Scientific Papers. Series E. Land Reclamation, Earth Observation & Surveying, Environmental Engineering. Vol. XI, 2022
Print ISSN 2285-6064, CD-ROM ISSN 2285-6072, Online ISSN 2393-5138, ISSN-L 2285-6064

THE USE OF GEOGRAPHICAL INFORMATION SYSTEMS FOR ISSUES OF FOREST LAND RETROCESSIONS

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Abstract

This paper aims to highlight the advantages of using Geographical Information Systems in the complicated problems of forest land retrocessions. The study is focused on an area of about 400 hectares in Poiana Mărului, Braşov county. This forested area has been identified on the appropriate forestry map, measured in the presence of landowners using two Trimble GPS receivers and parcel plans were created, in order to be sent to OCPI Braşov for approval. Sensible issues hindering the successful completion of this operation were evidenced, with four categories of problems being identified. Each category involves a number of situations which were individually analyzed. Besides the technical and judicial knowledge necessary in find the optimal solutions, the benefits offered by Geographical Information Systems are presented, benefits which give specialists significant opportunities to identify critical issues and make overall verifications. Therefore, the conclusion of this paper is that this modern instrument can be successfully used even in projects of this nature.

Key words*: mountainous forests, GPS, land retrocession, GIS.*

INTRODUCTION

This paper looks at one of the challenges the land surveyor meets in his activity, which is the technical and judicial issue of forest land retrocessions. It is a well-known fact that property laws propose the retrocession of land to the old owner, before the communist era expropriations. The study area is in the Poiana Mărului municipality of Braşov county (Figure 1) and is composed of a series of past forestry land parcels intermixed with arable land. For the mountainous area of Braşov county, numerous studies were conducted which looked at the factors influencing positioning accuracy using GPS equipment in the case of forested areas (Tereşneu et al., 2011; Tereşneu et al., 2014; Tereşneu and Vasilescu, 2015; Tereşneu and Vasilescu, 2019 a, b) and also correlating the influence this accuracy has on determining areas of forested land (Tereşneu, 2021). In this study the convenience offered by remote sensing techniques has been taken into account (Herbei et al., 2021; Vorovencii, 2014a; 2014b). A commission to analyse and validate all data collected has been established at the Poiana Mărului town hall. Point positions determined using GPS were classified in two categories: under the forest cover and at the edge of it. Taking into account the influence on point positioning accuracy (Ordonez Galan et al., 2011; 2013; Weilin et al., 2000; Zhang et al., 2014; Wang et al., 2014; Janez et al., 2004; Dogan et al., 2014; Sawaguchi et al., 2003) we found a horizontal precision of 0.75m for points under forest cover and 0.23m for points at the edge of the forest cover, respectively. Considering the realities of the study area, we can state that these values indicate a very good precision which can be successfully used in this kind of projects.

Figure 1. Study area

MATERIALS AND METHODS

The following materials were used for this study: topographical plans with forest parcel boundaries, ortophotoplan of the study area,

parcel description from the forest management projects, two *Trimble ProXT* and *Trimble ProXH* GPS receivers.

With regards to the research methods involved, these are: bibliographical study: by which all property titles issued by the land register commission, recordings of proceedings for land retrocession to owners, certificates of record issued by Poiana Mărului town hall; mathematical statistics methods, which were used for two purposes: the analysis of coordinate precision using GPS positioning and for data correlation (town hall data and forest administration office); direct measurement method with which over 2000 point coordinates were determined (specifically, by using the *Stop&Go* with post-processing method). A GIS project of the study area was created and point coordinates determined using GPS receivers were imported in the ArcMap software.

RESULTS AND DISCUSSIONS

Collected and correlated data was synthetized in Table 1, an extract of which is presented here.

Table 1. Collected and correlated data from Poiana Mărului town hall

No. crt.	GIS observation	UP	UA	Declared owner name	Measured area (ha)	Observation
1	397	XI	69	CORCA TEODORA	1.12	
2	398	XI	69	BOBEIU IOAN	2.27	
3	399	XI	69	TOGOE ALEXANDRU / COMANICI GHEORGHE	0.27	
4	400	XI	69	CORCA IOAN	0.08	
5	401	XI	69	LAZAROIU GHEORGHE	0.95	
6	402	XI	69	GUIMAN PARASCHIVA	0.43	
7	403	XI	68	GUIMAN PARASCHIVA	0.04	
8	404	XI	68	PISEU AUREL	0.70	
9	406	XI	68	PISEU AUREL	0.33	
10	407	XI	68	PISEU AUREL	3.23	
11	408	XI	68	PISEU AUREL / ADAM ION	0.26	
12	409	XI	68	TOGOE ION	0.10	
13	410	XI	68	PISEU AUREL / ADAM ION	0.13	
14	411	XI	70	PISEU MARIA	0.84	
15	412	XI	70	ENESCU ELVIRA	0.70	
16	413	XI	70	PASOIU (RASOIU) ANA	1.65	
17	414	XI	70	LIHACIU ANA (ANA STAN PERSOIU)	0.74	
18	415	XI	70	TITILINCU ARON	0.62	
19	416	XI	70	BALAU IOAN	2.28	SERVER OVERLAPPING
20	417	XI	70	TITILINCI ION	0.44	
21	418	XI	70	PERSOIU IANCU / PERSOIU EMIL	0.75	
22	420	XI	70	ORZAN ION	0.25	SERVER OVERLAPPING
23	422	XI	70	ORZAN GHEORGHE	0.53	SERVER OVERLAPPING
24	423	XI	71	TITILINCU ARON / GURAN ARON	0.40	
25	424	XI	71	POPA IOAN / DRAGOI MARIA	2.50	
26	434	XI	72 - 76	DOBRESCU ILIE	6.06	
27	435	XI	72A	CEAPA NECULAI	2.72	
28	436	XI	72A- 72C	NECULOIU GHEORGHE	3.33	(certificate)
29	437	XI	72	TICOI ANA (COFEI IOAN)	1.42	
30	438	XI	70	BRAGHESIU IOAN	2.02	
31	439	XI	70	BRAGHESIU VASILE	0.27	

No. crt.	GIS observation	UP	UA	Declared owner name	Measured area (ha)	Observation
32	440	XI	70	CODREANU ANA (FLANGEA MARIA)	2.66	
33	441	XI	70- 71	PASEU MARIA / PASEU GHEORGHE	5.06	(both claim the same surface)
34	442	XI	71	BOBEI ION	0.31	
…	…	…	…	……	….	….
382	884	XI	82	UNKNOWN	0.38	
383	885	XI	80	UNKNOWN	2.06	
384	886	XI	80	UNKNOWN	0.42	
385	887	XI	85	UNKNOWN	0.97	
386	888	XI	86	UNKNOWN	0.57	
387	889	XI	89	UNKNOWN	1.90	
388	890	XI	89	STAT (O.S.)	0.60	
389	891	XI	113	UNKNOWN	0.65	
390	892	XI	137	STAT (O.S.)	0.53	
391	893	XI	132	UNKNOWN	0.85	
392	894	XI	125	MANECUTA ION	0.22	
393	895	XI	84	STAT (O.S.)	1.74	
394	900	XI	90	STAT (O.S.)	1.24	
TOTAL					**393.43**	

By analysing this data, a number of issues were identified:

a. More than one landowner claiming the same forest area;
b. Some of the landowners carried out works of cadastral data updating based on the old cadastral registers (which did not use forest as a land use category) which went over portions of forest areas. In this manner real property overlaps occurred;
c. Other landowners updated their cadastral data for agricultural areas bordering the forest and virtual overlaps with it are present because of incorrect positioning;
d. There are differences between surfaces for the parcels identified in the field and those recorded in documents;
e. There are forests areas with unknown owners.

Each case was analysed and the best solution was aimed for. For a proper management of these issues, a warning system in the GIS project was established, based on the code of each issue (Tereşneu et al., 2016) (Figure 2).

With regards to the first category of issues, which is likely the most difficulty, each case was individually considered. For each category several cases were identified. In some of them, the conflict was only formal.

Even if both landowner had a claim over the same area, their documents lead to the conclusion that they were claimed a larger surface than proven. The real issue was explained by mediation and the issue was thusly solved. This is the case for parcel no. 111, where two landowners were claiming the same boundary (Figure 3). Each of them had claims in the same forest parcel, but at a certain distance from this location. By adding up the measured surfaces of the two landowners, both in locations without issues and in this conjoined location, a surface very close to the claimed one was obtained. Therefore, a splitting-up of the surface in disputation was proposed and the conflict was resolved.

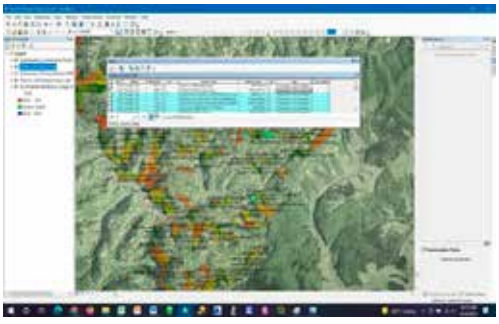

Figure 2. GIS warning system

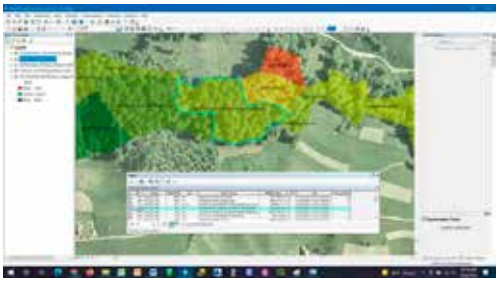

Figure 3. Resolved conflict

However, there are other issues of this nature, such as discrepancies between forest land administration and town hall records (Figure 4). In this case, all proving documents were searched and a recording mistake was identified. Specifically, the forest administration office did not subtract the corresponding surface retroceded to the previous owner from their records.

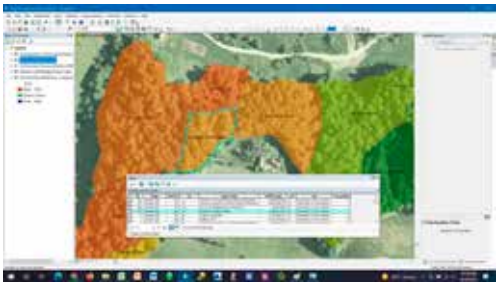

Figure 4. Artificial conflict due to lack of record updating

Another problem was identified in forest management unit no. 122 where another two owner had a claim over the same area. To solve this issue, the old cadastral register plans were consulted and the fact that one of the landowners had a claim outside his property's perimeter was established (Figure 5).

With regards to the second category of issues (real property overlaps), these are still to be resolved. Involved landowners were summoned and it was convened that the only solution is for the owners to carry out surface rectification works for the agricultural parcels overlapping forest areas. In this manner the owners would renounce their claims over the portions of their land overlapping the forest. With regards to the forest areas, a parcel plan will be created, as this is the only manner in which the landowners will be able to have noted, in the updated cadastral registers, forest as the land use category (Figure 6).

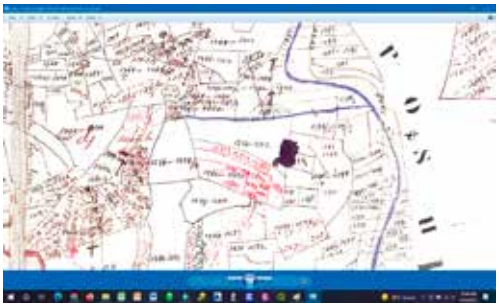

Figure 5. Solving a conflict issue by use of old cadastral register plans

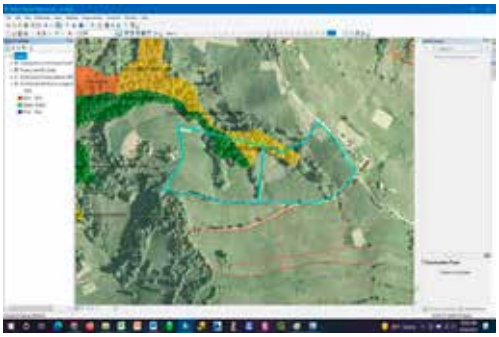

Figure 6. Real property overlap

For the third category of issues the solution is much simpler. Contact was made with land surveying experts which carried out cadastral data updates and they were asked to carry out repositioning works (Figure 7). No real parcel overlaps were identified for this issue, even if the problem of agricultural land-forest boundaries is not properly regulated.

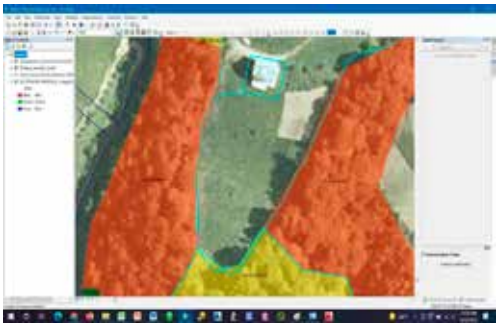

Figure 7. Solving virtual overlap issues

For issues in the fourth category no major problems were had, in the sense that surfaces did not have major differences in the field from the values validated in documents. Or, if high differences did occur, land surveys for the whole property in question were carried out and it was determined that the surface difference (for the most part) was located in the agricultural portion of the property (Figure 8).

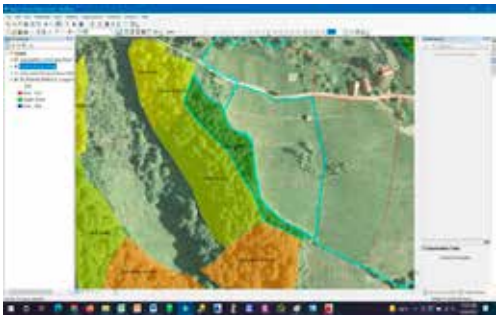

Figure 8. Surface-related issues

With respect to the category of issues, the fact that a lot of forest areas which have yet to be claimed show up as having an unknown owner was established (Figure 9). This issue does not hinder the creation of parcel plans, as all these surfaces are for the moment at the disposal of the local commission for the application of forest ownership laws.

Figure 9. Surfaces with unknown owners

CONCLUSIONS

Issues caused by the application of land property rights require the existence of trained specialists involved in their handling. Furthermore, there is a need for adequate equipment and software to ease the finding of solutions. In this paper, a series of issues were identified and solutions were found for each of them. To find optimum solutions for each situation, Geographical Information Systems were used to create a complex system of notifications for each situation with issues. Then, using the same system and experts, the best solution was found for each case. For the almost 400 hectares of identified, validated and surveyed forest areas, 12 parcel plans were created and cadastral number attributed, which are currently in the approval phase at local commission for the application of land property laws. Therefore, it can concluded that, no matter how complicated cases can be with regards to the application of laws intended to fix the damage of communism on private property, if adequate specialists are assigned and appropriate methods and technical means are employed, solutions can be arrived at for all cases in a reasonable timeframe.

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