

## THE DEVELOPMENT OF A GEOSPATIAL DATABASE REGARDING THE CALCULATION OF LAND TAXES AND DUTY SYSTEM

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**Abstract:** *Any property owner in Romania have to pay an annual tax for it but also exemptions are applied depending on title deed specifications and other special circumstances.*

*Current Romanian tax and duty system was influenced by adhesion to European Union. For our country to be able to adhere to EU a change to fiscal Code was necessary to comply with other state members.*

*Aim in Romania is to improve the capacity of revenue collections for state budget in the shortest period of time to fulfill priorities without influencing the public finance system in the medium and long term, so that the Romanian state can manage risks or unforeseen situations.*

*Specialized programs are currently implemented in Romania to support with automatic tax and duties calculations for ongoing and previous years. Debiting can be done through notification and automated invoicing to taxpayer or documents can be issued automatically according to the legal forms.*

**Keywords:** *system of taxes and fees, surface, real estate, topology, geodatabase*

### 1. Introduction

Currently in Romania, 90% of public financial resources are represented by tax revenues having a slow growth trend to avoid an exaggerated fiscal pressure on taxpayers.

Geographic informational system is used in cadastre for inventory and management of spatial data, and land attributions. Once computerized cadastral system (Land Information System) is implemented, data management becomes easier and obtaining information about land can be done in a shorter time.

Poor collection, excessive bureaucracy and inefficient administration are just some of the countless problems that Romanian tax system is currently facing. All these problems lead to a high rate of tax evasion.

### 2. Materials and Methods

This study's theme is a database creation which fiscal institutions can access the data collected via National Real Estate Advertising and Cadastre Program thus facilitating the calculation of fees and taxes related to each property.

Present work's objective is field number 65, Calea Bălgradului from Cricău commune.

In order to create a database using results from systematic cadastre works carried out at Cricău UAT level, following key actions were covered:

1. Creation of a data manipulation framework from the CAD environment;

2. Verification and validation stages of encountered errors;
3. Conditioning in populating the attribute database;
4. Statistical table generation;
5. Premises of spatial content visualization on other recognized platforms;

### 3. Results and Discussion

#### Data manipulation framework creation from CAD environment

By performing following steps Add data - file selection "plan\_cadastra\_sector\_3\_final.dxf" - Add, the import from CAD to GIS environment of cadastral plan results from systematic registration works was made.

The data contained in the cadastral plan were assigned to the 4 layer types: Points, Polygon, Multipatch and Polyline.

Queries are used to select a subset of characteristics and records from tables. All ArcGIS queries use SQL language when performing these search specifications.

"Query builder" is used to build queries. It is used for query definition specification on separate layers and tables and also to select features by attributes.

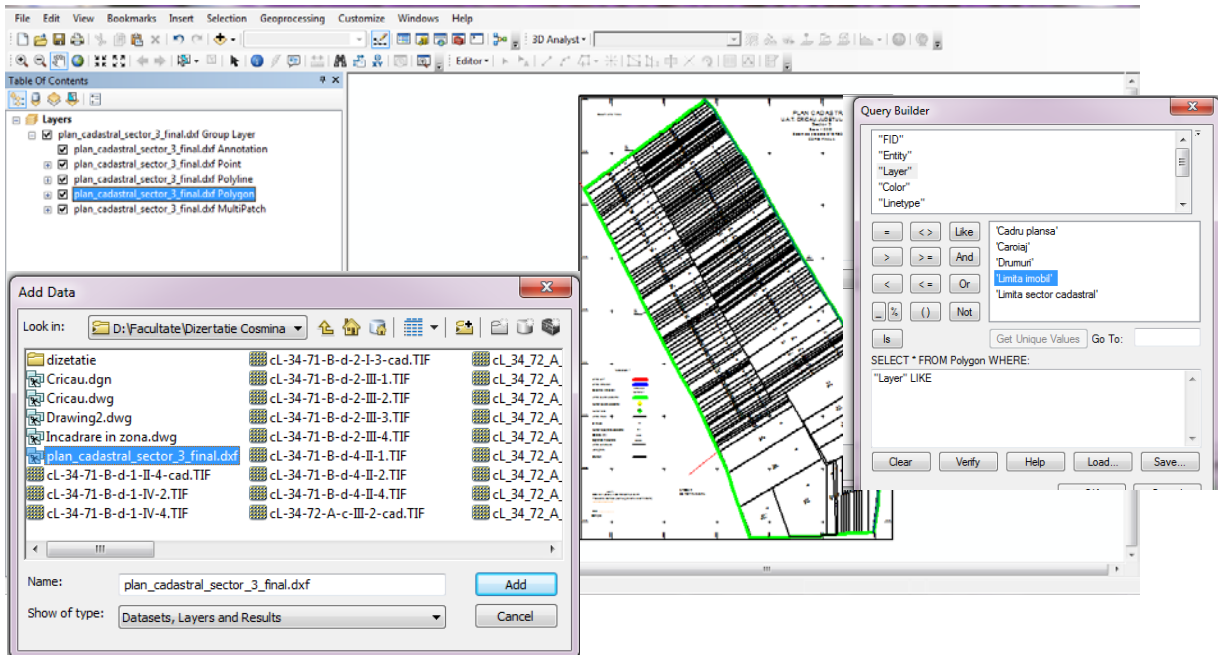


Fig. 1 Import and queries made to the cadastral plan in ArcMap

#### Steps to check and validate encountered errors

Feature Classes are homogeneous collections with common features having same spatial representation such as points, lines or polygons, and a common set of attribute columns. Most frequently used classes are: points, lines, polygons and annotations.

A Feature Class named TOPOLOGIE will be created within CRICĂU data set. The next necessary step is to import a feature class (single).

The Limita\_imobil.shp file is entered in Input Features box and TOPOLOGIE file is entered in Output Location.

From catalog tree Limita\_imobil.shp file is chosen in which the result of the queries is exported. It is necessary to create a new geodatabase topology in same name geodataset. Input

features and Output location remain the same but Output feature class must be defined with the name "Imobile". In "Topologie" Geodataset, additionally to Personal geodatabase feature class "Imobile" file which will be used to determine topology we also need Personal geodatabase topology named "topologie" with a tolerance of 0.001 m in topology check.

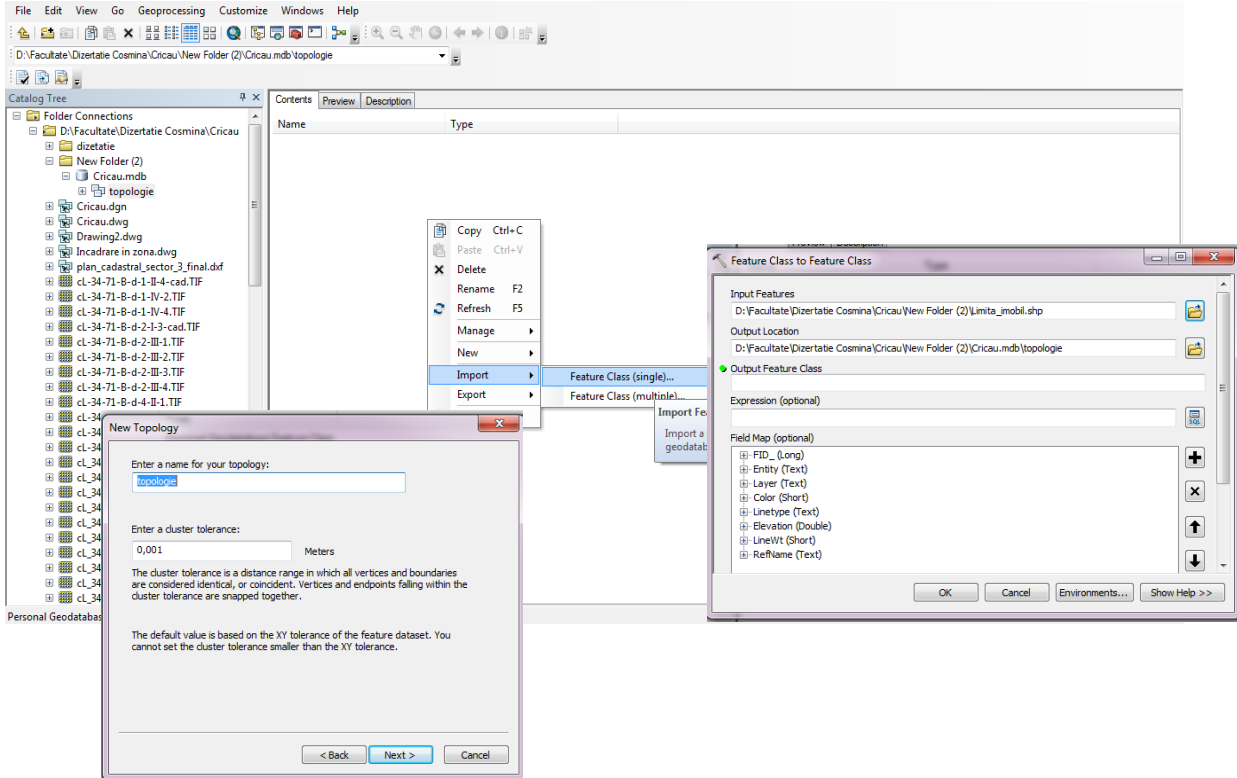


Fig. 2 Tolerance determination in topology verification

Project requires that polygons do not overlap within a feature class or subtype. Polygons can be disconnected, touch at a point or along an edge. This rule is used to ensure that no polygon feature overlaps another polygon feature in the same feature class or subtype.

The program displays a box with search result. There is an overlap error.

There are several ways to correct topology errors once they are identified. Fix Topology Error Tool can be used to select the error on the map or select the error from the Error Inspector, then right-click to apply one of the fixes listed in the shortcut menu for that error type.

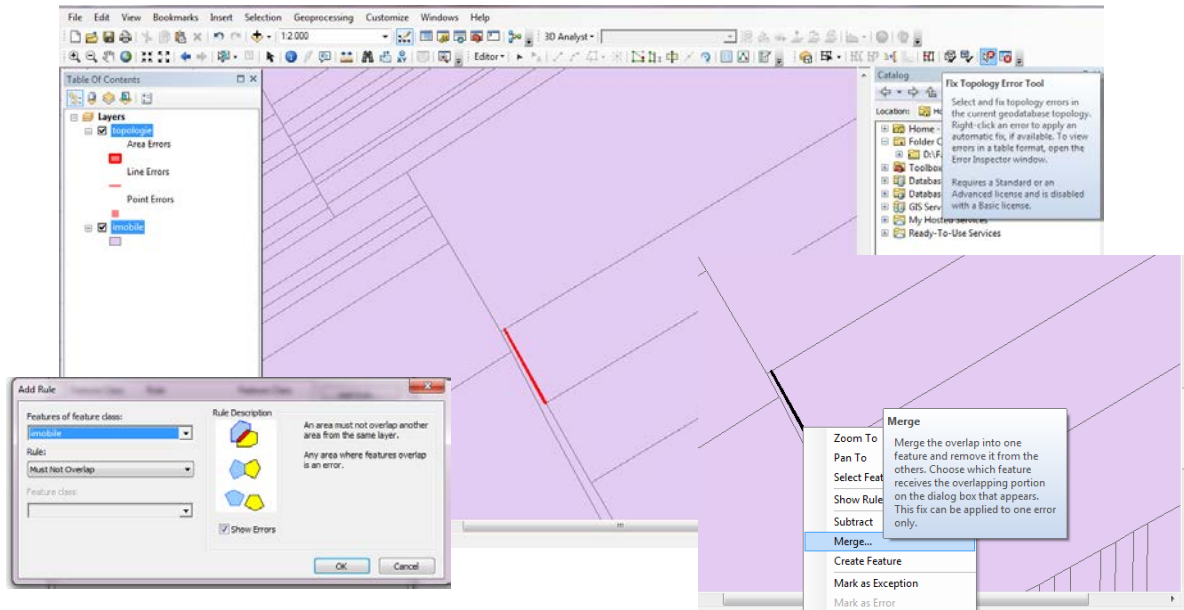


Fig. 3 Finding and fixing topology errors

Once a feature within topology has been modified, next step is to validate the topology. This means checking the features to identify possible rules violation that have been defined for the topology.

ArcMap allows you to validate a portion from topology during an editing session. ArcCatalog or Catalog window is used when a complete topology validation is needed, to be noted this process can take long execution time for complex or large datasets or in case there are many topology rules: Catalog – Topologie - Personal Geodatabase Topology - Validate.

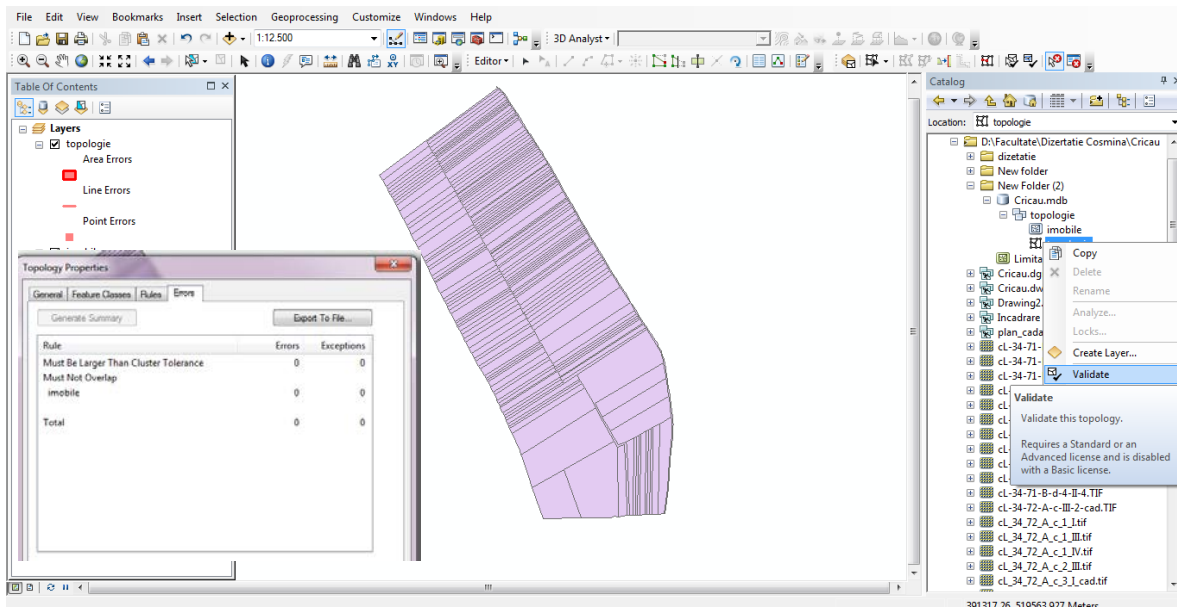


Fig. 4 Topology validation

### Conditioning in populating the attribute database

Attribute table displays the entities of a selected layer. Each row in the table represents a layer's entity and each column contains data about the entity.

Following fields were entered for this layer: Nr\_cad (property's cadastral number), Nume\_prenume (owner name and surname), TP (title deed number), Suprafata (property total area), Cat\_folosinta (property usage purpose).

Entity	Layer	Color	Linetype	Elevation	LineWt	RefName	Shape_Length	Nr_cad	Nume_Prenume	TP	Suprafata	immobile.Cat_folosinta
LWPolyline	Limita imobil	7	CONTINUOU	0	40		728.436074	743/1	FLOARE	1245/412	4600	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		720.838218	743/2	NICOLAE	1245/45	3100	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		728.055795	743/3	MIHAI	1265/421	4200	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		719.248279	743/4	ION	134/852	2400	F
LWPolyline	Limita imobil	7	CONTINUOU	0	40		722.194918	743/5	MARIA	1245/784	2800	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		722.913099	743/6	ANA	1365/425	2800	F
LWPolyline	Limita imobil	7	CONTINUOU	0	40		766.610117	743/6/1	GETA	1498/852	10300	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		742.021991	743/6/2	DORIN	1465/652	5700	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		734.784421	743/6/3	ANA	1452/421	4200	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		735.948578	743/6/4	SUSANA	1245/458	4200	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		742.224445	743/7	JENI	1236/124	5000	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		737.530859	743/8	GETA	1425/745	3800	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		729.399408	743/9	MARIA	1275/847	2100	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		738.523776	743/10	FLOARE	1245/789	3500	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		736.98855	743/11	SORINA	1348/145	2800	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		737.388921	743/12	MARIN	1249/456	2800	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		738.580016	743/13	IONEL	1354/875	2800	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		747.088005	743/14	ANA	1364/784	4200	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		747.43348	743/15	FLORIN	1245/784	4200	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		747.778403	743/16	DORIN	1442/784	4200	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		748.123247	743/17	MARIA	1442/754	4200	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		764.095238	743/18	ANA	1364/852	7000	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		526.496767	743/19	GETA	1367/452	8400	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		499.753094	743/20	GELU	1387/457	5600	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		473.567127	743/21	NELU	1245/784	2800	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		466.817535	743/22	NICOLAE	1456/745	2100	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		469.105976	743/23	SORIN	1234/895	2400	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		472.237776	743/24	ANA	1598/746	2800	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		471.728596	743/25	IONEL	1445/769	2800	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		471.21537	743/26	NICU	1465/789	2800	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		470.703032	743/27	NICOLAE	1247/876	2800	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		495.580483	743/28	IONELA	1345/996	5600	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		496.459967	743/29	SORIN	1452/369	5600	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		693.073396	743/30	GELU	1365/749	2100	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		711.983087	743/31	ION	1587/198	4200	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		718.071646	743/32	DORIN	1975/196	4200	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		725.931876	743/33	ANA	1864/144	5000	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		722.875134	743/34	FLOARE	1225/145	4200	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		711.614827	743/35	GETA	1364/145	2100	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		712.161489	743/36	ANA	1654/167	2100	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		712.70756	743/37	FLORIN	1456/233	2100	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		713.253489	743/38	GETA	1498/564	2100	A
LWPolyline	Limita imobil	7	CONTINUOU	0	40		733.422121	743/39	FLOARE	1698/412	1400	F
LWPolyline	Limita imobil	7	CONTINUOU	0	40		751.944393	743/40	MARIN	1458/123	4700	A

Fig. 5 Popularity of the attribute database

Layer features can be symbolized in different ways, depending on the type of data they display:

Single Symbol - Draw all features on a layer with a common symbol.

Unique Values - Apply different symbol for each feature category within the layer, based on one or more fields.

Offset Colors - Display quantitative differences in feature values with a range of colors.

In order to display on the map the properties that have an area above the average and arable as a purpose category, follow the steps: Layer properties - Definition query - Query builder by entering the syntax "Surface >= 4890 and Cat\_use like A".

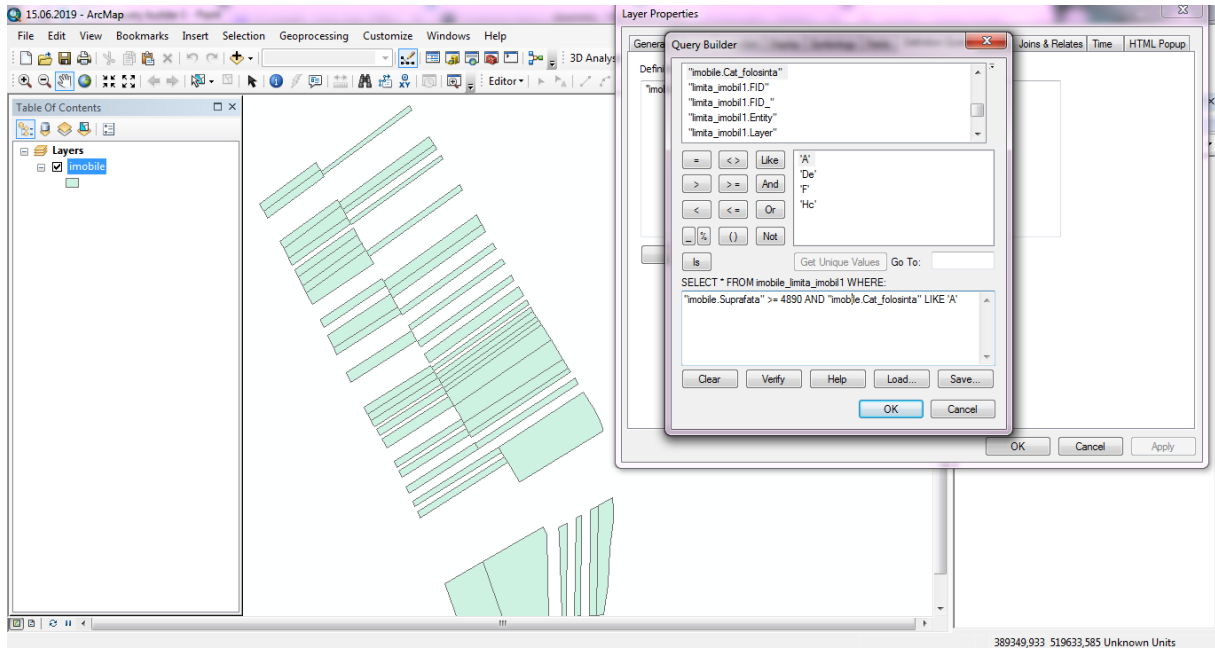


Fig. 6 Usage of multiple queries

Another selection method used to highlight features in a layer is an attribute query. This is done using the Select By Attributes tools.

Select By Attributes allows you to supply an SQL query expression used to select attributes that match the selection criteria.

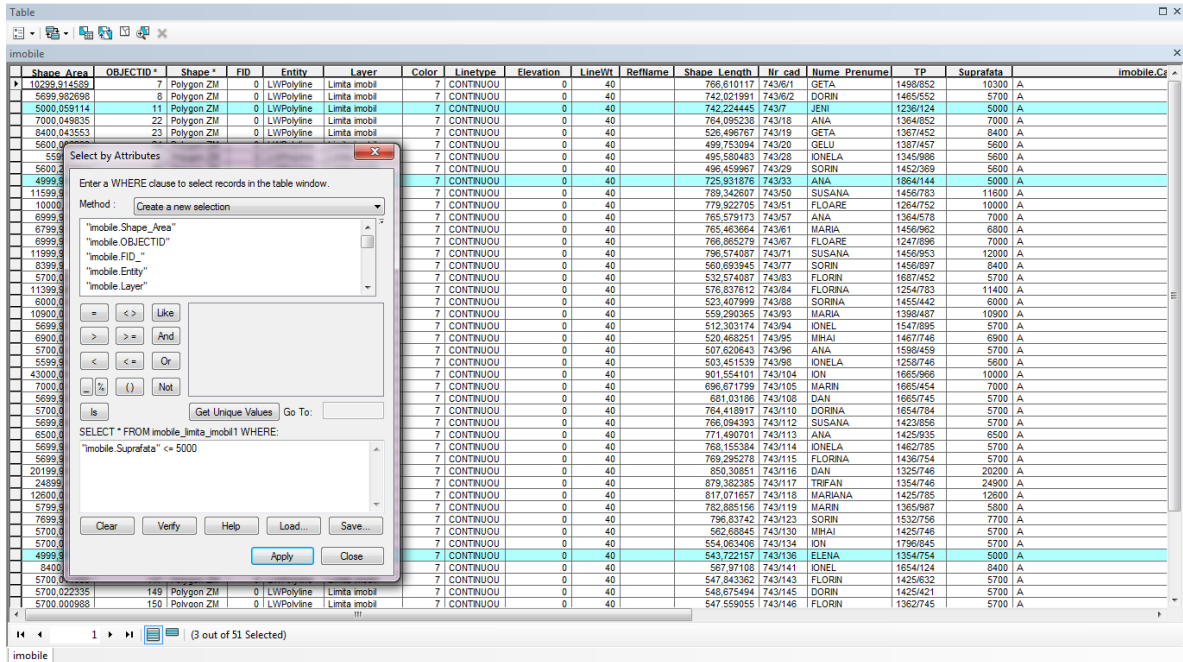


Fig. 7 Select By Attributes





### Premises in Viewing Spatial Content on Other Recognized Platforms

Create a KML file from any of data layers and maps using Layer To KML and Map To KML tools. The new KML output of these tools will be a snapshot of data and maps at the time it was created. It is also possible to share KML file with others who will be able to open and view it in applications such as Google Earth or ArcGIS Explorer.

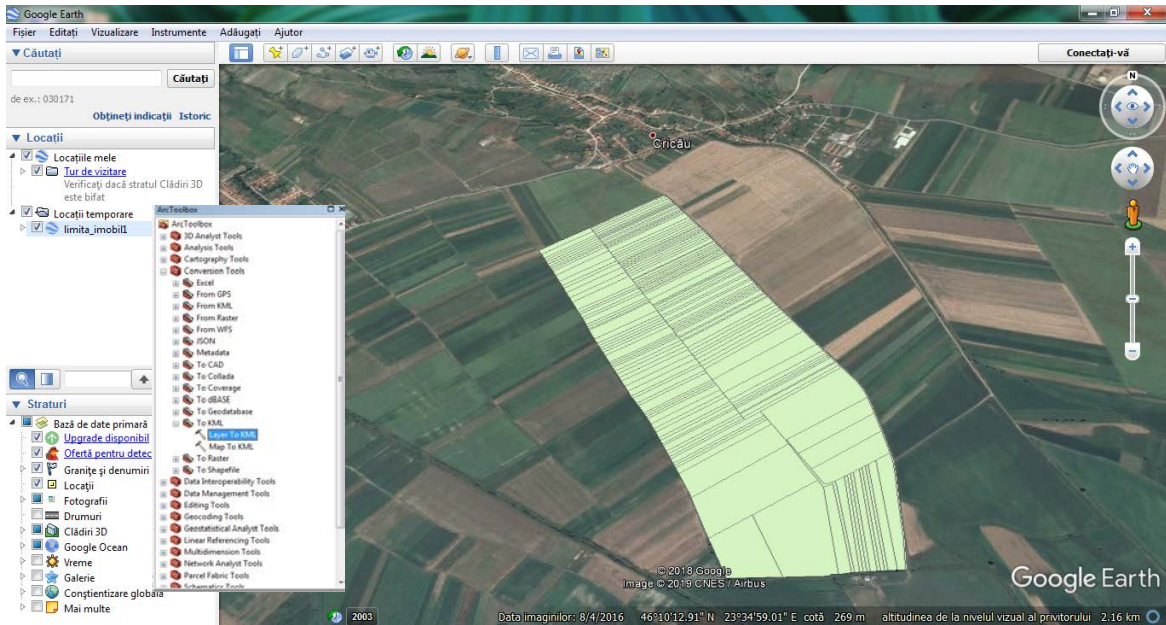


Fig. 10 Viewing in Google Earth

### 4. Conclusions

GIS is defined as a model that incorporates raster, vector, text data types or combinations from different sources corresponding to technological level we are now.

Today GIS represents only solution to all difficult problems of terrestrial resources nature by providing rational, intelligent and efficient results through spatial data processing and analysis.

Implemented on national level this project type should be more than a necessity because systematic cadastre work of targeted program properties were measured and updated in legal aspects so that taxation system can be aligned to the actual conditions on the field.

Such project can lead to improvements on state budget revenue collections in a shorter time with accurate process in order to achieve the objectives without possible inconveniences.

### 5. References

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