# Building Modern Land Administration Systems in Developed Economies

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***Abstract***

*Land Administration Systems (LAS) are institutional frameworks complicated by the tasks they must perform, by national cultural, political and judicial settings, and by technology. This paper assists sharing LAS among countries with diverse legal systems and institutional structures by identifying an ideal and historically neutral LAS model for -*

- *servicing the needs of governments, business and the public,*
- *utilising the latest technologies,*
- *servicing rights, responsibilities, restrictions and risks in relation to land, and*
- *delivering much broader information about sustainable development.*

*Case studies of Denmark and Victoria are used to assess the model.*

## INTRODUCTION

Western European countries use LAS policies and technologies developed from a systematic and complete cadastral map originally established as a basis for land valuation and taxation according to the use of land, particularly the yielding capacity of agricultural land. This promoted a classic "whole to part" strategy, allowing their LAS to support a more integrated approach to land management. By contrast, Australian systems focus on highly successful land markets. Their evolution from the Torrens system of title registration designed to manage transfers of individual land parcels resulted in LAS and associated spatial data models that rely on "part-to-whole" strategies. As a result LAS cannot adequately support the management and decision making needed to handle wider economic, environmental and social issues. Historical development of Australian data models still limits their ability to reach their full potential to integrate a wide range of land related data like their European counterparts.

However, the constraints of local history are diminishing. While national strategies and models vary across European countries, common policies, strategies and technology solutions are becoming apparent and offer timely lessons for Australia. Land administration systems are increasingly being tested against an emerging vision of a more unified model appropriate for developed economies but also capable of providing direction for transitional economies. This vision reflects drivers of globalisation and technology development which support establishment of multifunctional information systems incorporating diverse land rights, land use regulations and other useful data. A third major driver, sustainable development, stimulates demands for comprehensive information about environmental conditions in combination with other land related data. An emerging fourth driver, increasingly recognised in project design and analysis, is the identification of the role of people and organisations in the functioning of LAS and land markets. This driver emphasises individual, organisational and government competencies and capacities as instrumental components of successful systems (Wallace and Williamson 2004). Another driver, awaiting articulation, arises from the realisation that spatial information must now be organised to assist management of restrictions, responsibilities and risks related to land, and especially to assist emergency management (Galloway 2003). Taken together, these drivers suggest that LAS will become more dynamic, reflecting the changing needs of policy makers and governments.

Understanding of land administration is assisted by seeing how various models evolved over 30 years, culminating in the most influential model developed by Dale and McLaughlin (1999). The new vision builds on that model by concentrating on functions and systems delivery, in contrast to their comprehensive analysis of existing systems. The vision requires LAS to perform stated functions through delivery arrangements and systems; it develops holistic analysis of the functional relationship between the infrastructure of the LAS and the policy of sustainable development; it recognises land management as the policy imperative; and it parallels the development of a theory for spatial data infrastructures and demands for spatially specific information about government and private activities.

Underpinning the vision are –

- An holistic approach to LAS
- Recognition of risk information as a central requirement for land information and management
- Recognition of the human and governance elements
- Facilitation of incremental adoption of the model by countries at transitional stages of economic development.

## THE LAND MANAGEMENT PARADIGM

### The broad design

Land management is the process by which the resources of land are put into good effect (UN-ECE 1996). Land management encompasses all activities associated with the management of land and natural resources that are required to achieve sustainable development.

The organisational structures for land management differ widely between countries and regions throughout the world, and reflect local cultural and judicial settings. The institutional arrangements may change over time to better support the implementation of land policies and good governance. Within this country context, the land management activities may be described by the three components: Land Policies, Land Information Infrastructures, and Land Administration Infrastructures in support of Sustainable Development. This Land Management Paradigm is presented in Figure 1.

Land policy is part of the national policy on promoting objectives including economic development, social justice and equity, and political stability. Land policies may be associated with: security of tenure; land markets (particularly land transactions and access to credit); real property taxation; sustainable management and control of land use, natural resources and the environment; the provision of land for the poor, ethnic minorities and women; and measures to prevent land speculation and to manage land disputes.

The operational component of the land management paradigm is the range of land administration functions that ensure proper management of rights, restrictions, responsibilities and risks in relation to property, land and natural resources. These functions include the areas of land tenure (securing and transferring rights in land and natural resources); land value (valuation and taxation of land and properties); land use (planning and control of the use of land and natural resources); and land development (implementing utilities, infrastructure and construction planning).

The land administration functions are based on and are facilitated by appropriate land information infrastructures that include cadastral and topographic datasets and provide access to complete and up-to-date information about the built and natural environment.

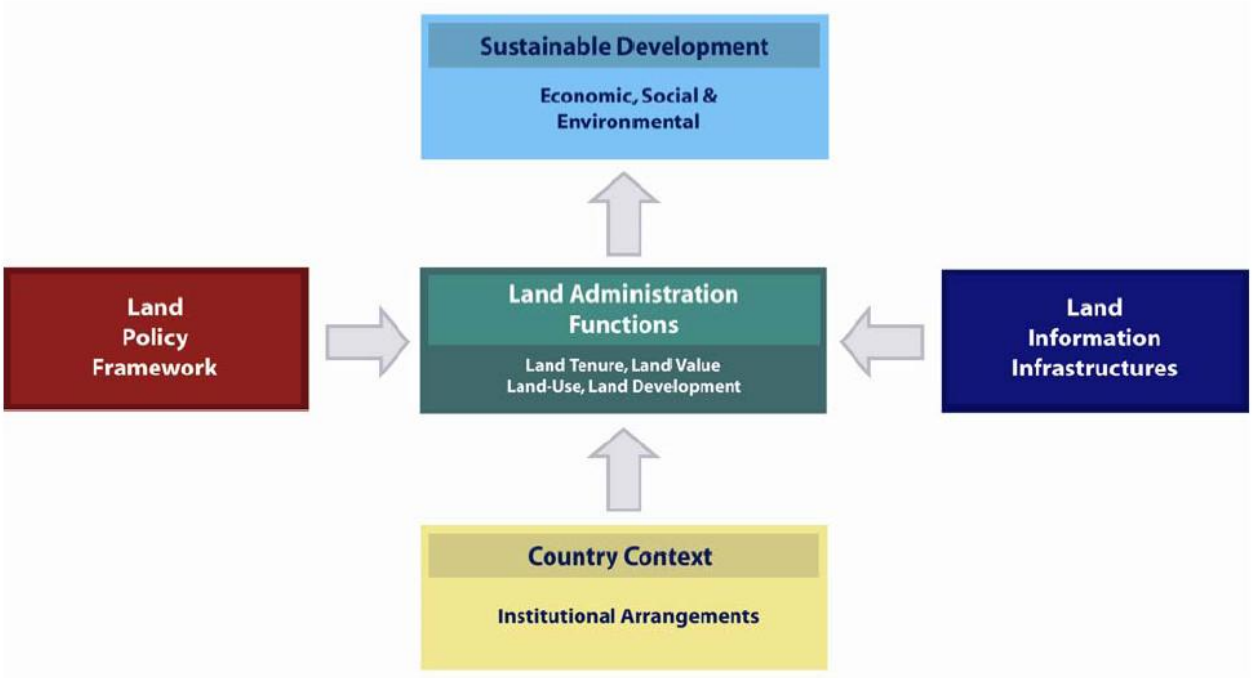


*Figure 1. The Land Management Paradigm*

Sound land management is then the operational processes of implementing land policies in comprehensive and sustainable ways. In many countries, however, there is a tendency to separate land tenure rights from land use rights. There is then no effective institutional mechanism for linking planning and land use controls with land values and the operation of the land market. These problems are often compounded by poor administrative and management procedures that fail to deliver required services. Investment in new technology will only go a small way towards solving a much deeper problem; the failure to treat land and its resources as a coherent whole.

Modern LAS in developed economies should facilitate sustainable development - the triple bottom line of economic, social and environmental sustainability - through public participation and informed and accountable government decision-making in relation to the built and natural environments. The interface between the LA infrastructure and professions and the public will increasingly be serviced by information communication technologies designed to implement e-government and e-citizenship. These processes will be used to link systems and information to people who would then be involved in delivering sustainable development at the local level (Ting 2002). E-citizenship is

mobilisation of society to engage in planning, use and allocation of resources, using technology to facilitate participatory democracy. E-government involves a government putting government information and processes on-line, and using digital systems to assist public access. E-Governance is E-democracy – helping to govern society through the use of the Web.

## Cadastral Systems

The basic building block in any land administration system is the land parcel as identified in the cadastre.

The International Federation of Surveyors (FIG 1995) defined a cadastre as "a parcel based, and up-to-date land information system containing a record of interests in land (e.g. rights, restrictions and responsibilities). It usually includes a geometric description of land parcels linked to other records describing the nature of the interests, the ownership or control of those interests, and often the value of the parcel and its improvements. It may be established for fiscal purposes (e.g. valuation and equitable taxation), legal purposes (conveyancing), to assist in the management of land and land use (e.g. for planning and other administrative purposes), and enables sustainable development and environmental protection".

However, the concept of "cadastre" is difficult to identify. It may be designed in many different ways, depending on the origin, history and cultural development of the country or jurisdiction. Basically, a cadastre is just a record that identifies the individual land parcels/properties. The purpose of this identification may be taxation (as was the original reason for establishing the European cadastres) or it may be security of land rights (as was the case in Australia). Today, most cadastral registers around the world are linked to both land value/taxation and to the securing legal rights in land.

Therefore it makes sense to talk about Cadastral Systems or Cadastral Infrastructures rather than just a cadastre. These systems or infrastructures include the interaction between the identification of land parcels, the registration of land rights, the valuation and taxation of land and property, and the present and possible future use of land. The role and purpose of cadastral systems is shown in Figure 2 below.

Throughout the world different organisations of cadastral systems are apparent, especially with regard to the land registration component. Basically, two types of systems can be identified: the deeds system and the title system. The differences between the two concepts relate to the extent of involvement of the state, and to the cultural development and judicial setting of the country. The key difference is found in whether only the transaction is recorded (deeds systems) or the title itself is recorded and secured (title systems). Deeds systems provide a register of owners focusing on "who owns what" while title systems register properties presenting "what is owned by whom". The cultural and judicial aspects relate to whether a country is based on Roman law (deeds systems)

or Germanic or common-Anglo law (title systems). This of course also relates to the history of colonization.

Deeds registration is rooted in Roman culture and is, therefore, common in Latin cultures in Europe (France, Spain, Italy, Benelux), in South America, and parts of Asia and Africa which were influenced by these cultures. The concept is also used in most of the United States. Deeds systems are found in different forms, with significant variations in the role of cadastral identification and surveyors.

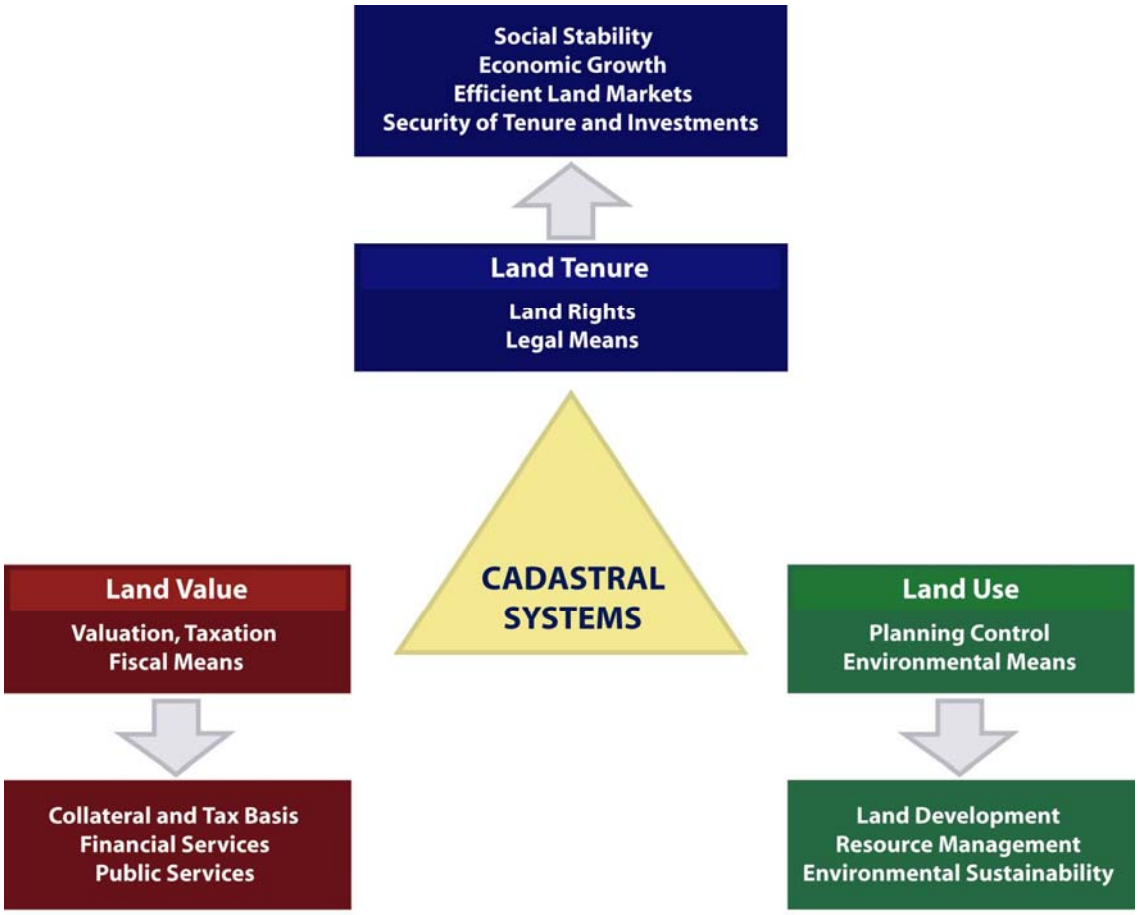


*Figure 2. Cadastral systems facilitate administration of three main areas:*

*Land Tenure, Land Value and Land Use.*

Title registration originated in the German culture and is found in central European countries (Germany, Austria, Switzerland). Different versions of the German system are found in Eastern European and Nordic countries. The various versions relate to the use of the property concept and the organization of the cadastral process including the use and the role of private licensed surveyors. A special version of the title system is found in UK, where the concept of general boundaries is used to identify the land parcels on the large-scale topographic map series. A third variant, based on the original German concept (Raff 2003), is found in the Torrens system introduced in Australia during the mid 1800´s to serve the need of securing land rights in the New World.

Even though cadastral systems around the world are clearly different in terms of structure, processes and actors, their design is increasingly influenced by globalisation and technology towards multipurpose cadastres (van der Molen 2003). The same influences push land rights and land use towards integrated, multifunctional information systems. Modern cadastres and land information systems also reflect urbanisation and micro-economic reform incorporating decentralisation, privatisation and quality assurance. The most significant driver is sustainable development with its demand for comprehensive information on the environmental conditions in combination with other land and property related data. As a result, the traditional surveying, mapping and land registration focus has moved away from being primarily provider-driven to now being clearly user-driven. The success of a cadastral system is a function of how well it internalises these influences and achieves these broad social, economic and environmental objectives.

**Land Administration Systems**

LAS, and particularly their core cadastral components, are important infrastructure, which facilitate the implementation of land policies in both developed and developing countries. LAS are concerned with the social, legal, economic and technical framework within which land managers and administrators must operate (UNECE 1996). These systems support efficient land markets and are, at the same time, concerned with the administration of land as a natural resource to ensure its sustainable development. This global approach to modern land administration systems is shown in Figure 3 below.

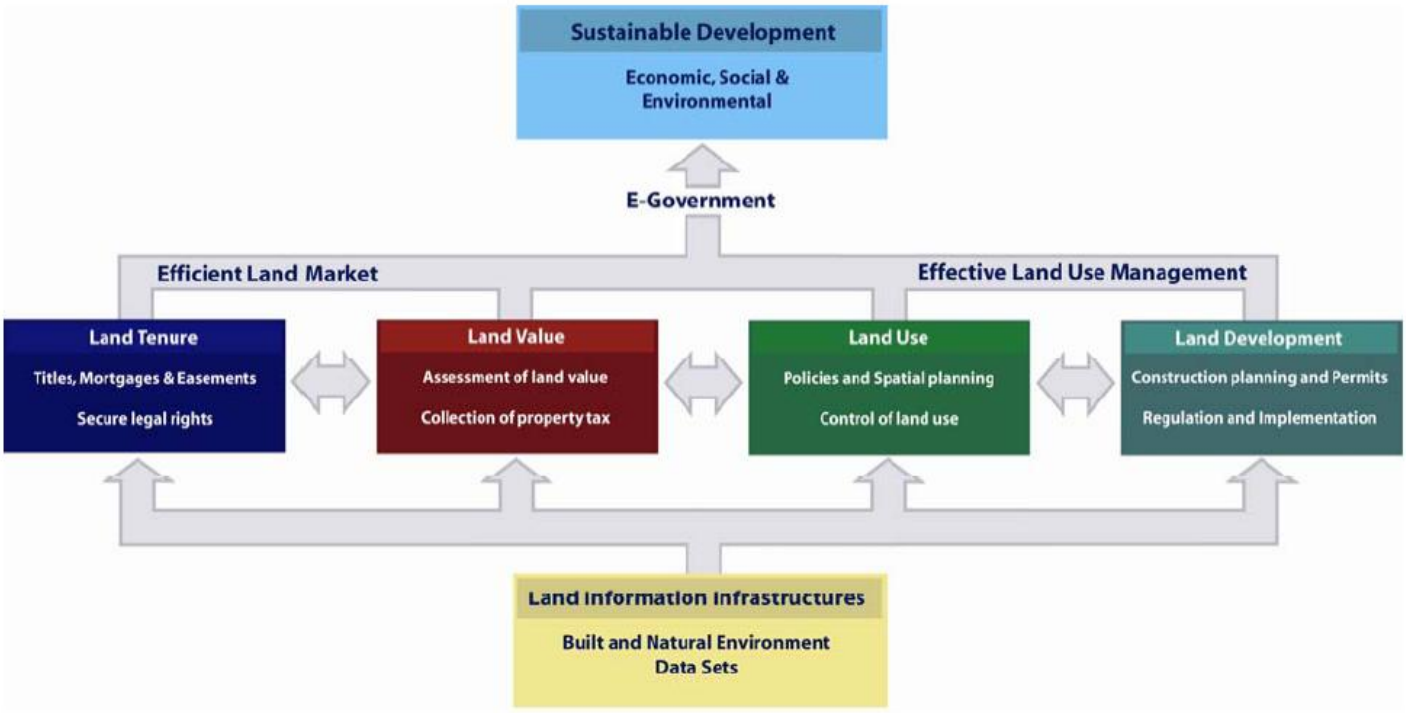


*Figure 3. A Global Perspective of Modern Land Administration Systems*

As described, land administration comprises an extensive range of systems and processes to manage:

- **Land Tenure:** the allocation and security of rights in lands; the legal surveys to determine parcel boundaries; the transfer of property or use from one party to another through sale or lease; and the management and adjudication of doubts and disputes regarding rights and parcel boundaries.
- **Land Value:** the assessment of the value of land and properties; the gathering of revenues through taxation; and the management and adjudication of land valuation and taxation disputes.
- **Land Use:** the control of land use through adoption of planning policies and land use regulations at national, regional and local levels; the enforcement of land use regulations; and the management and adjudication of land use conflicts.
- **Land Development:** the building of new physical infrastructure; the implementation of construction planning and change of land use through planning permission and granting of permits.

These systems are interrelated. The actual economic and physical use of land and properties influence land value. Land value is also influenced by the possible future use of land as determined through zoning, land use planning regulations and permit granting

processes. And the land use planning and policies will, of course, determine and regulate future land development.

The information on land and properties permeates through the system and provides the basic infrastructure for running the interrelated systems within the four interrelated areas. The land information area should be organised to combine cadastral and topographic data and thereby link the built environment (including legal land rights) with the natural environment (including environmental and natural resource issues). Land information should, this way, be organised as a spatial data infrastructure at national, regional/federal and local level based on relevant policies for data sharing, cost recovery, access to data, standards, etc.

The design of adequate systems in the area of land tenure and land value should lead to the establishment of an efficient land market capable of supporting trading in complex commodities. The design of adequate systems in the areas of land use control and land development should lead to effective land use management. The combination of an efficient land market and effective land use management should then form the basis for a sustainable approach to economic, social and environmental development.

A modern LAS acts within the environment of adopted land policies that fulfill political objectives with regard to land issues. It also acts within an institutional framework that imposes mandates and responsibilities on the various agencies and organisations. The system is concerned with providing detailed information at the individual land parcel level. It should service the needs of both the individual and the community at large. Benefits arise through its application in guaranteeing of ownership, security of tenure and credit; facilitating efficient land transfers and land markets; supporting management of assets; and providing basic information in processes of physical planning, land development and environmental control. The system, this way, acts as a backbone for society.

These ambitious goals will not be achieved unless there is a commitment to designing and implementing effective land administration infrastructures. These may be described as the organisations, standards, processes, information and dissemination systems and technologies required to support the allocation, transfer, dealing and use of land (UN-FIG 1999). Information and communications technology (ICT) will play an increasingly important role both in constructing the necessary infrastructure and in providing effective citizen access to information. Also, there must be a total commitment to the maintenance and upgrading of the land administration infrastructure.

## CASE STUDIES: DENMARK AND VICTORIA

While most European systems seem to integrate a wide range of environmental and sustainability issues through a comprehensive approach to land management, the focus on the parcel level by Australian systems reduces their capacity too support the management and decision making needed to handle wider fiscal, environmental and social issues. On the other hand, the Australian systems have been very successful in supporting efficient

land markets by implementing modern ICT tools and they are leaders in eConveyancing initiatives. A comparison of two jurisdictions, Denmark and the State of Victoria in Australia, each representative of regional systems, will identify the ways each has developed its local LAS to meet the emerging vision.

Both are roughly the same size in population and use the same basic approach to cadastral surveying and land administration, and they both have only one major city.

The comparison uses the following framework:

- Societal context, and a short historical path towards sustainable development.
- Presentation of the current LAS including the land information component, the land policy component, and the land administration functions relating to land tenure, land value, land use, and land development.
- Identification of the challenges and problems within the policy level, managerial level, and operational level.

## DENMARK

### Country context and a short historical path towards sustainable land management

The Danish cadastre, which derived from the enclosure movement, was established in 1844. The main purpose was the collection of land taxes from agricultural holdings based on a valuation of the yielding capacity of the soil. From the very beginning, the cadastre consisted of two parts: the cadastral register and the cadastral maps. Both these components have been updated continually ever since.

In the late 1800´s the cadastre changed from being a fiscal cadastre primarily as a basis for land valuation and taxation to a legal cadastre supporting a growing land market. This evolution was completed in the early part of the 1900´s when taxation became based on the market value. Simultaneously, in the 1920´s a new Land Book System was established. The new system was based on the cadastral identification and a close interaction between the two systems was established.

Denmark

**Location:** European Union

**Population:** 5,3 inhabitants

One third lives in the capital area of Grater Copenhagen

**Area:** 43,000 sq km

Low-laying country

10 % urban, 12% forest

67% agricultural.

Coastline: 7,300 km

**History:** Independent kingdom since the Viking Age around the year 1000.

**Government:** Constitutional monarchy governed by a representative democracy organised in three levels: national (Parliament and ministries), regional (14 counties), and local (275 municipalities).

During the first half of the 1900´s land was increasingly seen as a commodity and the focus was on agricultural production and industrial revolution. Land use regulations were introduced to improve agricultural productivity and at the same time sustain the social conditions in the rural areas. These regulations were based on cadastral information. The 1960´s introduced a close interaction between the cadastral process (e.g. subdivision) and the relevant land-use regulations.

An administrative reform was adopted in the early 1970´s to reorganise regional and local administration. The reform reduced the number of counties from 25 to 14 and the number of local authorities from almost 1,400 to 275. The reorganisation created the basis for transferring a number of responsibilities and decision-making power to the counties and especially to the municipal councils by means of decentralisation.

Land was increasingly seen as a community scarce resource and zoning and planning regulations were introduced to control land development. Environmental concerns appeared in the late 1970´s and developed into the major issue in recent years. Today, comprehensive planning and environmental protection are seen as the main tools to secure sustainable development. Cadastral information based on a modern IT platform evolved to support these processes towards sustainable land management (Enemark and Schoeler 2002).

**Denmark's current Land Administration System**

The LAS is tailored for a decentralised approach to land use management placing the decision-making power at regional and especially local level. The system works well in the sense that it supports sustainable development through an efficient land market and effective land use management.

***The land policy component***

Land policies are expressed partly through the constitution and other more general laws such as the Land Registry Act, The Subdivision Act, The Valuation Act, and the Planning Act, and partly through the sectoral land use acts such as the Agricultural Holdings Act, the Environmental Protection Act, and the Nature Protection Act.

A key land policy is based pm the Planning Act that establishes a general zoning dividing the total country into urban, recreational and rural zones. This provides a low land value in rural areas, where no developments are allowed except for agricultural and forestry purposes. The provisions on rural zones, covering about 90% of the country, are intended to provide a clear delimitation between town and country, and to prevent uncontrolled land development in the countryside and to preserve valuable landscapes. In urban areas, the land use opportunities are determined by planning regulations at a local level. The Planning Act also provides a planning zone within 3 km of the coastline, in which special attention is given to protection of valuable features of the landscape.

Sectoral land policies include the requirement that all agricultural properties be operated in accordance with agricultural and environmental considerations. This duty

applies to two-thirds of Denmark's land. The protection of agricultural land can be abolished when land is transferred into an urban zone, which is based on planning considerations and with due regard for the quality of the agricultural land. Conservation provisions apply to ensure responsible management of forest areas, which comprise 12 per cent of Denmark's land. The Nature Protection Act provides the legal basis for protection and conservation of nature, landscape features and historic elements. In addition the Act gives protection to certain areas and elements in nature and landscape by establishing fixed protection zones along coasts, lakes, streams etc. Heritage buildings are protected through conservation orders and certain regulations.

***Land Information Component***

The Danish concept for integrated land information is organised as a network of interactive subsystems containing the most relevant information. The cadastral register was computerised during 1984-86. The Land Book was computerised by the end of 1999. The computerisation of the old analogue cadastral maps was completed at the end of a ten year program in 1997. The remaining components of the land information system such as the building and dwelling register, the valuation and taxation register and the population register are also computerised. Both the names and the registered numbers of owners are recorded.

The automatic linkage between the subsystems is achieved by establishing the “Cross Reference Register”, which contains all key identifications within each of the subsystems (e.g. the parcel number, the building number, the address, etc.) and the cross-reference between these identifications. This means that it is possible to obtain all available information on a specific property or building by knowing only one of the keys. Furthermore, the identification-keys are linked into the relevant physical element represented in the digital cadastral and topographic maps such as the parcel, the building, etc. The main feature of this concept is that the daily running of the individual subsystems should, whenever possible, be decentralised and the maintenance should relay on an integration of the data-collection within normal daily administrative routines. The responsibility for the operation and maintenance of the systems rests with those (custodians) who need the data and therefore care for the updating procedures and the applications as a part of their daily administrative routines.

The goal of a Danish Land Information Infrastructure is to reduce duplication and costs of spatial data/information, to improve quality, to encourage co-operation on common standards and data models, to make spatial data/information more accessible to all, and to facilitate e-government and participatory democracy. However, an “official infrastructure” has not yet been created. A recent government analysis assessed that Denmark on the one hand is in a strong position for using geo-data in a digital management environment since all the basic registers and maps are now in place in a digital format. On the other hand, it stated that existing co-operation structures at the operational level are too informal and do not sufficiently support the most expeditious utilisation of spatial data. It was therefore recommended that a governmental body be established to ensure the drive runs in a more unified and holistic direction.

### *The land administration functions*

*Land tenure and cadastral systems.* The National Survey and Cadastre under the Ministry of Environment is responsible for geodetic and small-scale topographic mapping, nautical charting, and for maintaining and updating the cadastral register and the cadastral maps. Legal rights to land including ownership, mortgage, easements and leases are recorded in the Land Book at the local districts courts under the authority of the Ministry of Justice. Cadastral surveying or surveying for legal purposes is the responsibility of licensed surveyors in private practice. The land book is based on the cadastral identification of the land parcels. Land transfers can then be entered into the land book just by referring to the cadastral number in a deed; consequently there are no maps available at the land registry. When transferring a part of a property, subdivision has to be carried out prior to entering the deed to the land book. When a subdivided area is transferred from one property to another the legal rights of ownership and mortgage must arranged prior to cadastral registration to ensure close interaction between the two systems.

The cadastral system is well placed to serve multi-purpose needs by combining the datasets of the built and natural environments. It is generally agreed that the cadastral system should service all users, and their requirements for cadastral products should be carefully considered. The problem in this regard relates to the tension between the relative and absolute accuracy of property boundaries. Where the cadastral process traditionally focused on the relative accuracy between parcel boundaries, today some users, particularly local authorities and utilities, focus on absolute accuracy in order to fully combine cadastral and topographic datasets (Enemark 1998).

*Land Value.* Land and property valuation is controlled by the Ministry of Taxation and managed by the municipal authorities. Although values are automatically assessed on the basis of recorded sale prices and property information, there is a "human factor" present in the valuation process represented by local valuation committees that comprise typical laymen. The valuation is based on information from the cadastre, the land book, and zoning and planning regulations. However, the key element is the mandatory recording of property sales prices.

The property value is assessed as the full market value of the property including land and buildings but excluding machinery, furniture and animals. The valuation is assessed to reflect the average cash price paid by a sensible buyer. The value should also reflect the best possible economic use of the property. All public regulations such as zoning and planning regulations must be taken into consideration. The land value is assessed as the full market value (assumed cash payment) of the land without the buildings or other construction facilities. Again, the value is assessed to reflect the best possible economic use of the land - disregarding any existing buildings and the present land use. The land value includes of site improvements such as drainage, sewerage or roads.

Land tax is levied by the county and municipal authorities based on the assessed market value of the land for all kind of private properties. Land taxes account for about two percent of the total tax and duty revenue.

*Land-use and land development.* The system of planning control is based on the principle of framework control in which plans must not contradict the planning decisions at higher levels. The county councils carry out regional planning with emphasis on the regional infrastructure and the sectoral interests of the countryside. The municipal councils are responsible for municipal planning with emphasis on the local issues and the function and development of the urban areas. The municipal councils are also responsible for the legally binding detailed planning of their neighbourhood areas, and for the granting of building permits that serve as a final control in the system. The Minister for the Environment can influence the planning at regional and local levels through policies and national planning directives.

The system of planning control is supported by a number of the sectoral land use acts such as the Agricultural Holdings Act, the Environmental Protection Act, and the Nature Protection Act. The sectoral land use provisions are managed by the county and municipal authorities on the basis of sectoral land use programmes that also feed into the comprehensive planning at regional and local level. Furthermore, the system of planning control is supported by the land information infrastructure where the cadastre forms the basic layer for planning and administration.

The impact of central versus local government in support of sustainable development is a mix of vertical connections where each sectoral policy is implemented by a top-down approach; and horizontal connections where the different sectoral policy areas are balanced on the same level through comprehensive spatial planning.

In the Nordic setting, the decentralised model of land use control is based on a cultural tradition which strives for a broad political and social consensus. The concept of decentralisation comprises a precise and finely tuned relationship between a strong national authority and autonomous county and municipal councils. The purpose is to solve the tasks at the lowest possible level so as to combine responsibility for decision making with accountability for financial and environmental consequences. To put it simply: “planning is politics”.

**Challenges and barriers**

*Policy level.* There is no overall comprehensive land policy in Denmark. On the other hand there is no need for such a policy since the system is already established and embedded in the cultural and institutional setting of the country. There is, however, a need for an overall policy with regard to the National Spatial Data Infrastructure. There is also a need for an overall policy with regard to the design and implementation of e-governance and e-citizenship in relation to land and property management.

*Management level*. Strategic aspects need to be considered with regard to the cadastral infrastructure and the institutional framework. For example, whether the Land Registries at the local district courts should be merged with the Cadastral Agency under the Ministry of Environment, and thereby increase the potential for access to and management of data related to land and property. The adequacy of the current cadastral infrastructure and procedures in relation to new ICT tools such as the provision of maps

on-line from the relevant mapping database needs consideration. As does introduction of a 3D-cadastre to serve the registration of strata titles and some special construction works. Finally development of a marine cadastre to identify and secure rights and restrictions in the marine environment especially in the coastal zone should be considered.

*Operational level*. Fine-tuning of property concepts is needed in relation to the cadastre, the land book, and the valuation register. There is also a need to develop a user-friendly interface for access to land information in order to serve the needs of users in government, business, and the public in general as a basis for implementing e-government as the overall approach to land administration. This interface could be based on the web-cadastre in combination with the topographic database, and should also include information on ownership, mortgage and easements, the land and property value, as well as restrictions and responsibilities related to individual properties. The information should be accessible by the postal address, cadastral identification, or the name of the landowner.

## VICTORIA

### Country context and a short historical path towards sustainable land management

Victoria's cadastre is a recent historical development, sharply influenced by administrative arrangements and new technology.

Originally part of the colony of New South Wales, Victoria was separated in 1851 and is one of six states which (with two territories) make up the federation of Australia. The Australian Government has powers over defence, foreign affairs, trade and commerce, taxation, customs and excise duties, pensions, immigration and postal services. Other powers are the responsibility of state and territory governments, including as health, education, transport networks, town and rural planning, and land administration.

Victoria is the most densely populated state with 4.9 million people living mostly along the coast in an area roughly the size of the British Isles and about five times larger than Denmark. By European standards, the

**Victoria**

**Location**: one of six states that with two territories constitute Australia

**Population**: 4,872.5 million. 3,975,825 people live within 50 kilometres of the coast, including 3.5 million in Melbourne, the capital city.

**Area**: 227,420 $km^2$ and 3% of Australia's land mass.

**History:** Victoria was initially settled as a British colony in 1821 and used for convict transportation. Colonial government was established in 1851. A gold rush in the 1850's created enormous wealth.

**Government**: State Constitution passed in 1851 allows a bi-cameral parliament, with ministries based on the English Westminster system, with 73 local councils.

population number and density are very low. Home ownership is the norm. At 2001, 75% of dwellings were either owned outright or mortgaged.

Unlike other states, Victoria's relative close settlement virtually eliminated native title land, though some claims await resolution in the claims system. A small amount of land is held in trust or on behalf of Aboriginals.

The colonies, for over a hundred years, had insufficient skilled professionals (surveyors, lawyers and administrators) to service needs. After an initial regulation system was established in 1860's a gradual improvement in surveying was slowly achieved. This licensing and regulation system for surveyors and control over cadastral surveying survived for the next 100 years (Bell 2001). Reliable mapping and surveying were assisted by creation of legal standards for surveying, a permanent survey mark network throughout Melbourne, a better licensing system, and the audit of surveys by surveyors employed by the Titles Office (Ristevski and Williamson 2001).

The modern LAS emerged through digitization and new policies applied during the 1980's driving small government, privatization, deregulation and competition and business performance standards including risk management. By the mid 1990's the whole State was covered with both digital topographic and cadastral data. Subsequent efforts involved the enhancement and improvement of this data to meet users' requirements and to integrate the computerized data sets for roads, electricity and water supply authorities. However, environmental and planning authorities continued to work in isolation and developed topographic data and support systems for use in their areas of expertise.

The importance of spatial information grew immeasurably following the comprehensive review of the state's spatial information infrastructure in the Tomlinson Report of 1993. A State Coordination Council was established to look at a computerized land information system covering 104 data systems. It conceived a "legal" database supported by a "geographic" database together constituting a computerized cadastre (Chan and Williamson 1995). While the outward framework of legislation remained relatively stable, significant reorganization of the agencies took place (Williamson, Chan and Effenberg, 1998). Regional GPS base stations were established in 1995 and a comprehensive geodetic strategy was implemented between 1998 and 2001.

Victoria was very late to see the need for a robust and integrated cadastre as part of its spatial information system and slow to digitize registration processes. By the 1980's separate efforts to computerise activities in land tax, state revenue, and valuer-general offices resulted in about 23 sets of owner/parcel/property information using inconsistent approaches to addresses and unit identifier and property definition.

Integration of the two basic sets of spatial information (the private parcel based system of the land registry and the survey and mapping system in the Surveyor-General's office) was impeded by different approaches in each agency. The Land Registry focused on maintaining the deeds based measurements generated in the Crown survey processes. Survey and mapping system demanded on-ground accuracy. Technology provided

solutions by eventual use of more powerful computers and a robust Web system. The achievement of the utility of single data entries for multiple uses involved *ex post facto* construction of unique parcel identifiers through various attempts. The first, Landata, was before its time, and failed (Chan and Williamson 1999). The property information project (PIP) and systematization of street address approaches especially from 2002 onwards delivered accessible spatial information. VicMap Property became the first comprehensive cadastral layer in the state.

## The Current Land Administration System

The delivery of local services, including planning and building control is undertaken by local councils; otherwise the LAS is state based, through departments of the executive government organised along the lines of the English Westminster system. Victorian administrative arrangements reflect the British model with statutory agencies providing distinct functions in "silo" or stand alone systems, utilising three "generals": the Surveyor-General, the Valuer-General and the Registrar of Titles. The legislative framework did not require any agency to work with the others nor was cooperation facilitated.

Australia was forced to tackle jurisdictional separation to address major problems of water quality, salinity, soil acidity and erosion where national solutions were demanded. The national government, as the principle taxing agency, is looked to as having resources capable of addressing these major issues. Jurisdictional separation however remains an impediment to generation of coherent information sufficient for sound policy making, a dilemma familiar to Europeans where national boundaries fail to reflect the topographical realities.

Particularly since 1995, a strong commitment to improving access to and quality of spatial information, especially by web-based systems, has delivered practical and robust solutions to the historical and administrative problems. By 2004, the Spatial Information Infrastructure group (SII) in the Department of Sustainability and Environment managed all spatial information for the state through the Victorian Spatial Information Strategy (VSIS), VicMap, and Land Channel (the major land information web site of the Victorian government: www.land.vic.gov.au ). SII is recognised as an essential component in implementation of sustainable development policies.

Meanwhile the handling of the subdivision process underlying the cadastre remains the statutory and administrative responsibility of the Land Registry, with new plans going into VicMap through certification by local governments. Pioneering efforts in creation of electronic conveyancing, including electronic financial settlements, are being undertaken. A whole of government approach to spatial information continues to evolve through the efforts of a peak Spatial Information Council. Trends to uniform national standards are assisted by the Public Sector Mapping Agency and the Australian and New Zealand Land Information Council.

### *The land policy component*

While the Victorian government did not formally announce land policy, its LAS was developed in response to needs for closer settlement and land markets involving 2.4 million privately owned parcels and 2.3m properties in 1999 and markets in complex property commodities (Wallace and Williamson 2004). The remaining one third of the land mass is Crown land, representing only 70,000 parcels. Since the 1990's, another driver, sustainable development, underpinned the development of the existing robust and integrated land information system.

Victoria's LAS policy framework continues to require imaginative approaches to the legislative framework of separate Acts dealing with land transfer, sale of land, planning, valuation, stamp duty, land tax, heritage protection, pollution, building, subdivision and mining. By comparison, the marine environment is badly served having disconnected separated and disparate legislative frameworks characterized by large gaps in the regulatory framework. Titling of water is underway, with the encouragement of the Australian Government with the aim of establishing a national water market (Victorian Government 2004).

### *The land information component*

Land information is now an important commodity in its own right. Much of it is available on the Web, linking basic title and information searching systems retailed by contracted providers. Continuity and systematization is organised through VicMap as the crucial component of the state spatial data infrastructure. Eight fundamental datasets: geodesy, property including the cadastre, transport and hydrography, image, address (including postcodes) and administration (local government and electoral) boundaries are integrated, available on-line and delivered principally through private resellers. Soils are not included.

Issues of privacy, ownership, copyright, risk management, authorisation (legal or administrative), maintenance form and access are managed by the Department of Sustainability and Environment according to national and international standards, including metadata standards.

### *The land administration functions*

*Land tenure and cadastral systems.* Victoria's property law is English, allowing English case law used by the courts. The basic property law is derived almost entirely from the English Law of Property Act of 1925. Origins of the feudal system are still detectable in the estate scheme with ownership through freehold tenure still being held of the Crown. Common tenures are freehold, leasehold and Crown leases and licences. These old

concepts are held precious by the courts but the logic of land ownership is pragmatically built around the Torrens system of registration with its neat vocabulary of "registered interests".

While Torrens systems are universal for each Australian jurisdiction, they vary considerably in detail. Theo Ruoff (1952, 1957) provided the most famous analysis of its three basic principles: *mirror* (title mirrors all relevant interests in the land), *curtain* (the title creates a barrier or curtain ensuring that interests off the register need not be searched), and *insurance* (the state guarantees registered interests). Victoria, however, places a strong reliance on possession as a source of title capable of overriding the registered title. This reflects the history of surveying in the state and the frequency of non-conformity between surveyed and title boundaries. By relying on possession as a source of title for whole and part parcels, Victoria is able to deliver land transaction efficiency allowing buyers and lenders to be confident that the land inspected is the land they receive at settlement. Check surveys are relatively rare for domestic conveyancing; the contrast with New South Wales where physical and title boundary conformity is demanded and where surveys are common, is stark. Incremental processes of improved surveying standards and sensitive administration attending new subdivisions are gradually removing discrepancies between on-ground and cadastral boundaries.

The registry records mortgages, but generally not leases, since rights of tenants in possession override registered title. The Torrens system handles subdivisions smoothly, whether they parcel vacant land or buildings. Land can be sold "off the plan" before the subdivision is certified by the local council or registered. The developer is obliged to hold any deposit in a trust account until the subdivision process (and consequently the building itself) is completed. Mortgages to service land development can be registered on the parent title and carried through onto later issued titles to lots unless they are discharged in the interim.

Torrens conveyancing is comparatively simple with about 20% being done by parties on their own behalf, 20% by conveyancers (unregistered practitioners) and the remainder by lawyers. The land registry is geared to service the public and provides extensive help services. Its capacity is elastic, and capable of meeting surges in the property market. With other agencies, the registry is developing electronic lodgment of plans of subdivision and masterminding the introduction of digital conveyancing for both property transfer and financial payments.

*Land Value.* Valuations are professionally arranged through and recorded by the Valuer General and contracted out by local councils. Valuations underlie the land tax, stamp duty and council rating systems. The data is not made available to the public, nor is sale price history, in contradistinction to the rest of Australia where sale price history is a popular data set.

Valuations are professional compilations of sale prices of comparable properties, estimates of the capital worth of the land and buildings, without chattels, furniture or moveable business assets. Land tax is assessed on a percentage of the value of the total

land holdings of a person or company on an aggregated basis and payable annually; the tax is comparatively high. Land taxes are charged on residential land over a particular value and on commercial and industrial land. Productive agricultural land is exempted. State dependence on land tax traditionally gave the administrators of the tax system considerable negotiation power within government reflected by it being under the Department of the Treasurer. Tax administrators therefore collect and manage separate owner/parcel/taxpayer data, unrelated to land registry records. Rates are set by local councils as a percentage of value, and cover provision of local services including rubbish removal. Stamp duty at the rate of (about) 6% is paid by the buyer on the price or value of land at the time of transfer. In all, Victoria's land is comparatively heavily taxed by international standards.

*Land use and development.* Private and Crown land is subject to planning schemes with two basic chapters: state and local government covering the range of development, building, building removal and land use with elected local governments being the principal players and designers of the detail. Additionally substantial administrative controls operate over building, provision of water, drains, electricity, plumbing and other installations through building control legislation. Both building and planning control systems operate on the basis of articulated public standards or schemes, applications for and grant of permits and certifications of compliance before final certification is available. A mixture of public and private systems provide the infrastructure and services.

The planning system remains the point of tension for a government seeking to rebalance the state's stock of detached housing and commercial and industrial land with the escalating cost of essential services and roads. The need to preserve agricultural land on city perimeters and to produce much denser land uses within the existing service infrastructure raise high levels of case by case disputes. These situations are met by a mixture of negotiation, objections and hearings, formal legal appeals, and Ministerial overriding of local government powers.

In 2004, the Government sought to manage the planning tensions and to implement its policy of sustainable development by initiating a long term vision for development in a thirty year plan. This plan freezes productive agricultural land, and encourages high density development in selected activity centres and in-fill use of suburban land. Simultaneously, population growth in rural provincial towns and cities is encouraged as a means of decentralizing state activities.

**Identification of challenges and barriers**

*Policy level*. A strong commitment to sustainability in land and resource use and management is evident in the Government's plans for LAS to service the triple bottom line. Depleted land, soil degradation, water shortage, salination, erosion, deforestation, conservation of native flora and fauna and other problems are receiving serious and considered attention. While reorganizations of government and private instrumental

spatial data collection and management were driven by the desire to fill the information void, gaps are considerable. Public land records need attention; mining information, though of high standard, is not integrated; the marine environment is severed from LAS; and understanding of the utility of reliable and readily accessed spatial information needs to be improved. Demands for far more organised information about restrictions, responsibilities and, in the modern context, risks relating to land and resources are vociferous and drive changes, as will the development of international cadastral models and new opportunities available through spatially enabled IT platforms.

*Management level*. The place of spatial information in Victoria's LAS continues to evolve. The 19th century model of separate institutions managing their local activities is handled through administrative rearrangements aimed at permitting a whole of government approach to sustainable development. The integration of cadastral surveying attending land registration functions with the general spatial data infrastructure and land information group activities will continue to driven by technology and improvements in survey quality. Project based revitalization of particular aspects of LAS, particularly those focused on land markets, meanwhile will continue.

*Operational level.* National initiatives to improve organisation and accessibility of spatial data are likely to deliver more seamless web systems to overcome the state and territory based existing systems. Electronic conveyancing, driven especially by national mortgage businesses, also reinforces national over vested state interests. The future will see much more interest in servicing population mobility and international investment. The use of the register for managing "new property" in water, carbon, salinity, marine and other rights is now an open question.

Development of comprehensive accounts of responsibilities, restrictions and risks remains the greatest challenge. Reorganization of provision of land information away from land transactions towards a more generic regulatory support systems is required.

## CONCLUSION

Land administration systems historically reflect their jurisdictions of origin. Standardisation however is identified as a major goal to permit much more useful conversations about and comparisons between national systems for managing land. As nations develop, and as cost and complexity of technology increases, opportunities for sharing experiences and building internationally stable visions emerge. The FIG vision of 1995, Cadastre 2014 (Kaufman and Steudler 1998) and its updated version by Paul van der Molen (2003) demonstrate the value of broad generic models to identify critical issues and allow useful comparisons. The model LAS suggested here relies on this tradition of creating visions to assist development of systems and to provide hopefully a useful benchmark for the future.

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