



Federal Ministry
for Economic Cooperation
and Development



Land Management and Land Administration Projects in Southeastern Europe

Good practices and lessons learned from two decades of GIZ Engagement

Published by

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

Table of contents

1. Introduction	8
1.1 Objectives of the Study	8
1.2 Methodology	8
2 Study on Land management /Land Administration Projects by Country	10
2.1 Serbia	10
2.1.1 Initial Situation	10
2.1.2 General Project Approach and its Evolution Over Time	10
2.1.3 Looking at some practices in detail	12
2.1.4 Spatial Database Development Approach for Cadaster/Land Registry and other Spatial Data	16
2.1.5 Networks and Cooperation	16
2.1.6 Cooperation with Other Donors	17
2.1.7 Good Practices and Lessons Learned in Serbia	19
2.2 Bosnia and Herzegovina	21
2.2.1 Initial Situation	21
2.2.2 General Project Approach and its Evolution Over Time	21
2.2.3 Looking at Some Practices in Detail	23
2.2.4 Contribution to Spatial Database development for Cadaster and Spatial Information	24
2.2.5 Networks and Cooperation	24
2.2.6 Cooperation with Other Donors	24
2.2.7 Good Practices and Lessons Learned in BiH	25
2.3 Montenegro	27
2.3.1 Initial Situation	27
2.3.2 General Project Approach and its Evolution Over Time	27
2.3.3 Looking at Some Practices in Detail	28
2.3.4 Spatial Database Development Approach for Cadaster/Land Registry and other Spatial Data	28
2.3.5 Networks and Cooperation	30
2.3.6 Cooperation with Other Donors	30
2.3.7 Good Practices and Lessons Learned in Montenegro	30
2.4 Georgia	32
2.4.1 Initial situation	32
2.4.2 General Project Approach and its Evolution Over Time	32
2.4.3 Looking at Some Practices in Detail	33
2.4.4 Further Project Approaches	35
2.4.5 Networks and Cooperation	35
2.4.6 Cooperation with Other Donors	36
2.4.7 Good Practices and Lessons Learned in Georgia	36

3. Common Lessons Learned – Recommendations for Southeastern Europe	40
3.1 Project Approach	40
3.2 Institutional Setup for Land Administration	41
3.3 Capacity Development and Scaling Up	41
3.4 Donor Cooperation	42
3.5 New Technologies - Cadaster Surveying and Spatial Databases	43
3.5.1 Terrestrial Cadaster Surveying with Total Station – Electronic Tacheometer	43
3.5.2 Surveying with GNSS Technology	44
3.5.3 Remote Sensing – Aerial Photogrammetry	45
3.5.4 New Cadaster Surveying and Cadaster Maintenance	47
3.5.5 Spatial Databases and Standards	47
4. Conclusions	48
References	50
Websites	52

List of Figures

Figure 1: Municipal GIS Guide, GIS Example Subotica	12
Figure 2: Parcels before and after land consolidation in Serbia	15
Figure 3: Web GIS application - Urban plan	16
Figure 4: EU Twinning project at RGA, Serbia	18
Figure 5: UML data model extract for MonPlanGML	29
Figure 6: Boundary definition around high-rise buildings, Tbilisi	34
Figure 7: Donor projects in Georgia in the field of Land Management / Cadaster	35
Figure 8: Aerial Image Flight	45

List of Images

Image 1: Elaboration of an Integrated Urban Development Strategy for the Inner-city area, Kragujevac	14
Image 2: Cadaster surveying with Total Station	43
Image 3: GNSS Technology – Reference Stations	44
Image 4: Stereo data acquisition (3D)	46

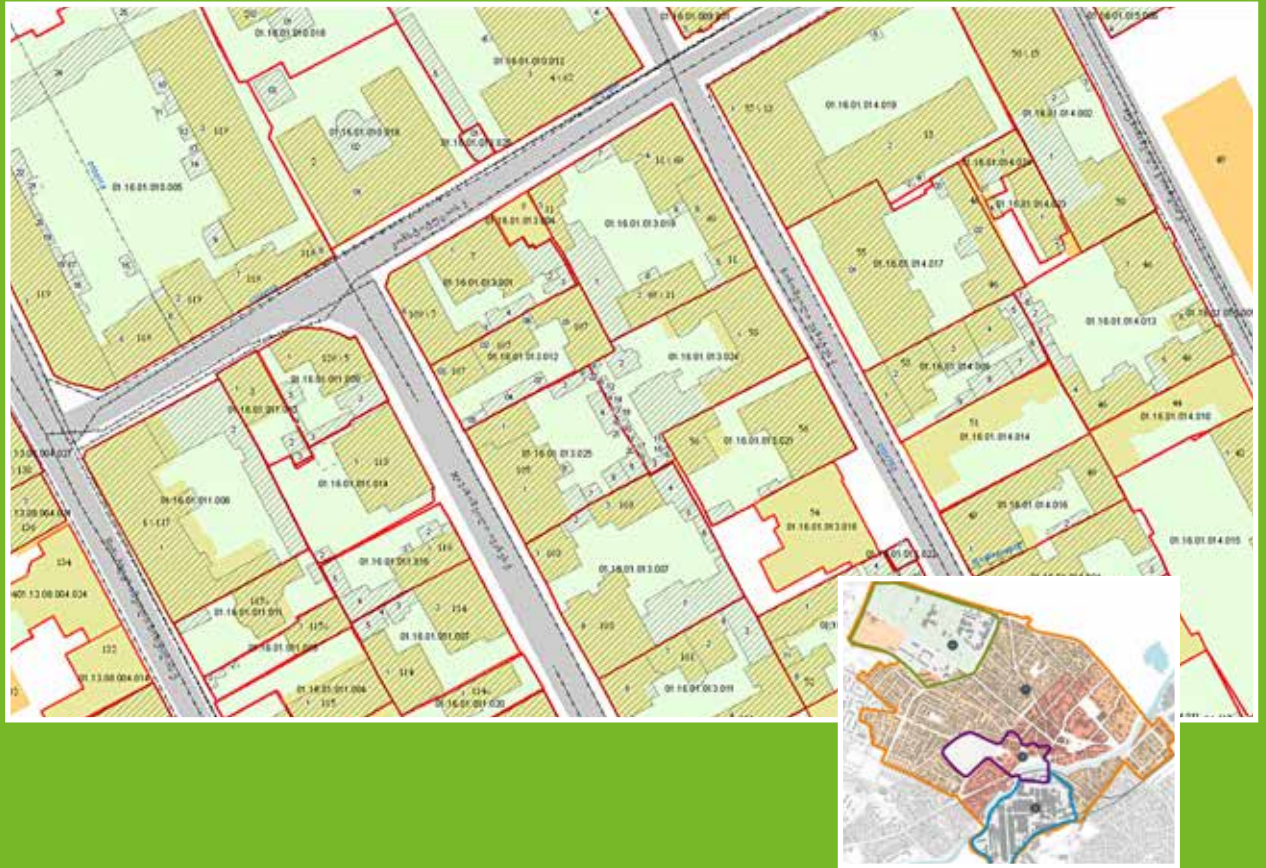
List of abbreviations

ABV	Office for Land Resources
ADA	Austrian Development Cooperation
AGB	Aero Geodetic Enterprise
BiH	Bosnia and Herzegovina
BMZ	German Ministry for Economic Development and Cooperation
CORS	Continuous Operating Reference Stations
DMIU	Digital Mapping Information Unit
FAO	Food and Agriculture Organization of the United Nations
FBiH	Federation of Bosnia and Herzegovina
GIS	Geographic Information System
GIZ	Gesellschaft für Internationale Zusammenarbeit GmbH
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GTZ	Gesellschaft für technische Zusammenarbeit
HOfRE	Head Office for Real Estate (national cadaster and land registry authority, Montenegro)
IB	Inventory Office
INSPIRE	Infrastructure for Spatial Information in the European Community
IPA	Instrument for Pre-Accession Assistance of the EU
KfW	German Development Bank
KOPOS	Kosovo Satellite Positioning Service
LAP	Land Administration Project in BiH
LGB	Land Surveying and Geoinformation Brandenburg
MAEP	Serbian Ministry of Agriculture and Environmental Protection
MoU	Memorandum of Understanding
NAPR	National Agency for Property Registration
NSDI	National Spatial Data Infrastructure
OGC	Open Geospatial Consortium
RGA	Republic Geodetic Authority, Serbia
RS	Republika Srpska
RTK-GPS	Real Time Kinematic - GPS technology
SAB	City Architectural Office
SCTM	Standing Conference of Towns and Municipalities of Serbia
SDI	Spatial Data Infrastructure
SDLM	State Department of Land Management
Sida	Swedish International Development Cooperation Agency
UML	Unified Modeling Language
UMM	Union of Montenegrin Municipalities
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
USSR	Union of Soviet Socialist Republics
WB	World Bank
Web GIS	Internet-based Geographic Information System

Acknowledgement

The author would like to thank, among others, the following people for providing essential information and sharing their insights:

Aleksandar Deuvić, Alexander Schmidt, Alexander Shakhov, Ana Krivokapić, Ana Lacković, Anne-Kathrin Wirtz, Babette Wehrmann, Benjamin Klinger, Blašo Filipović, Božidar Pavićević, Branko Begović, Christoph Jochheim-Wirtz, Darko Mišković, Dejan Klitovać, Đemaludin Mutapčić, Dragan Dimitrić, Dragan Jetrović, Dragan Tomaš, Ekaterina Meskhidze, Ekaterine Sanadze, Ekrem Tošić, Franz Schuh, Galaktion Hahubia, Gerhard Laux, Gernod Schindler, Giga Paitchadze, Giorgi Kurtanidze, Gordan Djordjević, Günther Zülsdorf, Gyorgyi Mrdjanov, Harald Mueller, Irena Vukević, Ivan Aleksić, Ivana Rogić, Ivane Khitazidze, Ivica Mićanović, Janko Vukotić, Jasmina Pejović, Jasmina Randjelović, Jean-Luc Horisberger, Jelena Matić-Varenica, Joseph Salukvadze, Jožef Čsipa, Katja Grbić, Klara Danilović, Larisa Velić, Laura Nibladze, Lika Tchanturia, Marija Ušumović Davčik, Marina Izgarević, Marko Lalević, Merab Nadaraia, Michael Becker, Milica Manojlović, Milivoje Avramović, Mirijana Marinković-Gabarić, Mirjana Civić, Mirjana Ljumović, Mirsad Buljević, Mladen Dugonjić, Nedžad Pajalić, Nenad Bajić, Nevena Daković, Nik Shakhov, Nikda Turčinović, Nikoloz Cheishvili, Pero Bosić, Petar Živković, Predrag Dimitrijević, Predrag Martinović, Radenko Nikolić, Reinhard Lüke, Sanja Lješковиć-Mitrović, Saša Đurović, Sead Adulić, Slaviša Aleksić, Sonja Vuković, Sreten Lekić, Stanko Janković, Stevan Maroš, Tanja Aleksić, Tatjana Posavljak, Thomas Meyer, Velibor Vitor, Vesna Nikolić, Vladimer Chkhaizde, Vladimir Milenković, Yvonne Müller, Zdravko Galić, Zdravo Bogetić, Zorica Gverović, Zurab Nemsadze.



Land Management and Land Administration Projects in Southeastern Europe

Good practices and lessons learned from two decades of GIZ Engagement

1 Introduction

1.1 Objectives of the Study

After the collapse of the former Soviet Union and the end of the latest Balkan wars, countries in Southeastern Europe had to reorganize their land management and land administration systems. Whereas in the Caucasus region privatization and first property registration were the main challenges, in the former Republic of Yugoslavia, essential objectives were the return of collectivized, confiscated property through restitution or (re)distribution, as well as the updating and harmonization of traditional land registry and cadaster systems and their conversion to modern systems.

For nearly 20 years, GIZ (former GTZ) has provided technical assistance in the field of land management, land administration, and in particular of cadaster to different countries in Southeastern Europe, including Georgia, Bosnia and Herzegovina, Serbia, Montenegro, Kosovo and Croatia. Whereas some projects uniquely focused on supporting land administration – hence land registry and cadaster – others concentrated more on the overall land management sector including spatial planning, land use issues, and land taxation. The objective of this study was to analyze the experiences gained from GIZ projects in a maximum of four countries of the region. An essential aspect of the southeastern region was the consideration of EU standards and EU best practices during project implementation. On the basis of project approaches and duration, projects were selected as representative samples in Serbia, Bosnia and Herzegovina, Montenegro, and in Georgia.

This knowledge study should contribute to the knowledge management of GIZ as a learning organization, and to its inter-organizational learning, especially in the “land sector”. It should open a discussion about what can be learned from experience in the area of land management and land administration, particularly in countries in transition in Southeastern Europe.

Core issues to be assessed were the experience using different project approaches, their evolution over time, the institutional setup (especially with regard to land registry and cadaster), capacity development, the implementation of new technologies and spatial databases, networks and cooperation with national and international institutions,

as well as experience with cooperation among donors. Hence, “good practices” were identified and “lessons learned” derived. The expected output of the study was distilled into the “Common Lessons Learned - Recommendations”, which might serve future land management and land administration projects outside of the region as well.

Guiding research questions were related to the above-mentioned core issues covering following:

- Overall project benefits
- Particularly successful strategies and activities and their reasons for success
- Less successful strategies and activities and the reasons they were not as successful
- “What should have been done in a different way?”
- Recommendations for similar projects in the future

1.2 Methodology

In General

The methodology chosen for this “knowledge study” is based on a qualitative research approach. The data collection instruments are reviews of GIZ’s internal project documentation and other literature, Internet research, and interviews conducted with experts and key persons in institutions that have been involved in the GIZ projects related to land issues in Southeastern Europe. The study can be described as a “good practices/lessons learned study.” Since most of the projects had already been completed several years ago, a particular challenge was to identify and meet former key persons in the four selected countries, and to gather their individual perceptions and opinions. The same applies to knowledge holders in Germany and neighboring countries. Finally, the information gathered was cross-checked and correlated with a large amount of existing project documentation and other document sources, as well as with studies related to land management and land administration for the region.

This study differs from classical project evaluation, which compares what was planned and what was achieved. For each selected country, particularly detailed attention was given to overall systematic project approaches, their evolution over time, the institutional setup, the capacity development and scaling up, the introduction of new technologies and spatial databases, networks and cooperation with national and international institutions, and last but not least, to cooperation among donors. For each of the four countries, “good practices” and “lessons learned” were derived. Finally, “common lessons learned - recommendations” were distilled, mainly based on the four selected countries. The study does not claim to be exhaustive and cover all project-related measures or activities.

Methodological Steps in Detail

- Review short project summaries of all GIZ projects in Southeastern Europe related to land management and land administration
- Select four projects, including corresponding following-up projects on the basis of their duration, their different approaches and management structures
- Collect and review GIZ’s internal project documentation for the projects in the four selected countries (Serbia, Bosnia and Herzegovina, Montenegro, and in Georgia)
- Gather initial insights into the project objectives, structures and evolution over time
- Prepare guiding questions and identify the first key persons
- Contact the first group of key persons via email, Skype or telephone in order to get contact data for additional key persons and project knowledge holders in all four countries
- Contact respective (former) managers and experts in order to plan official one-week trips to all four countries and to agree on time schedule drafts
- Travel to the four selected countries and conduct the planned interviews, thereby identifying further knowledge holders of (former) GIZ land management and land administration projects (snowball sampling method) and including them in the list of people to meet
- Collect further project-related reports and technical documents from partner institutions and GIZ offices in addition to the interviews as main sources of information
- Structure the information gathered from interviews
- Intensively review all of GIZ’s internal project documentation, literature and Internet research
- Cross-check the data collected from different sources and note open questions
- Conduct further interviews, mainly with key knowledge holders in Germany and neighboring countries, in part via direct meetings and by Skype or telephone
- Prepare the “knowledge study” draft and request feedback from main key persons of the four countries
- Clarify remaining questions and cross-check newly gathered information again
- Take into account the feedback and finalize the “Knowledge Study”

2 Study on Land management/ Land Administration Projects by Country

2.1 Serbia



2.1.1 Initial Situation

With the enactment of a new “Law on State Land Survey, Cadaster and Registration of Real Estate Rights” (SSCR Law) in the early 90s, together with additional amendments, the Governmental Geodetic Authority

(now the Republic Geodetic Authority, RGA) was given a mandate to administer and maintain the unified Real Estate Cadaster. Starting in the mid-80s in Vojvodina in northern Serbia as well as in urban areas, Serbia decided to merge the traditionally separate systems of land registry and cadaster into a single system. However, the implementation of this approach only started after 2000. Historically, the courts in Serbia had been responsible for the registry of immovable property. Depending on the region, different land registries and cadaster systems had been in use. Whereas in Vojvodina and in the industrial regions a land cadaster system, together with a “land book” system, was used that was originated in Austro-Hungarian Empire, in the south, people mainly transferred real estate ownership rights via so-called “deed books” (“tapija”), which had been inherited from the Ottoman Empire. Additionally, during the socialist period, the nationalization of properties and less focus on the maintenance of the land registry and cadaster led to the fact that both systems were outdated in many regions. From the start of the transition to democracy at the beginning of 2000, the modernization and reform of the land administration in Serbia was necessary in order to improve the development toward a market-oriented economy, and to meet the needs of the local self-governments¹ with regard to land administration and land management, including different planning tasks.

¹ Local self-government describes the right and the ability of local authorities according to the European Charter of Local Self-Government:
<http://www.conventions.coe.int/Treaty/EN/Treaties/Html/122.htm>

In the field of urban development, Serbia was strongly characterized by the structure and processes of the former socialist era. In order to foster the economic and political transformation process, new land management instruments were necessary in order to adapt urban development, as well as to balance the needs of different interests for public and private investment.

Concerning Serbia’s agricultural sector, the main obstacles nowadays to the development of rural regions and an increase in market-oriented growth and income are the extreme fragmentation of agricultural parcels, a lack of qualified human resources, and missing infrastructure. Another aspect of the sector is the large amount of abandoned land affecting the landscape development and the environment. Extensive erosion risk causes threats to human lives and property. Consequently, new policies are needed for fostering integrated rural development.

2.1.2 General Project Approach and its Evolution Over Time

The first project with the title “Land Management/Cadaster, Serbia” was launched in 2003 and was completed in 2009. The project approach focused on the support of municipalities and the National Geodetic Authority (RGA), with its subordinated regional and municipal cadaster offices. The main objective was to improve the legal security of real estate, as well as to increase the benefit of cadaster information for planning and other land management purposes in municipalities. In comparison to a “classical” land administration project where the focus is to modernize and update the land administration system, the GIZ project “Land Management/Cadaster, Serbia” aimed to both support the improvement of the national land administration as well as to improve the benefit and data usage at the local level, in other words in municipalities. A special challenge was to interact between controversial positions with regard to the cadaster data provision between RGA and municipalities, and to cope with recurring tensions.

In the course of the project, more and more donors became active in supporting RGA on land administration issues. Consequently, GIZ shifted its focus to action fields concerning the benefit and usage of cadastral data. Starting with the support of five pilot municipalities, an essential measure was the introduction of the municipal Geographic Information System (GIS). A particular challenge was the improvement of cooperation between municipalities and the RGA with respect to regular delivery of cadastral data. This was of high importance, since cadastral information serves as so-called “spatial base data”². They are the backbone for the majority of municipal GIS applications, such as spatial and land use planning, valuation and taxation. The project “Land Management/Cadaster, Serbia” accompanied the complete process of determining how to organize the setting up of a municipal GIS (see: 2.1.3). Their advice focused on the overall GIS management process, on capacity building, as well as on technical implementation. When introducing GIS, the main challenge was to obtain common agreements between different municipal departments and/or institutions for data sharing and future application development. Once a consensus was reached and a memorandum of understanding on these fundamental issues was signed, the technical realization of GIS was only a matter of time. In 2006, a partnership was started between the Serbian association of municipalities, named the “Standing Conference of Towns and Municipalities of Serbia (SCTM)”, which coordinated a nationwide scaling up of activities by establishing a horizontal network of GIS initiatives between cities and municipalities. The project’s support on the national level was concentrated mainly on commenting on law proposals and subordinated regulations for cadaster and on the development of a private sector for licensed surveying engineers, including staff vocational training.

2 According to the “Working Committee of the Surveying Authorities of the Laender of the Federal Republic of Germany (AdV)” Spatial Base Data are official spatial data, which describe the cadaster parcels, buildings and landscape (topography) independent of their usage in a unique geodetic reference frame. They are the basis for Thematic Spatial Data

In 2010, based on the experiences of the previous project “Land Management/Cadaster, Serbia”, a new project, “Strengthening Municipal Land Management”³, was set up with the objective of introducing the land management tools that are needed in the context of a democracy and market economy, and which were either not known or not relevant in the previous socialist setting. Examples include participatory planning as well as smart growth, avoiding the uncontrolled conversion of green land into construction land, land valuation, and land readjustment that only become relevant after the reintroduction of private land ownership. The main fields of activity were capacity building, training, and testing the implementation of various innovative planning and land tenure instruments. This included among others the preparation of urban development plans and their integration into Web GIS, integrated urban development strategy, quality improvement for the process of elaboration of a detailed regulation plan, urban renewal for touristic development, the setting up of a real estate valuation system, redevelopment of a brownfield site, land reallocation, etc. (see: 2.1.3). Further support focused on the reform of legal and institutional frameworks, as well as capacity building at regional institutions and municipalities concerning technical support on the introduction of new methodologies and procedures. As such, the basic conditions had to be considered for an ecological, sustainable, socially balanced and efficient management of land use.

In a first phase that lasted until 2012, the project mainly concentrated on the support of exemplary implementation of municipal land management instruments with regard to urban planning, land development and land valuation, as well as GIS applications in local land management. In a second project phase in 2013, different approaches were tested with the broad participation of citizens, followed by an upscaling of the experiences from pilot projects to the national level. According to one interviewee statement: “Only on the basis of examples carried out in practice could we persuade the ministries to agree with the “integrated city planning” approach. The result was that the participation of citizens in the overall planning process was integrated into the new law related to urban planning”.

3 GIZ delegated the project to AMBERO Consulting GmbH and ICON as implementation partner

The second project phase (2013-2015) that is currently still running consists of two modules. Module 1 is the continuation of the above-mentioned first project phase with a focus on urban areas, whereas module 2 “Rural Development - Effective Land Management”, is the activity field extension to rural regions’ support. The main objective is to foster rural development through the effective management of agricultural land by supporting both the local and the national level. It deals with, among others, the improvement of the legal and administrative frameworks, improving the management and monitoring of state-owned agricultural land, the development of innovative schemes for agricultural land consolidation, and the reduction of abandoned land. An essential aspect is the consideration of the environmental dimensions and biodiversity. This second module is co-financed by the European Union with GIZ as implementation partner.

2.1.3 Looking at some practices in detail

Land Management /Cadastral project (2003-2009)

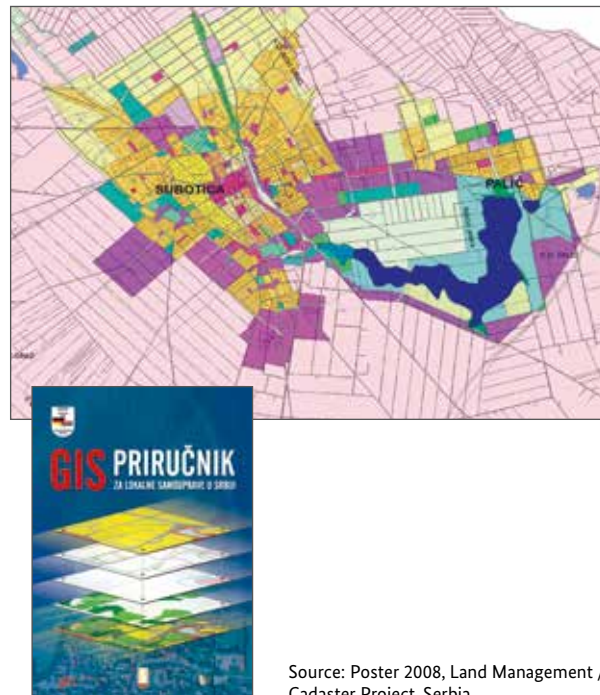
Participatory Municipal GIS Guide Development and Nationwide Training on Municipal GIS Implementation

The Land Management/Cadastral project had supported the municipal GIS development process beginning with five pilot cities. Based on the experience of this process, the project produced a practice-oriented municipal GIS guide in cooperation with the “Standing Conference for Towns and Municipalities of Serbia (SCTM)”. Its main feature, besides the general introduction of GIS technologies, was to describe how to manage the process of setting up a GIS in Serbian municipalities. The process for developing the GIS guidelines included more than 10 local municipalities. One chapter of the guidelines contains Serbian legal regulations that need to be taken into account in the creation of a municipal GIS. In addition, the guidelines contain some practical examples of Serbian GIS applications. In a series of public presentations and discussions with representatives of municipalities, the Republic Geodetic Authority, international consultants and others, the guide was increasingly adapted to special Serbian issues.

The overall consultative process for the development of the guide was also highly appreciated, as the municipal GIS knowledge was disseminated nationwide through the

training of 50 municipalities with about 100 participants. The fact that one of the trainers was an experienced practitioner from one of the pilot municipalities guaranteed a practice-oriented training that particularly covered Serbian needs. As part of the training, all municipalities developed action plans on how to set up “their” municipal GIS. Because of the intensive GIS activities, the “Standing Conference of Municipalities and Towns in Serbia” had created an informal GIS network with annual meetings and supported the municipalities after the project’s conclusion in how to comply with the formalities of applying for EU funding for the EU municipality program “Exchange”. As one interviewee commented, “The results of the former GIZ project “Land management/Cadastral” can still be seen”.

Figure 1: Municipal GIS Guide, GIS Example Subotica



Source: Poster 2008, Land Management / Cadastral Project, Serbia

Vocational Capacity Development

The project strengthened the capacity development sector concerning cadaster/land registry on three different levels. The support focused on universities, universities of applied sciences, and schools for technicians. Study tours to corresponding German universities and educational institutions fostered the knowledge exchange. Essential aspects were consulting services about the Bologna⁴ declaration for the reform of higher education, and the consideration of stronger practice orientation in the curricula. To achieve the latter, the first project seminar ever was initiated for geodesy and geography students of the University Belgrade in cooperation with the Technical University Munich and the municipality of Subotica. After an introduction to GIS, the students worked on a real project for Subotica, which they presented in the town hall of Subotica in front the municipal experts who made use of the results in their work.

Strengthening Municipal Land Management (since 2010)

During the ongoing project (second phase), a wide range of land management instruments were introduced, such as integrated urban development, construction land development and real estate valuation, GIS in local land management, land consolidation, monitoring of state-owned land, as well as instruments for reducing the proportion of abandoned land. An important element is the bottom-up approach from the local to the national level. In a first step, innovative land management instruments have been exemplarily implemented on a local level under consideration of active participation of citizens and other stakeholders. Based on these experiences, the objective was to develop guidelines and proposals for the integration of the findings in the corresponding laws and regulations on the national level.

A detailed description of the large amount of all urban and rural instruments in the ongoing projects would go beyond the scope of this study. Consequently, only the implementation of one instrument for each of the two modules (urban and rural) is described in detail below.

Module 1: Urban development (since 2010)

Integrated City Development Planning

One of the Municipal Land Management Project's instruments was "Integrated City Development Planning". Based on this instrument, a city development concept was set up in two city centers. This planning instrument, which is already in use in the EU as well as in Germany, is a precondition to obtaining funding for urban development projects. A key issue is the intensive participation of citizens during the planning process.

As a first step, all planning procedures were analyzed, followed by the guideline as to when public participation would be necessary according to international best practices. In a next step, the new solutions were compared with the participation procedures described in the current law. Based on the newly included participation processes, in some pilot cities, the integrated city planning was exemplarily developed. The experiences were compiled in a practical guide and recommendations were provided for the drafting of a new legal amendment on urban planning. As a result, the newly adopted law includes citizen participation in the whole planning process.

In addition to the support of pilot municipalities, the "Standing Conference of Municipalities and Towns in Serbia", the association of urban planners, and the University of Belgrade have been involved in the process. Cooperation with the university was mainly intended to ensure the capacity development of future urban planners.

⁴ Based on the Bologna Declaration (1999), the Bologna Process started voluntarily at European level. It defines the European Higher Education Area (EHEA) and is implemented in 47 states: <http://www.eua.be/eua-work-and-policy-area/building-the-european-higher-education-area.aspx>

Image 1: Elaboration of an Integrated Urban Development Strategy for the Inner-city area, Kragujevac



Module 2: Rural Development (since 2013)

Land Consolidation

One component of the current rural land management project is the introduction of land consolidation schemes based on a participatory approach and the inclusion of EU best practices in order to improve the Serbian Law on Agricultural Land (LAL) and its respective bylaws. The project therefore concentrates on the southeast region of Serbia, which is rich in biodiversity in contrast to the highly productive northern agricultural area of Vojvodina. In southeastern Serbia, the hilly landscape and low agricultural productivity require diverse farming approaches specially adapted to increase economic development and competitiveness. Modernized procedures and processes of land consolidation in Serbia strive to achieve efficient sustainable agricultural production in environmentally and ecologically balanced agricultural landscapes according to EU best practices. In comparison to past land consolidation procedures, which applied centralized

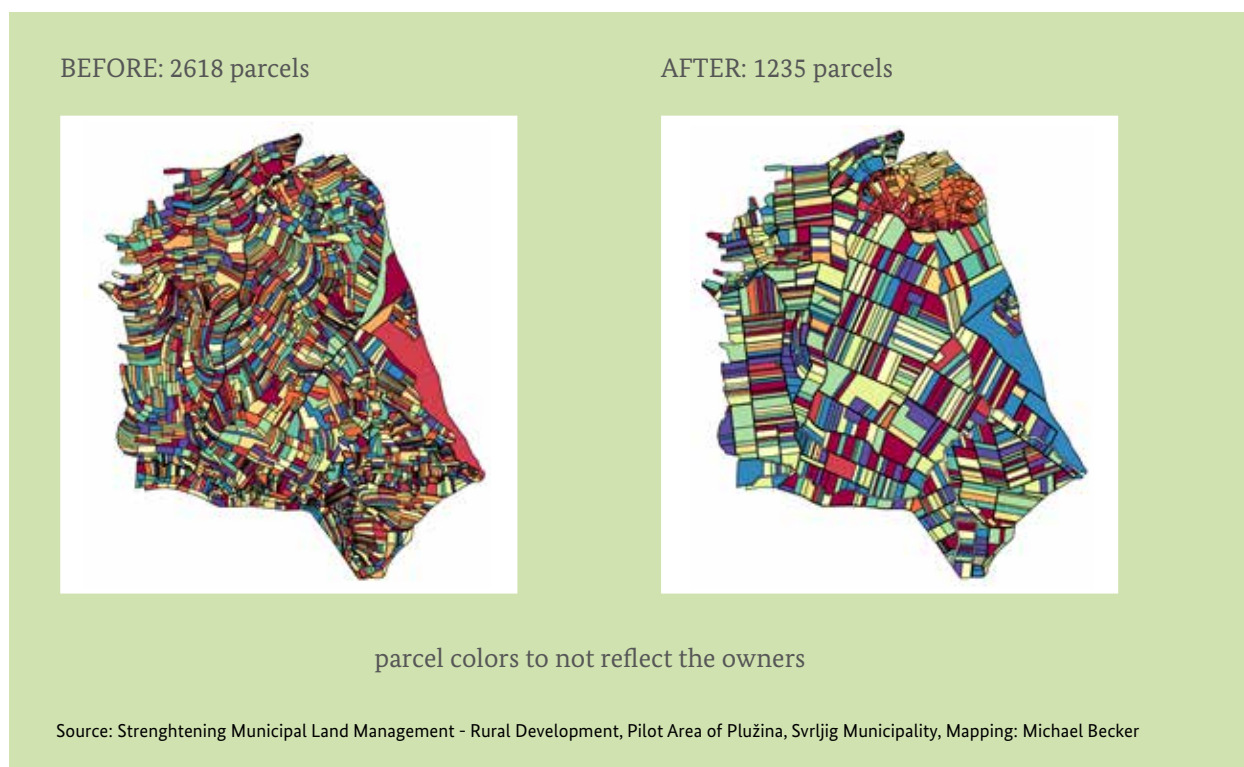
top-down approaches with low transparency and little participation, a modernized approach was elaborated and tested in seven pilot municipalities with a high level of participation and transparency. A special focus placed on the following four EU best practices for land consolidation:

- Active participation of all farmers and other stakeholders from the very beginning
- Improvement of the land valuation methodology
- Integration of environmental impact assessments when planning public and common facilities and the establishment of a landscape development plan
- Additional checks and balances on the local and national level in order to guarantee the quality of all land consolidation implementation steps and to increase decision transparency (e.g. board of participants, supervision of contracted works)

These modernized land consolidation procedures have attracted great interest in the ongoing land consolidation pilot projects. A participatory approach, including all stakeholders, has built the basis for creating a trusting atmosphere and mutual understanding. Due to the high acceptance by the land consolidation participants, the national and local government initiated an extension of the land consolidation areas of three pilot municipalities with additional governmental funding. The first pilots are expected to be finalized soon (early 2015). In the next step, draft amendments to the law on agricultural land as well as new bylaws will be proposed based on the experience and findings made during the piloting of these innovative processes.

Peer-to-peer learning approaches were an efficient way to transfer knowledge from other countries to Serbia. Study tours to European member states provided insights into the practical solutions and results experienced in the corresponding countries. Various discussions provided opportunities to clarify special issues. The participation of the Serbian governmental staff at regional and international conferences and round-table discussions on legal issues with EU member states in the region intensified the knowledge transfer and connected state officials to regional and international expert networks. Round-table discussions helped in understanding the process of EU accession and its legal requirements in the context of rural agricultural land management. These peer-to-peer learning approaches proved to be successful and effectively improved the learning processes of participants from local and national Serbian governments.

Figure 2: Parcels before and after land consolidation in Serbia



2.1.4 Spatial Database Development Approach for Cadaster/Land Registry and other Spatial Data

GIZ projects in Serbia mainly supported spatial database development in the context of municipal GIS. In the “GIS Guideline For Local Self-Government in Serbia” (see: 2.1.3), special attention was given to international OGC⁵ standards like, for example, simple features and web services, ISO 191xx⁶ standards, as well as the orientation towards EU standards according to the INSPIRE⁷ directive. All of these standards guarantee the data discovery on the web and the interoperability of data between different IT systems and countries. They are essential in paving the way for the development of a National Spatial Data Infrastructure (NSDI).

An example of Web GIS application development, according to the INSPIRE directive, is the application for urban plans for the city of Čačak. In a first step, a conceptual UML data model⁸ was adapted to Serbian needs followed by the implementation of an object-oriented vector-based urban plan and its provisioning in a Geoportals.

Figure 3: Web GIS application - Urban plan



Source: GDI portal of Municipality Čačak / Serbia

5 The Open Geospatial Consortium (OGC) is an international voluntary consensus standards organization

6 ISO 191xx are series of geographic information standards

7 INSPIRE - Infrastructure for Spatial Information in the European community

8 Unified Modeling Language (UML) for conceptual software application and its visualization

2.1.5 Networks and Cooperation

Land Management /Cadaster project (2003-2009)

There was national cooperation with the “Standing Conference of Municipalities and Towns (SCTM)” with regard to municipal GIS guide development and training on GIS implementation and nationwide knowledge dissemination (see: 2.1.3). Furthermore, within the framework of cooperation with the faculty of Geodesy and Geography at the University of Belgrade, students received training in the management of small municipal GIS projects. Among others, they developed an inventory of monuments on municipal land and GIS applications for city bicycle paths.

Regional cooperation and information exchange were conducted between institutions in the neighboring countries of the former Yugoslavia through workshops, conferences and fairs. This peer-to-peer approach facilitated the process of finding solutions to similar challenges typical of this region.

Starting early in the project, study tours and knowledge exchanges between Serbian and German experts were well-received based on cooperation with national and local governments, universities, as well as with the private sector in the state of Baden-Württemberg (BW). For the Serbian partners, it was extremely interesting to gain insights into German structures, the institutional setup, and the mutual institutional cooperation in BW. Consulting services for improving the legal framework and its comparison with German cases intensified the knowledge transfer. These positive experiences led to the application for an EU Twinning project. In 2006, the EU gave a mandate to the Baden-Württemberg Ministry of Food and Rural Regions for the Twinning project with a partner institution, the Republic Geodetic Authority (RGA). The project entitled “Institutional capacity building to manage land and real property information at the Republic Geodetic Authority” was implemented in cooperation with the GIZ and successfully completed at the end of 2008 (see: 2.1.6).

Strengthening Municipal Land Management (since 2010)

Module 1: Urban Development (since 2010)

The urban land management module partners with the University of Belgrade, the faculties of the architecture and civil engineering departments, and geodesy. An essential objective is the adaptation of the corresponding curricula in view of the land management instruments. A master course entitled “Integrated Urbanism” was set up at the department of architecture. Students were involved in integrated urban development strategies within the scope of their master’s theses. As an interviewee mentioned: “The national expert for urban planning will leave the GIZ project and move to the university. This will guarantee sustainability and the dissemination of knowledge that she gained over the course of the project”. The civil engineering faculty is involved in the property valuation process and is highly respected.

Module 2: Rural Development (since 2013)

The ongoing rural land management module initiated a round-table discussion on legal issues with EU member states from the region within the context of rural land management in order to openly discuss the process of EU accession and its legal requirements. In cooperation with FAO, the project organized a LANDNET conference in Serbia with an international group of experts from state organizations and academia. A field excursion was organized as part of the conference to show the progress of land consolidation in Serbia in one pilot municipality, and to jointly reflect on it.

2.1.6 Cooperation with Other Donors

Land Management /Cadaster Project – EU Twinning Project

As already mentioned above, the EU Twinning⁹ project titled “Institutional capacity building to manage land and real property information at Republic Geodetic Author-

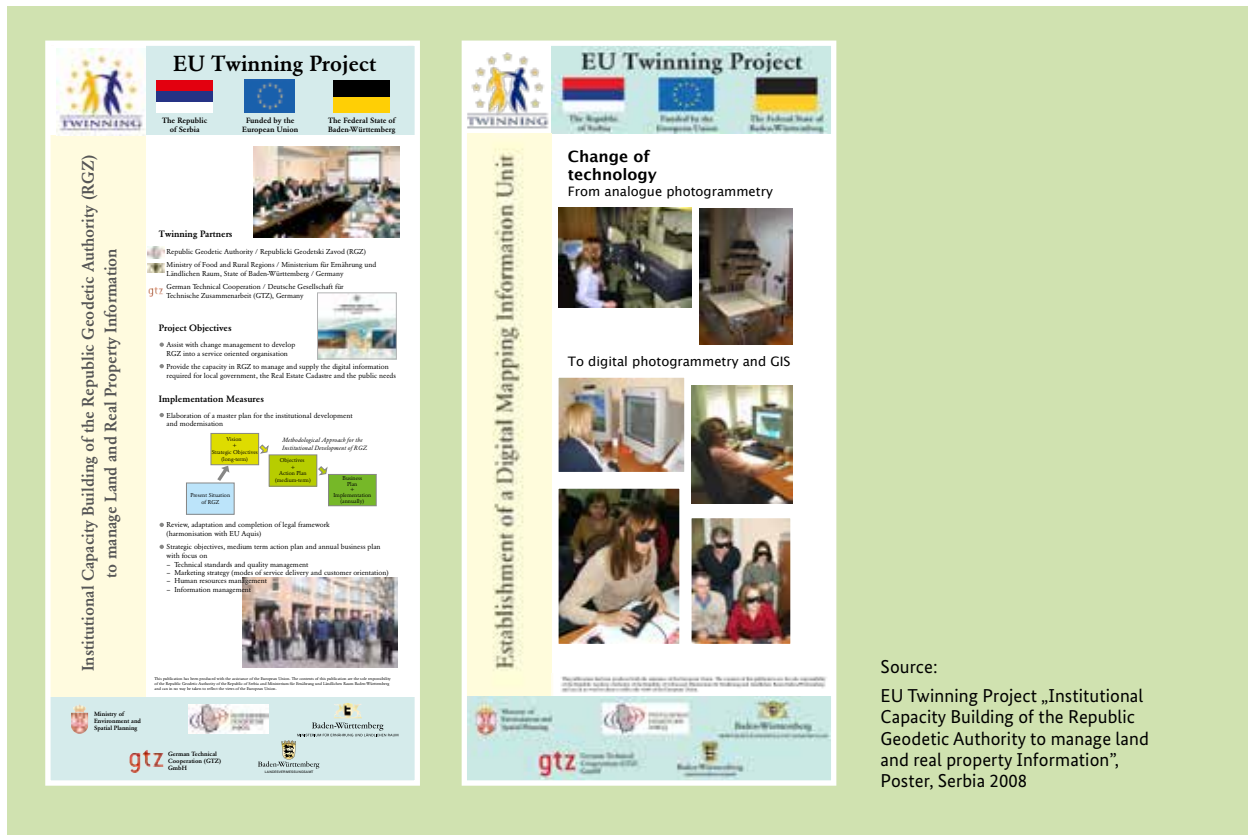
ity” started in May 2006 and ended in November 2008. Twinning partners included the Republic Geodetic Authority (RGA), the Republic of Serbia, and the Ministry of Food and Rural Regions Baden-Württemberg in cooperation with the GIZ. The Twinning project was managed by a GIZ project leader, a GIZ project manager, a co-project leader of the Ministry of Food and Rural Regions Baden-Württemberg, as well as two resident twinning advisors (RTA) in close cooperation with the RGA. It consisted of the following components:

- “Change management and institutional restructuring”
- “Establishment of a digital mapping information unit (DMIU)”
- “ICT strategy throughout period of project”

The first Twinning component in particular, “Change Management and Institutional Restructuring”, covered certain activity fields of GIZ’s “Land Management/Cadaster” project, for example in regard to consulting services for improving the legal framework. In order to avoid overlapping, the GIZ “Land Management/Cadaster” project adjusted its project concept and increased its focus on the intensive support of municipal GIS in pilot municipalities. Due to the permanent presence and consulting services of a large number of German experts, the visibility of the Twinning project in RGA is still higher to date than the “Land Management/Cadaster” project. Interviewees in RGA stated: “The ongoing discussions with German experts were a very successful aspect. Twinning gave us the best practical basis and know-how for conducting follow-up projects like the French IGIS (Integrated Geo-Information Solution) and the Japanese (Topographic Mapping) for NSDI development. We still use the excellent twinning guidelines for photogrammetry/remote sensing today. The participative and highly practical approach was very good.

⁹ The Twinning Project is an instrument for the cooperation between the Public Administrations of EU Member States and of Beneficiary Countries. It aims to support the transposition, implementation and enforcement of the EU legislation (Acquis Communautaire). An essential aspect is to share good practices developed within the EU. http://ec.europa.eu/enlargement/tenders/twinning/index_en.htm

Figure 4: EU Twinning project at RGA, Serbia



Source:
 EU Twinning Project „Institutional Capacity Building of the Republic Geodetic Authority to manage land and real property Information”, Poster, Serbia 2008

The partnership between “Land Management/Cadaster” and Twinning projects concentrated on several common activities for improving cooperation between the RGA and its subordinated local offices, as well as in setting up a private sector.

The coordination between active donors in the RGA during the twinning period, the World Bank, SIDA, and the Norwegian Government resulted in mutual reporting rather than coordinated activities. Different approaches concerning land registry/cadaster made it difficult to harmonize donor activities.

Strengthening Municipal Land Management – EU Co-Financing

The “Strengthening Municipal Land Management” project is being co-financed with EU funds since 2013 in the newly-added second module “Rural Development – Effective Land Management”. In addition to the GIZ project monitoring system, a steering committee was set up with representatives of the main implementation partners of the EU delegation and the GIZ. Interim reports have to be submitted every six months. On the one hand, significant results can now be obtained due to the budget increase, but on the other hand, the use of GIZ structures for project management saves project management expenses.

2.1.7 Good Practices and Lessons Learned in Serbia

Good practices

- The introduction of **municipal GIS** was not only a matter of IT technology. The awareness-raising on the benefits of a GIS for municipal land management and other municipal tasks was essential. Besides the transmission of technical know-how, the capacity building focused on process support in the overall GIS implementation management. A critical starting point was the obtainment of common agreements between different municipal departments and enterprises for data sharing. The technical realization of GIS could only be started after having successfully reached a consensus and having signed an MoU.
- The **scaling-up approach** for the municipal GIS implementation proved very successful and sustainable, starting with five pilot municipalities, followed by the inclusion of the “Standing Conference for Towns and Municipalities (SCTM)” for nationwide dissemination of the knowledge gained. A further result of the municipal support was the creation of an informal GIS network with annual meetings and regular inter-municipal exchange.
- The **participatory GIS guide elaboration** process with the intensive commitment of more than 10 municipalities led to the practice-oriented guide, which especially covered Serbian needs. “The practice-oriented guide itself was and is still very useful for the municipalities. It is not only a technical guide. Its main feature is how to manage the establishment of a GIS in municipalities”, according to the statement of an interviewee. The guide was distributed by SCTM.
- Essential measures included **international study visits** to administrations and institutions in different countries that had faced similar challenges. This provided the basis for a common understanding of the processes to be implemented for all persons involved.
- **On-the-job training and the training of trainers** for the further dissemination of knowledge has proven to be highly appreciated. An essential point was the trainers’ good qualifications and practical experience.
- The **parallel support of universities and educational institutions** in the “land sector” contributes to ensuring that the education of qualified experts is sustained. It has proven to be extremely beneficial:
 - a. in cooperating with several faculties/departments in covering all fields that deal with urban and rural land administration and management
 - b. in introducing new topics based on real projects that have already been implemented in Serbia
 - c. in including lectures in practical project activities and
 - d. in introducing modern/innovative ways of teaching.
- The **bottom-up methodology** for the introduction of innovative urban land management instruments primarily in municipalities and the subsequent drafting of proposals for the adaption of laws on the national level has proven its usefulness.
- In view of **urban land management**, an essential point is the improvement of **participation for urban planning** from the very beginning. This transparent process guarantees acceptance by citizens and avoids possible conflicts later on.
- In view of **rural land management**, the remarkable participatory approach in the still ongoing innovative land consolidation processes in pilot municipalities has built a trusting atmosphere and mutual understanding. **Peer-to-peer learning approaches** have strengthened this positive development from the beginning.
- A **Web GIS implementation** of an object-oriented vector-based urban plan and its provision in a Geoport has taken into account the **EU INSPIRE** directive for spatial data and further international standards. Compliance with these standards will guarantee data interoperability.

Lessons Learned

- All partners from the national as well as local level should already be deeply involved in the early project planning stage. Especially in a former centralized state system, potential future conflicts during the project planning process can be prevented in time through careful mediation between stakeholders with potentially contradictory opinions.
- A broad project approach that focuses not only on setting up land administration, but also on the use and benefit of cadaster and property data necessarily fosters the willingness for cooperation between the national geodetic/cadaster authority, local governments, and other national institutions. The introduction of land management tools into such a project in a timely manner prevents the uncontrolled conversion of agricultural and green land into construction land before private land ownership is reintroduced.
- In a politically difficult environment with frequent controversies between interests on the municipal and national level, a broad holistic project approach allows, if needed, some time to be gained by temporarily shifting the project focus to less sensitive activity fields.
- Although many change processes were initiated in the field of urban and rural land management and the understanding of innovative instruments has grown significantly on the local and national level, a long-term perspective is necessary for further development, particularly in view of developing financing models. Referring to land consolidation, an interviewee from the university said, for example, “We had seven small land consolidation projects, the university had the technical supervision, and all were satisfied. Nevertheless, these were only pilot projects. In a second phase, we need a professional phase with “real” projects that Serbia guarantees the financing for.”
- Although the innovative methodology for urban plan development was appreciated and essential knowledge was transferred, the overall implementation process has to be considered as well. An interviewee mentioned: “GIZ is always doing pilot project measures. If the plans developed will not be enforced, they are useless.”
- Since the provision of cadaster data for municipalities and other national institutions is an indispensable necessity for the implementation of most of the land management instruments, this issue must already be considered and regulated with the partners in the early project planning phase.
- Finally, more focus on donor coordination could avoid contradictory support by different donors. Ideally and in line with the Paris Declaration, the partner is responsible for and should ensure the coordination.

2.2 Bosnia and Herzegovina



2.2.1 Initial Situation

The land registry was introduced in 1884 in Bosnia and Herzegovina during the Austro-Hungarian Empire period. This system covered the whole territory of the Republic of Bosnia and Herzegovina, and was continuously maintained until 1945. Neither the end of World War II nor the socialist revolution caused crucial changes in the traditional procedure of the land register books' maintenance. However, because a huge quantity of real estate became state-owned land during the period of socialism in Yugoslavia, the attitude toward immovable property essentially changed. This led to a lack of motivation to keep the land register up to date. Nevertheless, the maintenance of land register books was still done according to the old laws (from 1931) of the Kingdom of Yugoslavia, which were based on the laws of the Austro-Hungarian Empire. A new legal basis was enforced with the new land registry law in 2002. This "law on land registry" had been "imposed" by the High Representative of the International Community in Bosnia and Herzegovina, followed by its adoption in both entities, the Federation of Bosnia and Herzegovina (FBiH) and Republika Srpska (RS). Since the old land register books were never repealed, the update procedures of these old books were just adapted to new regulations.

The above-mentioned legal tradition of the registration of immovable property in land registers was interrupted during the socialist period in Yugoslavia. In 1984, a "Law on Survey and Real Estate Cadaster" was adopted with the intention of revoking the competence of the courts to maintain the land registry, and to transfer it to the cadaster offices in the individual municipalities. At that time, a common real estate registry should have been established. This new real estate registry had only been implemented in a small number of municipalities before 2002. Most municipalities, more than 90%, continued with the traditional updating of the land register books. Moreover, since World War II, many records and documents related to immovable property had been destroyed. The situation became worse during the last war (1992-1995), when many people were displaced and the legal

entries in the land registers often no longer corresponded to the people who occupied the land. Besides, the above-mentioned main systems of ownership recording, some other historically inherited systems such as an "evidentiary cadaster" (census cadaster), for example, existed in some areas too.

With regard to cadaster maps, the situation was as follows: The old land registry books referred to old analogue (paper) maps, which were mainly produced in the scale 1:6250 during the Austro-Hungarian Empire period. A completely new land survey was executed from the 1960s to 1990s based on a systematic aerial survey with signalized parcel boundary points on the ground. By means of 3D stereo mapping, large scale cadaster maps were generated. However, the parcel numbers did not correspond to the system of the old maps. Hence, they were not linked to the land book numbering system, which led to an increase in contradictions during the updating procedures. Cadaster maps and land books drifted further and further apart.

Complexity of Institutional Setup in BiH

The land administration sector covers both entities – the Federation of BiH (FBiH) and the Republika Srpska (RS) – and the independent district Brčko (see: 2.2.2). Both respective ministries of justice and geodetic administrations were the primary project partners. In the RS, the geodetic administration is centralized with branches in the municipalities. In the FBiH, the cadaster is managed at the municipal level, whereas the cantonal level is in charge of quality control and the federal level is responsible for issuing standards and financing new surveys. Since the reform of the court system in 2003, the land registry is managed by 48 Courts of First Instance (19 courts in the RS, 28 in the FBiH, 1 in Brčko).

2.2.2 General Project Approach and its Evolution Over Time

The "Land Administration Project (LAP)" in Bosnia and Herzegovina was conducted from 2006 until 2011. It was built upon the originally separated GIZ predecessor "Cadaster" (2001-2005) and "Land Registry" (2003-2005) projects.

Since Bosnia and Herzegovina emerged from the war with a highly complex state structure consisting of two largely autonomous entities, the Federation of Bosnia and Herzegovina (FBiH) and the Republika Srpska (RS), and an additional district with its own special status and administration (Brčko), the project partners were the corresponding ministries of justice and geodetic administrations of both entities. In Brčko, the cadaster administration was the contact institution.

The original “Cadaster” project, which GIZ commissioned into a consulting consortium¹⁰, started with the support of the three pilot municipalities Trebinje (RS), Grude (FBiH) and Brčko, and later included the Sarajevo center cadaster office as well. As a result, 27 local experts were qualified through training for future project tasks like scanning, geo-referencing and vectorising analogue cadaster maps, field surveying with modern RTK-GPS-technologies (GNSS), and further data processing procedures. After the High Representative “imposed” the new “Law on Land Registry” in 2002, the responsibilities of cadaster and land registry were definitively divided. Consequently, the cadaster project also focused on supporting the institutional set up of cadaster and land registry authorities. With regard to the legal framework, the cadaster project supported the drafting of a new law on cadaster, by-laws, and other essential administrative instructions like regulations for cooperation with the private surveying sector.

The Swedish and Austrian governments co-financed the GIZ land registry project (see: 2.2.6). Its main objective was to support the systematic implementation process of the new land registry law throughout the country in 48 land registry offices through equipment provisioning, intensive training and methodological support, and by providing additional staff on temporary basis to execute special tasks. A continuous capacity building program for land registry clerks was carried out for legal matters. Intensive support to improve the status and competencies of land registry clerks and to establish a specific professional association strengthened the sector enormously. Sufficient local capacity was developed to provide efficient support through local experts in IT matters, in legal matters, as well as for the maintenance and continuous adaptation

of the land registration system in a new technological or legal environment.

In 2005, in close coordination with Sida and ADA as co-financing partners, GIZ designed a follow-up “Land Administration Project (LAP)” that unified the previous cadaster and land registry projects and included technical assistance for the implementation of the planned WB Land Registration¹¹ project as well. Still, in 2005 an MoU was signed, according to which the project steering should be assured by a “Land Administration Coordination and Advisory Board (LACAB)”. Although at that time this board was appointed by the council of ministers as a national land policy board also in charge of directing the upcoming WB project and other potential sector projects, it had been neither possible to develop common strategic guidelines, nor to establish efficient coordination at the BiH level during the project’s duration.

The LAP started in 2006 with the overall project objective to support the implementation of effective and efficient land administration in BiH in contributing to the establishment of appropriate legal, institutional and operational framework conditions. A main goal was the harmonization of cadaster and land registry. As a result, the LAP carried out consulting services on a national and local level by pursuing a systematic, multi-level approach. While on national level the focus was on the treatment of sector-political issues, the legal framework and standards, the advice on local level focused on practical solutions in the field of land registry and cadaster.

For various reasons, the preparation of the last project phase (2008-2011) started under difficult conditions. Following general elections in October 2006, it was necessary to wait for more than 6 months until new governments were appointed at the BiH and FBiH levels. The appointment of new ministers and new directors of public institutions implied new understandings, new approaches and policies, and time losses because of discontinuity. In addition, the implementation of the WB-funded “Land Registration Project” started in May 2007. Consequently, the main LAP project partners had more financial resources available due to the effectiveness of the WB loan,

10 GFA-Terra Systems and GCI - Dr. Schindler GmbH

11 <http://www.worldbank.org/projects/P096200/land-registration?lang=en>

and felt capable of implementing activities without the technical assistance of LAP. Although the LAP project had significant success (see: 2.2.3) and was the precursor to the WB financed “Land Registration Project”, or in other words built its foundation, the perception of the LAP changed enormously within a short period of time. The technical cooperation principle of providing consulting services but not financial resources was no longer accepted. The partners were not convinced that further intensive support in capacity development was still necessary. The LAP was increasingly perceived as a project with the objective of supporting the WB project, which meant that it should only fund the necessary human resources to strengthen their own teams and provide additional financial resources to supplement the WB loan. This approach was not acceptable to the LAP donors, who were ready to continue funding technical assistance as a process of ownership transfer for the last project phase, but not to suddenly change their policy and become both manpower and funding agencies. Consequently, an exit strategy was jointly agreed to by all donors and partners with a focus on ownership transfer to the partner institutions, and with a focus on achieving sustainability.

In general, lawyers and geodesists had diverging opinions on the implementation approach for a “dual” system, the land registry being under the ministry of justice and the cadaster being under the national geodetic authority. Although the “Law on Land Registry” of 2002 was the result of a long-lasting discussion with all stakeholders and donors, since the beginning, this “imposed” “Law on Land Registry” never achieved full acceptance by the geodetic administrations. This led to permanent frozen conflicts in the course of the projects. The situation was aggravated by the advent of additional donors who promoted the unification of the cadaster and land registry under one authority. Shortly after the LAP project’s completion in 2011, the Republika Srpska unified the cadaster and land registry under the geodetic authority, which could be considered a major setback for the efforts undertaken by the LAP.

Actually, FBiH also submitted a draft of a common cadaster and land registry law to its parliament in order to shift the responsibility of the land registry to the geodetic authority.

2.2.3 Looking at Some Practices in Detail

- The “Law on Land Registry” of 2002 divided the responsibilities of the land registry and the cadaster. The land registry was assigned to its respective ministry of justice, and the cadaster to its respective geodetic administration. The focus of the “Land Registry” project was to support the implementation of this law. Intensive capacity building was done nationwide for clerks, and the development of a “best practices handbook” for registration processes achieved broad acceptance from legal experts.
- The new “Law on Land Registry” was broadly accepted by lawyers, whereas the geodetic administrations had objections to its separation of responsibilities. They would have preferred an integrated solution under the roof of the geodetic administrations. Consequently, an essential need was to reach a better understanding and cooperation between the land registry and cadaster stakeholders. This was realized by organizing common multidisciplinary conferences and “round-tables”.
- The development and nationwide implementation of new software for the land registry “LARIS” essentially improved the land registry data management and data exchanges with other institutions (like banks and notaries). Consequently, the business processes for entries in the land registry were simplified, standardized and accelerated. The accompanying increase in transparency was an important step against corruption.
- The development of a standardized nationwide conceptual spatial cadaster data model (see: 2.2.4) paved the way for the facilitation of the administration and exchange of spatial data. Procedures for the harmonization of land registry and cadaster data had been developed and tested in many municipal cadaster offices.
- The modernization of land administration services allowed the development of strategies for e-services and the efficient use of information and communication technologies. These services concerned the development and adoption of new technical standards like data models and new business processes for the harmonization of cadaster and land registry records, as well as the computerization of land registry records and establish-

ment of new procedures. Online access to land book records and cadaster records was realized in various parts of BiH.

- Improvement of the professional qualifications of land administration specialists: the professional skills of most of the staff were improved significantly thanks to multidisciplinary training programs in legal, technical, IT and management issues, and a permanent infrastructure was established (six training centers).
- Functional and reliable land registry: in all 48 first instance BiH courts, the land registry records were digitized and are now managed in digital form using the same processes. Most of the services are provided immediately or in less than three days. The land registry offices became reliable and efficient partners of the land market, as was stated in the WB Doing Business Report of 2010.

2.2.4 Contribution to Spatial Database development for Cadaster and Spatial Information

An essential LAP project outcome for the cadaster administration was the development of a conceptual cadaster and topographic data model. This model was designed by a working group of international, regional and national GIS, cadaster and IT experts. Essential quality parameters can be stored in order to get information on the quality of graphic cadaster data (e.g. origin of data set based on surveying, on photogrammetry, or on scanning). The model was drafted in unified modeling language (UML) and meets modern international OGC¹² and ISO191xx¹³ standards for geographic information. These standards guarantee high quality GIS development and interoperability via web services. Consequently, it can serve for the integration of cadaster parcels into a National Spatial Data Infrastructure (NSDI), taking into account the INSPIRE¹⁴ directive.

12 The Open Geospatial Consortium (OGC) is an international voluntary consensus standards organization

13 ISO 191xx are series of geographic information standards

14 INSPIRE – Infrastructure for Spatial Information in the European community

The directive from May 2007 aims to create a European Union (EU) spatial data infrastructure. This will enable the sharing of environmental spatial information among public sector organizations, and will facilitate considerably public access to spatial information across Europe. Based on the conceptual cadaster data model, the development of a cadaster information system was carried out later by the World Bank “Land Registration” project.

2.2.5 Networks and Cooperation

Cooperation between Professionals

In the context of legal real estate transactions, an efficient and functional partnership between the private sector (lawyers, notaries, banks) and the land registry offices was established. The adoption of spatial information standards has improved significantly. The exchange of data between private geodetic companies and the public administration increased in speed and quality.

Regional and International Cooperation

The project promoted cooperation between institutions of BiH and corresponding institutions in neighbor countries, as well as between other countries worldwide. BiH institutions now actively participate in the Regional Conference on Cadaster and SDI and its Permanent Regional Technical Commission, and are members of EuroGeographics¹⁵.

2.2.6 Cooperation with Other Donors

The “Land Administration Project (LAP)” in BiH was executed from 2006 until 2011. Its costs were shared equally by the German, Swedish and Austrian governments with GIZ as the implementation partner. The project was built on the basis of the originally separate predecessor projects GIZ “Cadastre” project (2001-2005) and GIZ “Land Registry” project (2003-2005), whereas the “Land Registry” project had originally been co-financed by the Swedish government and joined by the Austrian government in 2004. Hence, the LAP was a continuation of the existing co-financing structure with other “Land Registry” project donors. Based on the conclusions of the Paris Declaration

15 EuroGeographics is the membership association and acknowledged voice of the European National Mapping, Cadaster and Land Registry Authorities, www.eurogeographics.org

(2005), the LAP took into account the improvement of coordination and synergies between international cooperation projects. Due to a large contribution from three donors, broader support was provided in order to achieve significant results. Additionally, close cooperation with the World Bank was established and maintained in preparing the WB “Land Registration Project”. For example, a social and institutional assessment study was conducted in 2005 that contributed to the World Bank project preparation and to the further planning of project activities to be distributed between donors. After a negotiation phase in 2006, the World Bank Project was launched in 2007. According to the agreement with the partner institutions and the World Bank, the LAP provided the technical assistance while the World Bank funds were used to pay for construction work, furniture and technical equipment, and to pay for the mass digitization of cadaster and land book records. In order to cover as many partner needs as possible, two additional projects were proposed in parallel to be funded by the EU IPA program: the provision of large-scale digital orthophotos and technical infrastructure procurement for the establishment of a satellite positioning service for “Continuously Operating Reference Stations (CORS)”. Both projects were accepted and implemented in 2010-2011. Additionally, the Norwegian government funded a project to develop capacity in scanning existing maps, as well as storing, managing and distributing spatial information. Hence, in view of the preparation and coordination of all of these international projects, the LAP project played an essential role, making them efficient and complementary in the best interests of the beneficiaries.

Some Words on the Co-Funding

The co-funding arrangement between the Swedish government/Sida and Austrian government/ADA had several advantages. Due to the merging of financial resources in a single project, a broad multidisciplinary approach promised concrete results. Additionally, the involvement of experts from the three donor countries Germany, Sweden and Austria contributed to building a common understanding and vision between the donors. The donors’ representatives on-site had no difficulty sharing the same opinion and appearing as a unit in the partners’ view. For the project management, it was very important to communicate that the project plan was developed on the basis of good cooperation and mutual understanding between

the three donor countries. This common position among the three donors also strengthened cooperation with other donors (WB, EU etc.).

From the project management point of view, for future co-funded projects, some improvements should be made in order to provide better efficiency and cost reduction. The donors should agree on a common monitoring organization to avoid parallel monitoring or evaluation missions. This would also be more comprehensible among the local partners, who were sometimes confused when receiving two or more experts one after the other over a couple of weeks asking the same questions about the same project. The donors should agree on the frequency of periodic reporting and budget controlling (for instance, once instead of 3 times per year), and about the relevant indicators. It is very understandable that donors have their own reporting, monitoring and evaluation systems. However, in the event of project co-funding, only one single system should be used.

2.2.7 Good Practices and Lessons Learned in BiH

Good Practices:

- The **co-financing** from Sida and ADA for the “Land Registry” and later “Land Administration” Project was a “trademark” of the project. Only with the large common budget was it possible to start the intensive nationwide capacity building for the support of the successful implementation of the land registration law (2002).
- A highly-qualified **multidisciplinary team** consisting of lawyers, geodesists, IT experts, and PR specialists was able to provide optimal support to the partners in the transformation process.
- A continuous **nationwide capacity building** program for land registry clerks and intensive support in order to improve their status and competencies, as well as the establishment of a corresponding professional association, strengthened the sector enormously.
- Sufficient **local capacity was developed** in setting up efficient support through local experts in IT matters, as well as in legal matters, for the maintenance and con-

tinuous adaptation of the land registration system to a new technological or legal environment.

- Conceptual **cadaster and topographic data modelling** by an LAP working group formed the basis for the software development and implementation through WB.
- Based on the experience and established structures of **the GIZ project, the World Bank found optimal conditions** for setting up its project.
- Professional manuals were developed and maintained for land registry issues, as well as technical standards for the cadaster sector. Both have been in daily use by professionals.

Lessons Learned:

- The cooperation with the partners as well as the coordination between partners was highly influenced by the complex political structures of BiH. Originally, the setting up of a “Land Administration Coordination and Advisory Board (LACAB)” initiated by the World Bank should have served as coordination on state level. This failed due to the difficult political situation in BiH. Consequently, the LAP had to cope with the task of cooperating with four mainly independently acting institutions. Besides the provision of technical competence, its function as a mediation board might have been advantageous in solving political blockades.
- The stability of the legal framework is a basic condition for the successful implementation of land administration projects. From the very beginning, the “imposed” “law on land registry” in 2002 was not fully accepted by the geodetic administrations, which over the course of the projects led to permanent frozen conflicts. This situation should have already been taken into account in the early planning process of the land registry project in 2002. In order to establish mutual trust and understanding between the “legally oriented” lawyers and the “technically oriented” geodesists, awareness-raising might have been considered, and a mechanism for their interaction should have been developed in time.

- Choosing between a “dual” or “single” administrative solution for managing the land registry and cadaster is not important, but a clear separation and the strong coordination of legal and geodetic functions is in any case “a must”.
- Before starting with a large project/program, a “fact finding” project might be carried out in order to first assess the existing situation and partner needs in the best manner.
- If a partner country makes a decision to go in one direction (single or dual solution), it needs to stand by that decision unless the first approach proves not to be feasible.
- When a solution has been implemented and is running well, it should be respected by subsequent donors in the sector. At that point, they should not promote and support the introduction of completely new solutions.
- Shortly after the termination of the LAP project in 2011, the Republika Srpska (RS) unified the cadaster and land registry under the geodetic authority, which could be considered a setback for some efforts made in the LAP.
- In order to guarantee cooperation between competing ministries, adequate conditions for the partners have to already be defined in the project planning phase. On this issue, an international consultant stated: “If national authorities (ministry of justice and geodetic administration) are competing with each other and are blocking each other accordingly, the donors (GIZ) are consequently squeezed in between and the success of a project is called into question.”
- From the project management point of view in co-funded projects, donors should agree on one single common monitoring system, not only for increasing efficiency and cost reduction. Partner confusion can be avoided by jointly undertaking similar monitoring and evaluation missions.

2.3 Montenegro



2.3.1 Initial Situation

The historical development of the land registry and cadaster systems in some regions of Montenegro dates back to the Ottoman Empire and the Austrian-Hungarian Empire, followed by the socialist period. Generally, the relationship to real estate changed during the time of the Socialist Federal Republic of Yugoslavia, which expropriated and converted land into state land. Following its breakdown, a process of rapid privatization started. All of this resulted in an unclear and contradictory legal situation regarding real estate. The national cadaster/land registry authorities, as well as the subordinated local offices in the municipalities, faced the challenge of solving this complicated situation. Hence, the municipalities were limited in their ability to collect real estate taxes, and municipal sources of revenue were highly restricted for investments and other spatial and urban planning purposes.

2.3.2 General Project Approach and its Evolution Over Time

The project “Municipal Land Management Montenegro” started in 2004 and ended after three phases in 2012. The overall project approach concentrated on the valuation or benefit of land registry and cadaster in municipalities. The main project goal was to improve the legal security of the real estate, as well as the use of the land resources with regard to municipal planning and administration tasks. An essential area of focus was to support the increase of municipal revenue by improving the ability to collect property tax revenue. In contrast to a “classical” land registry and cadaster project, the “Municipal Land Management Montenegro” project essentially concentrated on the support of municipalities as local self-governance units and as important users of cadaster and land registry information. Consequently, the project strengthened networking among the municipalities, and coordination and cooperation between national institutions like the “Ministry for Environmental Protection and Urban Planning” (later “Ministry for Sustainable Development and Tourism”)

and the National Cadaster and Land Registry Authority (the National Head Office for Real Estate – HofRE). Furthermore it promoted cooperation with the private sector (spatial planning and land surveying offices).

In 2004, the project started with the support of three municipalities in the coastal regions, followed by an expansion to six municipalities overall, including Herzeg Novi, Budva, Bar, Kotor, Tivat and Ulcinj. Its main activities were capacity development in the field of management, planning, and the provision of technical equipment. At the end of the first project phase, professional access and the use of cadaster/land registry data had already improved dramatically. Employees became aware of the potential for diverse benefits from cadaster data for municipal purposes and its possibilities for implementation. The procurement of municipal GIS software for the six municipalities covered modules for raising property tax, for urban planning, and for the management of municipal real estate.

In 2006, the project scaled-up the support to the 21 municipalities nationwide. An essential condition for the project’s development was that HofRE accepted to provide cadaster data to the municipalities on a regular basis. The steady improvement of the GIS applications in the municipal tax offices as well as the training and improvement of the IT-infrastructure led to a dramatic increase in tax revenues.

Concerning spatial planning, the project supported the development of a national spatial plan that was officially adopted in March 2008. The cooperation between municipal urbanism departments and HofRE, and the networking among urban planning employees between municipalities was improved. This resulted in the successful development of many diverse urban plans. As a result, the support of the project focused on development priorities that had been identified in collaboration with the municipalities. Hence, several general and detailed urban plans were set up and officially adopted. Three state location studies in nature conservation areas were conducted and adopted. Additionally, the drafting of a strategy for integrated coastal zone management had been organized and successfully completed together with the primary ministries responsible, NGOs and the public.

At the end of the project, the Union of Montenegrin Municipalities (UMM) was increasingly involved as an implementation partner with the goal of strengthening the communication and experience exchange between municipalities.

2.3.3 Looking at Some Practices in Detail

Standardization of Spatial Plans

In order to standardize national and local spatial plans, intensive consultation processes were done with relevant public and private stakeholders. As a result, an implementation regulation for spatial plans, the “Rulebook on detailed contents and format of planning documents, as well as on Criteria for Land Use, elements of Urban Regulation and the Standardized Graphical Symbols” was set up. For the first time since the collapse of the former Yugoslavia, a mandatory regulation was adopted for a homogenous structuring and visualization of spatial plans and urban land use plans. It was essential that this regulation and the included data model fulfill the EU-INSPIRE directive and consequently allow the standardized provision of spatial data in the field of spatial planning. This guarantees data interoperability between different institutions. The standards are a basic prerequisite for future integration into e-government services and the improvement of the participation of institutions and citizens in the planning processes. Based on spatial elements defined in the rulebook, the data model “MonPlanGML - Data model for spatial and urban planning in Montenegro” was developed in accordance with the international standards.

Integration of Environmental Aspects in Spatial Planning Processes

A particular focus was put on the integration of environmental aspects in the course of spatial planning processes. In 2008, Montenegro passed a law regarding strategic environmental assessments according to the corresponding EU directive. Practical implementation remained a challenge. Based on the law, an improvement of subordinated regulations and guidelines was made in close cooperation with the ministerial departments for spatial planning and environment. This led to a more efficient and objective

assessment of spatial planning drafts and environmental reports. Integrated experts¹⁶ also supported this process.

2.3.4 Spatial Database Development Approach for Cadaster/Land Registry and other Spatial Data

The municipal GIS software with its main module for raising property taxes was tendered in the first project phase, beginning with three municipalities. The bidding document had been set up carefully and explicitly covered the general requirements for a modern GIS system, including the common international standards of OGC¹⁷ and ISO191xx¹⁸. Nevertheless, the “low cost” winner of the tender did not completely fulfill all requirements. Essential improvements are still needed to date, mainly in the graphical part of GIS. In fact, the software guarantees the regular synchronization of the alphanumeric cadaster data provided by the national cadaster and land registry authority, and has in that respect fulfilled its purpose for the municipal tax departments. Based on the software, the tax officers have been able to update the information on real estate owners regularly, which has led to a meaningful increase in tax revenues in most municipalities. However, in view of future developments toward complex municipal GIS systems, the software does not yet guarantee sufficient interoperability via the web, which is “a must” for data sharing within a future NSDI.

The “MonPlanGML” data model was developed for the purpose of urban planning. It corresponds to the international GML¹⁹ standard, and is based on the spatial elements defined in the “Rulebook on detailed contents and Format of planning documents, as well as on Criteria for Land Use, elements of Urban Regulation and the Standardized Graphical Symbols” (see: 2.3.3).

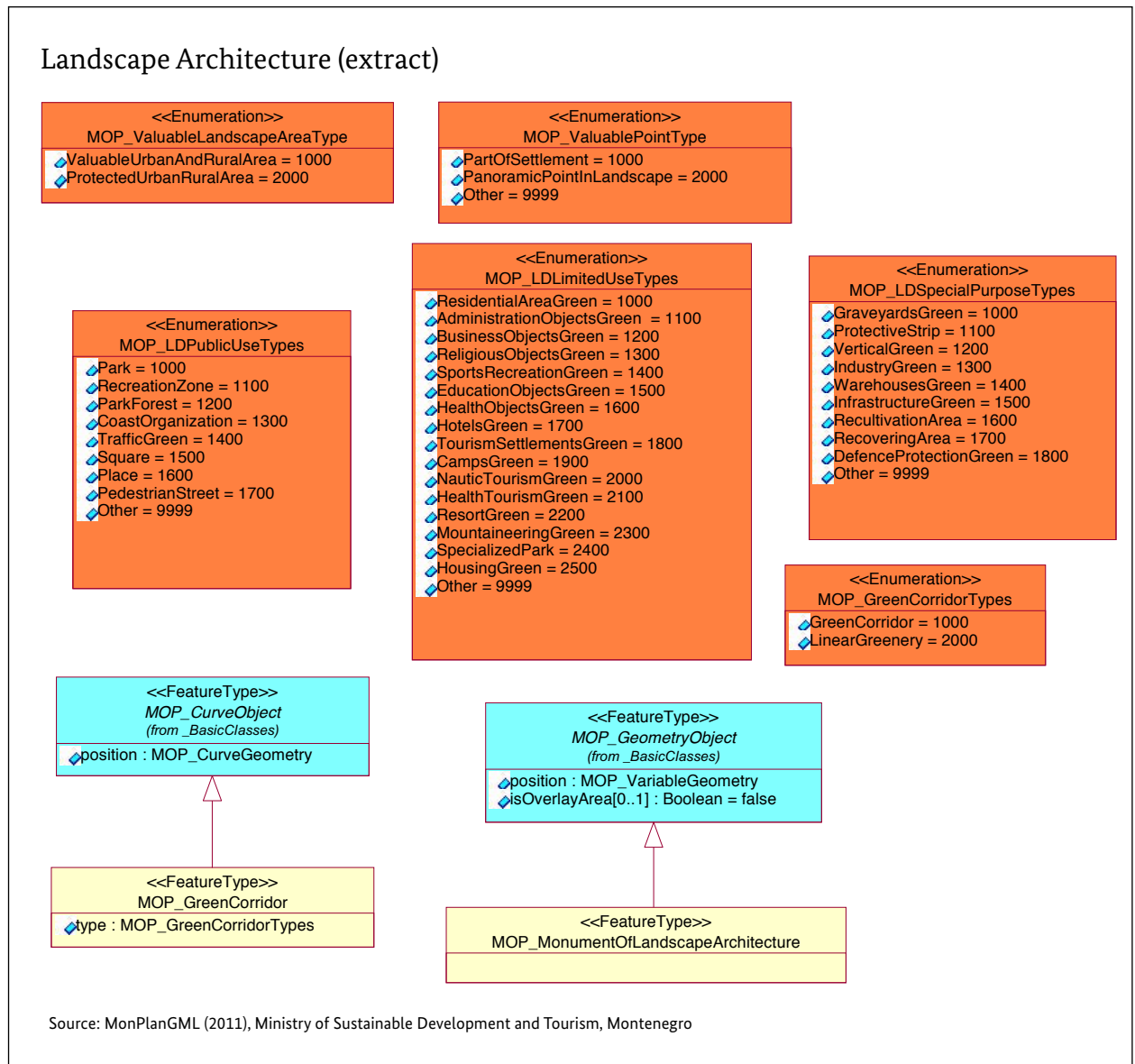
16 Integrated experts from Germany and EU member states are working in key positions in developing and transition countries. They are completely integrated in local structures. <http://www.cimonline.de/>

17 The Open Geospatial Consortium (OGC) is an international voluntary consensus standards organization

18 ISO 191xx are series of geographic information standards

19 The “OpenGIS Geography Markup Language”(GML) is a standard based on XML, which serves for the interoperability of geographic systems and open interchange format in the internet.

Figure 5: UML data model extract for MonPlanGML



This data model also fulfills the INSPIRE²⁰ directive. Therefore, urban plans implemented according to these standards will be ready to be disseminated via the web.

20 INSPIRE – Infrastructure for Spatial Information in the European community

2.3.5 Networks and Cooperation

In 2008, a cooperation between the national cadaster and land registry authority (HOfRE) and the office for “Land-Surveying and Geoinformation Brandenburg” (LGB) was initiated. Several activities were carried out, such as support for conceptual cadaster and topographic data modelling, support for data transformation into the European Geodetic Reference system ETRS89, as well as support for the legal framework.

Motivated by the recognition of the Municipal Land Management project, several implementation partners applied for further projects, which fit the overall portfolio. This caused the German Ministry for Economic Development and Cooperation (BMZ) to accept the execution of the following small projects.

- Integrated Spatial Planning and Landscape Protection (Visual Impact Study) (2009)
- Cross-Boundary Spatial Planning in the Skadar Lake Region, Albania and Montenegro (2006-2008)
- Cross-Boundary Cooperation in the Skadar Lake Region, Albania and Montenegro (2008-2009)
- Cross-Boundary Economic Development, Montenegro and Bosnia and Herzegovina (2009-2011)

A detailed description of these projects would be beyond the scope of this study.

2.3.6 Cooperation with Other Donors

GIZ supported the concept of the WB “Land Administration and Management Project” (since 2009). This led to a coordination of activity fields and avoided overlaps. The World Bank project’s focus was the field of land management, as well as the “United Nations Development Program (UNDP)” on the development of municipal spatial plans in the northern municipalities. However, the GIZ project concentrated on municipal urban plans and plans in national parks that the Ministry of Sustainable Development and Tourism (formerly: Ministry of Spatial Planning and Environment) was responsible for. The component “Land Administration” of the still ongoing

World Bank project included the improvement of offices and IT infrastructure of the HOfRE, as well as financed comprehensive cadaster surveying in order to set up the real estate cadaster. GIZ provided consulting services related to the improvement of data quality, administrative procedures and provision of data.

2.3.7 Good Practices and Lessons Learned in Montenegro

Good Practices:

- The **focus on the use and benefit** of land register/ cadaster data for municipal administration and urban planning was **essential for the high acceptance** of the project. The swift increase in tax revenues in the first six municipalities motivated local and national partners to cooperate nationwide.
- The **approach** of starting the software implementation in a reduced number of three **“pilot” municipalities** facilitated the improvement of the system according to the daily work conditions before rolling the system out in the whole country. This optimized the financial and organizational effort.
- The support of the **horizontal networking** between tax officers in the municipalities led to a constructive knowledge exchange and cooperation in solving upcoming challenges. In particular, in the case of small and financially weak municipalities in the hinterland of Montenegro, this inter-municipality cooperation was an important element in their development.
- Concerning urban land use planning, the approach was to **finance general and detailed urban plan development** using private planning companies. In parallel, capacity development was done using **“round-tables” and working groups** consisting of participants of private companies and municipalities. This resulted in the Ministry of Sustainable Development and Tourism getting the groups involved with all of the consulting processes for the new regulations to be adopted.

- On the basis of the cooperation of HOFRE with the German partner administration, the LGB Brandenburg, a modern **cadaster and topographic data model**, was drafted. It meets **EU-INSPIRE** and other international standards.
- Regarding urban planning, the standardization of national and local spatial plans resulted in a successfully-adopted **official rulebook** and the **data model “MonPlanGML”**. This guarantees that in the future, urban plans will be designed according to **EU-INSPIRE** standards.

Lessons Learned:

- It is essential to provide enough time in the starting phase of a project for cooperation between future implementation partners. Especially in the institutional context where the focus was traditionally not on cooperation and information exchange, it is necessary to gain the partners' confidence, which requires time and does not work under heavy time pressure.
 - The evaluation of the software and IT systems tender should include quality and economic aspects, and not only price. If the lowest bidder is chosen, the risk is that this will result in insufficiently-tested software at delivery. This can place a heavy burden on the project because valuable time is lost due to the necessity of finding “bugs” and doing “workarounds” in order to guarantee the functionality of the innovative working processes to be implemented.
 - The knowledge transfer was enabled by the creation of inter-municipal networking. Within the framework of joint training measures and workshops, municipal officers had the opportunity to get to know each other. This encouraged cooperation and mutual support among the municipalities.
- When working with multiple partner municipalities (21 in Montenegro), an effective approach was to start with those municipalities that have the most pre-conditions and show the greatest interest. Only after having success with these first municipalities were the activities extended to additional municipalities. Using this scaling-up approach, the interest and motivation of follow-up municipalities increased.



2.4 Georgia



2.4.1 Initial situation

For 70 years of Communist rule (1921 to 1991), Georgia was part of the Union of Soviet Socialist Republics (USSR). Private ownership of housing and land no longer existed. It had been converted into state-owned property. After the collapse of the USSR in 1991, Georgia became independent and started a transition toward market-oriented and democratic structures. Following this development, an initial campaign to privatize housing and land was started once the country became independent. Nearly the complete stock of housing was privatized, as well as a large part of the agricultural land. On the one hand, millions of citizens became real estate owners overnight, and on the other, Georgia did not have appropriate administrative and institutional structures in place for land administration to guarantee adequate legal protection in the privatization, to build up an efficient land management, and to launch the economic development of the land market.

2.4.2 General Project Approach and its Evolution Over Time

The first GIZ project on land issues in Georgia was carried out in 1994 with the title **“Land Registration and Land-Use of the Urban Area of Tbilisi”**²¹ in cooperation with the Saarbrücken Surveying Department. Its main goal was to provide initial advice to the Tbilisi urban administration in setting up a cadaster and immovable property register, which was intended to form the basis for overall land management issues, including spatial planning. It very soon became obvious that a land administration system could only be set up on the basis of a broader project concept, which included various aspects of land policy and guaranteed intensive long-term support.

Consequently, on the basis of the experiences gained within the above-mentioned short-term project (a kind of “fact finding project”), the follow-up project entitled

“Land Management Georgia / Cadaster”, also known as **“Pilot Project Tbilisi”**, was set up and began operations in 1995. Its main goal was to support the city of Tbilisi with an overall systemic approach in setting up a modern efficient land management system within the framework of the privatization of land and housing. The project provided advice on the definition of the different tasks and functionalities for Tbilisi Land administration institutions in their interactions and cooperation. It supported the development of methods and procedures related to land administration and land management, and supported the capacity development of managers and experts. Essential support was given for setting up a legal framework for land administration and spatial planning concepts appropriate for Tbilisi.

Due to the successful conclusion of the above-mentioned project with its main focus on Tbilisi, a follow-up project, **“Land Management Georgia”**, started in 2000 and lasting seven years, and led to an extension of the former approach, including a scaling up to additional cities. Complementary to the GIZ project, the KfW project “Introduction of cadaster and land title register” started, focusing mainly on primary surveying and document collection as a basis for registration in intensively-used agricultural areas with settlements (see: 2.4.5). The main GIZ project goal was to improve the legal security on real estate property in Georgia. Above all, special attention was given to the overall benefit, in other words the potential use of the cadaster. This resulted in setting up the project on the basis of the following three pillars:

Pillar 1: Cadaster, Land Title Register, Registration

Set up the cadaster and land registry system for the registration of parcels, buildings and apartments.

Pillar 2: Spatial Planning, Urban Planning

Support the development of spatial and urban planning based on cadaster. As a result, the use of land will become an essential resource for economic, social and ecological development.

Pillar 3: Capacity Development, Curriculum

Support capacity development for managers and experts in institutions and administrations, including the setting up of curricula in universities for land management, spatial planning and urban development.

²¹ German Project title „Registrierung und Nutzen des städtischen Bodens in Tbilisi“

Institutional Development over Time

From the very beginning of the support from GIZ, it was essential to focus on a clarification of roles and responsibilities for the different Tbilisi municipal administration units and other institutions in dealing with land administration and land management. Still, at the end of 90s, the institutional setup was quite complex and inhomogeneous due to its different historical roots. At that time in the Tbilisi city administration, the “Office for Land Resources (ABV)” was responsible for land registration and cadaster, surveying and real estate. The “City Architecture Office (SAB)” was responsible for urban planning. The “Inventory Office (IB)” kept the records of use on rights for housing and land from the socialist period, hence the main evidence for proving ownership after privatization. The “Aero-Geodetic Enterprise (AGB)”, or the national geodetic authority in former times, was responsible for the photogrammetric production of city vector maps and was privatized in the meantime. The newly founded “State Department of Land Management (SDLM)” was responsible for the supervision of technical standards on the national level. Thus, an improvement in the inter-relationship between the institutions involved became urgently necessary, as well as the cooperation with the private sector and the participation of citizens. Its implementation in practice became a difficult, long-lasting challenge, although statutes had been set-up that defined the tasks and roles of the different institutions and their responsibilities for maintaining data and data access. One of the reasons was the adherence to old structures during the transformation process overall.

The institutional situation essentially improved after the “Revolution of Roses” in November 2003 when a new government was formed in 2004. Within the framework of institutional reforms, the new government founded the “National Agency for Property Registration (NAPR)” under the Ministry of Justice. SDLM and IB were closed and incorporated into NAPR. The former municipal offices dealing with land registry and cadaster (ABV) were subordinated to NAPR. Hence, NAPR became the only responsible self-financing authority for land registry and cadaster in Georgia, becoming a transparent, service-oriented, customer-friendly organization. Cadaster surveying was assigned exclusively to the private sector. Up until the end of the project in 2007, an e-registration and e-cadaster system had been implemented all over Geor-

gia. It followed the “one-stop shop” and “back-office principle” and simplified property registration procedures. All data structures and procedures for digital data transfer had been set up. The NAPR databases consist of a registry and a cadaster database to which banks, citizens, private surveyors and other legal persons have access via web portals with different access rights. This development of NAPR led to Georgia repeatedly being ranked first with regard to property registration efficiency in the World Bank’s “Doing Business” reports. In order to guarantee fast and efficient administrative procedures for the ownership registration, it was decided that the requirement for cadaster maps to be delivered by the owners did not have to meet special standards for quality, reliability and high accuracy (see: 2.4.3).

2.4.3 Looking at Some Practices in Detail

Cadaster Mapping

Since the socialist period, land parcels were state-owned property, and precise spatial data on boundaries did not exist. So-called “inventory offices” held data on the rights of use of immovable property, mainly for citizens’ houses and apartments. However, these data were outdated and did not correspond to the needs of a modern cadaster and land registry system for the development of a land market. After the privatization of land and housing in cities, they were the only legal evidence for proving ownership. Consequently, cadaster maps had to be produced in parallel to the establishment of a legal registration system. The mapping of Tbilisi started in 1996. For this purpose, the photogrammetric method was selected to produce a vector map or better, a digital city base map by stereoscopic data acquisition (3D mapping), as a first step. Aerial photographs were taken with high ground resolution (image scale 1: 4500). Georeferencing of the aerial images was achieved by aerotriangulation on the basis of geodetic ground control points, which were still being determined by the geodetic reference system of the former USSR. The staff of the former USSR “Aero-Geodetic Enterprise” (AGB) department who had long-term experience in stereo restitution got intensive on-the-job training in the newest photogrammetric methods, and they carried out the vector mapping of Tbilisi. The maps contained, among other elements, boundaries of land use, buildings and streets. These digital vector maps were transferred into the newly installed GIS system in the office for

administration of land resources (ABV). Based on these digital vector maps, cadaster parcels were generated with a unique numbering system after their verification on the ground and after completion via terrestrial surveying methods (see: 3.5). Previously, detailed technical concepts and procedures for accurate cadaster parcel surveying as well as for maintenance were developed. Intensive on-the-job training was done in cadaster surveying and in the use of high precision differential GPS and electronic tacheometers (total stations). At the end of 2004, the cadaster map of Tbilisi was completed, with the exception of the high-rise buildings, and the data were handed over to the NAPR.

Spatial Database Concepts

Spatial database concepts and GIS applications had been developed for the storage of the above-mentioned Tbilisi cadaster map. However, the next step, the systematic ownership registration based on this cadaster map, was never launched due to a lack of legal regulations for the procedure. Furthermore, the NAPR decided to put particular focus on the acceleration of the sporadic registration processes on request by owners in order to rapidly promote the real estate market. This decision led to cadaster parcel maps only having to fulfill low standards, since they only had to be delivered by the owners when registering. Thus, nearly everybody was able to get a mandate to produce a cadaster parcel map even by means of inadequate surveying and mapping methods. Due to the lack of official regulations for surveying and cadaster mapping accuracy, boundary determination and surveying methods, the quality of the officially-stored cadaster maps diminished in many areas of Tbilisi. The parcel boundaries were therefore not stored according to OGC²² simple feature standards and GIS rules regarding topology²³. Quality information on the data was not stored. Furthermore, they did not provide seamless full coverage of the ground. In cases of contradiction with boundary-determination between neighboring parcels, the owners were responsible for coming to an agreement.

22 The Open Geospatial Consortium (OGC) is an international voluntary consensus standards organization
23 GIS topology describes the spatial relationship between spatial objects (points, lines, area features). It is a key GIS requirement for spatial data management and data integrity.

Assignment of Ground Areas to High-Rise Buildings and Generation of Cadaster Parcels

Since the socialist period, apartment buildings have been constructed based on a land-use plan, the so-called “general plan”, where parcel boundaries were never generated. After privatization, it was only possible to register apartment buildings legally if they were assigned to cadaster parcels. Due to a lack of clearly-defined boundaries around apartment buildings, conflicts arose within the scope of new construction in the urban districts. In cooperation with the ministry responsible at the time, the project developed “Guidelines for the division of ground areas and the boundary definition of high-rise buildings”.

On the basis of these guidelines, the project completed about 60 “division projects”, which included about 2000 apartment buildings.

Figure 6: Boundary definition around high-rise buildings, Tbilisi



Source: GTZ Brochure about condominium, 2004

Setting up Owners' Associations – Condominiums

After the privatization of the apartments, common property like stairways, roofs, facades, parcels had to be defined. The new apartment owners did not have any experience in how to manage the property jointly, and a fundamental change in thinking was necessary. By means of an extensive awareness campaign, brochures on condominium conversion were distributed and informational seminars were held. In cooperation with the city administration department “Tbilisi Corps”, the legal framework was established. An essential aspect was that the city administration provided financial incentives for the repair of roofs, facades, stairways, etc. in the event that apartment owners agreed on condominium conversion.

By the end of the project, about 3000 condominiums had been created, and a high citizen acceptance rate was achieved. In that way, the project contributed to conflict mitigation.

2.4.4 Further Project Approaches

Aside from the special focus on the above-mentioned project activities, the following project approaches are worth mentioning:

Real estate valuation became an essential issue in order to foster the economic development of the land market. The project supported the development of an atlas containing standard land values in Tbilisi (2004, 2006). This was done in compliance with international standards and valuation procedures, and it contributed to a transparent real estate market. Additionally, a training center for valuation, the “Caucasian Real Estate Academy” was established. This guaranteed a continuous supply of land valuation experts.

The establishment of the first multipurpose cadaster was initiated. Within the framework of a pilot project as a first step towards a municipal Geographic Information System (GIS), applications for urban planning purposes were developed. The above-mentioned cadaster maps served as the requisite “spatial base data”²⁴.

In 2005, concepts in spatial planning and support for the corresponding legal framework led to the Georgian law on the fundamentals of spatial planning and urban development. Curricula for university programs in land management, spatial planning and urban planning were subsequently developed.

2.4.5 Networks and Cooperation

The GIZ project was essentially carried out within the framework of the city partnership between Saarbrücken and Tbilisi. The regular expert exchange between the administrations of the two cities was particularly

Figure 7: Donor projects in Georgia in the field of Land Management / Cadastre



²⁴ According to the “Working Committee of the Surveying Authorities of the Laender of the Federal Republic of Germany (AdV)” Spatial Base Data are official spatial data, which describe the cadaster parcels, buildings and landscape (topography) independent of their usage in a unique geodetic reference frame. They are the basis for Thematic Spatial Data

valuable for developing trust between the partners, and fundamentally embedding the project into the partner structures. Hence it was demonstrated practically how cooperation between different units of a municipal administration can function successfully, including the involvement of the private sector and the participation of the civil society. It could be stated that the city partnership was a kind of brand name, and it played an important role in the successful course of the project. A regular expert exchange took place with Kaiserslautern University in the field of spatial and urban planning, which strengthened the knowledge transfer and the overall capacity building for urban planners.

2.4.6 Cooperation with Other Donors

From 1995 until 2008, a total of five main donors, WB, UNDP, GIZ, KfW and USAID, were active in the land management and land administration sectors and carried out cadaster mapping, which covered nearly the complete territory of Georgia.

With regard to cadaster mapping, the GIZ projects focused on the Tbilisi municipality, whereas the complementary Financial Cooperation (FC) project of the KfW concentrated (besides other components) mainly on primary cadaster surveying and document collection as a basis for the legal registration of about 3 million parcels. These parcels covered intensively-used agricultural areas and settlement regions. Due to a lack of qualified personnel, the KfW trained about 400 people in modern surveying technologies and procedures, as well as in GIS via a train-the-trainer approach. The selected trainees consisted of people with and without technical pre-qualifications in the field. At the end, with 40 enterprises remaining, a sustainable sector was set up. The KfW established a detailed spatial database concept for cadaster, which followed the topological rules of a modern GIS system. It covered all necessary cadaster and additional objects, their corresponding attributes, and included the storage of quality parameters with regard to boundary surveying.

Although donors cooperated to a certain extent, a common agreement on cadaster data model concepts, data accuracy and data exchange standards was not achieved, however. One essential problem was that the different

donors did the surveying in different geodetic reference systems and projections, or even in systems that were not clearly defined. All of this resulted in non-homogenous spatial data sets. The KfW project, which produced accurate data, agreed to assume the task of integrating the data of lower quality from other donors into its own data sets. Consequently, the resulting harmonized data sets were somehow “spoiled” by the less accurate data that came from different sources. This led to the opinion among the partners that the data quality of the unified data set was insufficient.

Although the resulting “merged” cadaster data were handed over to the NAPR, they were not taken as a basis for the registration of parcel owners. The author was not able to find out the real reason. The different statements in the interviews were that the NAPR was not ready to deal with the data at that time, that political reasons prevented the data use for registrations, and that the legal background for systematic registrations was not given. Nevertheless, the nearly nationwide cadaster data set was stored on a special layer in the spatial database of the NAPR, but it does not serve as a basis for property registration. Currently, an essential function of the data set is to be used for the cross-checking of newly submitted cadaster maps, of whatever quality they may be. A further positive aspect is that the data are a valuable source for different spatial and infrastructural planning applications in other institutions and ministries.

2.4.7 Good Practices and Lessons Learned in Georgia

Good Practices:

- Due to the **gradual scaling** up of the project from a Tbilisi cadaster project in the very beginning to a larger land management project that covered additional support for procedures and the overall legal framework, the opening of the country and the transformation process were successfully accomplished in an exemplary manner. In this way, trust developed over time and more and more sensitive topics could be addressed in the “land sector”. Taking on the overall land policy immediately, however, would not have worked during the early beginning of the project in the mid-1990s.

- The overall **holistic approach** of the land management project in Georgia covered a broad spectrum in the field of land policy, land management and land administration over time, such as cadaster/registry, registration procedures, spatial and urban planning, overall capacity development, institutional setup, legal framework, and curricula at universities. The following project motto of the former GTZ team leader was said it all: “Only when the entire wheel train is functioning does the clock mechanism not stop!”
 - The **integrated approach of the land registry and cadaster** under the same roof of the NAPR (under the ministry of justice) led to the simplification of administrative procedures and data processing. Nevertheless, **clear definitions of functionalities for land registry and cadaster** were an essential condition for the successful implementation of registration procedures.
 - The understanding and high rate of citizen acceptance of the need to create **condominiums for high-rise buildings** was achieved on the basis of intensive awareness campaigns and informational seminars.
 - Within the framework of the **city partnership**, the intensive expert exchange between **Saarbrücken and the citizens of Tbilisi** fostered a mutual understanding of how an administration can work together and cooperate.
 - The intensive information exchange and capacity development, mainly through **on-the-job training** in modern technologies and procedures and in the legal framework, strengthened the “land sector” and led to **strong ownership** from the Georgian side.
 - The strong Georgian ownership opened the way for the rapid development of an **e-registration and e-cadaster system**, which allows transparent procedures for registering property all over Georgia.
 - The intensive capacity building and knowledge transfer of the GIZ project(s) over the years and their **fundamental embedding into the partners’ structures** paved the way for arranging the **financial assistance of the KfW**.
 - The nationwide implementation of the KfW project was successful due to the fact that the **KfW “followed” the GIZ** and its approaches.
 - Intensive training through the **train-the-trainers approach** in the KfW project guaranteed that a **sustainable private surveying sector** could be set up.
 - For the creation of condominiums, it was of high importance to **provide incentives**. The City of Tbilisi agreed to provide subsidies for the maintenance and repair work for condominium creation (e.g. roofs, facades, stairways etc.), which provided an incentive for the citizens to participate in the process.
 - The introduction and training of various **modern surveying technologies** for land surveying built a good basis for the development of the land administration sector (GNSS, Total stations, Remote Sensing /Photogrammetry, see: 3.5).
- Lessons Learned:**
- Having the ownership, Georgian experts and a multi-disciplinary team of decision-makers should define how the land administration system should work. Common agreement on the overall approach has to be reached in order to avoid different international actors following different approaches based on contradictory ideologies.
 - Before starting with large cadaster mapping procedures, whether the storage and maintenance of the data can be guaranteed by the partners later on should be verified.
 - All donors and surveying companies should be obliged to do cadaster surveying with an official, well-defined, geodetic reference system according to predefined standards for surveying and geoinformation.
 - Systematic cadaster mapping procedures should be synchronized with systematic legal registration procedures.

- Before starting large projects/programs, the situation of the partner country should be assessed by a preliminary “fact-finding project”, which would allow one to become aware of the partner situation in depth, to gain confidence, and to build on existing solutions in the partner country.
- The cadaster mapping should be done according to the procedures of systematic land registration. The registration should be done continuously as soon as cadaster maps are verified within certain predefined blocks or regions. If this principle is not followed, the data will become outdated very quickly.
- A lack of clear data transfer regulations to partner administrations and missing agreements on data structure and exchange formats leads to the situation that data are not exploited in an optimal manner, and that data lose their value and relevance. Furthermore “high quality data sets” can be spoiled by being mixed with sets of “low quality”.
- Different donors should avoid doing cadaster mapping on the basis of different geodetic reference systems and projections, or even that they work in a local system with unprofessional methods and without any reference to a nationwide reference system!



Condominium seminar in Borjomi for a high-rise building (Batumi)

Source: Project “Land management Georgia”

3 Common Lessons Learned – Recommendations for South-eastern Europe

The recommendations, mainly based on the experiences gained in the four countries, are categorized into five essential sections and consolidated below. They may serve as input for setting up future projects related to land administration and land management.

3.1 Project Approach

- It is essential that all stakeholders already be deeply involved in the early land administration project phase, especially in former centralized state systems in South-eastern Europe, which were characterized by non-cooperation between national and local institutions, as well as between administrations and institutions on the national level.
- In the politically sensitive sector related to immovable property and ownership, competing interests and controversies mainly occurred between national authorities and local governments, as well as between experts coming from different professional fields, particularly from former Yugoslavian countries. This was especially the case between lawyers and geodesists. Their different views on the definition of land registry and cadaster tasks led to difficulties in communication and misunderstandings. In order to prevent this during the project planning process, **careful mediation** between potentially adversarial stakeholders would be extremely helpful, and future difficulties could be prevented in advance.
- The institutional setup of land administration, as well as corresponding legal frameworks, should never be copied directly from other countries. Although it is essential to get an inside view into different foreign systems in order to become more open-minded, a country should be supported in developing its own solutions. As for the current situation, both the historical background and legal tradition should be considered, as well as further country-specific sociocultural circumstances. This approach would contribute to strengthening the partners' ownership and probably the acceptance of newly-implemented land administration systems.
- In the field of land administration and immovable property, mainly due to countries with highly complex institutional setups and various historically evolved land registry systems, a preliminary short-term “**fact finding project**” might be advisable in order to most optimally plan a long-term project. Such a project could provide insights into different institutional land administration setups through study visits to different countries. It could provide international workshops for intensive information exchange on “single” and “dual” solutions. Experts of different professional backgrounds (lawyers, clerks, geodetic engineers, notaries, among others) could discuss the pros and cons of different institutional solutions for a country at round-tables. This would allow an inside view into the depth of controversial positions and an appropriate assessment of partner needs in the early beginning. Conflicts that arise could thus be moderated at an early stage. The objective of this “fact finding project” should be to find a consensus between all stakeholders on an implementation strategy for the institutional setup of the land administration.
- In the early project phase, enough time should be provided in order to gain the partners' confidence. Especially in former socialist states, where national administrations have traditionally been closed systems characterized by mistrust, significant time pressure can easily lead to blockades.
- Projects related to land issues should not be set up as standalone cadaster/land registry projects. A **broad holistic approach** covering the field of land administration as well as its benefits has the following advantages:
 - a. The inclusion of project components that focus on the use and benefit of land registry/cadaster systems raises the awareness of decision-makers on the urgent need to set up an efficient and service-oriented land administration.

- b. Due to the fact that land register/cadaster data are indispensable as (spatial) base information, e.g. for the management of municipal land, the raising of real estate taxes, urban planning, land consolidation and others, the institutions concerned should push to be provided with the data. This will foster an interaction between the land administration as the data provider and the data user.
- c. The introduction of land management tools in such a project prevents the uncontrolled conversion of agricultural and green land into construction land in time before private land ownership is reintroduced.
- d. The politically sensitive transition towards a transparent service-oriented land administration sometimes requires time to set up the legal framework as well as overcome future controversies and blockades. In the case of stagnation in the cooperation between the partners, this kind of holistic project approach allows a temporary shift in focus to less sensitive subjects in order to at least make some progress there.
- The exemplary implementation of innovative urban and rural land management instruments as is currently done in Serbia has led to a thorough understanding of new procedures. In order to guarantee a sustainable long-term foundation, further support and the development of financing models is necessary.
- registry/cadaster” under one roof. This system is often called “single system”. After the end of Balkan War, many controversies arose as far as “which system is the right one” due to the historical background, as well as the generally different positions of lawyers and cadaster officers/geodesists. Especially for this important issue the lessons learned are:
- Independent of the solution to be reached, “single” or “dual” system, it is groundbreaking to do intensive consciousness-raising on the pros and cons of the systems under the consideration in view of a country’s legal tradition. For these instances, it is indispensable to involve all relevant professional fields in order to improve the cooperation between “legally”-oriented lawyers and “technically”-oriented geodesists.
 - Principally, it does not matter which system, “single” or “dual”, a country finally chooses. However, a clear separation of tasks and the strong coordination of legal and geodetic functions is a must.
 - In view of modern IT technology, it does not matter whether a land administration system will be implemented as a “single” or “dual” system. Even in the case of a dual system solution under two different roofs, the data harmonization and information exchange can be easily regulated.
 - For the implementation of a land administration system, the stability of the legal framework must be guaranteed. Once the partners have made a final decision on the institutional land administration setup, that decision should not be called into question later.

3.2 Institutional Setup for Land Administration

Historically in the Balkan region, different land registry/cadaster systems had been in use. A widespread system, mainly in the northern regions of the former Yugoslavia, had been based on the Austro-Hungarian system dating back to the end of the 19th century. This system, often called the “dual system”, separates the responsibility of the land registry and the cadaster, and guarantees the separation of powers. Owners were maintained in the land register books in the courts, and the surveying and cadaster mapping was done by geodetic/cadaster authorities. During the course of the socialist period, the land registry tasks were assigned to the cadaster offices with the goal of establishing a common “real estate

3.3 Capacity Development and Scaling Up

- At the project’s start, an essential introduction to land administration and land management instruments should already be done through international and regional study visits to several corresponding institutions that have faced the same challenges. In this way, clear practical examples of implementations of relevant **EU standards** can be demonstrated, especially for Southeastern Europe. This should be done on site as much as possible, for example, for urban planning and land

consolidation schemes. This peer-to-peer approach provides an essential basis of mutual understanding in implementing the processes between the project team, the partners and different stakeholders.

- When supporting the local government, it has proven effective to first start with the support of the most appropriate pilot municipalities. After having tested implementation procedures for innovative instruments as well as the introduction of relevant IT systems such as, for example, GIS or integrated urban planning, the support should be **scaled up** to other municipalities nationwide gradually. This has the advantage that upcoming needs for adaptation and method improvement can first be made in the pilot municipalities before disseminating the procedures. This approach will save money and effort. Additionally, qualified trained staff from the pilots can support other municipalities.
- The support of inter-municipal exchange via workshops and **round-tables** within a **horizontal network of municipalities** has led to knowledge exchange between public servants dealing with similar daily challenges. This face-to-face cooperation has proven to be appreciated, and is an essential measure for increasing capacity.
- For the introduction of innovative land management instruments, an essential method for supporting capacity development as well as the improvement of the legal framework is the **bottom-up approach**. In the first step, the corresponding instruments are implemented on the local level, such as in the case of integrated urban planning, as well as land consolidation. Through the accompanying **on-the-job training**, municipal officers become directly familiar with the participatory approach in which all stakeholders are involved from the early beginning. Due to the high transparency of the process, citizen acceptance has increased and possible conflicts can be avoided in advance.
- The **training of trainers** was essential when sharing, for example, municipal GIS knowledge. The precondition is that the trainers have practical experience and the ability to transfer knowledge.

- In order to support capacity development in the most optimal way possible, it is essential to have highly qualified project staff working together in a **multidisciplinary team**. Depending on the scope of the project, the team should consist of lawyers, geodesists, IT experts, spatial planners and PR specialists.
- **Cooperation with universities** and the improvement of **curricula** to be included has proven successful in guaranteeing continuous education and training of professionals in the “land sector”.

3.4 Donor Cooperation

- Donor cooperation takes place in various forms. In order to avoid overlapping activities, it has varied from informal agreements, regular donor coordination meetings up to project co-financing by other donors and GIZ as an implementation organization. A special aspect is that GIZ has been on-site permanently, and consequently has deep inside knowledge of the partner structures and typical local conditions at its disposal. This inside knowledge, as well as its focus on broad measures in capacity development, has often paved the way for new donors to set up their projects in the “land sector”. This impact on follow-up projects with other donors cannot easily be quantified by indicators.
- Different donors have pursued different approaches in the field of land administration and land management, depending on their legal and administrative traditions. While some aim to foster a rapid increase in economic development and consequently focus more on the investor’s needs, others keep in mind the introduction of high standards with regard to legal, technical, environmental and social issues, which is more time consuming. Among others, the following controversies often arise between donors concerning the “single” or “dual” institutional setup of the land registry/cadaster, accuracy requirements and quality standards with regard to cadaster boundary mapping, as well as the inclusion of an environmental assessment and high stakeholder participation for spatial planning. A key recommendation is that subsequent donors should respect the direction taken by earlier donor activities. When a solution is performing well, other donors should not reject what

was just implemented, but build on it, unless it was proven to be completely inadequate and the partners have explicitly requested that it be thrown out.

- Another suggestion is that in the preparation phase of large projects, all potential donors with the intention of becoming active in a certain country should do a **“Common Donor Fact Finding Project”**. This enables them to best identify the special on-site conditions and country-specific circumstances. In common workshops with all stakeholders from the partner country, future donors should present different solutions as well as the corresponding pros and cons for their implementation proposals. Particularly in land administration, the historical and legal tradition and the relationship of citizens to matters of land ownership should be considered, and a platform for intensive discussions should be provided. In the course of the “Common Donor Fact Finding Project”, it might also be advantageous to take several study visits to different (donor) countries with similar challenges in order to gain insights into different solutions.
- The project implementation with co-financing from donors and the GIZ as the implementation partner has presented following advantages:
 - a. Due to the substantial increases in the budget, broader project approaches can be taken in order to cover as many partner needs as possible and to obtain more significant results. A standalone GIZ project that mainly provides consulting services is not generally able to cover such a broad spectrum.
 - b. Another advantage is that only one project management structure has to be set up. However, different donors who are sharing the project’s cost should come to an agreement on unified monitoring rules in order to avoid evaluation missions with similar recurring issues with each donor. This would prevent certain displeasure on partner side and save project funds.

As far as cadaster is concerned, it is essential to define and establish a common geodetic reference system before different donors start their surveying and cadaster mapping support. Furthermore, geospatial objects to be maintained in the cadaster maps should be clearly defined together

with partners and all donors involved. Only then can homogenous data acquisition be guaranteed.

3.5 New Technologies - Cadaster Surveying and Spatial Databases

The rapid development of geodetic technologies took place over the last two decades with GIZ projects related to land administration. The same applied to the IT sector, which facilitated the storage, the maintenance and the provision of digital data in spatial databases. In the following, a short introduction is provided on professional cadaster surveying technologies that have been applied in Southeastern European projects.

3.5.1 Terrestrial Cadaster Surveying with Total Station – Electronic Tacheometer

In classical surveying, total stations are operated in connection with geodetic reference points. The measuring elements are angles and distances from which the coordinates of objects to be acquired are computed.

Image 2: Cadaster surveying with Total Station



Source: GIZ project
Land management/ Cadaster, Kosovo (2012)

Although nowadays GNSS technology (see: 3.5.2) has replaced most of the classical cadastral surveying techniques, total stations are nevertheless still necessary in areas where satellite signals cannot be sufficiently received, e.g. in dense urban areas.

3.5.2 Surveying with GNSS Technology

GNSS technology, often associated with GPS, the Global Positioning System of the American NAVSTAR, comprises surveying technologies based on the reception of satellite signals and the derivation of ground coordinates. This currently includes the USA’s GPS, Russia’s GLONASS system, and in the future will also include the Chinese COMPASS and the European Galileo satellite systems. GPS technology became functional in the mid-90s, and accurate cadastral surveying was accelerated enormously. Hence, GIZ introduced this technology in all surveying training activities from the early beginning of projects related to land administration in Southeastern Europe. It was essential, however, to implement high-precision GPS methods (differential GPS²⁵) in order to obtain the same

accuracy as with classical surveying using total stations. Differential GPS methodology operates with so-called reference stations in combination with a mobile measuring unit, the GPS rover. This principle eliminates systematic errors in order to guarantee high accuracy. Either the reference stations are temporarily placed on geodetic reference points, or they are installed nationwide as “Continuous Operating Reference Stations” (CORS) on existing locations. The differential error correction of the satellite data can be sent from reference stations to the rovers directly via mobile phone signals. In case of a lack of phone signals, data corrections can be made after data capture through post-processing in the office. CORS are currently already operational in many southeastern countries.

Meanwhile, based on CORS, the geodetic institutions provide satellite positioning services for different levels of accuracy. For example, in Kosovo, the “Land management/Cadastral” project supported the monitoring of the implementation of the Kosovo Positioning System (KOPOS), as well as a proposal for its business model, and the World Bank financed its establishment.

25 http://de.wikipedia.org/wiki/Differential_Global_Positioning_System

Image 3: GNSS Technology – Reference Stations



Temporary reference station on a geodetic reference point



Permanent KOPOS Reference Station - CORS

Source: GIZ project Land Management /Cadastral, Kosovo (2012)

Since these modern satellite positioning services refer to homogenous geodetic reference systems, a highly accurate “coordinate cadaster” can easily be implemented in a country. As a result, parcel boundary points as well as house corners can be determined with an accuracy in the lower centimeter level, and can be re-established at any time on-site. This “coordinate cadaster” cannot be mixed-up with inaccurate coordinates coming from, for example, old digitized maps (e.g. meter range). Sometimes these inaccurate “map” coordinates are called “presentation coordinates”. They just serve for presentation purposes, and are not at all suitable for re-establishing the position of a boundary point.

Although the detailed description of accurate cadaster surveying with GPS/GLONASS would be beyond this study, the following essential points should be kept in mind:

Nowadays, many low-cost and low-accuracy amateur GPS receivers exist on the market and nearly everybody can operate them. They vary from amateur handheld GPS receivers like Garmin up to smartphones. However, such instruments are not acceptable for professionally accurate cadaster surveying. Due to the fact that nearly everybody can determine position coordinates, it is most important that a country define official cadaster surveying standards in order to guarantee the quality, accuracy, and reliability of data.

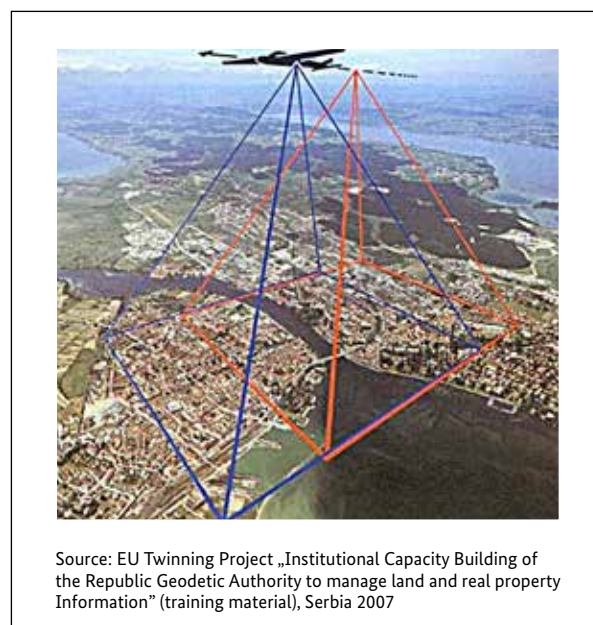
3.5.3 Remote Sensing – Aerial Photogrammetry

Aerial photogrammetry, nowadays assigned to the wide field of remote sensing technology, is an indirect method that measures in aerial images instead of directly surveying in the field. Photogrammetry is worldwide the main technology for nationwide large-scale mapping and high-resolution orthophoto production. During an aerial image flight with metric cameras or image sensors, large blocks of overlapping images are captured in short term, including positioning data (GPS/INS²⁶). After the flight,

terrain data are derived from image data, terrestrial control data, and positioning data in a comprehensive and simultaneous computing process. A whole block of images may cover hundreds of square kilometers.

For cadaster purposes, images with high ground resolution (e.g. 5-10 cm in cities) are used, from which accurate cadaster mapping can be done either from overlapping stereo images (3D interpretation) or differentially rectified single images, the orthophotos (2D interpretation). Stereo data acquisition is the most reliable and accurate method.

Figure 8: Aerial Image Flight



²⁶ GPS/INS systems are combined with digital aerial cameras (sensors). They provide the positions of the perspective centers and rotation angles of the aerial images. Consequently the georeferencing of large image blocks can be done with a few number of control points on the ground through aerotriangulation.

Image 4: Stereo data acquisition (3D)



In Tbilisi, the first digital map was produced in the mid-90s using 3D stereo restitution, which proved to be a most effective method of obtaining a precise city vector map of Tbilisi in the short term. Next to complementary terrestrial surveying, this map formed the basis for later cadaster parcel definition.

Although nowadays, the most common photogrammetric products are orthophotos, stereo-photogrammetry should still be taken into account. An essential aspect is that stereo models are automatically created during the nearly fully automatic orthophoto-generation process. Stereo models can therefore be delivered as a by-product, and stereo-restitution is then ready for use in the whole region covered. This should be kept in mind when specifying the data delivery in tender documents for orthophoto production.

When using photogrammetry for cadaster mapping, the following aspects need to be considered:

- A professional staff with high cartographic stereo interpretation and mapping skills is required.
- Only objects that are visible in the photos should be mapped as accurately as possible. The position of hidden objects (e.g. objects under roofs, under trees etc.) however, should never be estimated.
- Missing information has to be acquired using supplementary terrestrial methods.
- Consequently, the photogrammetric surveying methods are most appropriate in open areas, e.g. in rural regions or cities with flat-roofed houses.
- Visibility problems in urban areas can be solved by highly overlapping photo flights, which allow insights from different perspectives even into narrow streets or courts.

Generally, the applicability and the accuracy of photogrammetric products depend on many factors, and a detailed description would be beyond this study.

3.5.4 New Cadaster Surveying and Cadaster Maintenance

Principally, a clear difference should be made between completely new cadaster surveying, as was the case in Georgia, and cadaster maintenance or updating procedures. In completely new surveying, the boundaries are mainly defined by boundaries of land use, fences, walls, etc., or by specially marked points. For example, in the former Yugoslavia, new cadaster surveying had been done to a large extent by photogrammetric methods. As a result, the parcel boundary points had been signaled on-site by white signals before the aerial flights (see: 2.2.1).

The updating procedures of cadaster parcels are based on existing documentation and evidence. Therefore, clear regulations have to be set up as to how to deal with the previous documentation and existing landmarks if available. Since past evidence, such as, for example, old cadaster maps, are inaccurate by today's standards, a gradual adaptation to accurate cadaster boundaries should be done in the course of current cadaster maintenance procedures on the basis of up-to-date surveying principles (see: 3.5.1 to 3.5.3).

Another point is the harmonization of the cadaster maps with land registry or other alphanumeric evidence proving ownership. Large discrepancies have occurred in many former Yugoslavian countries since the maintenance of one or the other side, or even both, had been neglected for a long time. In some regions, the parcel numbers in the cadaster maps do not provide a reference to the numbers in the land registry. Also, here, clear procedures have to be established as to how to overcome this problem. In some cases, where the discrepancies between the reality on the ground, old cadaster maps, and evidence in the land registry are enormous, a completely new cadaster survey within a certain zone might be a better solution than trying to solve all contradictions that occur. As a result, all existing documentation proving ownership must be considered, and parcel owners must confirm the new boundaries of their parcels. If orthophotos are available, this procedure can be simplified considerably because people can generally imagine the neighborhood situation well, and a metric aerial image is a trustworthy product.

Another issue is the difference between parcel square meters noted in the land register and the newly calculated area based on cadaster coordinates. The areas in the land register were often determined using inaccurate methods that had become outdated, or the areas were even estimated. When parcel areas are newly calculated nowadays, it is evident that they differ from areas in the land register. This discrepancy often led to discussions between lawyers and geodesists. Also, clear legal regulations must be found here to determine how to deal with it.

3.5.5 Spatial Databases and Standards

Spatial databases for cadaster, topography, urban planning and others have to be set up according to the EU INSPIRE directive and other international standards like OGC and ISO191xx²⁷ for geographic information. Only based on these standards can the interoperability of spatial data between different IT systems and European countries be guaranteed through web services (among others: discovery services, web map services, web feature services).

With regard to cadaster databases, an essential aspect is to store quality parameters. In view of various data sources, in order to avoid a mixture of accurate and inaccurate data, it is essential for a parcel boundary point to store not only its coordinates, but also its quality parameters. These could be specified by information on the data source (e.g.: surveying method, digitizing from a map), by the accuracy and the reliability of the data (e.g. controlled surveying/ uncontrolled surveying).

²⁷ ISO 191xx are series of geographic information standards

4 Conclusions

For the last 20 years, the provision of technical support in Southeastern Europe related to land management and land administration has been quite challenging. The political transformation processes from centralized former socialist or communist states towards market economy-based democracies affected the project's progress, sometimes heavily, especially in the field of land administration. The privatization of land as well as the return of formerly expropriated property became hot political issues, and relevant institutions or land administrations were not ready to provide transparent procedures to manage, maintain and provide cadaster and land registry data. Whereas in the former Georgian Soviet Socialist Republic a cadaster and registry system had to be built up from almost nothing, in former Yugoslavian countries, due to their historical development, different land registry and cadaster systems had more or less been maintained in parallel. As a result, the main challenge was how to deal with these different historical systems and evidence, technically and legally, and how to integrate the relevant information into a modern and transparent land administration system.

The various project approaches evolved differently over time. In BiH, Serbia and Georgia, the projects began with the main focus on land registry and cadaster issues. In other words, in BiH, two projects were nearly launched in parallel, one for the land registry, and one for the cadaster. In Serbia and Georgia, besides the focus on the cadaster, the support of municipal land management also became an issue. An exception was Montenegro, which from the beginning had focused on the benefits of the land registry and cadaster for taxation and land use in municipalities. A key finding was that broader project approaches covering land administration as well as land use issues are promoting cooperation between cadaster data providers and data users. The urgent need for cadaster and land registry data for local governments and other national institutions, and their benefit for rural and urban land management, especially spatial planning, incentivizes the land administration authorities to maintain and update the data in a timely manner.

Another essential challenge was how to give advice and deal with the different administrations on the central and local level with the institutional set-up of the land registry/cadaster with regard to a "single" or a "dual" system solution. Finally, the four countries specifically analyzed (Serbia, Bosnia and Herzegovina, Montenegro and Georgia) implemented three different institutional setups. Serbia, Montenegro and the Republika Srpska entity in BiH decided to follow the "single" solution. As a result, the land registry and the cadaster were unified in the national or federal geodetic administrations. Georgia implemented the "single" solution in setting up a national agency for property registration under the ministry of justice. In the entity "Federation of BiH", the "dual" solution is still in use, with the land registry under the "ministry of justice" and the cadaster under the "national geodetic authority". As stated in the common lessons learned, a key finding was that each of the partner countries has to find its own appropriate solution that will be accepted in the best possible manner and which considers the legal tradition and specific country circumstances. All donors supporting a country should respect this basic condition and should not advocate discarding currently well-functioning solutions. This would be counterproductive and lead to overlapping funding.

Donor coordination with regard to the common planning of land management and land administration projects is an important challenge. Even in the case of different project approaches, the highest priority should be given to partners' ownership and "finding their own way", whereas donors should remain more in the background. One suggestion is to start donor cooperation before launching a project by using a "common donor fact finding project" in the early planning phases.

Serbia



Over time, the projects adjusted their concepts. The GIZ project in **Serbia** shifted its main focus towards municipal land management, including municipal urban and rural planning, and in **Georgia**, the activity field covered increasingly more urban planning and condominium conversions, as well as land valuation. Furthermore, it supported the preparation phase for the complementary KfW “Cadastral and Land Title Register Project”. In **Bosnia and Herzegovina**, the “Cadastral” and “Land Registry” projects merged after a while into a common “Land Administration Project (LAP)” in order to harmonize the cadastral and land registry. Finally, it supported the establishment of the WB “Land Registration Project”, and finished its own project smoothly with a jointly-defined exit strategy. Also in **Montenegro**, the GIZ project supported the concept of the WB “Land Administration and Land Management Project”. A key finding was that GIZ projects confirmed the ability to react flexibly to findings and situational changes, such as when other donors appear. The GIZ has been ready to support subsequent donor activities in the best manner possible in order to guarantee continued support.

For municipal capacity building in land management, it has generally proven successful to start with smaller pilot measures followed by spreading out the nationwide support later on. On-the-job training and peer-to-peer learning approaches have been highly appreciated in all four countries. For spatial planning and other land management instruments, the bottom-up approach through exemplary implementation on the local level followed by entering the findings on national level has proven to be an adequate strategy.

In contrast to land management, the implementation of technical and legal land administration procedures requires a stable legal framework, well-proven definitions, land registry and cadastral functionalities, and clear regulations to be followed in order to gain public trust in the security of ownership.

Georgia



Bosnia and Herzegovina



Montenegro



References

Bauer, Manfred (2011):

Vermessung und Ortung mit Satelliten, 6. Auflage, Wichmann-Verlag/VDE, Berlin und Offenbach

Becker, Michael, Ministry of Agriculture and Environmental Protection (Serbia) and GIZ (2015):

Peer-to-Peer Learning Approaches: Improving Land Consolidation with Peer-to-Peer Learning in Serbia. Application example elaborated based on experiences from the EU /German funded project: Strengthening Municipal Land Management /Rural Development- Effective Land Management in Serbia. Belgrade. Retrieved from:
http://www.methodfinder.net/example93_1.html

Becker, Michael and Zoran Knežević (2015):

Participation and Peer-to-Peer Learning – Implementing EU Best Practices into Land Consolidation in Serbia. Paper prepared for presentation at the “2015 WORLD BANK CONFERENCE ON LAND AND POVERTY” The World Bank - Washington DC, March 23-27, 2015.

MAEP/GIZ. (2014):

Land consolidation in Serbia, Brochure, Developed by the Serbian Ministry of Agriculture and Environmental Protection with support of EU/German funded Project „Strengthening Municipal Land Management – Rural Development: Effective Land Management“, Belgrade

GIZ Brochure (2014):

European Standards for Urban Development and Land Management, published by AMBERO - ICON on behalf of GIZ

GTZ Brochure (~2006):

GTZ Projekt “Landmanagement in Georgien”

GTZ Brochure (~2004):

About Condominium

Gvaramia, Alexander (2013):

Land Ownership and the Development of the Land Market in Georgia, A Report Commissioned by Alliances KK and undertaken by a Private Consultant.

Kraus, Karl (2004):

Photogrammetrie, Band 1, 7. Auflage, Walter de Gruyter GmbH & Co.KG, Berlin

Heckmann, Bernhard (2012):

Zur Positionierungsgenauigkeit von GPS-Handgeräten, DVW Hessen-/DVW Thüringen-Mitteilungen, Heft 2/2012

Heckmann, Bernhard (2013):

Administrative Instruction for Cadastral Surveying including GNSS-Technologies, prepared for GIZ Land Management/ Cadastre project Kosovo, Version 4,

Laux Gerhard (2005):

Vortrag “Landmanagement in Georgien – ein Projekt der GTZ, Georgien” (extract of Schröder, Bernd “Georgien – Gesellschaft und Religion an der Schwelle Europas. Eine gemeinsame Vortragsreihe der Fachrichtung Evangelische Theologie der Universität des Saarlandes und der Landeshauptstadt Saarbrücken”)

MAEP /GIZ. (2014):

Land Consolidation in Serbia. Brochure. Developed by the Serbian Ministry of Agriculture and Environmental Protection with support of EU /German funded Project „Strengthening Municipal Land Management – Rural Development: Effective Land Management“. Belgrade.

MAEP /GIZ. (2014).

What is Land Consolidation. Flyer. Developed by the Serbian Ministry of Agriculture and Environmental Protection with support of EU /German funded Project „Strengthening Municipal Land Management – Rural Development: Effective Land Management“. Belgrade.

Meskhidze, Ekaterina (2013):

Moving towards transparent land governance: Land and Property Confidence in Georgia, “WORLD BANK CONFERENCE ON LAND AND POVERTY” The World Bank - Washington DC, April 8-11, 2013

Povlakić, Meliha (unpublished draft, 2014):

„Roll-Back“ in einigen Bereichen des Privatrechts in der Föderation BiH, Juristische Fakultät Sarajevo

Project Management and Mapping AS (PMM) in association with the Faculty of Geodesy at the University of Zagreb and Norway Registers Development AS (2008):

Preliminary report. Regional cadastral study

Specht-Mohl, Claudia (2006):

Orthophoto, a profitable map substitute or more? True alternatives and practical benefits, Intergeo East 2006

Schindler, Gernod, Schmieder, Ronald and Jasper Lauert (2006):

Project Experiences with Land Management in Countries in Transition. Paper presented at the XXIII FIG Congress, Munich, Germany, October 8-13, 2006

Schmieder/Schindler (2007):

Sächsische Experten unterstützen die Neugestaltung des Vermessungswesens in Bosnien und Herzegowina, ZfV 4/2007

Urban Planning Directorate Kragujevac, Serbia (2013):

The Integrated Urban Development Strategy for the Inner City of Kragujevac, Kragujevac 2030

Voerkelius, Ulrich, Glavina, Jelena, Specht-Mohl, Claudia, Schilcher, Matthäus (2008):

GIS Guideline for Local Self-Government in Serbia, GTZ /Standing Conference for Municipalities and Towns

Wehrmann, Babette and Specht-Mohl, Claudia (2015):

Good practices and lessons learnt from two decades of GIZ supported land tenure related projects in south-eastern Europe, Paper prepared for presentation at the “2015 WORLD BANK CONFERENCE ON LAND AND POVERTY” The World Bank - Washington DC, March 23-27, 2015

Wehrmann, Babette (2010):

Governance of Land Tenure in Eastern Europe and Commonwealth of Independent States (CIS). FAO Land Tenure Working Paper.

GIZ internal project documents (a vast number of annual reports, intermediate and final reports, evaluations. etc.)

Websites

AMBERO Consulting Homepage:

<http://ambero.de/projekte/staerkung-des-kommunalen-landmanagements-in-serbien.php>

AMBERO/ICON

Project Homepage: Strengthening of local land management in Serbia -

<http://www.urbanlandmanagement.rs/en/>

Bosnia and Herzegovina / Cadaster Web-Portal

www.katastar.ba

Čačak, Web-GIS application - Urban plan

<http://serbia.gdi.net/gupCacak>

GeoSerbia - Geoportal of Serbia

<http://www.geosrbija.rs/rga/default.aspx?gui=1&lang=1>

Infrastructure for Spatial Information in the European Community

<http://inspire.ec.europa.eu/>

Montenegro, Ministry of Sustainable Development and Tourism

MonPlanGML

<http://www.mrt.gov.me/rubrike/gis/103891/Model-planskih-dokumenata.html>

Montenegro - Geoportal of Montenegro Real Estate Administration (HofRE)

<http://geoportal.co.me/>

KFW EX-Post-evaluation report:

https://www.kfw-entwicklungsbank.de/Evaluierung/Ergebnisse-und-Publikationen/PDF-Dokumente-E-K/Georgien_Kataster_Grundbuch_2011.pdf

KOPOS, Kosovo Positioning System

<http://kupos.rks-gov.net/spiderweb/frmIndex.aspx>

SAPOS, Satellitenpositionierungsdienst der deutschen Landesvermessung

<http://www.sapos.de/>

World Bank – Doing Business Report:

<http://www.doingbusiness.org>

Tbilisi Cadaster map – Web GIS

<http://gisapps.n.reestri.gov.ge/tbilisicadmap/Default.aspx>

Imprint

Published by

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Registered offices

Bonn and Eschborn,
Germany

Sector Project Land Policy and Land Management

Dag-Hammarskjöld-Weg 1-5

65760 Eschborn

Germany

Tel. +49 (0) 6196 79 - 0

Fax +49 (0) 6196 79 - 1115

info@giz.de

www.giz.de

Edited by

Claudia Specht-Mohl, Stuttgart, Germany

Design and layout

Jeanette Geppert, Frankfurt, Germany

Printed by

Metzgerdruck, Obrigheim, Germany

Printed on FSC-certified paper

Photo credits

Cover © GIZ/Project “Strengthening Municipal Land Management”, page 14 © GIZ/ Ratka Colic;

page 38 © GIZ/ Project “Land Management Georgia”; page 43 © GIZ/Alexander Schmidt;

page 44 left © STZ DiAccent/Claudia Specht-Mohl; page 44 right © GIZ/Mathias Meißies;

page 46x © GIZ/Claudia Specht-Mohl

As at

April 2015

GIZ is responsible for the content of this publication.

On behalf of

German Federal Ministry for Economic Cooperation and Development (BMZ);

Special Unit “One World, No Hunger”

Addresses of the BMZ offices

BMZ Bonn

Dahlmannstraße 4

53113 Bonn

Germany

Tel. +49 (0) 228 99 535 - 0

Fax +49 (0) 228 99 535 - 3500

BMZ Berlin

Stresemannstraße 94

10963 Berlin

Germany

Tel. +49 (0) 30 18 535 - 0

Fax +49 (0) 30 18 535 - 2501

poststelle@bmz.bund.de

www.bmz.de