

In November 2001 Ordnance Survey released the first layer of its OS MasterMap, the first data product based on the DNF. The re-engineering of over 430 million point, line, and area features, each referenced by a unique TOID, has created a seamless, object-based, large scales topographic layer that initially includes nine themes. Additional layers will be added later in 2002 and into the future, driven by customer requirements. Some of the planned layers, in addition to the existing topographic layer, are shown in the following diagram:

The data is intended to provide a definitive reference that acts as a common template onto which users can link their own data, by using the TOID. TOIDs support explicit linkages and therefore enable data sharing. The object based approach provides a more intelligent database including, where necessary, inferred links to close polygons. Service features such as on-line ordering and theme selection, user defined area selection, change only update, and on-line delivery make OS MasterMap data extremely accessible. Delivery is in industry standard GML which is supported by all major systems providers.

Having a national framework of data allows users to integrate and cross-reference data using the common ids (TOIDs). In Great Britain, the 400+ local government administrations have entered into a joint agreement with Ordnance Survey allowing access a portfolio of Ordnance Survey data products. Very recently a new pilot Pan-Government Agreement project has been initiated that enables Central Government departments also to have access to a similar portfolio of Ordnance Survey products. Both of these agreements allow government departments to provide free internet mapping services to the citizen, within certain licensed conditions. For example a new planning portal is being developed that will allow citizens to view planning development plans of their local areas free of charge. The service will eventually be expanded to allow citizens to make on-line planning applications. This is an example of what is being called in the UK «joined-up Government» i.e. it is helping government departments to work in a co-ordinated way to help the citizen.

Two other significant developments are NLUD and NLIS. NLUD is the acronym for the National Land Information Database and is a joint Central / Local Government initiative which has two main objectives. Firstly, a database of vacant and derelict land is being created, including previously developed land and buildings that may be available for redevelopment. Secondly a «NLUD-Baseline» database is being created that will be a comprehensive and up to date land use map of England based on Ordnance Survey MasterMap™.

The National Land Information Service (NLIS) is part of the UK Government «modernising government» initiative and is a project being jointly developed by HMLR, Local Government, and the Coal Authority. It features private sector partners that provide access to a National Land and Property Gazetteer.

The various UK Land Registry services are all developing their own services to the citizen also. In England and Wales HMLR operate a «Land Registry Direct» on-line service to professionals, and internet users are able to access up to date statistics on property prices. Registers of Scotland also have a «Registers Direct» service and are developing an automated registration of title to land. Similar services are under development by the Land Registers of Northern Ireland.

Ordnance Survey is working closely with the Land Registries in Great Britain, and other users, to help to

develop more effective ways of managing data that will result in better services to the citizen. As an example, studies are underway to see how the object based properties of OS MasterMap might be used to manage land and property ownership data.

In conclusion, while there is no cadastre in the United Kingdom the activities normally considered to be part of the cadastre on continental Europe are performed by a variety of agencies. Although the organisational framework is different, many of the issues facing UK institutions are similar to those faced by our colleagues involved in cadastre in other parts of Europe. There is a need to create co-ordination of effort in a way described in the UK as «joined-up government» in order to maximise the efficiency of effort and to provide the best value and service to the citizen. Issues such as serving customers, data interoperability, institutional and technological change, finances, and access to data, to name but few, will be high on our agendas in the coming years. ■

Cadastrés as Focuses on Environmental Protection

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The topic assigned to me is very challenging. What do cadastrés have to do with environmental protection? Do they contribute to environmental protection in some positive way? If we have a good cadastre, is the state of our waters better, can we further decrease emissions into the air than otherwise, are we better able to organize waste management, especially with regard to dangerous chemicals, can we decrease noise pollution, is it possible for us to improve the sustainable utilization of natural resources, protection of endangered species, protection of various biotypes, etc.?

In short, does a good cadastre promote sustainable development?

In this presentation I will not deal with the good and bad points of different cadastral systems from the point of view of environmental protection. Nor will I give any recommendations for proenvironmental cadastrés. I will try to find features that are common to all cadastral systems and important from the standpoint of environmental protection.

Cadastrés always relate to the land. They are a creation of man, while the earth was created by God. Basically, the question deals with man's relationship with the land.

«We know that the white man does not understand our ways. One portion of land is the same to him as the next, for he is a stranger who comes in the night and takes from the land whatever he needs. The earth is not his brother, but his enemy, and when he has conquered it, he moves on. He leaves his father's graves behind, and does not care. He kidnaps the earth from his children, he does not care. His

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fathers' graves and his children's birthright are forgotten. He treats his mother, the earth, and his brother, the sky, as things to be bought, plundered, sold like sheep or bright beads. His appetite will devour the earth and leave behind only a desert.»

«How can you buy or sell the sky, the warmth of the land? This idea is strange to us. If we do not own the freshness of the air and the sparkle of the water how can you buy them?»

«This we know: the earth does not belong to man; man belongs to the earth. This we know. All things are connected like the blood which connects one family. All things are connected.»

These words were said to have been uttered by Chief Seattle in 1854 when the President of the USA made an offer for the purchase of a vast territory populated by Indians by giving a reservation for the Indians.

We know now that the text is a speech made in the late 70s by Ted Perry, scriptwriter, for a film called «Home» produced by the Southern Baptist Convention in the USA.

Environmentalists have largely mentioned the speech, only a few parts of which have been quoted here, as one of the most noble and profound made for the defence of nature and native culture. When this was revealed to be a fake, some environmentalists stated that Chief Seattle at least should have spoken like this.

However beautiful the praising of nature the speech by Seattle and Perry may be, after man settled down and started farming, it was necessary to somehow show who controlled which land and who could be levied taxes based on ownership. It was a start with the centuries-old development of land holding that led to the creation of a modern cadastre. Agriculture bound the people to the land. The feudal system prevailing in Europe watched over it.

It was only the Industrial Revolution that broke this strong physical tie with the land. The Industrial Revolution made the land a commodity and created land markets. The land was changed into capital in the balance sheet. Cadastres made this development possible.

The rebuilding after the Second World War, strong economic growth and increase in population made it necessary to plan land use, both regional and urban. This rapidly led to concern over the state of the environment and its quality. More information was required on the land and its use. Once again, cadastres played significant roles in specifying the objectives of environmental protection measures or the regions in need of protection. In the last two decades, the importance of cadastres as a basis for the LIS and GIS systems has grown and thus contributed to better management of the environment.

Cadastre

Different countries interpret the term «cadastre» in different ways. FIG has also defined the term (The Fig Statement on the Cadastre/No.11/1995, Cadastre 2014, A Vision For a Future Cadastral System). In this context, it is not necessary to go into great detail to define cadastres. It is enough to say that cadastres record certain human interests, both public and private, regarding each area of land. These data on human interests may include information on the owner of a parcel, geometric data (coordinates, maps), land use etc. Cadastral data may be used to support land transactions, land markets, assist in administration of diverse sections of the economy such as agriculture, environmental protection, fishery, forestry, housing, land-

use management and zoning, public utilities and transportation.

Cadastres have developed in the same way as land administration. At first, land was an object of utilization, then it changed into an exchangeable commodity and capital and finally into an object of planning and protection. Land administration and cadastres have followed these trends. The system has acquired more layers to meet the new demands.

Cadastre-containing data collected from cadastral surveys only is no longer enough. To fulfil the new expectations, the data context of the cadastres must be broadened. Data covering land use, rights and restrictions such as zoning, environmental protected areas, historical monuments etc. are essential as well.

This does not mean that all the data should be collected and updated by the same organization; it is not even desirable. The most important thing is that the different databases of authorities and possibly private companies should be able to communicate with each other.

Sustainable Development

The first global conference on environmental matters was held in Stockholm in 1972: the United Nations Conference on the Human Environment. In 1989 came Gro Harlem Brundtland's report «Our Common Future», which laid the foundations for the second global conference held in Rio de Janeiro in 1992: the United Nations Conference on Environment and Development. And in a few months' time the third global conference will be held in Johannesburg, South Africa: the World Summit on Sustainable Development, 10 years after Rio.

Sustainable development calls for improving quality of life for all people without increasing the use of natural resources beyond the earth's carrying capacity. The Rio Conference recognized three areas that should be integrated to build a truly sustainable way of life. These are:

- economic growth and equity
- social development and
- conserving natural resources and the environment.

The major outcome of the Rio Conference was «The Rio Declaration on Environment and Development» and the directive Agenda 21, both of which define how the aims of sustainable development could be achieved with national and international collaboration. The second notable political result was a strong consensus over how the environment, economic and social development are involved with each other.

The European Union, soon after the Rio Conference has also approved the Fifth European Action Plan on the Protection of the Environment and Sustainable Development under the title «Towards Sustainability».

The European Council held in Lisbon on March 23-24 2000 set the ambitious objective for Europe to become the most competitive and dynamic economy in the world. It recognized an urgent need for Europe to quickly exploit the opportunities of the new economy, particularly those available on the Internet.

The Gothenburg European Council approved a Strategy for Sustainable Development, which added a third environmental dimension to the Lisbon strategy and requested the Council to develop the arrangements for implementing the strategy.

The decision on the 6th Environment Action Programme «Environment 2010: Our Future, Our Choice» will give an

enlarged European Union the direction, impetus and tools needed to create a clean and safe environment. It will involve citizens and business in this endeavour and will contribute to sustainable development.

The programme identifies four priority areas:

- Climate Change
- Nature and Biodiversity
- Environment and Health
- Natural Resources and Waste

The Barcelona European Council (March 15-16, 2002) underlined the importance of the 6th Environment Action Programme in attaining the goals of sustainable development. This programme is still in progress, to be approved by the European Parliament and the European Council by the year 2002.

In sustainable development, it is important to strike a balance between nature and man's action. It is essential to secure the sufficiency of natural resources and the quality of the environment at the same time as fostering economic growth.

Sustainable Development and Cadastres

When reviewing the programmes of the United Nations and the European Union, which I have quoted above, it can be seen that the term «cadastre» is not mentioned at all. What is the importance of cadastres in sustainable development and environmental protection?

From the standpoint of my topic, I conclude that its importance lies at least within three aspects:

- the importance of cadastres in fostering development and economic growth
- cadastres as bases for LIS and GIS systems
- cadastres as means of environmental management.

Cadastres as Promoters of Development and Economic Growth

The world-famous Peruvian economist Hernando de Soto examined this topic in his 1993 article in *The Economist* entitled «The Missing Ingredient».

De Soto wondered why only 25 of the 189 world states have risen to the status of developed market-economy countries, although developing countries have received funding amounting to billions of dollars. De Soto's answer is the «formalization» of property rights. A system must be established in which objects of property rights are registered (cadastre), the property right itself is entered in the records and the society guarantees the owner's rights if someone tries illegally take property away from the rightful owner.

Only, when the owner knows that his land property is under his control, does he have the interest in working for it, investing in it and obtaining a loan against the mortgage, improving its quality, fighting against erosion, removing waste etc.

In developed market-economy countries, this development has required centuries. It has become obvious and it is therefore not easy to perceive its importance. As de Soto mentions, a start towards this development was made in Germany as early as the 12th century, when written documents first replaced the informal oral rites used by the peasantry. It was not until 1896 that this development ended, when the German «Grundbuch» system covered the whole of the country.

Only this type of «formalization» of property rights makes it possible to change the land property from a means

of production into capital and thus into a prerequisite for economic growth, which in turn enables investing in environmental protection. Cadastres are an essential part of this development.

On the other hand, this realization may also lead to incorrect conclusions. Land surveyors like to emphasize the importance of cadastres as basic pillars of the society and as necessary prerequisites for the market economy. It is often stressed, as de Soto also does, that a modern cadastral system must be established in order to promote development. No doubt this is the case, but it is only part of the truth. A functioning cadastral system is a consequence rather than a cause. In the countries meant by de Soto, general development has, out of necessity, produced a functioning cadastral system, not the other way around. The cadastral system is a tool and a means, not the purpose in itself. Most problems related to land ownership are not solved by land surveyors. Cadastres should not be described as the solutions to a problem. In developing countries issues of ethnic, class and political nature related to land ownership are the most difficult to address. Societal circumstances must be stable before any cadastral system can be operational.

What Types of Society are Stable?

It may sound naïve, but the country must be democratically ruled and must respect human rights before any cadastre can function effectively. Those in power must be accepted as legitimate by the people and the administration should be transparent. In this type of society it is possible to create a land policy furnishing guidance for land ownership, land management, land-use planning, environmental protection, sustainable use of natural resources and cadastres. This is not often the case but decisions concerning cadastres are sometimes made separately by different official bodies without being aware of the targets. These bodies formulate land policy, enact legislation and push through the necessary implementation.

The most essential feature in a stable society is the existence of private property rights. The collapse of the communist system in the former Soviet Union and other socialist countries has revealed the senseless waste of natural resources and shocking lack of concern for the state of the environment.

De Soto described this as follows:

«When I was growing up in Peru, I was told that the farms I visited belonged to farming communities and not to the individual farmers. Yet as I walked from field to field, a different dog would bark. The dogs were ignorant of the prevailing law; all they knew was which land their masters controlled. In the next 150 years those nations whose laws recognise what the dogs already know will be the ones who enjoy the benefits of a modern market economy.»

Cadastres as Bases for LIS and GIS Systems

When acting in 1999-2000 as a UNECE Focal Point for land administration issues in the Balkans, especially in Kosovo, I presented a vision of a well-functioning LIS system in a society. In my view, it also has a wider meaning. In my vision, every piece of land is divided into cadastral units. Land registers provide information on ownership and mortgage for every unit in the cadastre. There is also a system for buildings and dwellings. Land- use rights and restrictions are described in their own system. These four systems are integrated; for the end user, they appear as one

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system, the Land Information System. Since all four data systems are integrated, logical data consistency between different systems is guaranteed.

This division into different data systems is based on the logical division of objects; it does not define the organizational structure. Each of the four systems may be maintained by a different administration.

This system is only the first in a series of steps in which registers of persons and enterprises would be integrated into the system.

And finally, many other GIS systems, e.g. those handling all environmental data, can also be connected to the system.

To integrate data from different systems, relationships between register units in different systems must be described. The question of unit identifiers is extremely critical. Identifier systems must be designed on a sound theoretical basis.

This vision could be made a reality if it were possible to build up the system from scratch. As we all know, this is not normally the case in developed countries like the EU Member States. Improving the system existing within different organizations to accommodate realization of this vision is a very difficult and painful operation.

Even in those organizations responsible for topographic mapping and cadastres, integration of these two datasets is very difficult. Each dataset results from different processes, usually with no coordination between the datasets which always leads to discrepancies. This is harmful to many applications.

Inspire

DG Environment and Eurostat started a new initiative in 2001 called the Environmental European Spatial Data Infrastructure (E-ESDI). Since the aim has been from the very beginning to create a general spatial infrastructure in Europe, the name of the project has recently changed into INSPIRE, Infrastructure for Spatial Information in Europe. The aim of the initiative is first to make available relevant, harmonized and high-quality geographic information for the purpose of formulation, implementation, monitoring and evaluation of Community environmental policy-making. At a later stage, the initiative will be broadened to cover other sector policy such as transportation, agriculture etc. and will eventually culminate in the establishment of a cross-sectoral European Spatial Data Infrastructure. The mandate and timetable of this initiative is very challenging. The aim is to prepare a proposal for a Community framework legislative act by the end of 2002. Work will be carried out in numerous working groups.

What is the Role of Cadastres in this Exercise?

It is one of the most important components of reference data.

The ETeMII (Accompanying Measure to Support the Setting Up of a European Territorial Management Information Infrastructure) project defined the term «reference data» as a dataset (or datasets) that everyone involved with geographic information (GI) «references» needs in order to do his/her jobs. Not only do these datasets provide a spatial context and structure to carry out these GI tasks, but they also provide a mechanism to integrate or link other georeferenced datasets and to ensure that this information is correctly related in a spatial context. It follows that if this dataset (or datasets) is standardised at a European level, significant economies of scale and scope would result not only for the use of these datasets but for

the development and provision of any datasets and applications that used them on the most basic level.

The project listed the reference data components as follows:

1. Geodetic reference system (i.e. a coordinate system for both horizontal and vertical measurements)
2. Units of administration
3. Units of land rights, i.e. cadastral parcels
4. Addresses
5. Selected topographic themes – notably elevation, transport networks and hydrography, and
6. Orthoimagery.

The INSPIRE Working Group on «Common Reference Data and Metadata» has accepted this ETeMII definition of reference data as the basis for their work, to be developed further at its meeting in February 2002. The Working Group also stated that reference data should function on three basic levels:

1. European level
2. Border level between countries and
3. Local level

Cadastral data by nature can serve as reference data on a local level.

EuroGeographics, which is the European organization of national mapping agencies, has also expressed its medium- to long-term vision by saying:

«EuroGeographics will achieve interoperability of the European NMAs Reference Data within 5 to 8 years».

Environmental Management and Cadastres

Since the term environmental management is commonly used, it is associated with protection of the earth and its resources. The **Environment** consists of: a diversity of chemical, physical and biological elements; their complex, interdependent relationship; and the effect of human activities on the delicate balance that exists in nature. Sustainable development also has an economic developmental function that translates as a balance between growth and protection.

Cadastres are important parts of different Spatial Data Infrastructure (SDI) systems that produce information crucial to decision makers in environmental management. The European Union takes the environment into account at every decision-making level. Stressful pressure against the environment can be efficiently decreased by good land-use planning. Sensitive areas can be protected, traffic emissions reduced by good road planning, location of polluting industry directed to places where the harmful effects are minimized, areas used for agriculture protected from urban construction etc. In all these planning processes information provided by cadastres is necessary for providing data on the land units included in the plans and their spatial dimensions such as borders.

In large environmental projects such as Natura 2000, information on cadastral units is necessary. Good administration also implies that information on plans by the authorities is given to the people concerned. Cadastral information connected to land registration information can identify all those individuals whose rights are affected by the plan. They can be informed personally beforehand and thus avoid resistance, which is usually based on poor information pertaining to the plan.

Future Prospects

In the European Union, cadastres are included in each country's national policy. The Commission has no power in cadastral issues. Each nation's cadastre has been developed over the course of centuries to meet national requirements

depending on historical development, nature and social circumstances. Policies and legislation covering environmental protection are undergoing a strong process of harmonization within the European Union. The INSPIRE initiative is focused on the creation of infrastructure for spatial information in the European Union. Since land administration and cadastres are essential parts of the INSPIRE project, it is possible that cadastral systems will also be harmonized in Europe in due course. On the other hand, land and credit markets over national borders can also increase the demand to harmonize land administration and cadastral functions within the European Union.

Also, the EULIS Project funded by the EU may in the long run lead to harmonizing land administration within the European Union. At the first stage, it will provide a tool to obtain information of land related data systems via Internet over borders.

The real harmonization of cadastral issues is possible only by supranational measures; in the European context, it means an initiative by the Commission. It may, however, be that this is not in the mandate of the Commission. Cadastral issues may belong to the national authorities.

Conclusions

1. Cadastres enabled changing the land from an object of utilization into capital and thus economic growth;
2. Economic growth is a prerequisite for investments in environmental protection;
3. Cadastres are essential parts of LIS and GIS systems. These systems provide information crucial to decision-making;
4. Cadastres are tools for environmental management. They are a means, not a purpose in itself.

Finally, I will revert to the question I asked at the beginning of this presentation: Does a good cadastre promote sustainable development?

My answer is that sustainable development is not possible without a modern cadastre.

References

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Official Closing of Congress

**ESTANISLAO RODRÍGUEZ-PONGA
Y SALAMANCA**

Secretary of Finances. Spain

Good morning to you all:

It is an honour to conclude this First Congress on Cadastre in the European Union, held in Granada during

the Spanish presidency of the EU Council between January 1st and June 30th 2002.

Within the political priorities that have oriented the Government's activity during this semester of EU presidency, the highlights in the economic area are the introduction of the Euro, the economic and social reforms to achieve full employment, and the continuation of negotiations regarding expansion of the European Union to include countries that are now candidates to accession.

From the fiscal and taxation perspective, our objective is to progress towards simplicity and transparency in the tax systems of member States in order to improve the way the markets for goods, services and factors work, and thus to stimulate the Union's economic growth. To achieve this goal, several different initiatives are now under way in the fields of direct and indirect taxation, and determined efforts are being made to increase and improve the degree of co-operation between the tax administrations of the member States, since we believe that this is the way to achieve more efficient tax systems for the European Union.

The first congress on Cadastre in the European Union aims to resolve, in its field, the need to increase and improve co-operation between member States. The main goal of the Congress was to share experiences on Cadastre in the European Union and to progress in their coordination.

The Cadastre is today a key public institution in EU countries; a land-based database containing the physical, legal and economic characteristics of all real estate, with the principal mission of describing real estate property to allow for its use by both citizens and the administration in multiple ways and for multiple applications (tax, environmental, planning and urban development...)

In Spain, for example, the General Directorate of Cadastre, under the Secretary of State of the Treasury, is responsible for the functions of elaboration, maintenance, management and revision of the Cadastre of rustic and urban real estate. It is a permanent source of information for the development of public investment policy, the design and execution of major infrastructures, urban planning, environmental protection and any other activities of value for the country's territorial structure.

Therefore, a key characteristic of the Cadastre, and its principal quality, is its multi-functionality. Unfortunately, another characteristic that also defines Cadastre in the EU is the lack of harmonisation between different Cadastres, causing a fragmentation that in practice prevents citizens and administrations from using available cadastral information for cross-border purposes.

The existence of a fragmented network of Cadastres, lacking common cadastral regulations, has generated a series of inefficiencies that makes it extremely difficult for users —citizens, administrations, and companies— to make the best possible use of the huge amount of information contained in the Union's different Cadastres.

It is therefore necessary to overcome existing barriers to access the information contained on public databases, since this makes it impossible for organisations to answer the demand for territorial information at the European level.

It will also be essential to harmonise geographic information systems in general, and cadastral information systems in particular, to the greatest possible extent, since although the Cadastre exists in all member States, there is no coordination between the respective national centres, nor a European cadastral model that can be used as a common guideline for future projects.

Therefore, the diversity of uses that cadastral information is put to, and the fact that the Cadastre is not a harmonised activity, make it especially necessary to develop