

Implementation of a Specific Land Reclamation Informational System for USAMV Cluj-Napoca in the Cojocna Area

Beáta LÁSZLÓ, Ana CIOTLĂUȘ

Faculty of Horticulture, University of Agricultural Science and Veterinary Medicine Cluj-Napoca, 3-5 Mănăștur Street, 400372 Cluj-Napoca; beacska.laszlo@gmail.com; aciotlaus@yahoo.com

Abstract. The specific land reclamation system is a technical and economical subsystem of evidence and systematic inventory of all real estate in the land reclamation in Romania. The evidence and inventory of land reclamation have an important role in the implementation of sectoral and local strategies. This paper aims at achieving such an evidence system, appropriate land reclamation works (control of soil erosion and control of excessive moisture) of perimeter Cojocna of USAMV Cluj-Napoca by building an informational system specific for this field. This system has to be compatible with regulations of the General Cadastre from Romania and with the current methodological rules. Spatial and tabular database will be built using any information obtained from earlier land reclamation projects for this area, with help of old and new maps and with topographic measurements. This specific informational system of land reclamation will be using ArcGIS software to represent the obtained spatial and tabular data. The objective to pursue is to obtain a complex digital plan for the studied area, which will help in studying the behavior of land reclamation works and for planning new land reclamation works.

Keywords: soil erosion, excessive moisture, information system, database, cadastre

INTRODUCTION

General cadaster is the unitary and compulsory technical, economic and legal registry system used to identify, register, graphically represent on maps and cadastral plans all lots, as well as all landed property throughout the country, regardless of their destination and/or ownership structure[MO 190/2004]. The basic entities of this system are the allotment, the construction and the owner.

Establishing a complex technical, economic and legal registry system of all natural resources and ground property is highly important. It is based on the *ground proper*, or *soil* that should be used and managed rationally in order to provide production of agricultural goods, however the *territory* needs to be managed, arranged and maintained systematically according to actual needs of human society.

General cadaster consists of registry and inventory subsystems that allow for systematic technical and economic capture of all landed property (specialty cadasters). This is how cluster-specific information systems appear, such as the agricultural cadaster, forest cadaster, archeological cadaster, industrial cadaster, mining cadaster, cadaster of land improvements etc.

Specialty cadasters, cluster specific information systems, classification of clusters according to various activities, the competences for organizing such cadasters and all technical implementation rules for each specialty cadaster are defined in Law no. 7/1996 of the Land Registry and Land Survey, including all subsequent modifications of this law.

The cadaster for arrangements for land reclamation is the systematic technical and economic registry and inventory subsystem of all landed property within the general land reclamation system in Romania. It observes information on areas, use and destination, and the

land proprietor contained in the databases of the general cadaster, in accordance with the existing territorial administration.

Arrangements for land reclamation are carried out in correlation with the needs of human society, considering their environmental impact.

MATERIALS AND METHODS

Establishing a registry and inventory system of arrangements for land reclamation within the Experimental Teaching Facility of USAMV Cluj-Napoca in Cojocna must comply with the requirements in arrangements for land reclamation, as stipulated in the specific implementation rules [MO 190/2004].

Basic requirements of the cadaster of arrangements for land reclamation derive from the basic requirements of specialty cadasters, in accordance with existing implementation rules [MO 190/2004].

Specific requirements of the cadaster of arrangements for land reclamation include rules of technical and economic registration and record keeping of arrangements for land reclamation.

The specific data so acquired in the cadaster of arrangements for land reclamation is processed, and databases of the record keeping in accordance with provisions set out in the implementation rules are created.

Integration of the cadaster of arrangements for land reclamation into the general cadaster must observe the following requirements:

all cadastral work concerning arrangements for land reclamation must follow the existing structure of territorial administration units;

execution of the cadastral programs in the field of arrangements for land reclamation must comply with all norms and regulations issued by ANCPI with a view to launching, executing and discharge of all works;

cadaster of arrangements for land reclamation shall use the inventory of geodetic coordinates for geodetic points provided by the ANCPI services and territorial administration units, and also rely on approved national networks or support networks for all cadastral plans at a scale larger than 1:10.000.

Execution of a cadaster of arrangements for land reclamation is carried out in two stages: first a compilation of the substantiation documentation, followed by the actual cadastral work of arrangements for land reclamation. In addition, geodetic, topographic, photogrammetric, cartography work and further efforts are being taken to satisfy the specific requirements in land reclamation.

RESULTS AND DISCUSSION

The Cojocna perimeter of the Experimental Teaching Facility of USAMV Cluj-Napoca is located in the hydrographic basin of the Căian Valley, within the commune of Cojocna, which lies in a hilly region of the Transylvanian Plain, some 20 km east-southeast of the city of Cluj-Napoca.

The perimeter concerned stretches out over an area of approximately 700 ha and is administered by USAMV Cluj-Napoca. A great part of the terrain within this perimeter is affected by superficial erosion, degradation and excess of humidity, which is why during the 1990s they were included in a complex project of arrangement of the Gădălin-Căian hydrographic basin/Cluj County (Fig. 1.).

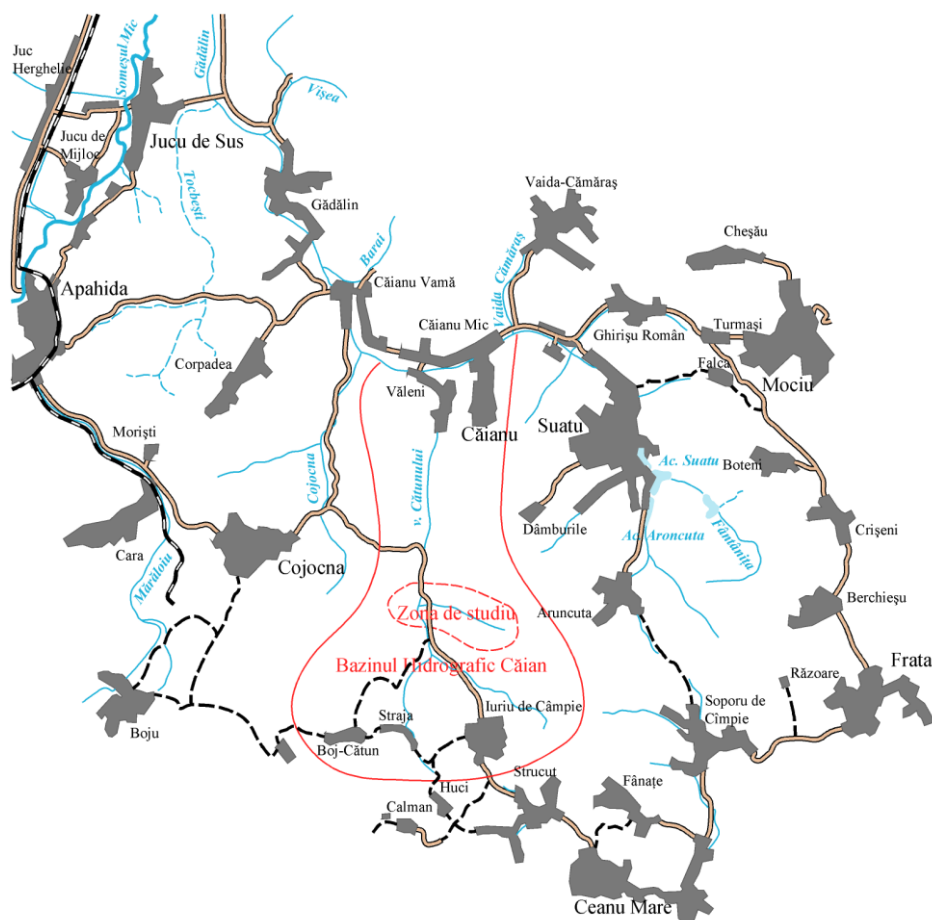


Fig. 1. The Căian hydrographic basin

The works undertaken were executed in several stages, and those carried out in the perimeter of USAMVs Experimental Teaching Facility were conducted after 2001. The project was run under the name „Abatement of soil erosion in the Gădălin-Căian hydrographic basin” received approval no. 02/2001, which also constituted the basis for the execution calculation DDE 04/2001 and other operational detail plans, undertaken by the Transylvania subsidiary of ISPIF SA Bucharest.

This documentation contains details and execution calculations for the following objects: abatement of superficial erosion, abatement of degradation, arrangement of affected terrains and abatement of excess humidity on the hillsides.

The following works were planned for abatement of soil erosion: access roads, layer stripping, tubular bridges, surface modeling, classical terraces and bank-type terraces. Plans for the drainage of excess humidity from the hillsides foresaw absorbent drains made of ceramic tubes, as well as collecting drains made of ceramic tubes.

The starting point for any specific informational system in the field of land reclamation is a database (Fig. 3.). Data contained herein is the fundamental component of the geographic information system (GIS).

Every GIS relies as a matter of principal on a spatial database and another, attribute (tabular) database. Spatial data describe the absolute and relative position of geographical features, such as the exact location of the perimeter of the Experimental Teaching Facility and the land reclamation works within this perimeter, using coordinates. Demarcation of the perimeter and the land reclamation objectives was done through digitization and vectorization of topographic and cadastral maps using orthophotomap and actual topographic measurements.

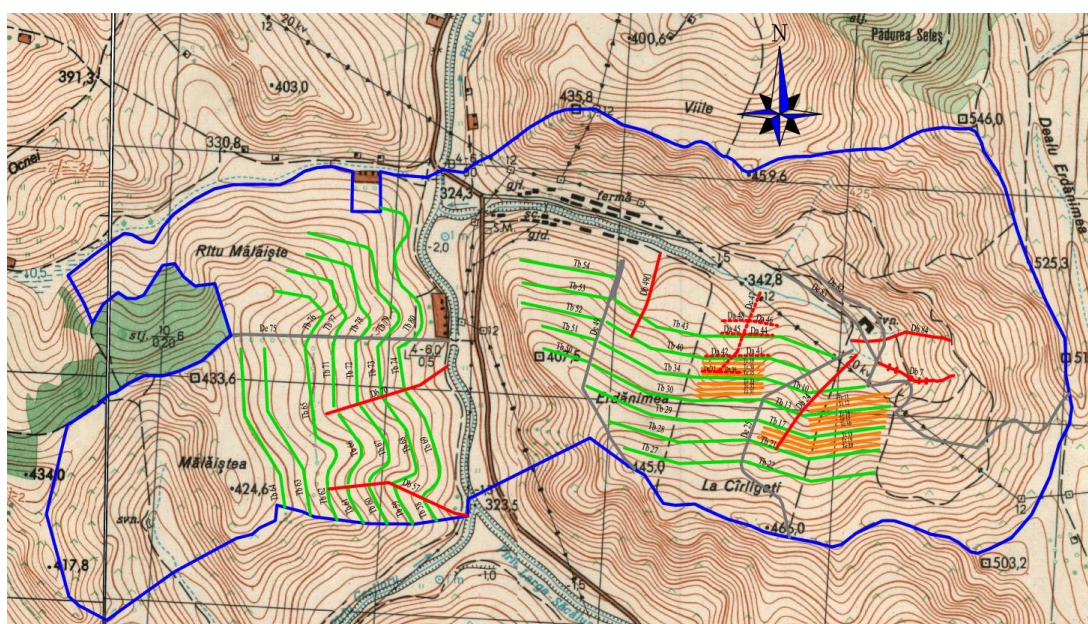


Fig. 2. Proposed land reclamation works at the USAMV Experimental Teaching Facility

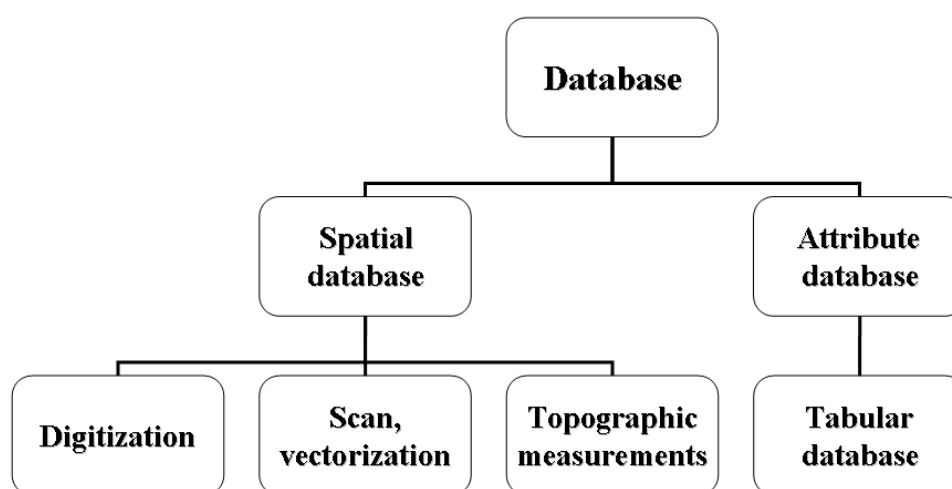


Fig. 3. Structure of the database

Spatial data needs to be structured in thematic layers. Each such layer contains information on the entities within the model, and thus specifies their geographical position, spatial relation to other entities, attributes and features and other details. The specific informational system of land reclamation will be set up with the ArcGIS application. Building specific layers is very important; the perimeter investigated must be considered, as well as land reclamation works, land reclamation objectives and the terrain on which such land reclamation works are to be carried out.

Attribute data describe the features of objects or geographical elements found, and are usually considered tabular data. The data model can be defined as a general description of a set of entities and the relations between them. These entities must be ascertainable and distinct. Attribute data associated with the entities of the map is stored in classical databases,

containing rows and columns. An attribute table is associated to each layer, and there is a record in the attribute table for each object found.

Tabular data will be structured according to the information system requirements. They will contain information on the area measured, the area affected by these works, the owners and geographical information on the coordinates x, y, z. Further elements that may be attached are sketches and images.

The information system so constructed then undergoes an automated geo-encoding process, through which spatial data is associated with the attribute database. In order to obtain a digital map with real geographic data, a geo-referencing process must be applied to the system. This information system allows queries and analysis of all information stored, as well as modifications to the database.

CONCLUSIONS

Achievement of a specific information system allows detailed description of the land reclamation works and land reclamation objectives. Registration and inventory of have a special role in establishing sectorial and local strategies according to actual needs.

This information system constitutes an improvement in the speed of obtaining information, data analysis and data verification. Searching the database is much easier, more accurate and faster. It is possible to generate thematic maps as necessary, and to modify the database according to changes over time.

REFERENCES

1. Boş, N., Iacobescu, O. (2009), Cadastru şi cartea funciară., Ed. C.H. Beck, Bucureşti
2. Dârja, M., Budiu, V. (2006) Îmbunătăţiri funciare. Combaterea excesului de umiditate pe terenurile agricole., Ed. AcademicPres, Cluj-Napoca
3. Keller, I.E., Haidu, I. (2006) Utilizarea tehnologiei GIS pentru reţelele de alimentare cu apă şi canalizare. Revista de cadastru nr. 6:113-116
4. Koncsag, E. (2012) Elaborarea unui nou concept al cadastrului de specialitate în vederea perfecţionării activităţii miniere. Teză de doctorat, Petroşani
5. Leu, N. şi colab. (2003) Topografie şi cadastru, Ed. Universul, Bucureşti
6. Pădure, I. (2004) Cadastre de specialitate, Ed.Didactică, Alba Iulia
7. Toderaş, T. (2007) Sisteme informatice geografice. Ed. Univ. Lucian Blaga, Sibiu.
8. ***Legea nr. 7/1996 Legea Cadastrului şi a Publicităţii Imobiliare
9. ***Legea nr. 138/2004 Legea Îmbunătăţirilor Funciare
10. ***Ordin al Ministerului Agriculturii, Pădurilor, Apelor şi Mediului şi al Ministrului Administraţiei şi Internelor pentru aprobarea Normelor metodologice de întocmire a cadastrului amenajărilor de îmbunătăţiri funciare, Monitorul Oficial nr. 190/2004.