THE REQUIREMENT OF IMPLEMENTING GIS IN URBAN DEVELOPMENT

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Abstract: *The main activities of urban landscape planning consists in exposing the strategies, the politics and the programs meant to aid a sustainable development of the environment through the entire national territory and also their proper development according to the legal framework. Along with large scale automation of the technological processes, shows up the need of using a digital support that allow us to obtain a informational system. This kind of system can be used for activities such as: a proper spatial development, protection of natural and built heritage and improvement of living conditions in urban and rural areas.*

Keywords: *GIS, urban development, metadata.*

1. Introduction

Spatial management of the entire country land becomes a continuous mandatory activity which has a great future interest and is being conducted in the community's benefit and aspirations. This kind of management is made through urban landscape planning which consists in general interest activities that contributes in matters like: proper spatial development, protection of natural and built heritage and improvement of living conditions in urban and rural areas.

Urban planning consists in doing researches about geographical, political, economic, social and cultural environment and their impact on city built heritage [2].

Civic design involves several complex activities with global and interdisciplinary nature aiming a proper management of the territory.

The main activities of urban landscape planning consists in exposing the strategies, the politics and the programs meant to aid a sustainable development of the environment through the entire national territory and also their proper development according to the legal framework[2].

The urban planning requires elaborated paperwork which fulfils the rigors of the existing law.

2. GIS development in urban planning

Geographical data involves spatial information (through the coordinates) and descriptive data (attributes) associated with geographical objects or phenomenon (streets, lots, accidents).

A geographic database is made of a large collection of geographical data organized in order to aid storage, querying, updating and displaying by a lot of users in a proper manner. Spatial data used in GIS technologies can be classified by: precision, source documents that had been used, updating cycle.

A Geographic Information System for urban planning projects must fulfil the following main functions:

- Establishing and delimitation of the habitable areas;
- Establishing and delimitation of the buildable areas;
- Establishing and delimitation of the functional areas;
- Establishing and delimitation of areas with temporary or permanent ban on building;
- Upgrading and enlargement of the utility network;
- Establishing objectives of public benefit;
- Data editing;
- Creating links between the elements of the maps, images, sketches, plans, documents;
- Data handling: displaying the interest area allowing to view different layers, zooming and labelling;
- Finding entities on the map;
- Organisation and development of the communication routes;
- Establishing the property type of the land.

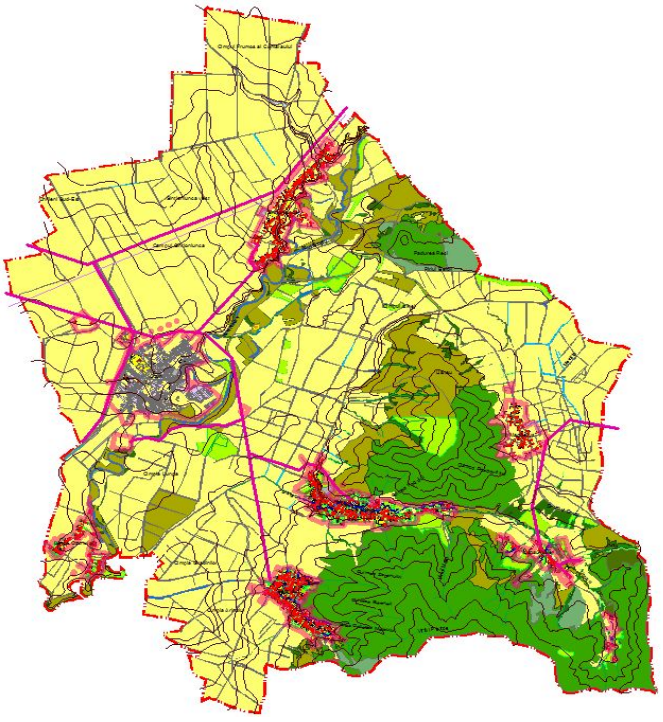

Fig. 1. Studying area

3. Study case

By implementing a GIS is understood the use by a company of some dedicated software equipment and data from various sources such as maps or existing plans, satellite images in order to develop a proper application.

The result of implementing a GIS consists of a spatial database referring to studied geographical area and some applicable procedures for making queries and spatial analysis. Results will be displayed as graphs, sketches, maps or reports to the user interface.

The efficiency of implementing such a system is evaluated based on the costs and benefits derived. The main costs are the necessary equipment and data entry costs. It has been worldwide estimated that the data input and maintenance constitutes 70-80% of the total cost of GIS implementation.

Stages of GIS implementation :

1. Identifying the problem;
2. Acquisition of data;
3. Database planning design of the informatics system;
4. Developing textual and spatial databases;
5. Data Analysis;
6. Overviewing the results and proposing optimal solutions.

1. Identifying the problem consists in defining the objectives and recognizing features of the interest area. It should also be determined the number and type of thematic layers according to the nature of data needed.

2. Acquisition of data refers to verifying the existence of data for the interest area. The map scale, projection system, datum and the concerning details asked by beneficiaries (infrastructure, objectives, relief) must be known. It is also necessary to locate sources of information used to create the database.

3. Database planning design of the informatics system assumes to determinate the database structure. Its initial configuration can be easily modified when find out there were some gaps in data input.

Stages of database planning design are the following:

- The first stage consists in finding and organization of spatial and attributive data for creating the thematic maps and performing inscriptions that will appear on the final product.
- The second stage refers to establishing the type of data which will be stored in the database already created.
- The third stage presumes to storage the coordinates. When matching up data from different layers, those who coincides must perfectly overlap, otherwise there will appear problems involving relative displacement (jagged edges, imprecise measurements) and the submission of final reports.
- The final stage consists in the actual construction of the database by entering data into digital format.

4. Developing textual and spatial databases;

Spatial database - is created based on the acquisition of data from various sources. After this step, the data must be processed in order to eliminate the errors and to achieve topology in a correct manner.

Fig. 2. Spatial database

Textual database - is performed by determining the attributes, filling the tables the tables and finding entry errors.

FID	Shape *	Entity	Handle	Layer	LyrLnType	Elevation	DocType	Suprafata
1	Polygon ZM	LWPolyline	527A	e_a	Continuous	0	DWG	731893
5	Polygon ZM	LWPolyline	62E9	e_a	Continuous	0	DWG	740666
4	Polygon ZM	LWPolyline	56D5	e_a	Continuous	0	DWG	768209
3	Polygon ZM	LWPolyline	5284	e_a	Continuous	0	DWG	1239195
2	Polygon ZM	LWPolyline	527E	e_a	Continuous	0	DWG	1524806
0	Polygon ZM	LWPolyline	5278	e_a	Continuous	0	DWG	1860055

Fig. 3. Textual database

5. Data analysis
It can be made different types of analysis:
- Spatial data analysis;
- Textual data analysis;
- Integrated analysis of spatial and textual data.
6. Overviewing the results and proposing optimal solutions includes:
- Current data presentation;
- Presentation of selected categories of data;
- Submission of predictions on the state of data at a certain time.

After collecting data and metadata that we subsequently imported into a GIS type software, we obtained the map with the distribution of slopes (Fig. 4). In this map we can observe significant differences in ground elevation. It is widely known that this kind of land configuration can affect mountain slopes and lead to landslides.

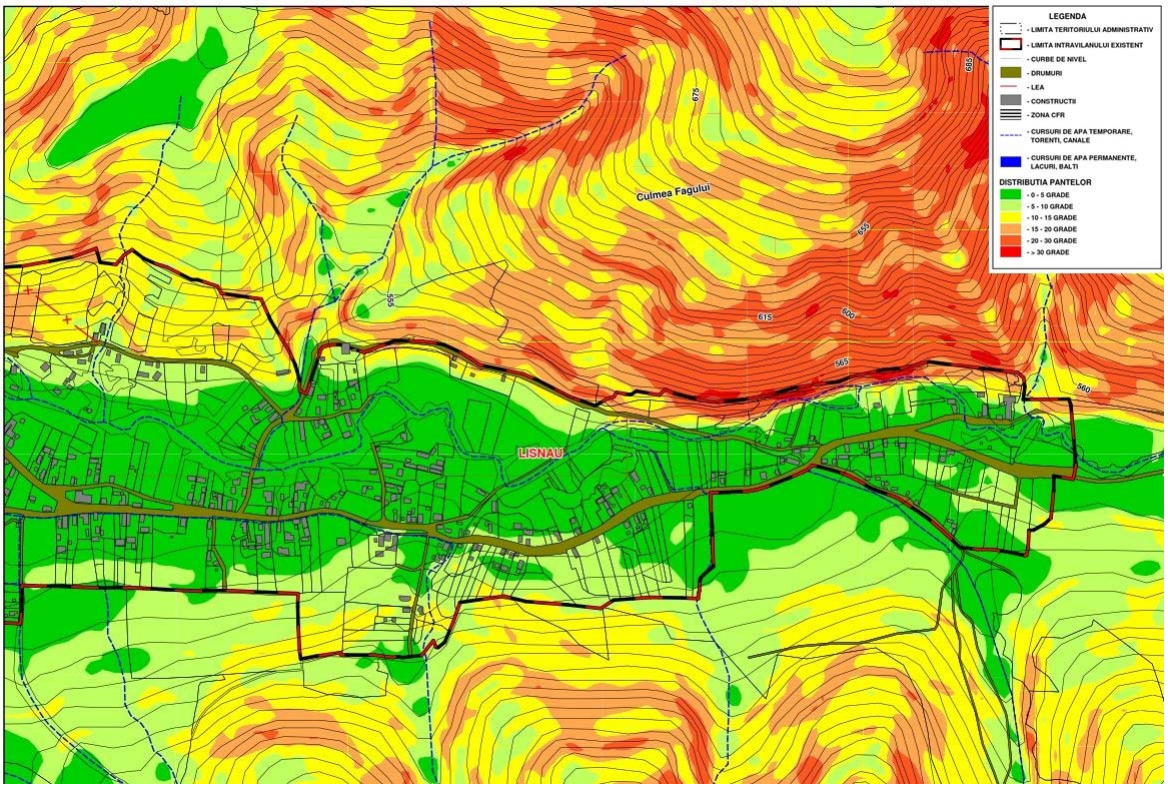

Fig. 4. Distribution of slopes

Metadata is basically an abstract concept because this term was introduced to provide information about content, quality, conditions and other characteristics of data.

Metadata consist in documentation and properties. Documentation is required paperwork provided by a person able to offer you accurate information and properties are intrinsic and are derived from the data even.

Once metadata are created for a data source there are automatically copied, moved or erased with the data. The process of updating metadata with the current properties of the data sources is called synchronization.

The metadata is basically storing the product of geographic data by identifying the data subject, where they originally came from, how, when and by whom the data were processed. This type of documentation can help organizations to maintain an accurate inventory of data ownership, to protect the company's investment in that data and also it can help the employees to use the data properly and effectively.

The spatial analysis is defined by transforming maps in information by finding patterns suitable with user's requirements, evaluating tendencies and making decisions. It is not the large flow of information found on a map that highlights the majority of models and relations. A solution for this problem is changing the way data is displayed by modifying viewing models. In this purpose there are analysis tools that allow changing the data in different forms: maps, tables, charts.

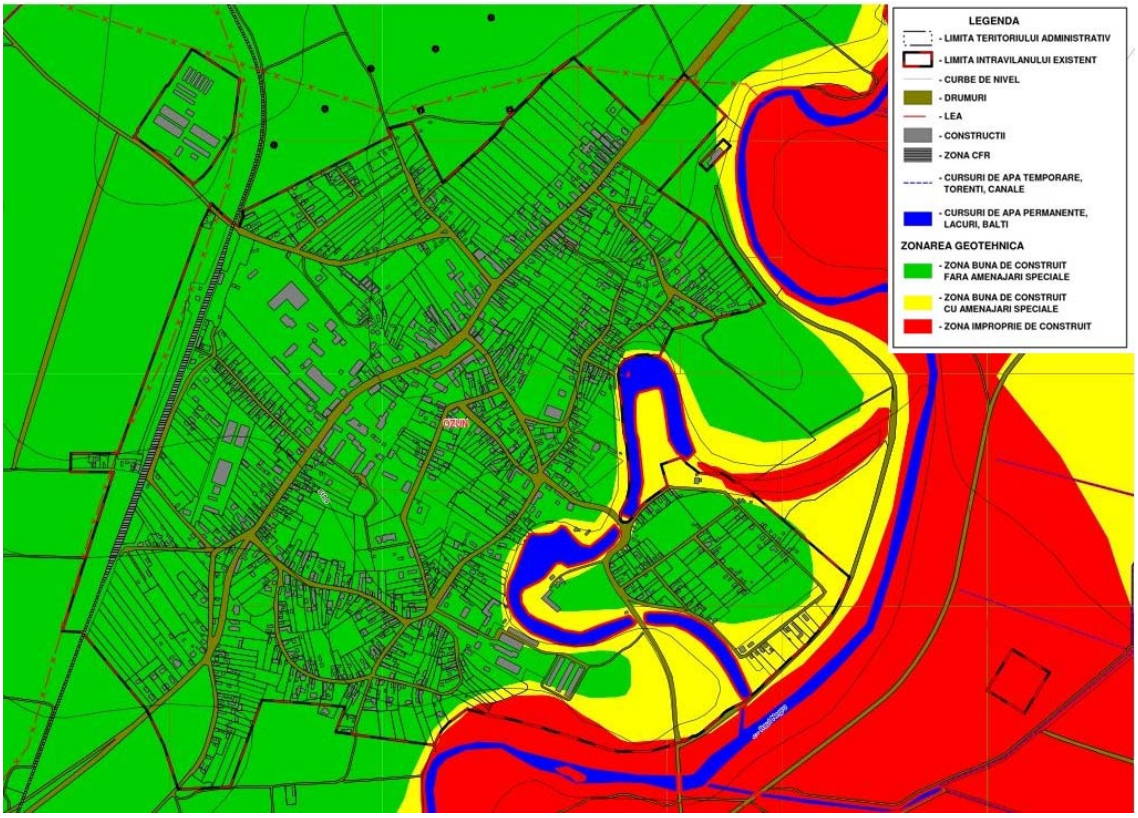

Fig. 5. Geotechnical zoning

"ModelBuilder is an application available in ArcView that you can use to document and automate your geoprocessing workflows. With ModelBuilder, you construct model diagrams from the data and geoprocessing tools needed for your analysis or workflow. Once the model is built, you can run it once or save it and run again using different input data parameters." [4]

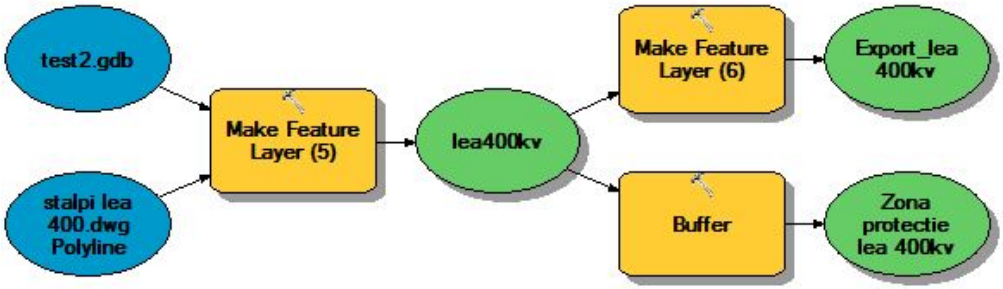

Fig. 6. ModelBuilder for creating protection zone of overhead power lines

There are several types of analysis tools:

1. Overlay analysis:

Overlapping thematic layers combines two or more thematic layers in a single one. We can think of it like a single map resulted from associating several other maps that gathers information from all those maps.

2. Searching (interrogating):

"A query expression is a precise definition of what you want to select. Building a query expression is a powerful way to select features because an expression can include multiple attributes, operators and calculations." [5]

This kind of tools are functions adequate to database, that helps on finding certain information that fulfil selection requirements. They allow the user to search certain information by using search commands or by using structured query languages (SQL).

3. Proximity analysis

In this case are calculated the distances between every pixel and some details from the map that are specified by the user.

4. Network analysis

With this tools we can perform network analysis (linear details that compose the network) and maintenance of data sets. Are exploiting the connections between separate entities, for example, for a transport network we can make models for total time of the route, access to the nearest facility or service area, matrices of origin-destination duration.

In short, we have two type of analysis:

1. Determining the shortest path, or sometimes the best- refers to calculating a route between two objectives required by the customer, after certain requirements;
2. Traveller problem - involves setting up and connecting a number of points after certain criteria (for example, planning a tourist route conditioned to pass through some specific points and having a minimum length).

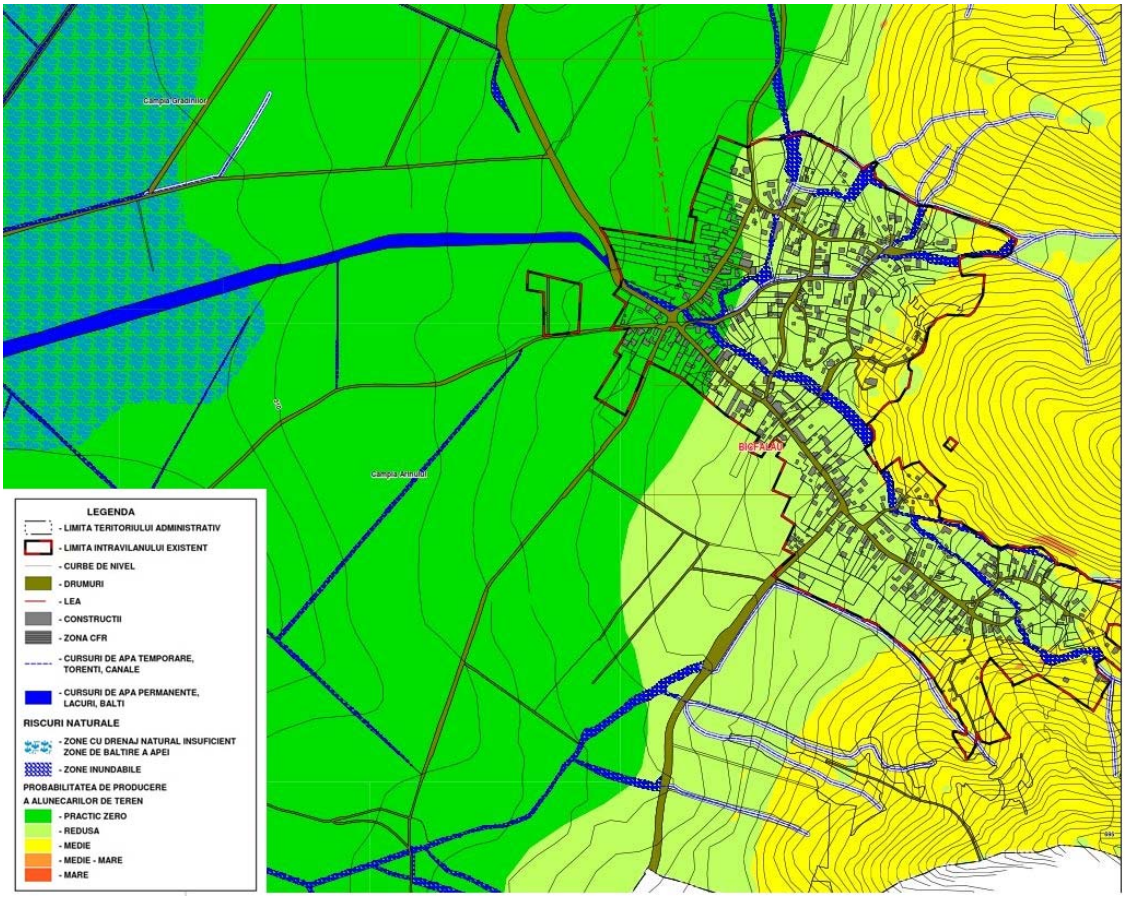

Fig. 7. Natural hazards

3. Conclusions

The GIS application we created is an efficient tool made to contribute at a balanced spatial development and protection of natural and built heritage in order to improve living conditions in urban and rural areas.

All in one, the target points of the application are the following:

- Improving live conditions by eliminating dysfunctions, easing the access to infrastructure, public services and providing convenient housing for all residents;
- Efficient use of land, according to appropriate urban functions, controlled expansion of built-up areas;
- Protecting and highlighting the natural and built heritage;
- Quality assurance of the framework built, landscaped and planted in all urban and rural areas;
- Protecting communities against natural disasters.

As a summary, the GIS application created is a powerful tool that allows a public administration to share information in common and to streamline the internal work and how it interacts with the public.

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