

Cadastré – An Essential Component in Developing Spatial Data Infrastructures: Experiences in Argentina and Colombia

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Key words: Cadastre, Spatial Data Infrastructure.

ABSTRACT

Cadastré is dynamic and continues to modify its role in society, in as much due the evolution of necessities as due to the generated impacts of scientific and technological development within the field and its area of interest.

The development of communications (electronic mail, Internet) has made it possible to share cadastral experiences with larger communities of national and international dimensions while generating new opportunities, especially in those countries whose economies limit the more expensive forms of communication.

These new perspectives have made it possible for different players at local, national, regional and international levels involved with land information to combine their forces, direct their objectives, and steer towards collaborative projects with the aim of maximising the social, economic and environmental benefits of land information.

Spatial Data Infrastructures emerged within this context, in as much on the global level as on the regional, national, and local level.

On the regional level on the American continent, the Permanent Committee on Spatial Data Infrastructure for the Americas (PC IDEA) was created, and in 2001 has incorporated with the Working Group for Cadastre.

This paper describes the role of Cadastre within Spatial Data Infrastructure, illustrating the experiences, opportunities and challenges from the viewpoints of Columbia and Argentina, and the motivations behind the activities of the PC IDEA Working Group.

RESUMEN

El Catastro es dinámico y va modificando su rol en la sociedad, tanto por la evolución de las necesidades de ésta como por el impacto que el desarrollo científico y tecnológico generan sobre su temática y ámbito de acción.

El desarrollo de las comunicaciones (correo electrónico, internet) ha posibilitado asimismo interactuar en materia catastral en comunidades más amplias, del orden nacional e

internacional, generando nuevas oportunidades, sobre todo en países donde sus economías limitan formas de comunicaciones más costosas.

Estas nuevas perspectivas han posibilitado que distintos actores del orden local, nacional, regional, e internacional involucrados en la información territorial, sumen fuerzas, direccionen sus objetivos, y se orienten a un trabajo colaborativo a efectos de maximizar los beneficios de la información territorial, principalmente con fines sociales, económicos y medioambientales.

En este contexto han surgido las Infraestructuras de Datos Espaciales tanto a nivel Global como a niveles regionales y nacionales.

A nivel regional, para el continente americano, se creó en el año 2000 el Comité Permanente para la Infraestructura de Datos Espaciales de las Américas (CP IDEA), incorporándose al mismo en el 2001 el Grupo de Trabajo de Catastro.

El paper describe el rol del catastro en las Infraestructuras de Datos Espaciales, ilustrando a tal fin las experiencias, oportunidades y desafíos desde la óptica de Colombia y Argentina y las motivaciones para las actividades del grupo de Trabajo de CP IDEA.

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1. INTRODUCTION

Cadastré has enhanced its role in the actual society.

Technological and communicational possibilities, public, private and social needs and the foreign finances in some cases, have given new opportunities and challenges in different places.

Vision concerning the importance of Cadastré for SDI, has motivated that members of organisations of Columbia and Argentina, have acting as leaders or active participants in SDI activities, such as: GSDI since the beginning, the creation of PC IDEA in February 2000, the creation of the Cadastré Working Group of PC IDEA in January 2001 (during the 7th Regional Cartographic Conference of United Nations) and in the conformation of the Cadastré Working Group during GSDI5, in May 2001.

In addition to the actions in that international framework, Argentina and Columbia have realising own experiences in the context of opportunities and challenges that the reality of their countries permits.

2. BACKGROUND

Argentina and Columbia are two countries in South America, with different realities regarding to the Cadastral organisations, but with similar needs and a shared vision in SDI matter.

2.1 Argentina

Argentina is a Federal Republic in which the Cadastré is the responsibility of each of the 23 provinces and the autonomous City of Buenos Aires.

The Argentinean Cadastré completes an important role in society and had a long history of development It has advanced significantly over the last few years due to the technological advances in geo information on the one hand, and to the possibilities of realising cadastral development projects, that have been carried out in the majority of the provinces mostly with the World Bank finance.

World Bank loans have been provided to finance tax reform and provincial development projects.

Cadastral development projects have been initiated during the 1990-tees. The objectives of

these projects were largely to have an up to date set of parcel-based data, which would serve fiscal cadastral processes.

Each province could develop its own project. 10 Projects have been concluded, 6 are still in execution and another six, partly new, partly additional projects are under approval.

Regarding to SDI, the projects are very different.

At present, many provinces have concluded important phases, or their entire project; therefore analysis of experiences can be done. The Federal Council of Cadastre (CFC) is a platform, which facilitates this process.

The Federal Council of Cadastre was constituted in 1958, with the purpose of promoting, coordinating and orientating the execution of tasks relative to the Territorial Cadastre of the Argentine Republic, supporting the national and provincial states. Therefore, since 1958, the Federal Council of Cadastre have fulfilled a continuous role in promoting the cadastral development of the Country.

Since 1997, and taking into account the importance of GSDI and the role of Cadastre in any SDI, some activities, such as workshops, have been carried out through the Federal Council of Cadastre, in order to create a shared vision for it.

2.2 Colombia

Colombian Cadastre has evolved from being a support for the tax in the municipal level to being the fundamental information source for the development on both local and national level. The cadastral information is produced in a national public company.

Colombian Cadastre came into being in an incipient form at the end of the first decade in the 19th century, but it was nationally formalised around 1940 with the consolidation of the Instituto Geográfico Militar y Catastral (Military and Cadastral Geographical Institute); in 1957 became into the Geographic Institute Agustín Codazzi (IGAC), that is standing as the only civil geographical institute in South America.

The Institute include activities in mapping, agrology, cadastre and geography; according to the political institution, IGAC must produce and update the official map of the republic and as governmental entity, it must develop the policies and carry out the plans of the national government with regards to cartography, agrology, cadastre and geography through the production, analysis and publication of cadastral and georeferenced environmental information.

The Colombian Cadastre is a national one and is developed by a cadastral department within IGAC; actually, there are more than seven million parcels into the National Cadastral Data Base. The cadastral information is produced based on the detailed cartography and soil quality studies; as a result of the joining of both rural and urban areas, IGAC owns a valuable information in digital form about physical, legal and economic characteristics of both state and private parcels.

In order to get a modern cadastre management within the parameters that will allow the entity to produce and offer better quality information and in more dynamic manner, currently the so called Cadastre Management Reform Project is being developed. The main objectives are to improve efficiency in the Cadastre process to provide users with data and information in a much faster and more efficient manner, updating procedures, using new tools and the most important aspect, to facility the access to information.

Due to its nature, the Cadastre is an information system where the information describing parcels and their relation with the scenery is stored, processes and filled. The Geographic Institute produces basic cartographic, agrologyc and cadastral data, and in order to implement a complete GIS, the SIGAC Data Model was created and cadastral elements are grouped in the Cadastre theme.

The information about parcels is produced based on the detailed cartography and soils quality studies; it is the inventory of the physical, economic, legal and fiscal characteristics of both state and private property.

Due to the fact that IGAC produce basic cartographic, agrologic and cadastral data, in order to implement an integrated geographic information system, in 1992 a modernisation team charged to create a data model named SIGAC was constituted; within the data model cadastral elements are grouped in the cadastre theme and is actually implemented at national level.

The cadastral reform is currently being carried out since 1997; the objective is to bring up the cadastral management to date and as its product, converting cadastre into a Land Information System (LIS) to provide information for supporting sustainable development.

3. EXPERIENCES IN ARGENTINA AND COLOMBIA

3.1 Experiences in Argentina

Argentina experiences regarding SDI and Cadastre can be summarised as local actions (municipal or provincial level) and national and international participation.

In such experience human resources have been favoured, convinced that people are the motor for this type of initiative. At the same time the human network, covering all the country is the motor for the development and sustentability of all new initiative.

As economic situation is a continuous constrains, partnerships have been an interesting possibility with successful results gained among institutions and people from different locations and specialities, but with common visions and needs.

As one of the most important first steps in the creation of an effective SDI is the establishment of good *communication* channels between people/ organisations concerned with spatial data, local experiences have started some years ago in Argentina with successful

results. Some examples with participants of public and academic sectors are mentioned in the following papers of the FIG XXII Congress: Experiences of Inter -Institutional *Collaborative Work* as Forms of multiplying the Benefits of Territorial Information (TS3.6 Spatial Information - Open Access and Cooperation) and in Spatial Data, *Good Governance* and Society (TS 7.1, Cadastral Innovation I).

The importance of Good Governance principles and Land administration development and the limits caused for economic situations, advise to people involved in Cadastral dataset to have be a clear vision on SDI.

Clear perspective of contributing to building a SDI, require people/ organisations involved in spatial data (about cadastre) to modify their traditional management and daily activities, towards a data collection and data maintenance focused to a wide community of users instead of traditional ones.

Local experiences in Chubut Province – Argentina have been carried out together with the execution of the Inter – organisational Cadastral Development Project financed by the World Bank. As results of these actions the human network is growing, partnerships with public and academic sectors have been established and significant amount of data have been collected, updated or standardised.

Regarding a national level, several organisations involved in Spatial Data, started to meet in 1998 in order to share experiences and discuss themes of common interest.

An informal working group, called SIGRA (Geographic Information System for the Argentinean Republic) was created.

In 2001, SIGRA was more oriented to GSDI agenda.

The organisations involved in SIGRA have actually a clear objective of constituting a NSDI. A draft of Statutes is been analysed.

Until now meetings are in the City of Buenos Aires and most of the participants are organisations located in this City.

Federal Council of Cadastre is participating and a Working Group of Cadastre has been created. CFC have co-ordinated with SIGRA in order to meet together with the purpose that the Directors of Catastre of the provinces have the opportunity of participating actively in the NSDI initiative, maximum taking in account that the country is about 4000 km from the North to the South.

As a very significant amount of data are collected and maintained in all the country through Cadastre and private Land Surveyors, the Argentinean Federation of Surveyors (FADA) have joined to SIGRA meetings.

It is expected that Cadastre & Land Surveyors play an important role in data collection and data maintenance, because the Land Surveyors are moving around the urban and rural areas and the Cadastre organisations register the private works of the Land Surveyors in their

offices.

A clear contribution of the Land surveyors & Cadastre, to the maintenance of geographic names and production of metadata has been seen, because they walk around the territories of their provinces.

At the same time: Cadastre & surveyors have good opportunities for implementing standards and collecting metadata within the daily job. For this goal cadastral rules must be adapted.

The Working Group of Cadastre has presented last December a working plan for one year. Concerning the international level Argentina is involved in the Working Group of Cadastre in PC IDEA.

3.2 Experiences in Colombia

As a major provider of spatial data in Colombia, IGAC is involved as a technical coordinator in the development of metadata and standards for spatial information within the Colombian Spatial Data Infrastructure (ICDE). Using the Colombian norm NTC-4611 for metadata, the cadastral organization has seven and half million parcels totally described.

The initiative about National Spatial Data Infrastructure for Colombia was born within IGAC in 1996 and in 1999 the inter institutional committee was organised with the co-ordination of the institute and ICDE started to work nationally. One of the work groups of ICDE is the Fundamental Data Group that is co-ordinated by IGAC specialist in order to define the fundamental data to fulfil most of the demands concerning information about land resource.

One of the initial elements defined as fundamental data are the cadastral data, that because this information is constituted as an essential base to aid several processes related to land management and planning in Colombia.

Now, the Land Information System (Cadastre) is a great significance tool for the sustainable development, the territorial ordering, urban and regional planning, since these processes require a clear and actual knowledge of the information about the land resource. The Land Information System consolidated to the cadastre as a science for land management and the Spatial Data Infrastructure is the way to get the best development.

The United Nations and the FIG defined the cadastral view as “ develop modern cadastral infrastructure that facilitate efficient land and property markets, protect the land rights of all, and support long term sustainable development and land management ” (UN,1996, Bogor); without NSDI it will not be possible.

3.3 Shared Experiences

Colombia and Argentina, with big territories and a conviction about the role of Cadastre for

developing the NSDIs of their respective countries has started some years ago, with experience in different levels. The role of international bodies such as PC IDEA in the international context or CFC in Argentina case is essential for developing this type of initiative.

Based in a shared vision about SDI and Cadastre, both countries have participated in a Workshop carried out in Chubut, Patagonia Argentina in December 2000.

The workshop " Catastro, un Desafío con Muchas Oportunidades" (Cadaster, a Challenge with Many Opportunities) was organised to evaluate progress, exchange experiences and plan collaborate action for the consolidation and sustainability of the cadastral projects. The workshop was organised jointly by the CFC and the UEC (Unidad Ejecutora Central), the commission in charge of the co-ordination and control of the World Bank financed projects at the federal level. Participants were the directors of 19 Provincial cadastres of Argentina and directors of Cadastre of some municipalities of Chubut, members of the UEC, the National Mapping Agency (IGM), the Argentinean Federation of Land Surveyors (FADA), a representative of the Colombian Cadastre and PC IDEA (Permanent Committee on Spatial Data Infrastructure for the Americas) and of the Dutch Kadaster and the International Institute for Geo-Information Science and Earth Observation, ITC.

The workshop stimulated among all participants the awareness of the importance of the Cadastre for Spatial Data Infrastructure and the role of the cadastral data for such infrastructure. It led to the wish to present the Argentine Cadastres at national and international level and participate actively in PC IDEA. The Federal Council of Cadastre, CFC, received the mandate to do this.

Following the recommendations of the workshop, the CFC presented the initiative for the establishment of a Cadastral Group of the Americas in the 7th Cartographic Conference of the United Nations, New York, USA, January 2001. This proposal was accepted and the leadership was given to the CFC. The work plan of the group was presented during the GSDI 5 meeting in Cartagena de Indias, Colombia, may 2001.

In Argentina, in follow up of the activities of the SIGRA group (Geographic Information System of the Argentine Republic) started in 1998, several meetings have been organised during the year 2001 at the offices of the National Mapping Agency (IGM), with a range of agencies generating spatial information in the country. These activities are directed towards a National Spatial Data Infrastructure. The CFC, through a Cadastral Working Group, is actively involved. In December 2001 a work plan, following the recommendations of the workshop of 2000 mentioned above, was presented.

4. CONCLUSIONS AND RECOMMENDATIONS

Spatial Data are essential in SDIs initiatives, other way cannot exist.

SDIs pursues social, environmental and economic aims principally; in such context the relationship between people and land offered by the Cadastre is essential. Consequently spatial data provided by Cadastre are fundamental for any SDI development.

The cadastral information is the most specific description about a land source and is the fundamental data for most of public and private activities in the world; as a component of the National Spatial Data Infrastructure, that information must be produced using national standards basically.

As a fundamental data in National Spatial Data Infrastructure (NSDI), the cadastral information must be a base for the sustainable development since that process requires a clear and actual information about the land resource.

The value of territorial information for Good Governance, Land Administration, Spatial Data Infrastructure and related issues must be the light for orienting the people responsible for Cadastral organisations, for planning and acting within the context of the requirements and needs of society.

In this context actions towards SDIs, must be carried out at all levels (municipal, provincial, national, etc.)

In countries such as Columbia and Argentina considerable amount of spatial data of Cadastre still are as analogue dataset and only part of them are in digital environment. For this reason and in order to contribute to SDI development it is important that the activities regarding data collection, data maintenance and related issues can be focused under a SDI vision.

The cadastral information must be produced using national standards; after that, the cadastral organisation has to facilitate transfer of data to users. In case of Columbia with ICDE both problems will be solved and the user will get the best information via Internet.

With the management of the cadastral infrastructure, the cadastral organisations will be accomplished as the information supplier for the territorial ordering and planning, contributing with a significant effort for the country development. In case of Colombia, IGAC has to guarantee that cadastral information is a permanent item in the Colombian Spatial Data Infrastructure.

REFERENCES

- Alvarez de López M., (1997) *Perspective Land Records State and National*, Proceedings Global Spatial Data Infrastructure Conference, Chapel Hill, North Carolina, USA, October 1997.
- Alvarez M, Agudiak B, Mascheroni Torrilla E, (1994) *The Trend of Argentine Cadastre Towards Land Information Systems*, Commission 7, XX international Congress, SGS 761 1994.
- Alvarez M, de Meijere J, Paresi C, (1996) *Structured Development of Territorial Information System in the Province of Chubut, Argentine*, Proc. FIG 63 PC Meeting and

- International Symposium, Buenos Aires, Argentina.
- Bathurst Declaration *about cadastral frameworks and sustainable development*, United Nations-FIG; Bathurst, Australia, 1999.
- Bogor's Declaration, United Nations-FIG, 1996.
- Claverie H.H.; Alvarez de López M (1998) *Integration of Forest and Cadastral Projects in the Province of Chubut, Argentina*, in *Cadastral and Land Management, Commission 7, XXI International Congress, Developing the Profession in a Developing World*, pp. 541 – 549.
- De Meijere J., Alvarez de López M, Georgiadou Y (1998) *Maintenance of Cadastral Information Systems: A Case Study from the Province of Chubut, Argentina*, in *Cadastral and Land Management, Commission 7, XXI International Congress, Developing the Profession in a Developing World*, pp. 212 – 219.
- Georgiadou Y, Kleusberg A.; de Meijere J., Alvarez M.; Usandivaras J C., (1997) *The Argentine Cadastral in Transition*, *Geomatica*, Vol.51, Nr. 2.
- Martinez Martinez Yovanny A and Ubaque Ubaque Nyrian A; *Cadastral a land information system for sustainable development*. In International Cadastral System seminar Bogotá, May 3-5; 2000
- Martinez Martinez Yovanny A and Ubaque Ubaque Nyrian A.; *The New Millennium Cadastral*. In *Revista Cartográfica (Cartographic Magazine)*. Colombian Cartographic Society. Bogotá 2002.
- Williamson I.P., *Land Administration "Best Practice" providing the infrastructure for land policy implementation*, Department of Geomatics, The University of Melbourne, Victoria, Australia 2001.
- http://www.sli.unimelb.edu.au/research/publications/IPW/2_01Williamson_LUP.pdf, accessed 10 January, 2002.

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