

THE RECONSTRUCTION OF THE CADASTRE AND THE DEVELOPMENT OF A LAND INFORMATION SYSTEM IN KOSOVO

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ABSTRACT

This paper deals with the present process of reconstructing a cadastre that has been left with big holes after a long ethnic conflict, which ended in a war in 1999. UN and three donor countries agreed upon a three-year programme to rebuild the cadastre. The build up of capacity, competence, organisation, technology, equipment, reference network and communication is a huge and exciting task in this conflict-ridden corner of the world.

1 BACKGROUND ON KOSOVO

Kosovo has been a province in former Yugoslavia until it erupted in an ethnic conflict between the Albanians and the Serbians in the spring of 1999. NATO entered the war and after 77 days Serbia surrendered. On 10 June 1999, the United Nations Security Council passed Resolution 1244 authorizing the United Nations Interim Administration Mission in Kosovo (UNMIK) to begin the long process of building peace, democracy, stability and self-government in the shattered province.

To achieve this goal, UNMIK has been acting as the transitional administration for the region. UNMIK performs the whole spectrum of essential administrative functions and services covering such areas as health and education, banking and finance, post and telecommunications and law and order.

KFOR is a NATO-lead international force responsible for establishing a security presence in Kosovo. This peace-enforcement force entered Kosovo on 12 June 1999 under a UN mandate, two days after the adoption of UN Security Council Resolution 1244.

KFOR has reached its full strength of 50,000 men and women. Nearly 42,500 troops from 37 countries are deployed in Kosovo and another 7,500 provide rear support through contingents based in the Former Yugoslav Republic of Macedonia, in Albania and in Greece.

The war destroyed much of Kosovos infrastructure, for example was more than 300.000 buildings destroyed. When the Serbians withdrew from Kosovo they destroyed or took with them almost everything of value. Archives, maps, instruments, computers etc. are still in Serbia.

2 BACKGROUND TO THE PROGRAMME

At the request of the United Nations Interim Administration Mission in Kosovo (UNMIK), UNCHS (Habitat) carried out a rapid assessment of the situation regarding housing and property rights and property registration in Kosovo in 1999.

The rapid assessment highlighted the following major areas of concern:

- Property certificates and registries were partially destroyed
- Property boundary markers, survey control points and associated documentation were destroyed or defaced
- Geodetic surveying equipment and computers had been destroyed or removed
- Discriminatory legislation applied over more than a decade and lack of effective control over property registration and taxation had deterred people from recording property transfers
- Restrictions in the recruitment of personnel for public sector positions and the displacement of people after the conflict left many municipal cadastral offices without qualified staff

The Government of Sweden (Sida) commissioned a consultant, Blom International, to carry out a more in-depth study of the situation and develop a strategy to support the re-establishment of a cadastre system and the improved operation of the municipal cadastral offices. In parallel, the Government of Switzerland had committed support for the preparation of aerial photography for Kosovo. Equally, UNMIK allocated resources from the Kosovo Consolidated Budget to develop the cadastral system. These resources were targeted to the payment of local wages and other expenses.

The "Blom Report" outlined a three-year action programme to support the re-establishment of the cadastre system in Kosovo. The report made also proposals on funding arrangements and indicated the need for the mobilization of contributions from several donor sources. Sida organized a Logical Framework Analysis (LFA) Seminar in Sweden in February 2000 with the participation of a team of Kosovar professionals, international experts, representatives of UNMIK and the Governments of Sweden, Switzerland and Norway, Blom International and UNCHS (Habitat). The LFA reviewed the Blom report and made recommendations for improvement.

2.1 Terms of reference

The terms of reference for the implementation of the Kosovo Cadastre Support Programme (the Programme), is the result of the above process and the specific negotiations for the implementation and financing of a three-year programme involving the Governments of Sweden, Switzerland and Norway, UNMIK and UNCHS (Habitat).

The main objective of the programme is to develop a well functioning real property and land market, supporting democratic and sustainable development and economic growth in Kosovo.

A central principle underlying efforts has been the need for a strong and effective coordination mechanism to ensure that duplication of efforts is avoided and resources are properly integrated into a coherent and sustainable strategy. These aims shall be achieved by the establishment of a strong and efficient **Kosovo Cadastral Agency (KCA)**.

The Terms of Reference set down included 7 main objectives, 17 results and 82 specific activities as aims for KCA and the Programme.

3 KOSOVO CADASTRAL AGENCY (KCA)

KCA was established in November 2000 as a result of an UNMIK Administrative Direction no. 2000/14 of 7 June 2000. This Direction gives KCA the necessary authority in:

- Formulation of the strategy for the re-establishment of the cadastral information system, including the land information management and the land administration system
- Formulation of a program for the re-establishment of the cadastral information system
- Development of a regulatory framework for the re-establishment of the cadastral information system, including the setting of standards
- Provide technical support in matters relating to the cadastre
- Manage the program for the re-establishment of the cadastre
- Monitor technical standards for data capture, including field survey, data processing and data exchange related to the cadastre
- Develop a data base for land and real property information at the municipal level and administer and archive such information at the central level, consistent with given data protection requirements
- In coordination with the Local Administration, develop, introduce and oversee measures for harmonizing the practices and procedures by the municipal cadastral offices, including the levying of fees or charges for cadastral services
- Make necessary arrangements to provide the municipal cadastral offices with required basic surveying equipment
- Train the municipal cadastral officers to adopt new technologies and use of surveying equipment and software related to the cadastre in the most sustainable and efficient manner, including the appropriate management of the cadastral data base
- In coordination with other Departments and relevant institutions in the land administration sector, monitor domestic and foreign assistance, including donor contributions related to the cadastral information system
- The Head of KCA shall manage KCA and KCA shall be staffed, organized and administered according to the following guidelines:
 - Manage KCA and ensuring that the functions entrusted to it are implemented
 - Staffing, organizing and administering KCA and issue administrative instructions and operating guidelines
 - The effective and efficient management of resources provided to KCA from the Kosovo Consolidated Budget or from any other source
 - Implement non-discriminatory personnel policies designed to ensure that the composition of the staff of KCA reflects the multi-ethnic character of Kosovo

- Endeavour to ensure equitable gender balance in all areas and levels within KCA
- Ensure that all recruitment is based on professional qualifications, competence and merit
- The organizational structure of KCA shall include the following areas of competence:
 - Cadastral administration
 - Cadastral development
 - Geodetic field survey
 - Legal consulting
 - Training of cadastral personnel

There are a lot of activities and responsibilities mentioned in the terms of reference and the UNMIK direction. These will always be our first priorities, but as the only agency dealing with these issues in Kosovo there are additional issues to be considered:

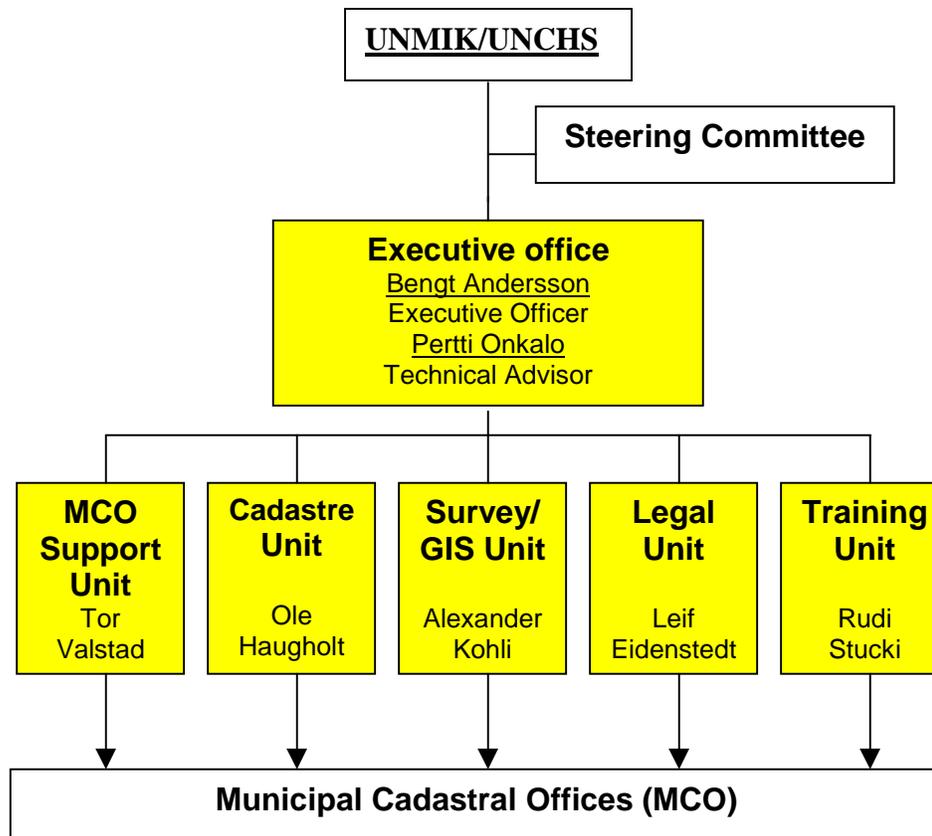
- Information technology and communication
- Geographic (spatial) information management
- Utility mapping
- Photogrammetric mapping
- Building and construction services
- Building and dwelling register

Depending on demand and finances the Kosovo Cadastral Agency might evolve into a Mapping and Cadastral Agency by the end of the three-year Programme.

4 ORGANISATION

The organisation of KCA is established with international co-heads of each unit and with both local and international staff within the units. Since KCA is a sustainable agency, local co-heads will be trained to take over within the Programme period.

At present (August 2001) there are 13 international and 25 local employees at KCA, but this will increase to 66 local employees next year.



5 THE RECONSTRUCTION OF THE CADASTRE

The entire area of Kosovo (10,908 sq.km) was divided into 1298 cadastral zones and the cadastral system is parcel based. The cadastre books have detailed descriptions of the possessor(s) and of land use classes including quality classifications. This information was integrated into a graphical mapping system based on surveying and aerial photogrammetry from 1931 – 1935 and 1951 – 1985. Luckily the data was processed using punch card equipment and it was possible to build a digital cadastre based on the backup of the cadastral records.

5.1 The textual database

One of the main priorities of the Programme was to restore the cadastral information and make it available in digital form. The aim was also, to some extent, to integrate textual and geographical data. Major parts of the operational database and original graphical cadastral plans were removed from Kosovo during the conflict.

The main objective for preparation of the textual database is to give the MCOs reconstructed data about parcels and owners as soon as possible. This will give the MCO the possibility to discover mistakes and prepare the staff for new administrative procedures.

The Interim Database version 1.0 was a simple read-only database in MS-Access, reconstructed from textual data obtained from the Electronic Data Processing Facility of Kosovo (EDPK). This centre in Pristina possessed backups for all cadastral records for all territory of Kosovo until 1989. The data was organised into databases for each municipality and delivered together with a computer and printer.

Totally for Kosovo there was 29 databases containing 1,853,090 parcels and 331,324 possessors.

This read only database was distributed in March 2001 and KCA had in average 3 follows up visits in each MCO in the period up to May 2001. We corrected some errors in the database and gave on the job training.

KCID1.0 has also been used actively in KCA for serving private persons, enterprises and institutions, which are in need of cadastral information.

The Interim Database version 2.0 was a read-write database developed in Visual Basic and MS-Access. In this version the MCOs will gradually be able to improve the quality of the data by introducing new information. Old information is archived in a separate database. Updating will be based on information found in MCOs up to 1997, where this information is available, and information provided by the public. This information will be connected to vectorized cadastral maps when they are available.

After a test and error correction period in April a pilot period started in May 2001. Pristina MCO had an older DOS-based system, which had been updated to 1997, therefore KCA made an agreement with Pristina MCO to reconstruct the database from 1987 to 1997. The updating was finalised by the end of August.

The training and installation of KCID2.0 is now finalised in 25 municipalities.

Our experience up to now, regarding the reconstruction, is that each MCO have different challenges regarding administration, localities, data sources and level of computer skilled personnel. KCA will make a plan for each MCO where action is taken based on the actual situation in the MCO.

5.2 The Cadastral Plans

Property registration and cadastral mapping were integrated into a unified system. No digital maps existed and most of the updated and original cadastral maps had been removed. The cadastral maps also had Kosovo-wide coverage and consisted of more than 10,000 sheets in scales 1:500, 1:1000, 1:2500 and 1:5000. The most recent maps was from 1989 and the oldest from 1931.

5.2.1 Scanning

Already in July 2000 KCA started the scanning of cadastral plans (maps in scale > 5000 are called plans) received from the Archives of Pristina and the various Municipal Cadastral Offices. The scanning of 10,000 plans was finalised in April 2001. About 500 plans have not been found. The content of the plans vary from plans with only boundaries and parcel number to complete topographical maps with contours.

5.2.2 Vectorization

The next step is to geo-reference and rectify these scanned cadastral plans so that they can be imported to selected GIS software and delivered to the MCOs together with computers and software. The linkage between the cadastral plans and the textual database will be based on the parcel number.

Linking the cadastral database to the cadastral plan will be an important measure of success regarding the reconstruction of the cadastre and will greatly enhance the user friendliness of the system.

The vectorization process includes the introduction of new software (GeoMedia from Intergraph and GeosPro), a data model and the screen vectorization using snap functions in the software.

A pilot project has been finalised with the vectorization of 20 cadastral plans containing 2500 parcels. The results were acceptable, but it is time-consuming and with the limited computer skills and resources in the municipalities it is difficult to estimate when all the plans are vectorized.

6 DELIVERY OF SURVEYING AND COMPUTER EQUIPMENT

27 municipalities got one computer with printer and UPS together with Microsoft Office 2000 and the first textual database in March 2001. 2 additional computers will be delivered to each municipality together with GIS and surveying software later this year.

Reflectorless total stations TCR303 from Leica with accessories was delivered to 23 municipalities in May 2001. Additional equipment like levels will be given later this year. Switzerland was also donor for several Leica GPS instruments that are used by KCA.

7 REFERENCE NETWORK

The Gauss-Krüger conformal transverse cylindrical projection of three-degree meridian zones was adopted as the official map projection for Yugoslavia in 1924. The Bessel (1841) reference spheroid was chosen and Hermanskogel (Austria) was used as a datum. The network has never been adjusted as a whole and it was believed to have irregularities due to scale differences and azimuth changes. In addition many of the points had been partially destroyed or not within reach because of land mines. There was also little documentation available about the quality of the network and no inventory of its present condition.

It was decided to establish a new network based on the existing Gauss-Krüger projection (7th zone) included the scale reduction at the central meridian by 0.0001 (scale factor 0.9999). But this time the system should be based on the International Union of Geodesy and Geophysics (IUGG) spheroid GRS80 (Geodetic Reference System of 1980) as used in the European Terrestrial Reference System ETRS89 and connected to the EUREF Permanent Network (EPN).

32 stations was established and measured with Leica GPS receivers SR520 and SR530 in static mode with duration of up to 9 hours. 23 of the new GPS stations was linked to the existing levelling network of Kosovo.

The computations were done by SFOT and the quality of the measurement is very good.

For the second order network there are altogether 53 stations established and measured and another 50 stations has been prepared for measurement. All the former second order network stations (1500 points) will be transformed using the 7 transformation parameters found between the old and the new coordinate system.

8 AERIAL PHOTOGRAPHY AND ORTHOPHOTO PRODUCTION

Kosovo is absolutely in need of new digital technical and economic maps. But mapping the whole territory of Kosovo is a slow and expensive process, so it was decided to produce digital colour orthophotos as soon as possible. Due to the weather conditions only 40% of Kosovo was covered in 2000. The rest of Kosovo was photographed in May/June 2001 with the exception of the buffer zone to Serbia and Montenegro.

The aerial photography is completed and films have been developed. Scanning of the films is ongoing by Swiss Federal Office of Topography (SFOT). Orthophotos for 10 urban areas are produced and quality control is ongoing in Norway. Orthophotos from the 2000 images will be delivered in October 2001. First test areas are already delivered and KCA has produced an example of combined orthophoto and vectorized cadastral plan.

Local staff of KCA has done most of the GPS surveying of ground control points and points for the digital elevation model.

KCA has now the capacity to print orthophoto hardcopies. Two high quality plotters, a laminator machine and plotter media has been delivered to KCA from Norway.

9 LEGAL FRAMEWORK

The regulation of the land cadastre in Yugoslavia was applied at the Federation level after the Second World War. The Former Republic of Yugoslavia established regulations at the Republic and Provincial level in 1989. Different laws in the field of public surveying and land/real estate cadastre applied before and after 1989. Some laws applied after 1989 had clearly discriminating features, such as restricting transactions between different ethnic groups or the transfer of agricultural land to Serbs and Montenegrins. Based on research carried out by UNCHS (Habitat), UNMIK repealed two discriminating laws in November 1999 (UN Resolution No. 1999/10).

Cadastral system functions remained essentially the same following the revoking of autonomy for the Province in 1989. However, its administration was moved from Pristina to Belgrade. New laws passed between 1992-1996 (The Law on Public Survey and Registration of Real Estate Rights) introduced the radical change of transforming the land cadastre into a real estate cadastre. However, there was neither funding nor qualified professionals to implement the proposed changes. These laws were revoked by UNMIK in December 1999 (Regulation No. 1999/24).

UNMIK issues Regulations, Directions and Instructions, which functions as temporary laws in Kosovo. These can be used to make necessary amendments or additions to the existing laws. But to ensure sustainability it is important to revise or make new laws concerning the cadastre.

KCA is now in the process of rewriting the following laws in cooperation with the Department of Judicial Affairs and other relevant institutions:

- Law on surveying and land cadastre, 12/80
- Law on basic property relations, 6/80
- Law on transfer of real property, 45/81 and 29/86

There are also several revoked laws about the cadastre that should in part be used to revise the existing laws. Although the Kosovars feel themselves to be real owners of their properties there is in reality no private ownership in Kosovo. Establishing real private ownership will be absolutely necessary.

The Yugoslavian laws are very technical in nature, which makes them soon very outdated. It is necessary to make the laws more basic and leave the technical descriptions to separate procedures that can easier be updated.

10. TRAINING AND SUPPORT

Training and support both to the local employees at KCA and to the MCOs is of course an essential part of our activities. If we do not succeed here, the utilisation of the given tools will be limited and it will be easy to revert to old routines.

So far more than 250 has participated in our training courses and 160 has received on the job training.

10.1 MCO capabilities

Coordinates for traverse points are missing in some areas. Most points are expected to exist also in the field, but the employees have limited knowledge about their condition.

The organisation of the Cadastre differs from one municipality the other. Some places the Cadastres are stand alone units. Elsewhere its function is organised together with other municipal tasks. Usually the director is a surveyor (approximately half the cases) or a lawyer by education. Generally the number of surveyors and other staff employed seems not to correlate very well with the tasks in each municipality. Only a few have had possibilities to practice their profession during the last decade of the past century. The salaries are small in most municipalities – in some less than 200 DM pr month. It is argued that the low income is reflecting the working intensity for cadastre work.

The highest potential for increasing the effective use of new instruments and methods in each municipality are in raising the knowledge in use of computers. Lack of basic knowledge about Windows, Word and Excel is a barrier for transferring data between total station and computer and saving data in a structured way in the computer. This problem will be a barrier when special software for computing, documentation and presentation of measurements and plans are taken into use. Training is necessary for most of the municipality staff!

It is not only technical skills that is lacking. Training in management, planning, budgeting and organisation will be a challenge for our future support to the municipalities.

11. FUTURE CADASTRE AND LAND INFORMATION SYSTEM

In a society's information infrastructure the Cadastre and Land Information System plays a vital role. The aims for the future Land Administration in Kosovo should be to fulfil the criteria mentioned in "Land Administration Guidelines" presented by MOLA (Meetings of Officials on Land Administration), Economic Commission for Europe. These criteria are as follows:

- Guarantee ownership and security of tenure;
- Support land and property taxation;
- Provide security for credit;
- Develop and monitor land markets;
- Protect State lands;
- Reduce land disputes;
- Facilitate land reform;
- Improve urban planning and infrastructure development;
- Support environmental management;
- Produce statistical data.

The present cadastral system in Kosovo will be a foundation for a future system, but it is some distance to go between the present system and to a future modern and complete Cadastral and Land Information System.

The build up and implementation of a Cadastral and Land Information System in Kosovo is depending also on the general situation in Kosovo regarding infrastructure in general and especially on education, legal framework, organisation, the emergence of a market and of course the political situation.

The cadastral (textual) database has already been implemented in most of the municipalities in Kosovo and since it is the only digital register on properties, there is already a demand to utilise this register to cover tasks that is normally part of a Land Information System. This means that the cadastral database may soon evolve into a multipurpose cadastre containing:

- Real property and owner information
- Digital cadastral plans
- Mortgage information
- Valuation and taxation
- Rights and restrictions
- Buildings and dwellings

But both this interim multipurpose cadastre and a future Cadastral and Land Information System must be based on the needs of the local and central government, the producers and most important; the users.

BIOGRAPHICAL NOTES

Working as a Cadastral Programme Manager at the Kosovo Cadastral Agency in Pristina. On two years leave from the Municipality of Oslo, Norway where I worked as Manager of Cadastral Surveying. Earlier experience in engineering surveying, land, geodetic, hydrographical and quantity surveying. Vice chair in the Norwegian FIG Committee and Secretary of FIG Commission 3 since 1996.

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