

Position paper
UNDERSTANDING LAND ADMINISTRATION SYSTEMS

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Introduction

This paper introduces basic land administration theory and highlights four key concepts that are fundamental to understanding modern land administration systems - firstly the land management paradigm and its influence on the land administration framework, secondly the role that the cadastre plays in contributing to sustainable development, thirdly the changing nature of ownership and the role of land markets, and lastly a land management vision that promotes land administration in support of sustainable development and spatial enablement of society. The paper concludes by highlighting the over-arching importance of good governance in promoting appropriate land administration systems.

A land administration framework

Land administration systems (LAS) provide a country's infrastructure for implementation of its land-related policies and land management strategies. Land in modern administration includes resources, the marine environment, buildings, and all things attached to and under the surface. Each country has its own system, but the focus of this paper is about how to organise successful systems and improve existing systems.

This exploration of LAS provides an integrated framework to aid decision makers to make choices about improvement of systems. The story is based on the organised systems used throughout modern western economies where the latest technologies are available, but it is also applicable to developing countries that struggle to build even rudimentary systems. The improvement of integrated land administration involves using four basic ingredients in the design of any national approach:

- the **land management paradigm**, with its four core administration functions of land tenure, land use, land valuation and land development,
- **common processes** found in every system,
- a **toolbox approach**, offering tools and implementation options, and
- a **role** for land administration in supporting sustainable development.

The **land management paradigm** is theoretical and universal in application, in that it can be used by any organisation, especially national governments, to design, construct and monitor their LAS. The core idea behind the paradigm involves moving land administration beyond its familiar functions of mapping, cadastral surveying, and registering land.

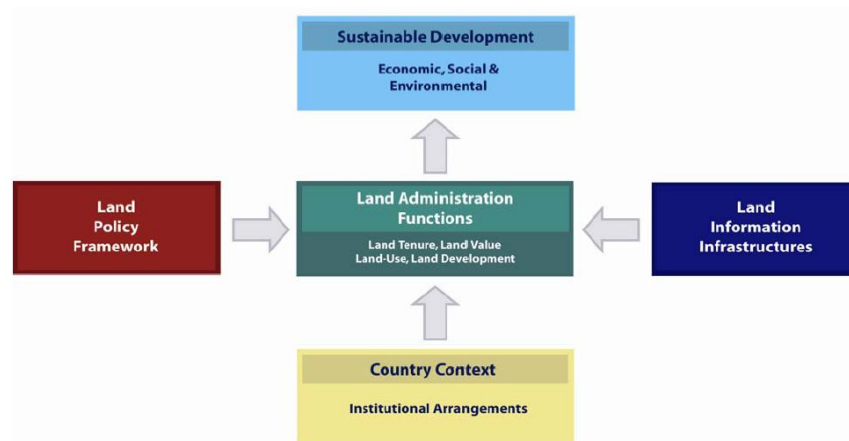


Figure 1: The land management paradigm (Enemark and others 2005)

To achieve sustainable development these familiar functions need to be approached holistically and strategically integrated to deliver, or assist delivery of, the four functions in the paradigm (land tenure, value, use, and development). If the organizations and institutions performing these four functions are multi-purpose, flexible, and robust, they are capable of assisting the larger tasks of managing land, and dealing with global land and resource issues. The paradigm drives adaptability and flexibility of land administration, both in theory and in practice, and encourages developed countries to aim for good governance, eDemocracy and knowledge management, and developing countries to implement food and land security, and poverty reduction, while improving their governance, and, in many cases, building effective land markets.

While the theoretical framework offered by the land management paradigm is universal, particular implementation paths must vary, depending on local, regional and national situations. This enigma of open-ended opportunities for implementation is solved by applying an engineering approach (design, build and manage) that relates design of a LAS to management of local practices and processes. These **common processes** are found in all countries and include dividing up land, allocating it to identifiable and secure uses, distributing areas to people, tracking social changes such as death and inheritance, and so on. Variations in how these processes are undertaken underlie the remarkable variety of existing LAS.

Among all the variations, market based approaches predominate, both in theory and practice. Their popularity arises from their relative success in managing these common processes and, at the same time, improving governance, transparency, and economic wealth for the countries where they are successfully used. Market based approaches thus provide best practice models for improvement of many national LAS where governments seek similar economic results. The tools used in market based systems are therefore frequently related to general economic improvement. This relationship is, however, far from self evident. Market based approaches are creatures of their history and cultural sources. Transferring them to other situations is difficult and a long term process that requires forethought, planning, and negotiation.

This leads to the third ingredient of good LAS design: the **toolbox approach**. The land administration toolbox for any particular country contains a variety of tools and options to implement them. The tools and their implementation reflect the capacity and history of the country. The selection of tools reflects the historical focus of land administration theory and practice in cadastral and registration activities, and includes, among others: *general tools* such as land policies, land markets and legal infrastructures; *specialist tools* such as tenure,

registration systems, cadastral surveying and mapping and land boundaries; and *emerging tools* such as pro-poor land management and gender equity.

There are of course many other tools. Valuation, planning and development tools raise separate and distinct issues. Many countries include land use planning and valuation activities in their formal LAS. Other countries rely on separate institutions and professions to perform these functions and define their LAS more narrowly. For all LAS, however, these functions need to be undertaken in the context of the land management paradigm and integrated with the tenure function. The design of a tool by an agency engaged in any of the four functions therefore needs to reflect its integration with the others. The cadastre remains a most important tool, because it is capable of supporting all functions in the land management paradigm. Indeed, any LAS designed to support sustainable development will make the cadastre its most important tool.

The list of tools and their design will change over time, and so will the suitability of any particular tool for national LAS, and the options appropriate to deliver it. To successfully use the tool box approach, the LAS designer must understand the local situation, diagnose the next steps for improvement, and select appropriate tools and options from the possible array. Usually the steps can be clarified by international best practices explained in well-documented case studies, United Nations and World Bank reports and publications, and a wide variety of books, journal articles and reports.

One of the major problems with LAS design, even in countries with successful systems, is the isolation of components from each other. This is known generally as the problem of “silos”. Another problem is reliance on single tool solutions in complex situations. The toolbox approach addresses both these problems. It requires that each tool be considered in the context of all the others, and tested against the over-all land management paradigm. It relies on using methods and options appropriate to a situation, compared with a “one size fits all” suite of policy and technical options.

The options now available vary widely. Land identification systems, registration systems, digital support systems, tenures, surveying and mapping systems, and so on, are both variable and increasingly adaptable. Indeed, no LAS is static. The tools used are always being adapted to reflect changes to the ways people think about and use their land, and many other influences. These changes feed back into the overall design of the LAS and its capacity to inform land policy at large. The essential theme of this paper is to inform the design of any particular LAS by starting with the broad context of the land management paradigm, observing the common processes that are actually used, then choosing options for each of the tools to manage these processes according to a well grounded understanding of what is appropriate for local circumstances and international best practice.

In practice, from a land administration design viewpoint, LAS problems are universally shared. Whether or not a country uses private property institutions as the foundation of its land rights, land security and land management are overriding imperatives capable of being implemented by the new **role of land administration in supporting sustainable development**. And whether a country is economically successful or resource hungry, betterment and improvement of existing systems are essential. An overall theme is therefore developing land administration capacity to manage change. For many countries, meeting the challenges of poverty alleviation, economic development, environmental sustainability, and management of rapidly growing cities, are immediate concerns. For more developed countries, immediate concerns involve updating and integrating agencies in relatively successful LAS, and putting land information to work for emergency management,

environmental protection, economic decision making, and so on as part of a wider spatial enablement of government and wider society.

The central role of the cadastre in land administration

The theoretical framework of a land administration role in delivery of sustainable development relies on using the land management paradigm to guide the selection of tools in the toolbox used to manage common processes. Within this framework a wide range of options and opportunities is available to LAS designers and land policy makers. One tool is, however, fundamental – the cadastre or land parcel map (Figure 2) (FIG, 1995). The history and influence of the cadastre explain how knowledge about land administration was gathered, particularly after World War II. This background demonstrates that modern cadastres have a much more significant role than their original designers envisaged. The cadastre, or the large scale, land parcel map related to parcel indices, is the vital information layer of an integrated land management system, and, in future, will underpin information systems of modern governments.

While some developed countries do without a formal “cadastre”, most generate digital parcel maps (or digital cadastral data base or DCDB) reflecting land allocation patterns, uses and subdivision patterns, and even addresses and photographs. A country’s DCDB is its core information layer that reflects the use and occupation of land by society – the built environment. Critically it provides the spatial component for LAS and more particularly the location and place dimension with the most useful output being a geocoded street address of each property. Simply the cadastre is the central component in spatially enabling government. It is destined for a much broader role as fundamental government infrastructure equivalent to a major highway or railway, though it was originally created on behalf of taxpayers merely for better internal administration of taxation, and, more recently, titling of land in support of more efficient and effective land markets. Without these digital facilities, modern governments cannot understand the built environment of cities, manage land competently, utilise computer capacity to assist policy making, or retrieve significant value out of land.

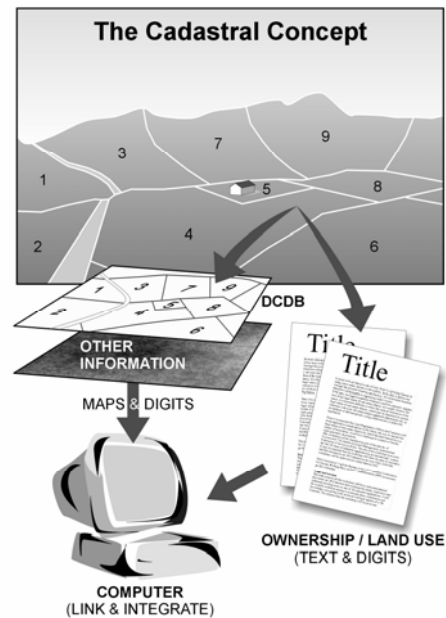


Figure 2 The Cadastral Concept (FIG, 1995)

The greatest potential of the DCDB lies with the information industry at large, as the principal means of translating geographic coordinates and spatial descriptors of land parcels into meaningful descriptions of places that everybody can understand. Land parcels describe the way people physically use and think about their land. The familiar configuration of parcel based descriptions in the DCDB ensures people-friendly identification of precise locations of impact of private ownership and, more vitally, of government, business and community policies, regulations and actions. In cadastres supported by professional surveyors, the descriptions have the added advantage of being legally authoritative.

While having a cadastre is not mandatory for a LAS, all modern economies recognize its importance, and either incorporate a cadastre or its key components in their LAS. For example, Australian LAS did not evolve from a traditional cadastral focus as did many of their European counterparts, but their cadastres are equal to, and sometimes improve upon, the classic European approach.

The cadastral concept shown in Figure 2 is simple and shows the textual and spatial components, which are the focus of land surveyors, land registry and cadastral officials. The cadastre provides a spatial integrity and unique identification for land parcels within LAS. However, while the cadastral concept is simple, implementation is difficult and complex. After ten years, the model still remains a useful depiction of a cadastre. However it needs to be extended to incorporate the evolving and complex rights, restrictions and responsibilities operating in a modern society concerned with delivering sustainable development as well as the social context of people to land relationships. It also does not show the important roles for the cadastre in supporting integrated land management, or in providing critically important land information to enable the creation of a virtual environment, and, at a more practical level, e-government.

Within the constant theme that land administration should be used to deliver sustainable development, the cadastre takes on extended functions as discussed above. In summary two features of the modern cadastre underpin these functions: cadastres provide the authoritative description of how people relate to specific land, and they are the basic spatial information in digital land information system (LIS).

Even with the help of a clear theoretical framework, an explanation of how cadastres should be used within an LAS focused on sustainable development, is far from easy. Cadastres take on many shapes and sizes. Some countries, for example, the USA, do not yet use them as such, though many or most of its cities, counties and states assiduously collect parcel information in some form. Other countries do not have the resources to build high-end cadastres, and need a well designed, incremental approach. To deal with situational variety, cadastres can be categorised as three general types, depending on their history and functions: the European or German approach, the Torrens or English title approach and the Latin, French and Spanish approach (that includes the USA approach). The focus is on the European, map-based, cadastre with integrated land registration functions. The utility of this tool in land management is seen both in its successful use by its European inventors, and in the contrast of lack of land management capacity in countries using other approaches.

The relationship between cadastres, SDIs and LAS that interact to spatially enable government and wider society in pursuit of sustainable development objectives, is shown diagrammatically in Figure 3 below – the “butterfly” diagram. The diagram shows the critical role that the cadastre plays in providing built environmental data in a national SDI that has traditionally focused on natural environmental data (topographic data) and how the integrated SDI can then contribute to a LAS that supports effective land management. It is only by bringing together the SDI and the LAS that an integrated land policy can be implemented to support sustainable development. This integration also provides the key role of spatial enablement of the LAS, as well as government and wider society. Ironically only a relatively small number of countries, the “developed countries” have the ability at the present of achieving this objective. However the model does provide a road map for less developed countries to move down this path.

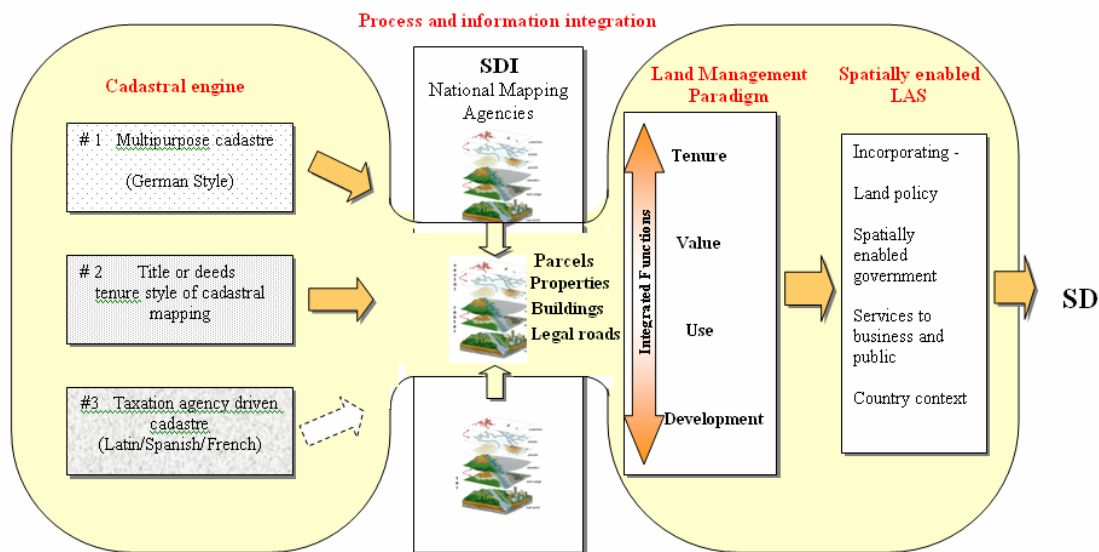


FIGURE 3. The cadastre as an engine of LAS
The “butterfly” diagram.

The changing nature of ownership and the role of land markets

The rapid growth of restrictions on land in modern societies is paralleled by a change in the nature of land ownership. Nations are building genuine partnerships between communities and land owners, so that environmental and business controls are more mutual endeavors. Rather than approach controls as restrictions, the nature of ownership is redesigned to define opportunities of owners within a framework of responsible land uses for delivery of environmental and other gains. This stewardship concept is familiar to many Europeans long used to the historical, social and environmental importance of land. For these Europeans, the social responsibilities of land owners have a much longer heritage, with the exemplar provision in the German Constitution insisting on the land owner’s social role. The nature of land use in The Netherlands, given much of the land mass is below sea level, presupposes high levels of community cooperation, and integrates land ownership responsibilities into the broader common good. The long history of rural villages in Denmark and public support for the Danes who live in rural areas also encourages collaboration.

The Australian mining industry provides typical examples of collaborative engagement of local people, aboriginal owners and the broader public. The Australian National Water Initiative and the National Land and Water Resources Audit reinforce the realisation that activities of one land owner affect others. The development of market based instruments (MBI), such as EcoTenders and BushTenders, is an Australian attempt to build environmental consequences into land management. Australia’s initiatives in “unbundling” land to create separate, tradable commodities, including water titles, are now established and are built into existing land administration systems as far as possible. As yet a comprehensive analysis of the impact of unbundling land interests on property theory and comprehensive land management is not available.

Whatever the mechanism, modern land ownership has taken on social and environmental consequences, at odds with the idea of an absolute property owner. Australia and European

approaches to land management are inherently different. While Europe is generally approaching land management as a comprehensive and holistic challenge requiring strong government information and administration systems, Australia is creating layers of separate commodities out of land and adapting existing LAS as much as possible to accommodate this trading without a national approach. In these varying national contexts, the one commonality, the need for land information to drive land management in support of sustainable development, will remain the universal land administration driver of the future.

The land market of 1940 is unrecognisable in today’s modern market (Figure 4). Modern land markets evolved from systems for simple land trading to trading complex commodities. New trading opportunities and new products were, and continue to be, invented. The controls and restrictions over land became multi-purpose with an increasing focus on achieving sustainable development objectives.

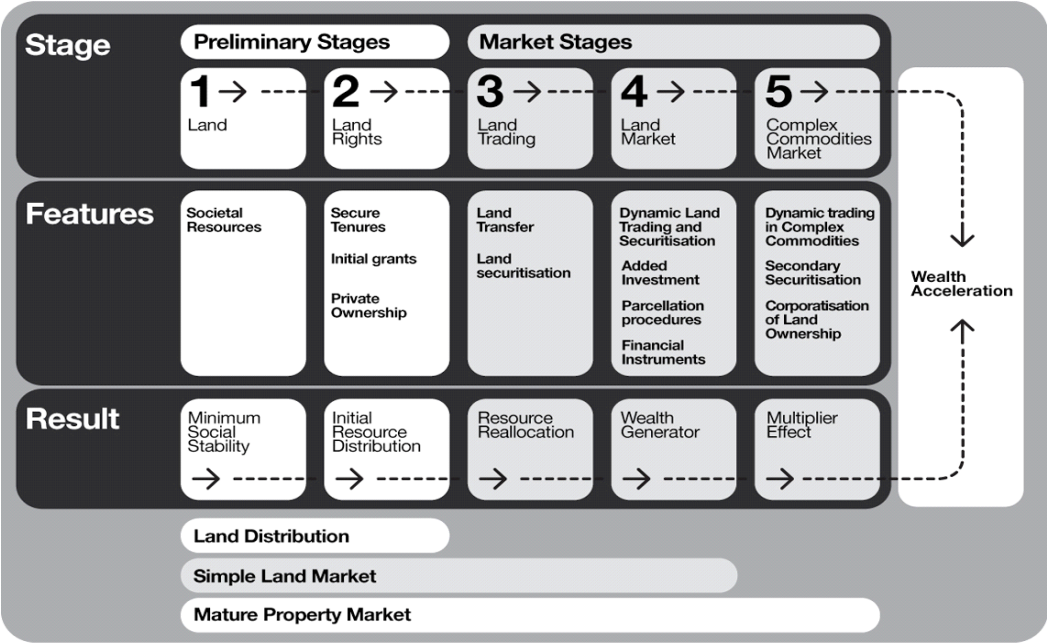


Figure 4: Evolution of Land Markets (Wallace and Williamson, 2006)

As with simple commodities such as land parcels, all commodities require quantification and precise definition (de Soto, 2000). While LAS have not yet incorporated the administration of complex commodities to a significant degree, these modern complex land markets offer many opportunities for LAS administrators and associated professionals, if they are prepared to think laterally and capitalise on their traditional measurement, legal, technical and land management skills

This complexity is compounded by the “unbundling of rights in land” (ie water, biota etc) thereby adding to the range of complex commodities available for trading. For example, the replication of land related systems in resource and water contexts is demanding new flexibilities in our approaches to land administration. These emerging demands will stimulate different approaches to using cadastral information.

Our understanding of the evolution of land markets is limited, but it must be developed if LAS administrators are going to maximise the potential of trading in complex commodities

by developing appropriate land administration systems. Figure 4 shows the various stages in the evolution of land markets from simple land trading to markets in complex commodities. The growth of a complex commodities market showing examples of complex commodities is presented diagrammatically in Figure 5.

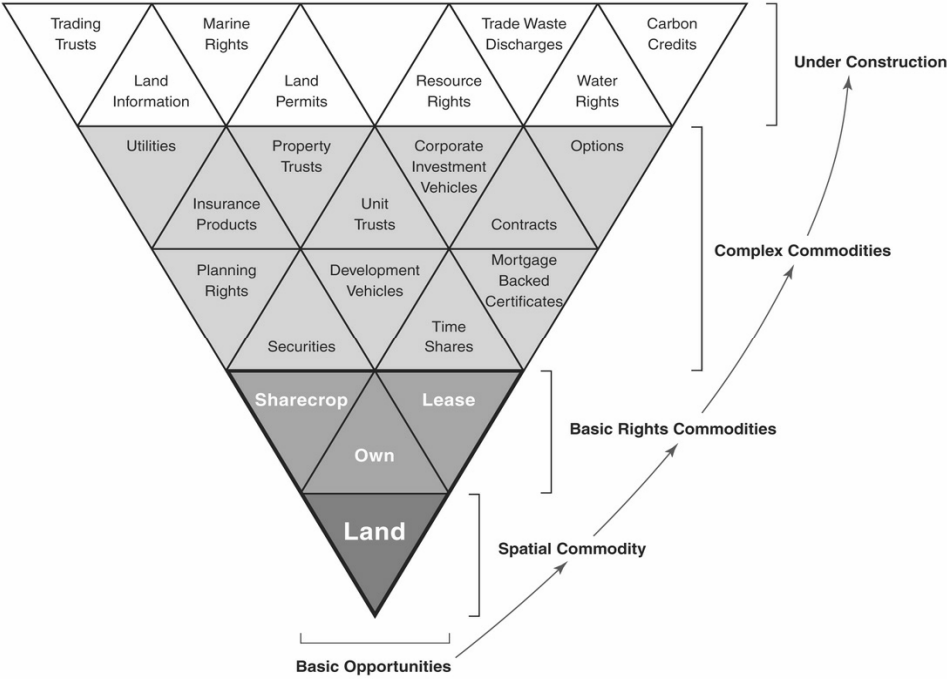


Figure 5 Complex commodities market (Wallace and Williamson, 2006).

A land management vision

Developed countries use LAS to support their land markets and accelerate wealth creation by systematically converting land into an open-ended range of commodities, as described above. Internationally, market advancement will remain the driver for LAS change. But it should not be. Sustainable development is more urgent – economic wealth is only one part of the game. Unless countries adopt the land management paradigm informed LAS, they cannot manage their future effectively. Our argument is that planned responses to land and resources will help manage the social, economic and environmental consequences of human behaviour. Only then will nations be able to deal with the water, salinity, global warming and cooling, and land and resource access issues facing the globe.

Thus this theory of land administration assumes that resources applied to building a cadastre can pervasively improve an entire LAS, and eventually public and private administration in general, while simultaneously improving land based services to government, business and the public. Whether the question is how to set up a LAS, or how to adapt an existing system, designers need to take into account the dynamism in land, people’s attitudes, institutions, technologies used, and its potential. A capacity to predict aspects of the future is helpful for managing this dynamism.

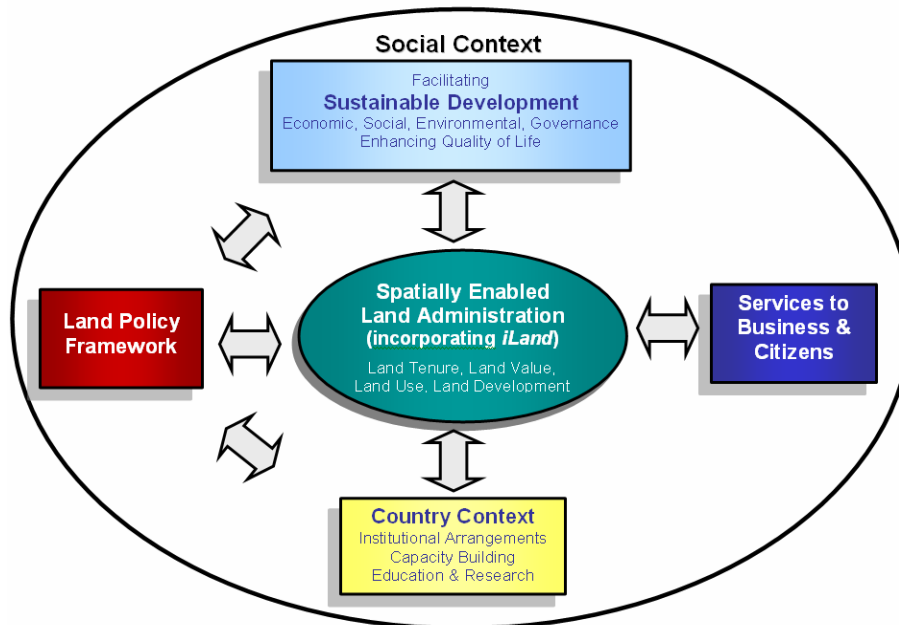


Figure 6: A land management vision
(Williamson and others 2006)

Figure 6 describes a land management vision that incorporates a spatially enabled land administration system and builds on the land management paradigm. This vision presents another major challenge for LAS designers - that is, for a jurisdiction to understand and accept the vision and the operation and interaction of the key components being the cadastre, the SDI, the spatially enabled LAS. Sustainable development objectives will then be easier to achieve and evaluate. Adaptability and usability of modern spatial systems will encourage more information to be collected and made available. For governments, improved information chains will assist development and implementation of a suitable land policy framework. The services available to private and public sectors, and to community organizations, should commensurably improve. Ideally these processes are interactive: modern information and communication technology, the engagement of users in design of suitable services, and the adaptability of new applications should increase and mutually influence each other.

The spectacular growth in spatial technologies is the basis for predicting a future for land administration in which spatially enabled governments have much more useful information on which to base their decisions about sustainable development. This future land management vision is offered to challenge those engaged in land administration and related activities, and to provide a clear direction for excellence in LAS.

Good governance and land administration

Lastly, good governance is at the heart of good land administration. Governance is the process of governing. Land administration is therefore essentially about good governance. The UNECE land administration principles (2005) are built on the assumption that “sustainable development is dependent on the State having overall responsibility for managing information about the ownership, value and use of land”. The land management paradigm extends this connection by demanding an even wider approach to governance in land administration, in which the government builds infrastructures for management of land

in addition to management of information. Thus the paradigm builds governance directly into land administration.

Governance refers to the manner in which power is exercised by governments in managing a country's social, economic, and spatial resources. It simply means: the process of decision-making and the process by which decisions are implemented. This indicates that government is just one of the actors in governance. The concept of governance includes formal as well as informal actors involved in decision-making and implementation of decisions made, and the formal and informal structures that have been set in place to arrive at and implement the decision.

These general considerations link land administration with governance so that land governance is seen as essential to successful nationhood and civic capacity. In its study on *Good Governance in Land Tenure and Administration*, FAO remarks:

“The message to land administrators is that they cannot pursue technical excellence in isolation. Their skills and techniques should serve the interests of society as a whole. Land administrators act as guardians of the rights to land and the people who hold those rights. In doing so, they act to stabilize public order and provide the preconditions of a thriving economy.” (FAO, 2007).

The major international agencies demonstrate that successful land administration requires accountable government. Sustainable systems require the institutions that interact with the citizens who are its intended beneficiaries do so in ways that build their confidence, particularly by negating disputes and managing points of tension relating to land ownership, use and availability. The major engagement should involve policy formation and implementation to ensure that the system reflects the cognitive capacity of the beneficiaries and their beliefs about land. A national capacity to create laws through legislation and subordinate legislation is also necessary for sustainable LAS. For nations on the development track, rule by law, rather than rule by elites or ad hoc responses to circumstances, is essential. These conditions apply even if the nation's administration horizon includes land held in social tenures that rely on informal systems of land management.

For successful governance, institutions need to be stable, transparent and free of corruption. Weak governance in land administration leads to massive over-regulation, production of conflicting and gap-ridden bodies of laws, standards and documents, but with little cohesion and mutual reinforcement of legal and economic norms. Sadly, LAS more often exhibit corruption in collection of fees; multiple rent seeking and unnecessary processes; delivery of multiple and ineffective titles to parcels; arbitrary allocation of land and negligible capacity for planning or controlling building quality. Repeated problems in developing countries include legitimization of mass land theft; failure to police uncontrolled evictions; inability to manage interaction between competing tenure holders especially between land owners and users and resource takers; and inability to manage state assets. Weak governance will never be able to manage the transition of the world's populations from rural areas to urban slums.

Simply good governance is central to delivery of appropriate, effective and efficient land administration in both developing and developed countries.

Conclusion

This paper argues that it is difficult if not impossible to design, build and manage land administration systems that will support sustainable development unless there is a good understanding of the underlying theories and concepts, particularly as applied to an integrated land administration framework. The paper discusses the basic ingredients of the framework being the land management paradigm, land administration processes, the use of the tool box approach and the role of land administration in delivering sustainable development. The key concepts that are explored in more detail to improve understanding include the land management paradigm, the role of the cadastre in land administration, the changing nature of ownership and the role of land markets, and the need for and components of a land management vision. The paper concludes by emphasizing the need for good governance as an over-arching principle otherwise all the other components will not be achievable.

Acknowledgement

This paper draws on the collective experience and research of the authors over many years and particularly in recent years as they have worked together on a new book to be titled “Land administration and sustainable development” to be published by ESRI Press in the USA. The article also draws on the research of colleagues and graduate students in the Centre for Spatial Data Infrastructures and Land Administration, Department of Geomatics, University of Melbourne.

References

- De Soto, Hernando, 2000, *The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Everywhere Else*, Bantam Press, London, 235 pp
- Enemark, S., Williamson, I., and Wallace, J. 2005, Building Modern Land Administration Systems in Developed Economies. *Journal of Spatial Science*. 50:51-68.
- FAO 2007, Good Governance and land tenure and administration, FAO Land Tenure Series No 9. Rome. http://www.fao.org/NR/lt/en/abst/lt_en_071101_en.htm (Accessed 5 August, 2008)
- UNECE 2005, Land Administration in the UNECE Region Development Trends and Main Principles. Geneva. <http://www.unece.org/env/documents/2005/wpla/ECE-HBP-140-e.pdf> (Accessed 5 August, 2008)
- Wallace, J. and I.P. Williamson, 2006a. “Building Land Markets”, *Journal of Land Use Policy*, Vol 23/2 pp 123-135
- Williamson, I., Enemark, S., and Wallace, J. (eds.). 2006, Sustainability and Land Administration Systems. Department of Geomatics, University of Melbourne, Australia. http://www.geom.unimelb.edu.au/research/SDI_research/EGM%20BOOK.pdf (Accessed 5 August, 2008)

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