

LAND INFORMATION SYSTEM BASED ON LAND CADASTRE

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ABSTRACT: The use of the photogrammetric methods to compile cadastral maps, on a large scale, and the aerial space remote sensing to improve data contents as well as, to compile cadastral maps entails a complex cadastre development. Digitizing and numerical processing methods have facilitated a data base development to store cadastral map contents and other data of the complex cadastre. A land information is now developing in Romania, based on the above mentioned items, both at a district level where usual cadastral data are used, and at a national level where synthesis data are processed and retrieved.

Some tendencies in increasing built-in areas, their degradation by erosion, desert formation, and pollution in various ways, concurrently with population and its need increasing have been ascertained as regards land uses. The answers to these problems are complex: they must keep in view on the one hand, investment allowances to put deserted lands under crops, to extend agricultural surfaces and develop them intensively but rationally and, on the other hand, a continuous monitoring system, as well as, a land protection legislation.

The requirement for the present-day ground data and information, and as complex as possible is underlined, to carry out the above mentioned objectives. Therefore, land cadastre representing several technical, economic and legal operations, which the state undertakes to systematically and continuously inventory national land resources, thus establishing surfaces, land-use category, each parcel quality and ownership is paid special attention in our country. In fact, land cadastre enables to carry out the following technical, economic, and legal categories: ground measurements, cadastral mapping, calculation of areas on parcels, and cadastral register preparation; qualitative classification of soils, management work and construction estimation, owner identifications and registrations according to the legal deeds on land and building rights.

Maps photogrammetrically compiled at a 1:5,000 scale for zones showing scarce topographical details and large parcels (up to 100 units per sq.km) situated in plain and mountainous regions, 1:2,000 scale cadastral maps (up to 2000 units per sq.km) for zones showing high density topographical details in hilly regions and for all rural settlements and 1:1,000 scale cadastral maps for all towns are used in cadastral works. Cadastral maps at 1:10,000 and 1:25,000 scales after generalizing 1:50,000 and 1:100,000 scale cadastral maps compiled and updated employing space data are used, as well.

The activity within the national land resource field is becoming more and more complex and, as a consequence, the classical cadastre cannot answer the present-day requirements and is going to be gradually converted into a complex one, corresponding to the land information systems, able to provide present-day data and information on each distinct parcel, in due time. But such a change implies the existence of a certain technical endowment and development stage. To this effect, digital cadastral mapping - a concept defined as a digital stored cartographic data collection representing the map contents - is to be mentioned. Considering its own features the digital cadastral map (Zegheru 1981) is compiled, using a technological process (figure 1) for automatic data processing and representation.

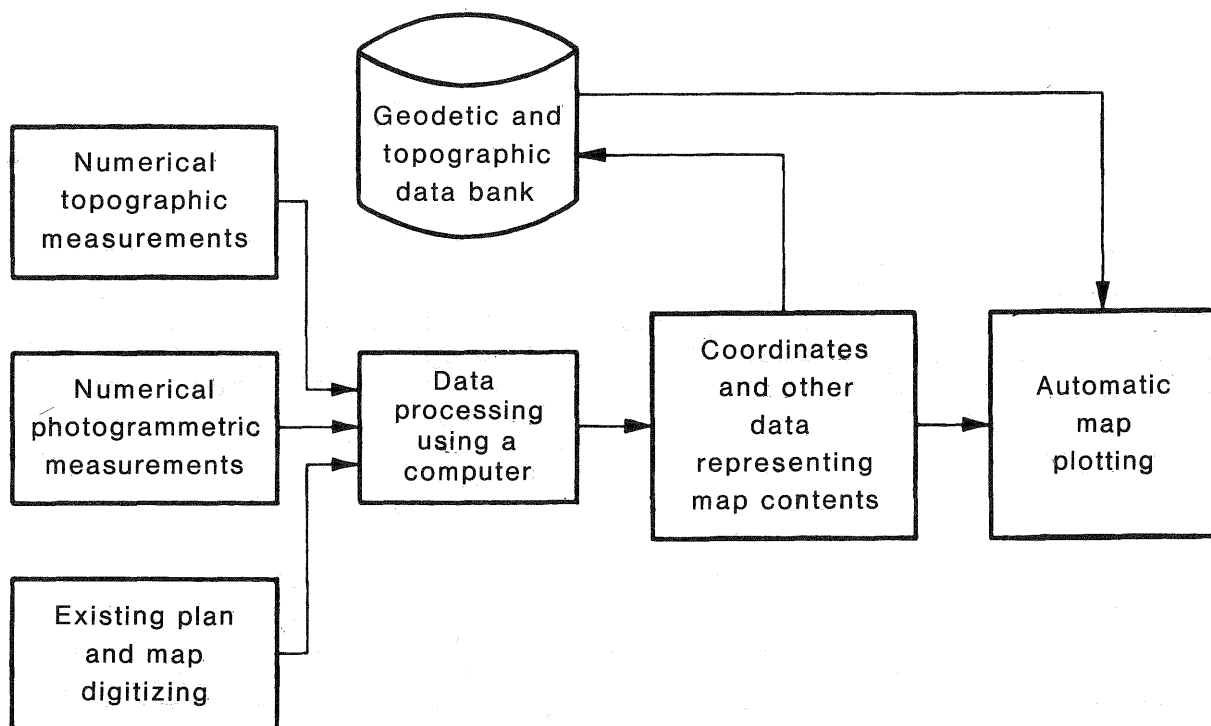


Figure 1. Technological Process for Automatic Digital Map Compilation

Today, as 1:5,000, 1:2,000 and 1:1,000 graphical cadastral maps are practically compiled over the whole country, using analogical photogrammetric methods, the digital cadastral maps will be compiled above all digitizing the existing cartographic products. Although both analytical photogrammetric methods (Zegheru, a.o. 1982, a) and numerical topographical ones are used to compile 1:2,000 and 1:1,000 scale digital cadastral maps, their volume is not yet noteworthy.

The geodetic and cartographic data bank is the main part of the processing and storing process for these map contents and other data and information on national land resources derived from aerial and space recordings, when the digital cadastral mapping technology is envisaged. This data bank was developed to provide digital cadastral map storage to be carried out at 1:5,000, 1:2,000 and 1:1,000 scales (Zegheru, a.o. 1982, b), giving the

possibility to automatically generalize their contents and to compile digital cadastral maps (Figure 2).

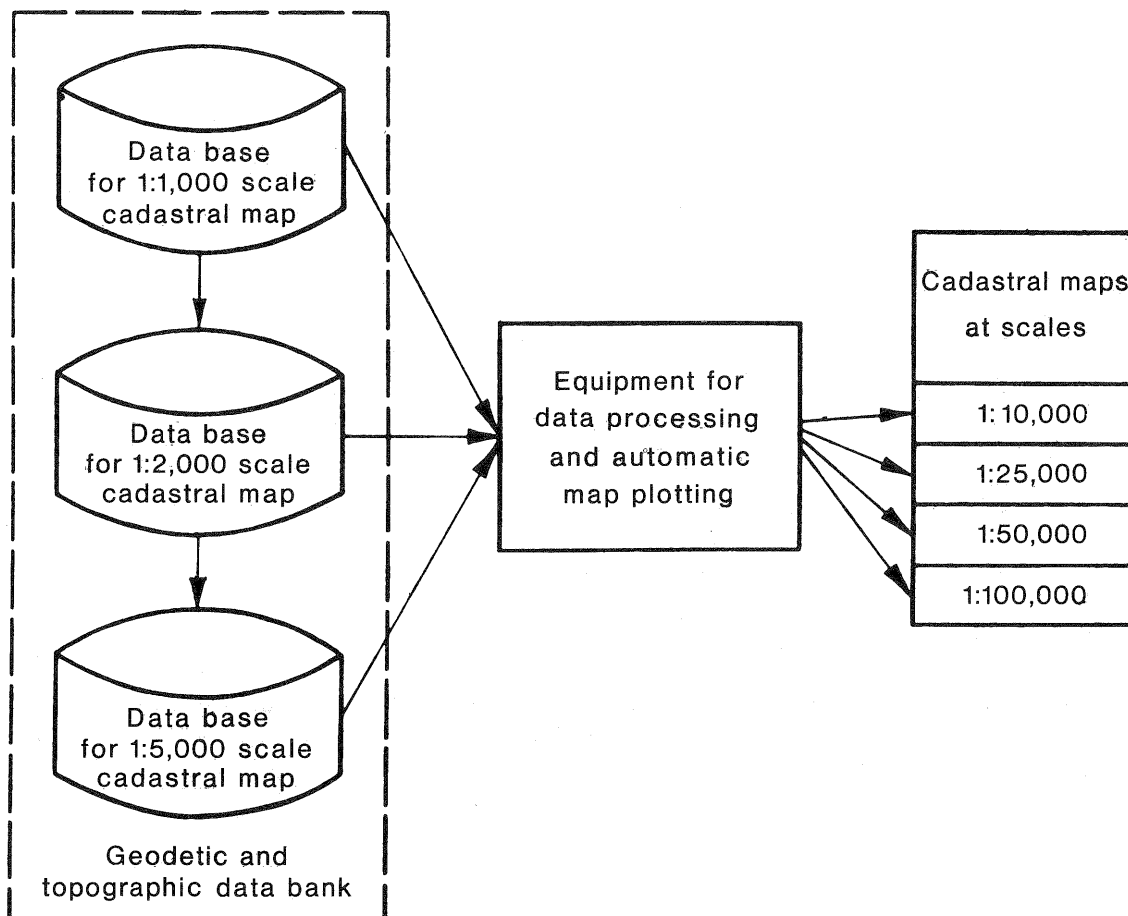


Figure 2. Technological Process for Digital Cadastral Map Content Generalization and Mapping

As we have mentioned above, the existing 1:100,000 and 1:50,000 scale cadastral maps are photogrammetrically updated, using space recordings.

Problems related to conventional signs used to carry out cadastral map automatically (Fusoi, a.o. 1982), coding cadastral map contents (Vass 1981), (Gheorghiu, a.o. 1981), and digital cadastral map contents generalization (Gheorghiu, a.o. 1982) have been solved to develop technological processes shown in the diagrams in Figures 1 and 2.

A cadastral data bank considering two levels: a regional level carrying out the proper cadastral maps, and a national level processing synthesis data to be given to the decision-making bodies has been conceived and is under development to process, store and display cadastral data and information, and to prepare cadastral registers, as well (Zegheru, Gheorghiu 1984).

The information system, i.e. an integrated data bank and base network containing technical, economic, legal, social data and information for the whole country is under development (Figure 3). Considering the estimates made, the data and informa-

tion volume for the digital cadastral map and the proper cadastral data represent about $6 \cdot 10^{10}$ bits and $1,5 \cdot 10^9$ bits for the whole country and a district, respectively.

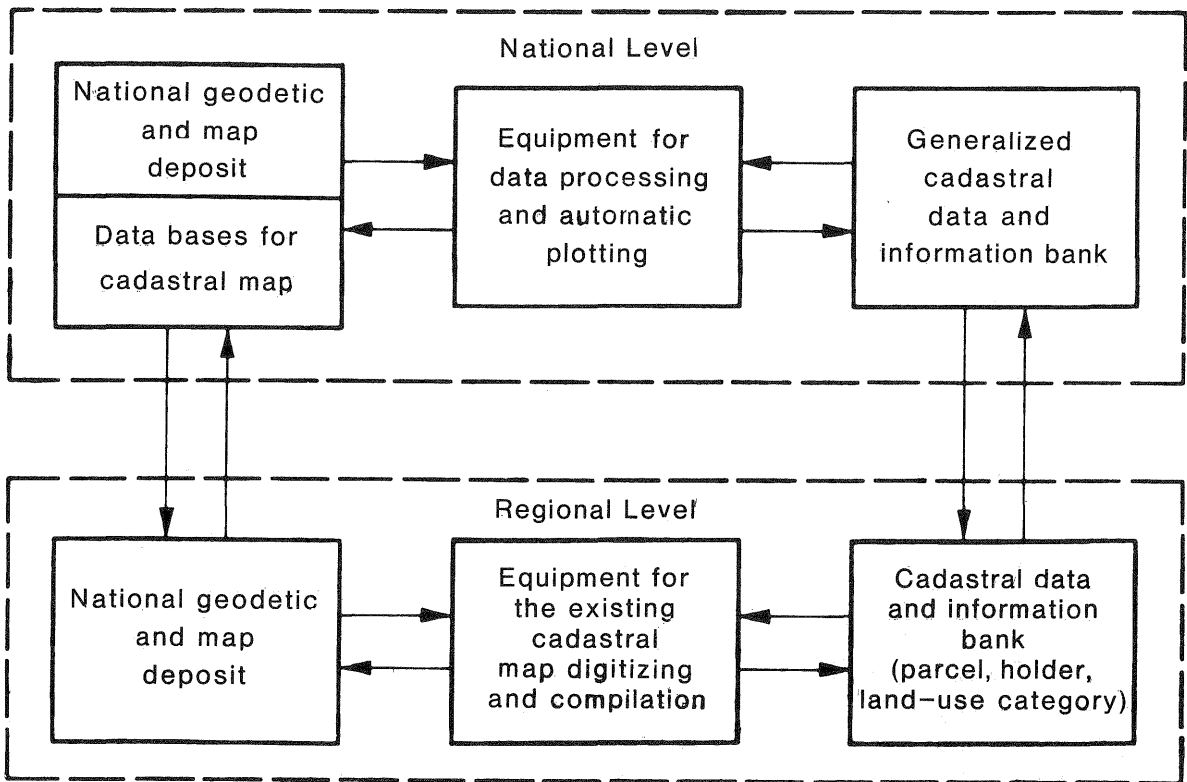


Figure 3. Land Information System Based on Land Cadastre

The land information system will be put into operation step by step, over a rather long period of time, when "classical" cadastral maps can be found alongside the digital ones. Then, collecting, processing, storing and displaying equipment will be improved on, contributing towards the land information system and the complex cadastre achievements in a short period of time - an objective requirement in the near future.

Résumé: L'utilisation, sur une vaste échelle, des méthodes photogrammétriques pour l'établissement des plans cadastraux et de la télédétection aérospatiale ayant comme but l'enrichissement du contenu des données et l'actualisation des cartes cadastrales contribue à la réalisation d'un cadastre complexe. Les méthodes de digitaliser et du traitement numérique ont facilité la création des bases de données pour le stockage du contenu des plans et des cartes cadastrales et des autres données du cadastre complexe. Grâce à ces conditions, en Roumanie est en cours de réalisation un système informationnel concernant le territoire, ayant un niveau départemental où on travaille avec des données cadastrales usuelles et un niveau national où on traite et on extrait des données de synthèse.

Zusammenfassung: Die breite Verwendung der photogrammetrischen Methoden zur Katasterherstellung und der Fernerkundung, aus der Luft und aus dem Weltraum, für die Bereicherung des Dateninhalts

und für die Laufendhaltung der Katasterkarten, tragen zur Realisierung eines Mehrzweckkatasters bei. Die Digitalisierungsmethoden und die numerische Verarbeitung haben die Erstellung der Datenbasen für die Speicherung des Inhalts der Katasterkarten und der Daten des Mehrzweckkatasters ermöglicht. In Rumänien wird nun, auf dieser Basis, ein Informationssystem des Territoriums entwickelt. Dieses System arbeitet, auf Bezirksniveau, mit den gebräuchlichen Katasterdaten und entnimmt und verarbeitet, auf Landesniveau, Synthesedaten.

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