2)	Cemetery (m^2)	
0	*1*	*2*	*3*	*4*	*6*	*5*
1	Pasture Secţie	95833.22	0.00	0.00	0.00	95833.22
2	Pasture Secţie	64850.17	0.00	0.00	0.00	64850.17
3	Pasture Între Fagi	197936.65	0.00	0.00	0.00	197936.65
4	Pasture Fântâna Dili	224800.26	0.00	0.00	0.00	224800.26
5	Forest Rât	0.00	0.00	70028.69	0.00	70028.69
6	Pasture wooded Miculeni	0.00	28877.15	0.00	0.00	28877.15
7	Pasture wooded Miculeni	0.00	24301.09	0.00	0.00	24301.09
8	Pasture Miculeni	113247.43	0.00	0.00	0.00	113247.43
9	Forest Miculeni	0.00	0.00	61645.52	0.00	61645.52
10	Pasture Şabasca	65237.67	0.00	0.00	0.00	65237.67
11	Private property	5750.59	0.00	0.00	0.00	5750.59
12	Pasture Între Garduri	3056.91	0.00	0.00	0.00	3056.91
13	Pasture Imaş	106851.15	0.00	0.00	0.00	106851.15
14	Cemetery	0.00	0.00	0.00	2748.85	0.00
15	Pasture Panţâreasca	365731.94	0.00	0.00	0.00	365731.94
TOTAL	**Total (mp)**	**1243295.99**	**53178.24**	**131674.21**	**2748.85**	**1428148.44**
	Total (ha)	**124.33**	**5.32**	**13.17**	**0.27**	**142.81**

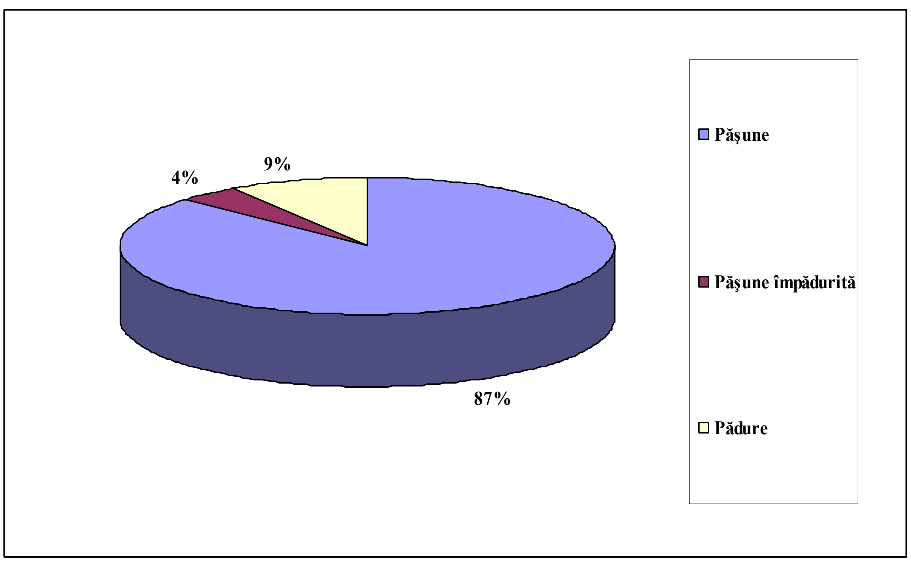

Fig. 8. Percentage distribution of use categories related to forest-pastoral system

CONCLUSIONS

Using of geomatics technologies for detail positioning and mapping of silvo-pastoral systems representing an opportunity to streamline the technical and economic related activities.

Completion of the identification, positioning, materialization respectively topographic mapping details related to silvo-pastoral systems representing the preliminary stage of the process for their entry in the land register.

Identifying and materializing the topographic points characteristic to the limits of silvo-pastoral systems and agroforestry system will be done by their owners and owners of neighboring land, achieving this purpose a verbal identification process and establishing neighborhoods.

The limits will materialize on the ground with paint and the existing terminals will be preserved and maintained in proper conditions. Where appropriate, the terminal can accommodate the boundary in appropriate places, to ensure their future use and sustainability.

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