

Property rights, restrictions and responsibilities: their nature, design and management

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For Eve, Sarah, Jill and John

DECLARATION

This is to certify that:

- (i) the thesis comprises only my original work;
- (ii) parts of this work have been published in refereed journals or refereed conference proceedings as listed in Appendix 3;
- (iii) due acknowledgement has been made in the text to all other material used;
- (iv) the thesis is less than 100,000 words in length, exclusive of tables, maps, bibliographies and appendices.

Rohan Bennett

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ABSTRACT

This research is composed of four broad sections: introduction, background, research and conclusions. The introductory phase describes the research problem and aim. It asserts that property rights, restrictions and responsibilities over land are designed and administered in a disparate, ad hoc and disorganized fashion which makes achieving sustainable development objectives difficult, if not impossible. This thesis aims to develop a framework for organizing the management of property rights, restrictions and responsibilities in a way that enables the achievement of sustainable development objectives by citizens and governments.

The background section explores the problem more deeply. First, it looks back to the root causes: a diverse range of drivers including environmentalism, free market economies and social equity are producing legislative and policy sprawl. Second, it looks at the limitations of current attempts to overcome the problem: traditional land administration tools are being bypassed, small ad hoc legal and technical solutions are favoured and only limited holistic approaches exist. Third, the background section investigates the emerging tools being applied to the problem: ontological design, social learning, SDI and spatial technologies, uncertainty theory and new funding models could all profoundly influence the management of land interests.

The research section uses the contextual understanding to develop, justify and execute a robust research design. The hypothesis articulates that expanding the existing land administration systems with new tools and principles would enable better management of property rights, restrictions and responsibilities and consequently assist the achievement of sustainable development objectives by citizens and government. A mixed methodology involving both qualitative and quantitative studies is required to test the hypothesis. Additionally, top-down (government) and bottom-up (parcel) perspectives are also used. The sheer size of the legislative sprawl (Federal – 514 statutes, State – 620 statutes, Local – 7

statutes) and the administrative effort required to manage it is exposed at all levels of government. However, amongst the tangle of bureaucracy, pockets of very well managed, automated and spatially integrated land interests is uncovered. Additionally, the underutilized potential of the cadastre and existing registry to manage 'some' interests is identified. The bottom-up case studies provide a detailed insight into the effect of old and new land interests on individual parcels. The historical complexities of existing cadastral and registration systems and their deficiencies are also clear. Together, the results from these equally weighted case studies are used to test the appropriateness of the hypothesis, and generate components of an updated land administration toolbox, one capable of managing all interests in land.

The conclusions section synthesizes the results and develops the 'RRR Toolbox' and 'Property Object' concept. The 'RRR Toolbox' includes eight components: policy, legal, tenure, institutional, cadastral and registration, spatial and technology, capacity and emerging tools. If a jurisdiction wishes to coherently manage its land rights, restrictions and responsibilities, then each of the eight components needs to be addressed and acted upon. The 'Property Object' is defined as an advanced descriptive framework of the key attributes (objective, action, spatial extent, people impacted, duration) that make up an individual property interest. The property object permits holistic treatment of most current property interests, from ownership down to simple access powers, and also enables meaningful contrast between different interests. Together, the 'RRR Toolbox' and 'Property Object' provide new and innovative perspectives on the research aim. The results of the case studies reveal the hypothesis to be substantially not disproved. Together the concepts help to deliver sustainability objectives. However, this thesis does not claim to fully solve the problem: more work on each of the toolbox components and their implementation in different jurisdictions identified is required.

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LIST OF ACRONYMS

ABC	Australian Broadcasting Corporation
AGIMO	Australian Government Information Management Office
ALGA	Australian Local Government Association
ANZLIC	Australia and New Zealand Land Information Council
ASDI	Australian Spatial Data Infrastructure
CCDM	Core Cadastral Domain Model
CLSO	Crown Land Status Online (Victoria)
COAG	Council of Australian Governments
CSW	Catalogue Web Service
DCDB	Digital Cadastral Database
DCMB	Digital Cadastral Map Base
DSE	Department of Sustainability and Environment, Victorian Government
DPI	Department of Primary Industries, Victorian Government
EC	Electronic Conveyancing (Victoria)
FIG	International Federation of Surveyors
GIS	Geographic Information System
GIRG	Geospatial Information Reference Group (Victoria)
GNAF	Geo-coded National Address file (Australia)
GPS	Global Positioning System
GSN	Geosensor Network
GTZ	Gesellschaft für Technische Zusammenarbeit (German)
ICSM	Intergovernmental Committee on Surveying and Mapping (Australia)
ICT	Information and Communication Technologies
IQPC	International Quality and Productivity Centre
LASSI	Land and Spatial Survey Information (Victoria)
MBI	Market Based Instrument
NSW	New South Wales, Australia
NZ	New Zealand
OECD	Organization for Economic Co-operation and Development
OGC	Open Geospatial Consortium
OSDM	Office of Spatial Data Management
PCGIAP	Permanent Committee on GIS Infrastructure for Asia-Pacific
PIP	Property Information Project
PSMA	Public Sector Mapping Agencies (Australia)
PVS	Public View System (Victoria)
QLD	Queensland, Australia
SDI	Spatial Data Infrastructure
SIDP	Spatial Interoperability Demonstrator Project
SII	Spatial Information Infrastructure, Victorian Government
SLIM	Social Learning for the Integrated Management and sustainable use of water
SPEAR	Streamlined Planning via Electronic Applications and Referrals (Victoria)
SPI	Standard Parcel Identifier (Victoria)
UK	United Kingdom
UN	United Nations
UN-ECE	United Nations Economic Commission for Europe
USA	United States of America
UML	Unified Modeling Language
VAR	Value Added Resellers
VGIS	Victoria's Geospatial Information Strategic Plan
VGSC	Victorian Government Spatial Council
VIC	Victoria, Australia
VMAS	Victorian Mapping and Address Service
VOTS	Victorian Online Titling System

VSC	Victorian Spatial Council
VSCO	Vendor Statement Certificates Online (Victoria)
VSIS	Victoria's Spatial Information Strategy
WA	Western Australia
WALC	Western Australia Legislative Council
WALIS	Western Australia Land Information System
WCS	Web Coverage Service
WFS	Web Feature Service
WMS	Web mapping Service
WSN	Wireless Sensor Network
WTO	World Trade Organization
XML	Extensible Mark-up Language

PART 1

INTRODUCTION

CHAPTER 1

INTRODUCTION

The aim of this research is to develop a framework for understanding and organizing the management of property rights, restrictions and responsibilities in a way that enables the achievement of sustainable development objectives by citizens and governments. This chapter provides an overview of the problem, describes the overarching research structure, and provides an outline of the subsequent chapters of the thesis.

SETTING THE SCENE

On the 18th of October 1999, forty international experts on land administration met in Bathurst, Australia. The meeting was organized by the United Nations (UN) and the International Federation of Surveyors (FIG) and aimed to understand and articulate the important and growing relationship between land administration and the sustainable development of human societies. Over five days, delegates debated the changing relationship between people and land. They lamented the acceleration of environmental degradation and the continued social inequalities caused by poor land administration. They recognized that existing land management systems were not coping and that, without substantial reform, they would not meet the challenges set by sustainable development theorists.

Action was needed. The group made twenty recommendations aimed at assisting countries to reform their land administration arrangements. These principles, now known as The Bathurst Declaration on Land Administration for Sustainable Development (UN-FIG, 1999), represented a paradigm shift for land administration systems. In the new millennium, land administration would be more than just a tool for enabling land taxation and the operation of land markets. Land administration systems would ensure sustainable development by collecting, securing, integrating and disseminating all information about land. Better organized information on property rights, restrictions and responsibilities would result in better land-policy decisions, less disputes and better land use.

Reforming existing systems would not be easy. Land administration systems had evolved over hundreds of years. Their many quirks and peculiarities were deeply embedded in the psyches and systems of governments and citizens. History showed that tampering with property rights and their management systems provoked strong reactions. Nonetheless, The Bathurst Declaration laid down the challenge. It set a course for the future of land administration. This thesis aims to continue the challenge set by the Bathurst Declaration. It will explore an essential component of

the vision: the improved management of 'all' property rights, restrictions and responsibilities that relate to land.

DEFINING THE RESEARCH PROBLEM

In the latter stages of the 20th century, sustainable development principles began guiding government decision making processes. The principles demanded that growth occurring in the present must not compromise the ability of future generations to meet their own needs (UN, 1987). To achieve sustainable development, governments increasingly turned to legislating new rights, restrictions and responsibilities over land. These laws gave powers to governments, individuals and other mandated bodies, and were aimed at controlling the community's behaviour in relation to land.

These new interests increased in number and complexity for several decades to a point where most land related activities were subjected to some form of legislative control. Examples included the alienation of land for use as national parks, the creation of water and timber rights on private land, and the reallocation of land rights to indigenous peoples. In addition to these highly visible interests many other lower profile interests were created, including entry powers for agents of the state and the allocation of private parking spaces.

The volume of legislation involved was enormous: a 2002 study found that, in the Australian state of Queensland, almost two hundred individual statutes created some type of control over land (Lyons et al, 2002), and the number of interests was continuing to increase. An investigation into Australia's regulatory environment by the federal government's Regulation Taskforce found that the Australian Parliament had passed more legislation since 1990 than in the previous ninety years of federation (Regulation Taskforce, 2006). Similar statistics can be found in other jurisdictions and countries.

The traditional role of land administration systems was to manage the rights and interests that exist over land (Ting, 2002). This role was centered on managing a specific type of interest, namely privately held property ownership rights. These interests remain central to modern economies. They are responsible for generating much of the wealth in developed countries (De Soto, 2000). Unlike many of the newer interests, these traditional interests are well understood and respected by citizens. They are backed by theoretical, legislative and institutional frameworks that evolved over hundreds of years.

In contrast to the long standing private ownership rights, most new land interests were managed outside the traditional land administration systems. They were often created in isolation and administered using a complex range of government bodies and information systems. This led to a number of problems. The literature (Williamson et al, 2005, Enemark et al, 2004; Van der Molen, 2003; Lyons et al, 2002 and 2004; Ting, 2002; Ting et al 1999; Ting and Williamson, 1998; FIG, 1998) sheds light on three main issues. First, some interests were poorly designed. They were practically unenforceable by authorities or provided little incentive for those who were supposed to adhere to them. Second, some interests were, and remain, poorly administered. The administration system may offer only limited public information access, provides slow permit and licence processing times, or be administered in complete isolation to other related interests. Finally, some interests did not exist where they ought to. For example, in the Australian state of Victoria, there are minimal controls preventing people from building on contaminated land.

All three problems impeded, and will continue to impede, the achievement of sustainable development objectives. Indeed they make it virtually impossible: sustainability cannot be achieved without integrated management of property interests (UN-FIG, 1999). The traditional land administration systems must be reformed and integrated using a holistic design framework, one which encompasses the majority of property interests from outright ownership to simple access. While

components of this framework already exist, there is not yet a complete coherent understanding. Contributions to knowledge in this realm are urgently required.

In response to these issues this thesis is guided by the underlying problem statement:

Property rights, restrictions and responsibilities over land are designed and administered in a disparate, ad hoc and disorganized fashion. This makes achieving sustainable development difficult, if not impossible. How should we organize the management of these property rights, restrictions and responsibilities in a way that enables citizens and governments to meet their sustainable development objectives?

THE RESEARCH AIM AND SCOPE

To address the research problem the overarching research aim is:

To develop a framework for understanding and organizing the management of property rights, restrictions and responsibilities in a way that enables the achievement of sustainable development objectives by citizens and governments.

Where:

‘Framework’ means a set of assumptions, concepts, values, and practices that constitutes a way of viewing reality.

‘Property rights, restrictions and responsibilities’ (or land interests or property interests) is a generic term used to describe all formal and informal interests that exist between people and land and are supported by the jurisdiction’s people.

‘Sustainable development’ is development that meets the needs of the present as well as future generations.

‘Citizens’ are those people who owe an allegiance to and are entitled to the protection of a jurisdiction.

'Governments' are the complex political institutions, laws, and customs through which the function of governing a jurisdiction is carried out.

Additionally:

The framework would focus on a range of technical and non technical aspects including: policy, legal, tenure, institutional, cadastral, registration, technical and human resource aspects. These broad elements are essential to all land administration systems.

The framework would primarily be designed for use in developed countries; however, parts would be applicable to all country typologies.

THE RESEARCH ROADMAP

The research undertaken followed a conceptual roadmap (Figure 1.1). Additionally, the roadmap provides a guiding structure for this thesis. The roadmap is composed of four parts: this introduction, a background section, a research and testing section, and a section dealing with overall findings and conclusions. Each part builds on the previous and presents the outcomes from a particular stage of the research process.

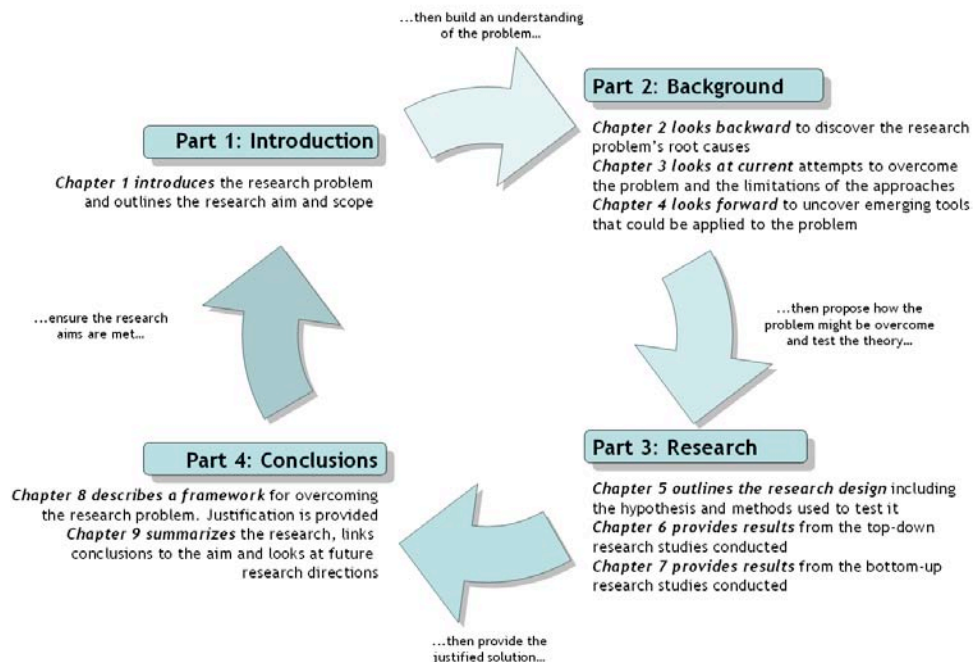


Figure 1.1: The research roadmap

Part 1, the introduction, outlines the research problem and justifies it. It delivers the overarching aim and scope of the research. Additionally, it describes how the research and the thesis are structured. Importantly, no hypothesis is provided in the introduction. A well-reasoned hypothesis can only be delivered after a thorough understanding of the problem context has been gained.

Part 2, the background section, positions the research undertaken in the context of past and present activities. Chapter 2 explains the growth in new land interests. A number of perspectives, including policy development, legal trends, and land tenure theories, are used to guide discussion. Chapter 3 considers how the proliferation of land interests has challenged the institutions, people and existing technologies involved with traditional land administration. It then reviews some of the key national and international responses and considers the relative success of these efforts. Chapter 4 looks to the future and examines the many new spatial tools and information management concepts that could be used to address the problem.

Part 3, the research section, is composed of three chapters. Based on the outcomes of the background section, Chapter 5 reveals the research hypothesis before outlining and justifying the methods used to test it. The research design revolves around two sets of case studies undertaken from the different perspectives of government administration and of individual properties. Chapter 6 presents the results of the government administration case studies. Chapter 7 presents the results of the four individual property case studies. The results of each perspective can be used to confirm to the other. In this way the research design is self-testing.

Part 4, the discussion and conclusion section, compiles the results and delivers a coherent framework for managing all rights, restrictions and responsibilities to achieve sustainability. Chapter 8 introduces and details the framework and its eight key components. Chapter 9 summarises the previous chapters, determines the

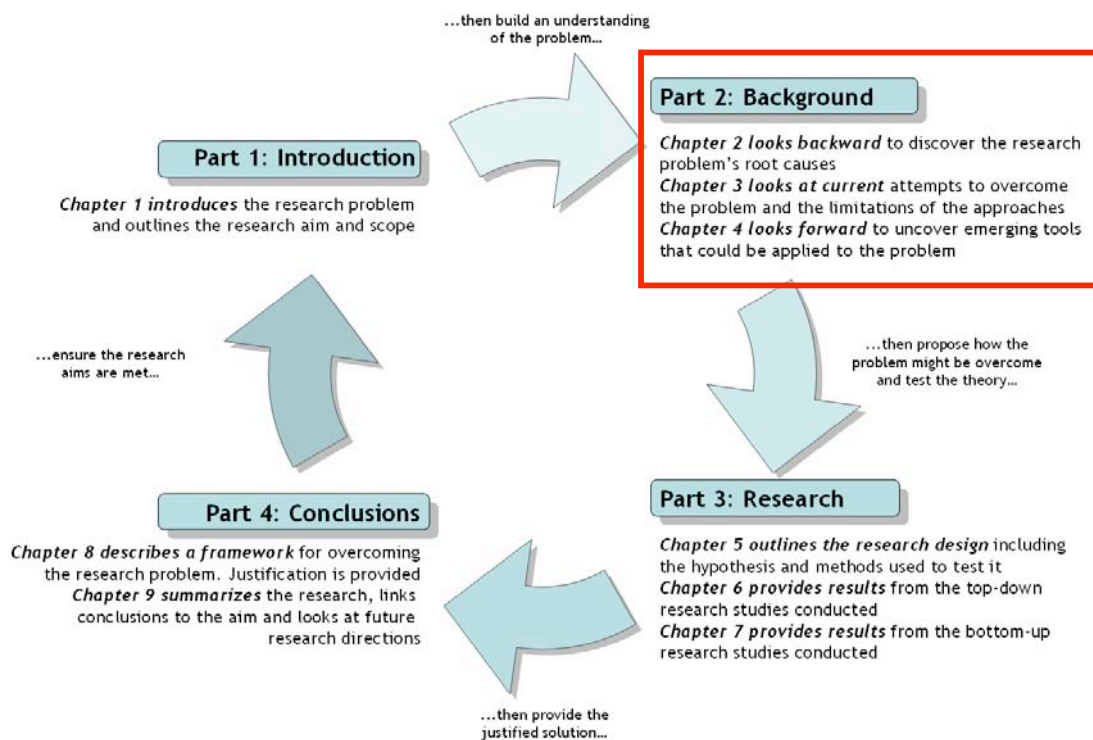
aptness of the hypothesis, links the original aim to conclusions and identifies areas of future research.

SUMMARY

This chapter introduced the research problem and the overarching aim of this thesis. The process for achieving the aim, the research roadmap, was also described. A deeper understanding of the problem, its causes and of current and emerging solutions is now required. Part 2 delivers this understanding.

PART 2

BACKGROUND



CHAPTER 2

THE RISE OF LAND RIGHTS, RESTRICTIONS AND RESPONSIBILITIES

It is important to recognize how context has molded perceptions of land and land administration systems. A new framework for managing land interests must incorporate these understandings or risk being irrelevant. This chapter aims to explore, from a historical context, the reasons for the dramatic increase in land rights, restrictions and responsibilities. Once these reasons are identified, a better understanding of why today's land administration systems are inadequate and how they might be improved can be discovered. Historical developments from three different perspectives, land tenure trends, legal trends and land policy trends, are analyzed.

INTRODUCTION

In 1979 Mr Con Puican left Romania for Australia, a country more than 15,000 kilometres away. He settled in the outer western suburbs of Melbourne and began work as a mechanic. Mr Puican's dream was to buy a small block of land in rural Victoria where he could retire with his wife Barbara. In the year 2000 he purchased a 16 hectare block for \$AU 120,000 in the Macedon Ranges, an hour north of Melbourne. By February 2005 he had saved enough to begin building. One year later not a brick had been laid and Con Puican's story became headline news (Russell, 2006).

Con Puican had thought the building process would be a simple formality: he would notify the local council who in turn would grant the required permissions. Of course, he was wrong. In Australia, as in most other developed nations, the right to use land is governed by a large body of legislation. In Mr Puican's case, the local council required a building plan, a farm management plan and a soil test, at a cost of \$AU 10,000. However, the biggest obstacle had yet to come. In September 2005 the council vetoed Mr Puican's proposed construction. New state planning regulations had zoned the block as farm land and in order to preserve its agricultural function no dwelling could be constructed. The council believed an approved application would set an undesirable precedent in a town with no sewerage or infrastructure. His dream seemingly in tatters, Mr Puican was understandably upset: "How can this happen in Australia?" he lamented (Russell, 2006).

Con Puican's situation is not uncommon, nor is it isolated to Australia. People acquire property believing they can use it for a practical purpose only to discover that restrictions and responsibilities impede their ability to do so. In most countries the law addresses this problem by placing responsibility on the buyer: before purchasing they should undertake the appropriate 'due diligence' investigations to ensure the title is 'clean'. However, as the number of restrictions dramatically increases the task grows more difficult. Furthermore, 'due diligence' does nothing

to stop new restrictions being created after purchase. In any case the fundamental problem is not the land restrictions, Mr Puican's dream or even the local council's decision. The real problem concerns the psyches of governments, communities and individual citizens and the different ways they perceive their relationships to land.

The origins of these diverse perceptions may be found in social history. For millennia, the way people have related to land has changed. Fifty years ago, prior to the emergence of an environmental movement, perceptions of land were very different and consequently land management controls were very different. Two hundred years ago, when land ownership was available to only a select few, the administrative situation was radically different still. It is important to recognize how context has molded perceptions of land and land administration systems. A new framework for managing land interests must incorporate these understandings or risk being irrelevant. This chapter aims to explore, from a historical context, the reasons for the dramatic increase in land rights, restrictions and responsibilities. Once these reasons are identified, a better understanding of why today's land administration systems are inadequate and how they might be improved can be discovered. Historical developments from three different perspectives, land tenure trends, legal trends and land policy trends, are analyzed. These areas have fundamentally shaped past and present relationships between people and land.

THE LAND TENURE PERSPECTIVE

THE IMPORTANCE OF LAND TENURE

Land tenure arrangements are at the heart of all communities. In modern academic literature the term describes the mode by which land is held or owned or the human relationships concerning land or its products (Bruce, 1998). These relationships have developed over millennia and reflect the nature and needs of a particular society (Neave et al, 1999). Outside of the land administration community, the terminology is little used and poorly understood. However, the concepts play a significant role in determining how a society functions. Changes in land tenure

arrangements have transformed national economies, revolutionized social patterns and caused armed conflict. Indeed, land tenure underpinned the hostilities of the post-WWII, Cold War, era.

The contrasting ideologies of the Cold War emerged long before the end of World War II. The eighteenth century marked the beginnings of capitalism, as championed by the classical economists David Ricardo, Jean-Baptiste Say, and John Stuart Mill (Backhouse, 2002). Adam Smith's, "An Enquiry into The Wealth of Nations" (1776) presented an economic system in which the means of production were profit driven and privately owned (Canterbury, 2001; Palmer, 1997). The distribution, production and pricing of goods and services were to be governed by a largely free market. Conversely, modern communism emerged during the nineteenth century. Karl Marx and Freidrich Engel's "The Communist Manifesto" (1848) envisaged a classless and stateless social organization in which the means of production were communally owned (Canterbury, 2001).

Land tenure arrangements were a key point of difference between the two ideologies (Fabos, 1985; ACIL Tasman et al, 2004). Capitalists believed that private-property rights should be allocated to more of the world's resources with minimal regulation; this would result in optimal allocation and usage (Backhouse, 2002). Communists, on the other hand, believed that only government control, through either regulation or state ownership of resources, could result in the provision of public goods (Canterbury, 2001). Under the capitalist system, the ability to own private property is considered essential to wealth creation. By contrast, communists saw private property as a source of oppression and inequality (Neave et al, 1999). By the middle of the twentieth century the two ideologies were on a collision course.

For over forty-five years the Cold War occupied the attention of the world's two super powers: the Soviet Union and the United States. Conflicts across Korea, Vietnam and the Middle East killed thousands and the Cuban Missile Crisis

brought the world to the brink of nuclear war. The fall of the Berlin Wall in November 1989 symbolized the unification of East and West. Thousands from communist East Berlin surged through crossing points to congregate and celebrate with those from the capitalist West (Gaddis, 2005). Less than one month later, at the Malta summit, Presidents George Bush and Mikhail Gorbachev declared the war over (Gaddis, 2005). The end of the Cold War largely ended land tenure debate at a global level. Capitalism had won. Private tenures were the path towards a wealthy society. However, not only did other forms of tenure continue to co-exist but new forms have since evolved and will continue to do so in the future. Like private tenures, these will require formal recognition, securitization and administration. This chapter will now address conventional land tenure theory and, in particular, how it has struggled with these practical developments.

CONVENTIONAL LAND TENURE THEORY AND ITS LIMITATIONS

In its simplest form, tenure involves four very general types: private ownership, government ownership, communal ownership, and open access or no organized rights (Prosterman and Hanstaad, 1999) (Figure 2.1). ‘Private’ tenures are legal interests and opportunities granted to individuals, households, corporations and partners for the use and management of land (Bruce, 1998). The well-formulated and familiar typologies of private tenure sustain highly mobile local and global investment programs (De Soto, 2000). ‘Government’ or public tenures denote land held by the state through various levels of government (Dalrymple, 2005). The tenure is often inseparable from highly restricted use rights. The onus of management of the property is at the government’s discretion (Prosterman and Hanstaad, 1999). ‘Common’ tenures are those held by multiple users in communal ownership (GTZ, 1998; Bruce, 1998). Historically, common property belonged to a tribe, clan or family (Dalrymple, 2005). Such property tenure allows individuals to hold rights and obligations in common with all other users. ‘Open access’ refers to unrestricted resource areas. This typology emerged as a result of confusion with the term common property. No formalized rights, restrictions or responsibilities

pertain to open access, thus leaving resources open to exploitation (Bromley and Cernea, 1989).

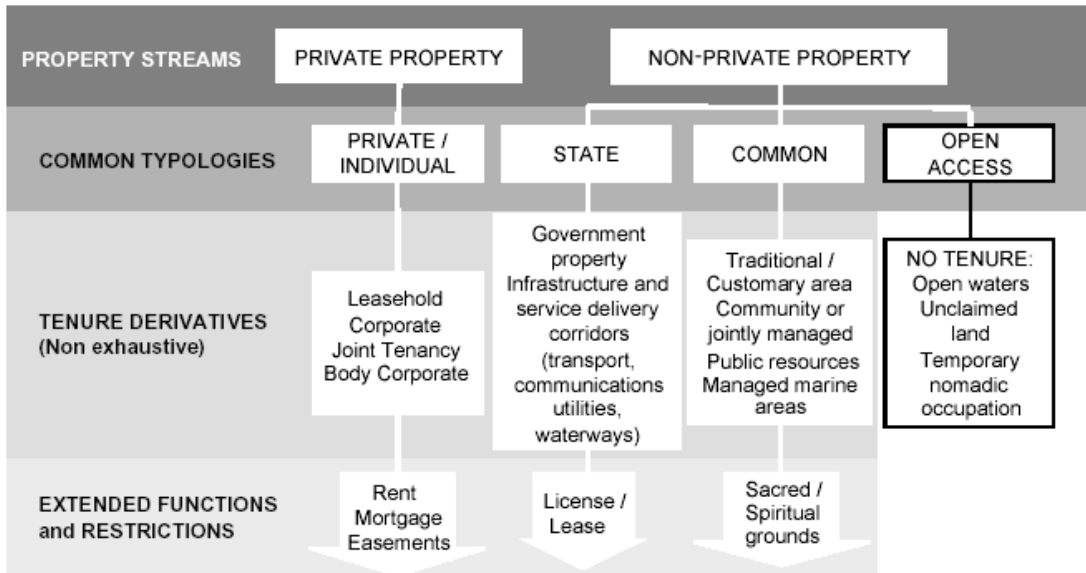


Figure 2.1: Common land tenure typologies (Dalrymple et al, 2004)

Within the four tenure categories, individual jurisdictions provide extremely complex arrangements for ordering access to land. Most countries use all arrangements simultaneously, with one being predominant. Countries employ the system to answer very basic questions about land organization: Who can access it? How much land can a person access? How can the access be managed (Giovarelli, 1999)? The local tenure system is a simple, short hand way of defining what a person, including a government, is allowed to do with his or her land and what the rest of us must not do.

Developments in the late 1990s and 2000s illustrate the practical limitations of the simple land tenure model. The adoption of the Habitat Agenda 21 (UN, 1992) by the United Nations in 1996 generated significant discussion about land tenure. The debates focused on how governments and international agencies could better provide security of tenure. The need for secure tenure, regardless of its typology, had become very clear. Cobbett (2000) identified that insecure land tenure

reinforced poverty and social exclusion, inhibited housing investment, undermined long-term planning and distorted prices of land and services. It encouraged unsustainable land use and led to poor allocation of services, insufficient housing, and poor investment and reduced access to credit (Feder and Nishio, 1998). In countries where tenure security increased, socioeconomic development tended to increase (GTZ, 1998). Individual owners could spend more time contributing to the economy rather than protecting the possession of their land. Additionally, long-term security encouraged better resource management decisions (Dalrymple, 2005). Secure tenure provided households with a transferable asset and thus new opportunities in the land market. It provided for the development of better communities and environments (Alder, 2000).

The importance of secure land tenure was clear, however, the pathway for achieving such security was not. While the Cold War led to a dominance of private tenure in the developed world, the situation was markedly different for developing countries. The land administration projects carried out in the developing world during the 1970s and 1980s raised many questions. Many such projects were inspired by capitalist theory: Garrett Hardin's 'Tragedy of the Commons' (1968) presented common ownership as a source of anarchy and a cause of land overuse and degradation. Hardin believed the human desire to extract the greatest self-benefit outweighed any communal objectives. Whatever the underlying reason for these projects, some succeeded (e.g. Thailand, Malaysia), but, many failed (De Soto, 2000; Törhönen, 2003). The private tenures allocated to countries such as Indonesia and the Philippines were unable to improve the tenure security and well-being of a large proportion of the population.

Only recently have we begun to understand why such projects failed. Dalrymple (2005) explored the reasons for land administration project failures in the developing world with a particular focus upon the inability of projects to alleviate

rural poverty. Like other authors (GTZ, 1998; De Soto, 2000; Magel, 2001, Törhönen, 2003) she recognized that the technical components of land administration systems cannot succeed in isolation; a number of conditions must be met. The successful introduction of such systems requires a secure and certain legal apparatus which respects human rights; a participative political system; processes for the provision of credit which acknowledged the use of tenure as collateral; and open and accountable public institutions. Perhaps most importantly, however, Dalrymple (2005) identified the need to recognize the limitations of the theoretical land tenure models being introduced. The application of such simplistic tenure models to complex land relationships was partly responsible for the failures.

The simple land tenure model and its four tenure typologies were idealistic (GTZ, 1998). The model was developed by Western cultures and was most suitable for application in Western countries. The reality for developing countries was a mixture of tenures which included colonial models and/or adaptations of customary traditions and practices (Dalrymple, 2005). In Cambodia, Dalrymple observed share cropping and many other non-formal categories of land use, which were being overlooked by government authorities. While the land problems of rural Cambodia may seem unrelated to those of a developed western country, they are not. This chapter will now consider the increase in new land tenures typologies for developed countries.

NEW LAND TENURES IN DEVELOPED COUNTRIES

The land tenure issues uncovered by Dalrymple (2005) are similar to those experienced by developed countries who are attempting to holistically manage all rights, restrictions and responsibilities relating to land. The tenure model does not capture all observable and evolving people to land relationships. Tenure classifications are continually modified by societies to reflect the local demands on land and resources and a simple model does not reflect this (Dalrymple, 2005).

The work of Wallace and Williamson (2006) provides an insight into how these new tenures have emerged, often outside traditional land administration systems. Most land administration systems support the ‘simple commodities’ of land ownership, leases and financial interests such as mortgages. However, they also indirectly support the management of ‘complex commodities’. Examples include interests in bodies corporate, water titles, carbon credits, biota interests, mortgage backed certificates and trust interests (Figure 2.2). The creation of these complex interests represents the next step in the conceptualization of land as an economic opportunity. A complete comprehensive definition is impossible because new typologies are constantly invented.

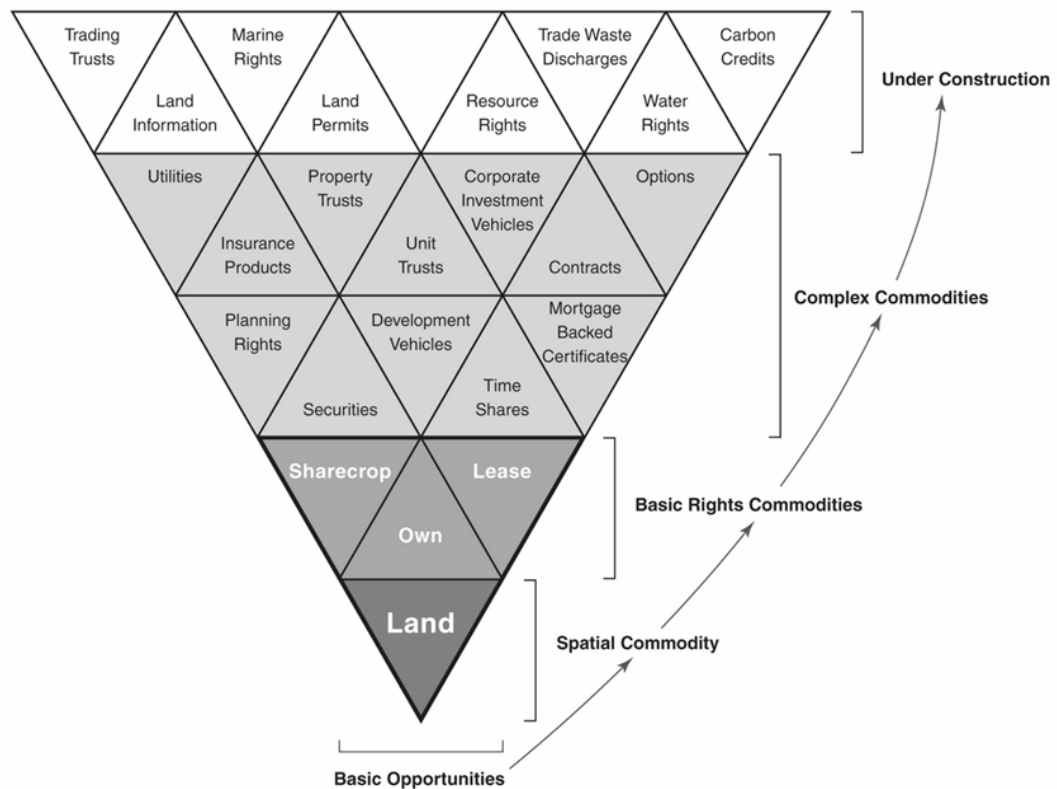


Figure 2.2: Complex commodities are new forms of land tenure (Wallace and Williamson, 2006)

The administration of basic rights commodities underpins the creation of complex commodities. Financial institutions and other corporate entities bundle basic

opportunities in land, administered by traditional land administration systems, to facilitate the creation of highly abstract interests which can be sold in unilateral and global markets. These higher level interests may have very limited links to the individual land parcels upon which their existence relies.

The complexity of these interests and the trading systems which underpin them continue to increase. These commodities, fundamentally private in nature, cannot exist without sophisticated administrative supports. Without sound administration the commodities are open to fraud and exploitation (Wood and Smith, 2005). Administrative systems are typically being provided by government; however, government systems are struggling to keep pace with developments. Additionally, without administrative support, the highest possible economic and environmental value will not be achieved. Rationalization and securitization of complex commodity administration is needed. For example, operating multiple water, biota and carbon trading systems within a single country, without the security and control of government is likely to result in sub-optimal environmental and economic outcomes. In the first decade of the twenty-first century Australia was grappling with this very situation (Sheehan and Small, 2004; Small, 2002; Hannam, 2007).

SUMMARY

The growth of complex commodities is not a problem if managed appropriately. However, the existing tenure models are anachronistic and do not reflect all of the emerging land interests. Complex commodities provide just one example. Native title rights and government held environmental controls are also recent forms of tenure. These new interests do not fit easily within the existing parcel-based land tenure frameworks and property regimes. Conceptual understandings of tenure must be modified and extended. A new land administration framework which manages all rights, restrictions and responsibilities would make use of this model. This chapter will now turn to legal theory and practice, an area which has also struggled to keep up with the evolving people to land relationships and which has also contributed to the rapid rise in property rights, restrictions and responsibilities.

THE LEGAL PERSPECTIVE

Land tenure systems describe the relationships between people and land; legal systems mandate, secure and enforce such relationships. In the present day this is achieved through formalized legislation, processes and institutions. As with land tenure systems, the legal systems used to protect land interests evolved over millennia with different societies developing different approaches. Patrick Glenn (2004) groups these developments into seven typologies: Chthonic (or Customary), Talmudic (from Jewish culture), Civil, Islamic, Common (English), Hindu and Asian. Each legal tradition has its own approach to allocating and managing land and property. However, many similarities exist between the traditions: over time they have borrowed concepts from one another. Common and civil law traditions now dominate. These two traditions, along with Chthonic traditions, are central to understanding the proliferation of land rights, restrictions and responsibilities.

COMMON LAW TRADITIONS AND LAND

William the Conqueror's victory in the eleventh century over the Anglo-Saxons provided the origins of common law (Caenegem, 1997). Over the next one hundred and fifty years the Normans implemented a swathe of legal reforms to enable them to rule a country which they had not traditionally occupied (Patrick Glenn, 2004). The creation of a loyal group of law enforcers was essential where the people were not necessarily. These new judges based their decisions upon royal commands (Hale, 1713). However, their decisions had to be seen as 'just' by the public and in this way the people played a role in the development of law. The common law evolved over time with the outcome of each writ adding to the existing body of law (Patrick Glenn, 2004). Eventually the great number of writs began to cover entire fields of human activity, including rules for governing land and property.

In the common law land could be held and enjoyed, but never owned (Patrick Glenn, 2004). This still remains the case in formal expression. There was no absolutist, legal concept of ownership. The common law system relied on

relativities of title so that different people could ‘hold’ the land at the same time. All land was fundamentally held by the grantor, the Crown, who permitted indefinite enjoyment and succession (Pollock, 2005). The highest form of free holding in the feudal system was a ‘fee simple estate’ (fief simple) (Neave et al, 1999). This ‘legal holder’ was recognized by the land title or the common law. An ‘equitable owner’ is recognized by the old system of chancery courts and the laws of equity. Equitable ownership is now called beneficial ownership and typically exists within a trust held by the legal owner. A ‘possessory owner’ is a person in adverse possession. They are capable of barring all other owners. Thus, the common law is familiar with the concept of layering interests over land.

The fee simple is markedly different from its original form. Over time, common law courts individualized the concept of property and the Feudal system contracted (Pollock, 2005). They were influenced by the civil law tradition and the notion of individual rights. However, The Court of Equity continued to enforce Chthonic or Christian obligations which deemed property to be a shared concept, such that the rights of a legal owner could be subject to those of the equitable owner (Patrick Glenn, 2004; Raff, 2005). Other private interests also emerged which did not equate to ownership. Restrictive covenants, easements, profit á prendre and usufruct rights are all examples of interests held by private non-owners that bind the private legal owner. Ownership under common law is relative rather than absolute. This characteristic allowed common law to adapt and create new land interests in response to social, economic, political and environmental demands on land and resources.

CIVIL LAW TRADITIONS AND LAND

The civil law tradition dates back to ancient Rome. The first Roman laws were recorded in 450BC when a set of principles was formulated to resolve disputes (Patrick Glenn, 2004; Stein, 2000). Like common law, the development of civil law depended upon public participation and an institutional framework (Merryman and Pérez-Perdomo, 2007; Tamanaha; 2004). In the beginning the system operated

without formal legislation and under the guidance of an untrained judiciary. (Patrick Glenn, 2004). Eventually, to assist judges, the College of Pontiffs (the priests) was made responsible for legal interpretation (Stein, 2000; Patrick Glenn, 2004). These interpretations were put in written form on papyrus rolls and eventually became bound volumes (Honore, 1974; Stein, 2000). Therein lies the major difference between common and civil law: while common law was created disparately by judges on a case by case basis, civil law codes were essentially the academic pronouncements of a centralized learned council.

Under Roman law, property could be ‘owned absolutely’ (dominium) by individuals (Honore et al, 1996). Examples included patrimonial objects, common objects, sacred objects and principal objects (Patrick Glenn, 2004). While ownership was private, there were objects similar to trusts in which someone had to look after the property of another (Johnston, 1988). In fact, many interests existed which were less than ownership, notably the ‘hypothec’ - a civilian equivalent of the mortgage (Patrick Glenn, 2004).

As the Roman Empire expanded, its laws were applied to a greater number of foreign jurisdictions and its eventual collapse led to the reinstatement of customary law across Western Europe (Patrick Glenn, 2004). The rise of Islam and the Arabic nations after the eleventh century is said to have jolted Europe out of its ‘dark ages’. Many events occurred in a short space of time: the separation of Church and State, the development of universities and the beginnings of the legal profession. Roman law re-emerged, legal proof was radically reformed and Greek philosophy was unearthed (Honore et al, 1996). Across much of Western Europe a melding of Roman and Chthonic legal traditions occurred (Merryman and Pérez-Perdomo, 2007). The substantive nature of the revitalized Roman law complemented Europe’s chthonic traditions (Patrick Glenn, 2004). As rationality increased, the law became more subjective and started to generate new rights (Honore et al, 1996; Tamanaha; 2004). For property law, this meant that the individual ownership provided by Roman law developed into an exclusive form of ownership. Communal

ownership was prohibited, the trust disappeared (Patrick Glenn, 2004). Civil lawyers started to see property and ownership as an absolute and rigid concept. Over time this created the need for greater certainty and demand for secure documents of ownership and boundary measurement.

In recent times the practice of comparative law has greatly impacted upon civil law (Patrick Glenn 2004). Comparative law encourages information to be shared between the different legal traditions. While many have abhorred such cross-pollination, it is difficult, if not impossible to stop. Consequently, the civil law concept of absolute rights and ownership is now under attack, particularly from the environmental movement. Absolutism is incompatible with environmental sustainability and the community interests which constitute strong policy drivers. For this reason, civilian ownership and common law ownership are becoming increasingly aligned. It is the terminology rather than the concepts that are now different.

CHTHONIC LAW TRADITIONS AND LAND

Chthonic legal traditions are as old as humanity itself (Patrick Glenn, 2004). All people are descended from people who were chthonic. In this way Patrick Glenn (2004) groups the natives of Australasia, North America, South America, Africa and Asia and the early Europeans. The chthonic legal tradition grew through human experience. Oral communication and memory provided a medium upon which the legal tradition could build and sustain itself (Sheleff, 2000; Patrick Glenn, 2004). From a modern perspective chthonic traditions often appear simplistic: formal expressions of law are rejected in favour of informal dispute resolution, rules and procedures are not written down but are immediately applicable through adjudicators (Patrick Glenn, 2004). Community and shared understandings are at the core of these legal traditions (Sheleff, 2000). Living in harmony with the land means limiting technology which could be destructive. The human person is generally not elevated to a position of dominium over the natural world. There is no

incentive for the development of complex machines and no way of accumulating wealth through their use.

The concept of ownership is strictly limited. The moveable or personal property of a person is limited to those things used in daily life: tools, decorative wear and clothing (Patrick Glenn, 2004). With respect to land the concept simply does not exist: there is no right of alienation. There is no reason to accumulate land as its fruits are simply to be enjoyed (Sheleff, 2000). Land is for communal and collective enjoyment and no formal concept of property describes the relationship between the people and the land they live off. Until recently the more developed world interpreted such behavior as abandonment (Ørebech, 2006). When chthonic traditions met with the more modern common and civil legal systems this assumption proved to have disastrous consequences.

On Thursday April 19, 1770 at 6am, a small Whitby collier vessel sailing in a westerly direction sighted land at Latitude of $38^{\circ} 0' S^{\circ}$ and Longitude of $211^{\circ} 07' W^{\circ}$ (Hughes, 1987). The captain was James Cook and the ship was the HMS Endeavor. Cook, along with his crew, had just encountered Point Hicks on the south eastern coastline of Australia. Cook navigated north, charting and naming the coastline as he went. A week later he sailed into a wide shallow inlet and made landfall (Blainey, 1966). Botany Bay, as it became known, was where English common law met with Australian chthonic traditions.

This first meeting foreshadowed the problems that these two very different laws would encounter. Hughes (1987) describes Cook offering gifts to two Aboriginal men who had come down to the shore. These were ignored and probably not understood. For some reason muskets were then fired over the heads of the indigenous Australians slightly wounding one of them. The Aborigines responded by aiming spears at the English but there were no casualties. More muskets were fired and the tribe then retreated to the bush. Such conflicts became common place

when the English returned eighteen years later to create a new colonial outpost (Clark, 1963).

On January 26th 1788 the English landed in Australia bringing not just convicts and settlers but a new system of law (Hughes, 1987). Common law and chthonic law initially coexisted, however, as the English colony spread, the two peoples and their different legal traditions clashed. Individual ownership, property, titles and fences did not sit easily with nomadic movement patterns, seasonal burnings, communal resources and spiritual places. Furthermore, the colonizers introduced alcohol and new diseases which would prove disastrous for Aboriginal populations. As they died out, or were incorporated into the colony, chthonic traditions began to disappear. Common law was becoming the new law of the land, first in Botany Bay and Port Jackson, then across the entire east coast, finally reaching the wide expanses of the continent.

The destruction of chthonic legal traditions occurred across the globe throughout the seventeenth, eighteenth and nineteenth centuries (Hobsbawm, 1996a and 1996b; Blainey, 2001). Firstly the Spanish, Dutch, and Portuguese, then the English, French and German: all played a role in colonizing and imposing western ways of life upon large parts of the world. While many chthonic traditions fared better than those of the indigenous Australians, common and civil law definitions of property came to dominate. This legacy remains in developed and developing countries alike. As agricultural economies developed into industrial and then information economies, common and civil concepts of property and ownership have been strengthened. However, as will be demonstrated, the civil and common law theories of property and ownership are being challenged and forced to evolve. This chapter will now consider contemporary understandings of property rights and the re-emergence of chthonic traditions.

CONTEMPORARY LEGAL THEORY FOR PROPERTY RIGHTS AND OWNERSHIP

'Property rights' are a specific form of 'rights'. The concept of 'rights' emerged mainly from the civil law tradition, although the magna carta (Great Charter) sealed by King John I of England in 1215 is also seen as a foundation statement for civil liberties (Strong, 1998). Rights are generally described as a benefit or claim entitling a person to be treated in a certain way (Butterworths, 1997). More specific definitions depend on the jurisprudential school being studied. There are many types of rights. Examples include personal liberty, the right to a fair trial, the right to privacy, worker's rights, human rights and universal suffrage. The reasonings behind the existence of rights have changed over time. Natural law theory, central to Roman and civil legal philosophies, was initially dominant. Natural law suggested that rights arose in nature as a matter of justice and independent of law. The role of government was to enforce rights not create new ones (Sprankling, 1999). The influence of natural law theory gradually diminished to be replaced by legal positivism, although legal theorists continue to debate the merits of each philosophy (Reynolds, 1993). Legal positivism impacted greatly upon both Civil and Common law. It suggested that rights only exist if they are supported by governments and adhered to by other citizens (Sprankling, 1999). This has implications for the concept of property (Figure 2.3).

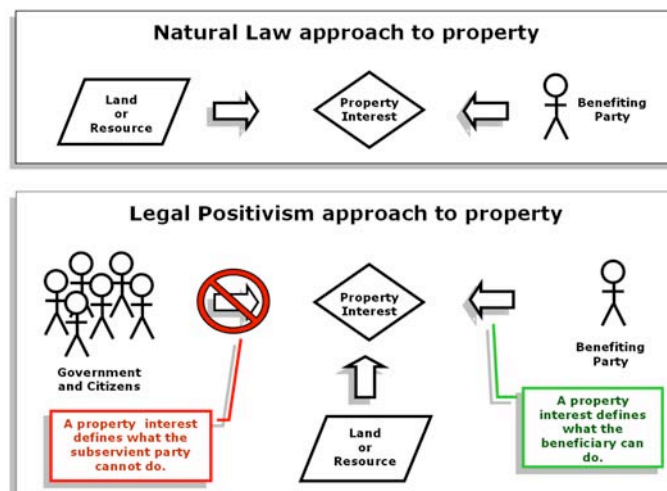


Figure 2.3: Approaches to property: Natural law versus Legal Positivism (Bennett, 2007)

The term 'property' has a powerful hold on human emotions and imagination (Underkuffler, 1990). Given its importance in social, economic and environmental outcomes it might be expected that a detailed and clear definition would exist. However, like 'rights', the term has a range of different definitions which depend on the theoretical framework being used. Lyon et al (2002) outline the various definitions of 'property' including those which do not distinguish between property and rights and those which do; those which group access rights, use rights and entitlement rights in their definitions of property; and those which distinguish between 'real' and 'personal' property. 'Real property' denotes land and any permanent fixtures which exist on it such as buildings, trees and other features. 'Personal property' encompasses everything else and includes objects of tangible or intangible existence, such as copyrights, patents, or securities. Felix Cohen, a legal realist (an offshoot of legal positivism), is credited with the modern definition of property. In his 'Dialogue on Private Property' (1954) he asserts that to talk about property is to talk about legal relationships between different groups of people rather than just objects. Property only exists in the psyches of people (legal positivism). Therefore, current perceptions of property see it as a legal statement which brings together three entities: the resource itself, the owner and the non-owners (such as government and other citizens).

In practice, a simple definition is not always enough. New models for enabling more detailed discussions of property rights are emerging. Meinzen-Dick and Knox (1999) offer a set of characteristics or attributes for discussing individual property rights: excludability- the ability of the right holder to prevent others from using a particular resource; duration- the length of time for which the right is held; assurance- the guarantee given to the rights by institutions that can enforce an individual's rights?; transferability- the ability to temporarily or permanently transfer the rights; identification- the accuracy with which boundaries can be defined; and robustness- the number and strength of legitimate uses and benefits

that the owner may gain. These frameworks can be useful when trying to compare new land interests with the more traditional property rights.

The relationship between ‘property rights’ and ‘ownership’ is also complex. Many debates over property rights concern different interpretations of these terms (ACIL Tasman et al, 2004). As demonstrated above, there are significant historical differences between common and civil law meanings of ownership. Modern definitions equate ownership of property with holding all the legal rights to an object that the law recognizes in a particular jurisdiction (Butterworths, 1997). What the set of rights includes will differ between jurisdictions. More specific definitions of ownership advocate the conferral of three qualities: management power or the ability to exclude others; the ability to receive income or benefits; and the ability to sell or alienate the interest (Sheehan and Small, 2002). While a property right might be any of these, outright ownership will typically encompass all of them (ACIL Tasman et al, 2004). However, it is generally the right to alienate that defines a legitimate owner. This right is usually vested in the name of the holder through a secured deed, title or contract.

The ‘bundles of sticks’ analogy is also useful for understanding ownership (Jacobus, 2003). Ownership can be seen as an aggregation of individual property rights. An individual right can be considered as a stick. Different entitlements with respect to land are created depending on the type and number of sticks held. For example, if the property rights that enabled exclusion, income and alienation were ‘bundled’ together then an ownership bundle would be created (Figure 2.4).

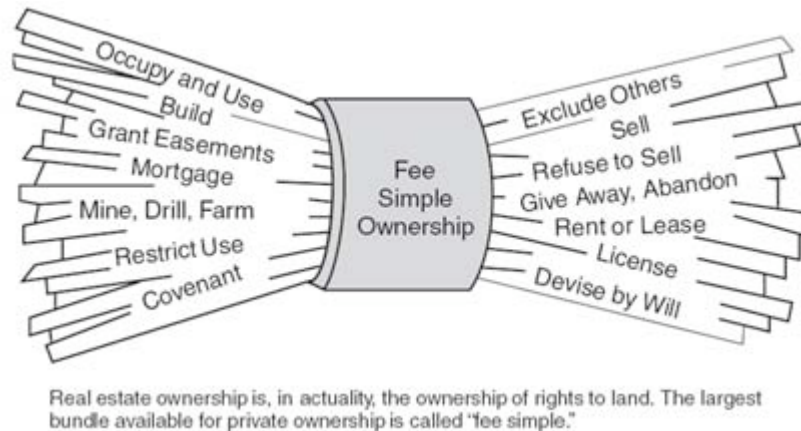


Figure 2.4: The 'bundle of sticks' approach to ownership (Jacobus, 2003)

THE THEORY VOID FOR LAND RESTRICTIONS AND RESPONSIBILITIES

The above definitions and descriptions greatly assisted the understanding and management of property rights over the last century; however, they focus only on the 'rights' and 'ownership' of the private citizens or the right holder. This is only one side of the dual or bifurcated nature of rights and ownership. Ownership is, and always has been, subject to regulation in the form of restrictions and responsibilities (Raff, 2005). The rights recorded in a Torrens register are not immune from subsequent legislative or regulatory modifications (ACIL Tasman et al, 2004). So the view that property is an unrestrained set of rights is inadequate (Small, 2002). A large number of the new interests simply do not fit into the old theoretical frameworks of 'rights' or 'ownership'. Moreover, there is no equivalent framework for restrictions and responsibilities. A country trying to organize the restrictions and responsibilities it places on land 'owners' will find that there is no theoretical framework or common language, even among countries with a shared legal heritage.

There are several reasons for the lack of a theoretical framework. Firstly, rights have existed for a long time. In the past, rights had to be announced and backed by the state. When disputes arose they were enforced by the state so that owners would not regress to private force. Secondly, land rights became highly organized and administered because of markets (Wallace and Williamson, 2006). They are now

the model for developing new and complex products. Thirdly, the history of restrictions and responsibilities is far more recent and ad hoc. Indeed, the term was only recently created by land administrators to describe the problems underlying this thesis (Lyons et al, 2002). Legal restrictions developed as governments assumed responsibilities for land related activity and created capacities to deliver land polices and land management. There was no perceived need for a meta-theory relating to restrictions and responsibilities because land was incidental to the pursuit of economic, social and environmental policy objectives. Restrictions and responsibilities multiplied with the growth of government: taxation, pollution controls, environmental protection, use management, and so on. Rather than see regulation as land related activity, restrictions and responsibilities have been the analytical realm of administrative lawyers, bureaucrats and governments.

The lack of theoretical understanding has resulted in the emergence of ad hoc alternative management systems. Some interests have been recorded on the titles, others recorded in a range of different registers, some spatially defined, others not spatially defined and some barely recorded at all, particularly if they do not relate to individual private parcels. It would be incorrect, however, to suggest that no literature exists on these new interests. It exists, but is hidden within the large amounts of literature dealing with rights and ownership.

Wesley Newcomb Hohfeld's (1919) influential 'system of jural relations' constructed during the first half of the twentieth century is perhaps the best known theory that recognizes the relationship between rights and restrictions/responsibilities (collectively referred to as duties) (Table 2.1). Hohfeld expressed concerns about the vague definitions of rights: the term was being "used indiscriminately to cover what in a given case may be a privilege, a power, or immunity, rather than a right in the strictest sense" (Cole and Grossman, 2002). Hohfeld's jural relations theory suggests that in order to establish a right (as opposed to some other, lesser, interest) one must be able to identify the corresponding duty (or restriction) that someone else possesses.

Table 2.1: Hohfeld's System of Jural Relations (Cole and Grossman, 2002)

Elements	Correlatives	Opposites
Right	Duty	No Right
Privilege	No Right	Duty
Power	Immunity	Disability
Immunity	Disability	Liability

Hohfeld's system raises a number of interesting points. Firstly, a person's perception of a right might vary according to how that right affects him or her: it might be considered a form of restriction. So in fact, rights and restrictions are the same legal object looked at from a different point of view. This duality is fundamental. For example, a restriction on clearing vegetation from private land 'benefits' the whole community while 'limiting' the actions of the owner. If, in addition, a ruling allowed the owner to be compensated, then a second interest would be created: the owner 'benefits' and the community is 'bound' and must recompense the owner.

Hohfeld's system also shows that not all interests in land are 'rights': they may be lesser interests. In general this tends to mean that they require less intensive administration. For example, in most Australian states cadastral surveyors have the 'privilege' to enter any private property. While this interest is highly important it need not be recorded on the registered title. The long term minimal impact on the land owner does not warrant the administrative expense.

Finally, the system shows how new interests cannot be created in isolation. If a government places a new duty on a particular parcel they are not only creating a corresponding right for the community, they are tampering with the notion of ownership- a notion which forms the basis of modern economies.

In more recent times Schlager and Ostrom (1992) provided a framework for understanding those entitlements to land which are lesser than ownership. New restrictive land interests created by government and complex commodities can all be understood within the framework. The model provides perhaps the simplest yet most comprehensive framework for differentiating between the available actions of

different property interests (Table 2.2). The attributes are listed in order from the least authority of ‘access’ to the greatest authority of ‘alienation’, which usually equates to ownership. New government-created property interests are usually at the lower end of the scale, granting access or management controls to statutory authorities. The level of interest created plays a key role in determining the most effective system for titling and registration (ACIL Tasman et al, 2004). For example, higher forms of authority, such as alienation or withdrawal rights are generally of greater economic value and therefore usually demand more extensive forms of administration and management. An administrative regime can be based upon the type of interests created and allocated. In Australia, a bundle of rights equating to ownership is registered and secured by the state government using the Torrens form of registration.

Table 2.2: Bundles of rights associated with position (Ostrom and Schlager, 1996)

	Owner	Proprietor	Claimant (Tenant)	Authorised User	Authorised Entrant
Access	X	X	X	X	X
Withdrawal	X	X	X	X	
Management	X	X	X	X	
Exclusion	X	X			
Alienation	X				

Schlager and Ostrom (1992) demonstrate how legal theory is evolving to incorporate new land interests. However, in general, existing property theories such as those espoused by Hohfeld (Cole and Grossman, 2002) or Cohen (1954) cannot comprehend the hundreds of new restrictions that are placed on land. A new model for understanding and organizing property interests is needed, one that sits above the jurisdiction’s legal and administrative systems, be they common or civil, Vietnam’s land use right, Indonesia’s Hak MilikMilik, Malaysia’s qualified title or an Eigendom, of the Netherlands. Until this is achieved there will be little chance of providing concise land information to the government and the public. Currently this information is hidden in a complex system of legislation, regulation and codification. This chapter will now consider the complex systems of legislation which have emerged.

LEGISLATIVE AND REGULATORY OVERLOAD ON LAND

Traditional property law systems consist of the rules for administering public land, private land, registration, taxation, cadastral surveying and land transactions. All developed countries have a body of legal rules to enable these basic land related tasks. In Australia, most states use common law and a range of legislation drafted and approved by parliaments. Early Australian legislation borrowed heavily from English systems. In the mid 1800s the systems were greatly influenced by the development of the Torrens system of private land registration. Other more recent changes included legislation for streamlining subdivisions and enabling the creation of strata titles. These changes all occurred *within* traditional property law systems; however, since WWII more significant changes occurred *outside* the systems.

On June 3, 1992 the High Court of Australia passed down its landmark *Mabo v Queensland (No 2)* (1992) decision. The judgment effectively undermined the doctrine of terra nullius ("land belonging to no-one"), which dated back to the beginnings of colonial rule (Bartlett, 1993). The ruling provided formal recognition of Aboriginal native title. After two hundred years of suppression, Australia's chthonic traditions were now being re-evaluated, albeit within a common law framework and using Western concepts of property. The integration of rights discourse into chthonic tradition was not without difficulty (Patrick Glenn, 2004). However, the Australian federal Parliament responded by enacting the Native Title Act 1993 (Cth). This was amended in 1998 following the *Wik Peoples v The State of Queensland* (1996) decision. The Act established the Native Title Tribunal which enabled claims of traditional occupation to be heard. If the required conditions were met a form of title could be granted. The rediscovery of chthonic traditions was not isolated to Australia: Canada and New Zealand instituted similar laws. The cases were a source of much debate and reflection and forced a reconsideration of the way in which humans relate to land (Patrick Glenn, 2004).

The recognition of native title is one example of governments using the legislative process to create land interests outside the traditional property law system. There

are many more examples. After WWII public interest in Australia's social and natural heritage led to the creation of a number of federal and state heritage protection statutes: for example, the Fauna Protection Act 1948 and the various State Conservation Councils established between 1967 and 1971 (Ting, 2002). Environment groups emerged during the 1970s, facilitated by government grants which provided community education and resources for voluntary groups. A Federal Office of the Environment was established by John Gorton in 1971. In 1975 the Whitlam government established the Department of the Environment and Conservation which brought the federal government to the centre of environmental policy-making. During this period all state governments established departments of the environment or of conservation (Papadakis, 1993).

By the late 1970s it was possible for almost any circle of concerned citizens to form an action group over an issue of concern and draw facilities and other support from the broader movement (Marsh, 1991; Blainey, 2006). Problem cases and special interest groups gained the ear of government and this led to the creation of many laws at local and state levels. These included controls on animals, utilities and even public behaviors such as nude bathing. Agriculture, manufacturing and other industries also had new legislation restricting their land activities. These volumes of land-related legislation generated new fields of legal activity. They also impacted on property systems; however, as noted by Reeve (2002), property theory was both inadequate and divisive in addressing issues of land use and regulation and was therefore often bypassed. The regulations were administered outside traditional property systems by a range of government departments and statutory authorities. Only recently, have citizens started to feel the impact of such regulation. Individuals like Con Puican who are attempting to undertake land related activities are being confronted by a swathe of legislative controls and associated red tape.

SUMMARY

Over a short period of time the old common and civil law approaches to land and resources have been overwhelmed by a new legal order: statutory legislation,

regulations and new codes have emerged to fill the voids left by the old systems. Absolutist concepts of property are outdated and unworkable in systems that allow for the layering of land interests. Legal theories related to property are gradually evolving to reflect what is occurring at ground level, but further development is needed. A better understanding of the new interests and their impact is required. This will lead to re-engineered legal frameworks that better define what we mean by restrictions and responsibilities, how they relate to traditional property rights and how they all might be managed holistically. This chapter will now consider developments in land policy drivers and how they have also led to large increases in the number of new property interests.

THE LAND POLICY PERSPECTIVE

LAND POLICY THEORY

A policy is a statement of objectives that provides a framework for actions which are consistent with the priorities of the organization or government implementing it (Merriam-Webster, 2007; Dalrymple, 2005). In practice, it consists of a set of coherent decisions that adhere to common long-term purposes and objectives. Sound policy should underpin the creation of laws, institutions and administrative processes (Williamson, 2001). Compared to the legal discipline which has emerged over millennia, the formal practice of ‘policy making’ is a recent invention. In the twentieth century, rapidly changing environmental, social and economic climates forced organizations to continually reassess, change and adapt their activities. Governments, political parties, businesses and even religious groups that once based their activities on an unchanging set of core beliefs now used formalized policy development processes, often based around scientific and democratic methods, to guide their actions (Rennie, 1998).

A land policy is a policy that articulates current and future relationships between land and people and how they will be managed. National governments are usually responsible for their generation, however, lower levels of government and even

international organizations sometimes formulate land policies. A land policy should apply across departments, especially of land, environment, forestry, agriculture, water, taxation and finance (Dalyrmp, 2005). Land policy objectives will often be controversial and place emphasis on different priority areas depending on the country scenario (GTZ, 1998). Williamson (2001) outlines that a modern land policy may incorporate:

“... a statement on the roles and responsibilities of the various land related activities such as land management, land reform, land registration, cadastre and particularly the role of land administration as an infrastructure. These principles could be included in a state or national land policy. Such a policy could recognise the range of humankind to land relationships in a jurisdiction and the need for appropriate land administration responses and could describe the land administration infrastructure which facilitates the development and implementation of land policies. The principles could include the components in an integrated or holistic state or national land administration vision as part of a land policy. The land policy framework could clarify the role that an integrated land administration infrastructure plays in supporting land markets, the management of cities and urban areas, and many natural resource and environmental management policies. The land policy framework could recognise the growing complexity of rights, restrictions and responsibilities relating to land and the consequent demands on land administration infrastructures. “

The concept of an overarching comprehensive land policy is relatively new. Drafting of formalized policies only began occurring in the 1960s and 1970s (Ting, 2002). Even in the 2000s many countries still did not have an overarching people to land vision. However, it should be noted that many older constitutions (e.g. Germany) contain statements relating to land and some are very comprehensive.

To understand what ‘land policies’ existed prior to the 1960s an analysis of legislation, constitutions and codes is required. Ting and Williamson (1998) provide a generalized model for understanding land policy developments in the Western world (Figure 2.5). Perceptions and relationships to land can be grouped into four

advancements. Firstly, in the agrarian state land was purely seen as wealth: taxation and agricultural production were the underlying land policies. Secondly, the rise of classical economics and the industrial revolution saw land transformed into a tradable commodity: policies promoted the act of transferring land as it generated further wealth. Thirdly, in the post WWII reconstruction era land was still seen as a commodity, however, scarcity became more apparent. Policies dealing with the need to manage the growth of cities began to emerge. This resulted in the first big wave of public interest rights, restrictions and responsibilities. Finally, by the 1980s, policies dealing with scarcity and the environment matured into what is now known as sustainable development. Today, the concept of sustainable development is central to the land policies of most developed countries. It guides the majority of land-related decisions and activities. It is necessary to look more closely at how the concept emerged and what it means.

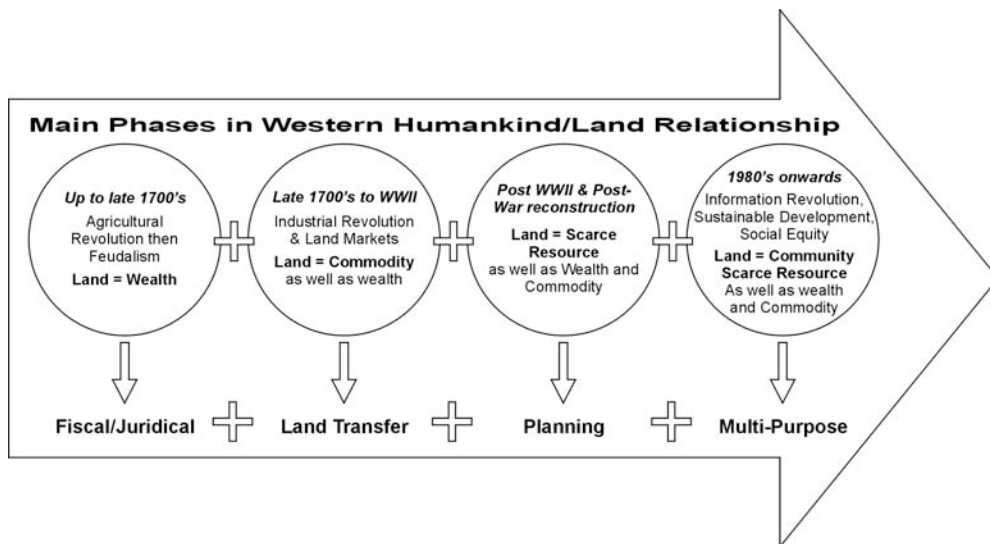


Figure 2.5: Main phases in western people to land relationship (Ting and Williamson, 1998)

SUSTAINABLE DEVELOPMENT: THE CONTEMPORARY LAND POLICY DRIVER

The term 'sustainable development' is widely used but represents different things to different interest groups. This thesis employs the most commonly recognized

definition of the sustainable development, which rose to prominence in the 1980s at the United Nations sponsored 'Our Common Future' conference (UN, 1987). The Brundtland Commission, as it became known, defined sustainable development thus: "Development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (UN, 1987). In 1992 a second conference, 'The Earth Summit' (UN, 1992), endorsed the Brundtland report and produced the Agenda 21 publication which outlined modern day sustainability objectives (Robinson, 1992). These were adopted by more than 178 Governments at the United Nations Conference on Environment and Development held in 1992 (Ting, 2002; UN, 1992). Since the publication of Agenda 21, conferences in 1997 and 2002 (UN, 1997 and 2002) have re-endorsed the definitions and principles of sustainable development.

These international initiatives inspired many countries to develop land policies and legislation that incorporated the principles of sustainable development. One example of this is the National Heritage Trust of Australia Act 1997, Section 21:

"(3) For the purposes of this section, the *principles of ecologically sustainable development* consist of:

(a) the following core objectives:

- (i) to enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
- (ii) to provide for equity within and between generations;
- (iii) to protect biological diversity and maintain essential ecological processes and life-support systems; and

(b) the following guiding principles:

- (i) decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equity considerations;

- (ii) if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;
- (iii) the global dimension of environmental impacts of actions and policy should be recognised and considered;
- (iv) the need to develop a strong, growing and diversified economy that can enhance the capacity for environmental should be recognised;
- (v) the need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised;
- (vi) cost-effective and flexible measures should be adopted;
- (vii) decisions and actions should provide for broad community involvement on issues which affect the community.

Note: The principles of ecologically sustainable development that are set out in this subsection are based on the core objectives and guiding principles that were endorsed by the Council of Australian Governments in December 1992.”

Sustainable development principles were often highly contentious. While the need for such principles was agreed upon, the methods of implementation were not. The main debate concerned the role of government in land management, particularly, should governments play a large or small roll in sustainability?

Discussions about the size and overarching role of government have existed for centuries. Small government theorists base their arguments upon an analysis of the microeconomic environment of the individual land owner: regulation should only be permitted if a land owner’s actions would cause direct anticipated harm to others (von Mises, 1944; Hayek, 1944). The foundations of ‘big government’ theories can be found in the work of James Mill. His paper on the role of government suggests that democracy requires government intervention and the regulation of human behaviour must be justified on the basis of public order (Mill, 1992). More recent theorists used this thesis to suggest that no activity be outside the restraint of government. This included the regulation of property and land use: it needed just as much regulation as did the use of a car. Proponents believed it was legitimate for

the state to seek shared goals including equity, land stewardship and environmental protection through regulation (Raff, 2005).

The debate continues. The processes of democracy will decide when and how a government should seek to regulate land based activities. In practice, most Western governments have used a middle ground approach: controls are imposed as hard cases and scientific evidence emerges. For this reason many have taken the view that conservative restriction of pesticide use, fertilizer use, water use, and so on is better than leaving the widest realm of choice to individual property owners. Despite the evidence, this still angers many owners.

While the implementation debates continue, the underlying hypothesis of sustainable development theory is unchanged: the 'three pillars' must be balanced in order to achieve sustainability. This 'triple bottom line' is made up of 'efficiency and promotion of economic development', 'equality and social justice' and 'environmental preservation and a sustainable pattern of land use' (GTZ, 1998; Deininger, 2003). A fourth pillar, 'governance', is now often included. However, in this thesis discussion is limited to the original three pillars. These three policy pillars have tended to increase the number of stakeholders dealing with property rights, restrictions and responsibilities. Developments in each pillar are now considered, particularly how they have contributed to the rise in rights, restrictions and responsibilities.

THE ENVIRONMENTAL COMPONENT

In early 1835 the Australian city of Melbourne did not exist. In its place was a temperate Kakadu, teeming with wildlife and rich soils (Flannery, 2005). Later that year John Batman, a European grazier, sailed into Port Phillip Bay and established his homestead upon a hill overlooking the Yarra River. Over the next 50 years many thousands followed as first pastoralists, followed by gold prospectors and land speculators came to make their fortunes. The local ecology was quickly

overwhelmed. The towns undulating topology resulted in the many low lying streets becoming muddy bogs. The Yarra's waterfalls were blasted away and slaughterhouses, tanneries and factories spewed their residues into the river. Downstream the river's course was altered, destroying natural marsh lands (Otto, 2005). The hill where Batman established his homestead was flattened and its soil used to fill in a lake. Foxes and rabbits were introduced and they set to work ravaging local wildlife populations and destroying the landscape. By the 1890s Melbourne was an economic basket case and its environment was fairing no better. Port Phillip Bay was a receptacle of foul drains and rubbish dumps and the Yarra was polluted and lifeless (Cannon, 1966; Flannery, 2005). A pristine natural environment had been transformed into a polluted metropolis in just fifty years.

The atrocities occurring in places like Melbourne during the late nineteenth century would not go unnoticed (Kovarik, 2001). In Australia, like the United States and Western Europe, scientific and natural history groups began to form. This was followed by outdoor walking groups and associations to protect national parks and wilderness areas (Marsh, 1991; Ting, 2002). While chthonic peoples can be considered the first environmentalists: living in harmony with the natural environment was embedded in their cultures, these new groups represented the beginnings of the modern environmental movement. By the early twentieth century scientists and social activists began sounding concerns about the exploitation of resources; however, these concerns fell on deaf ears (Kavorik, 2001). Technology and energy production continued to boom. The drive for economic wealth continued to motivate decision making as globalization and urbanization spread.

It was not until the post WWII reconstruction era that the movement gained meaningful momentum. Traditional conservationist themes combined with the liberalist attitudes that grew out of the general protest movements of the 1960s (Dalrymple, 2005; Papdakis, 1993). *The Silent Spring* (Carson, 1962) is one

example of this convergence and is often credited with being the genesis of modern environmentalism. The alignments gave the issues political force and environmentalists started to enter the mainstream. Significant international debate emerged: The United Nations Stockholm Conference on the Environment, held in June 1972, produced the Stockholm Declaration and accompanying action plan (UN, 1972). It made recommendations regarding the conservation of natural resources, education, human settlements and pollution. In 1980 various interests groups involved in conservation, wildlife and strategy met to prepare the World Conservation strategy (Dalrymple, 2007). In 1983 the United Nations established the World Commission on Environment and Development which eventually lead to the Bruntland report (UN, 1987) and Agenda 21 (UN, 1992).

Government portfolios focusing specifically on the environment emerged in the 1970s (Ting, 2002). In Australia, concerns for the natural environment in Tasmania were a significant reason behind the election of the Hawke Labour government (Lines, 2006). Governments also began funding voluntary organizations, even in times of economic downturn (Papadakis, 1993). Since then, environmental concerns have increasingly been incorporated into political institutions and business practices (Papdakis, 1993; Ting 2002). In her 2002 PhD thesis, Lisa Ting highlighted how the Canadian Department of Natural Resources Act specifies that the Minister must give regard to the sustainable development of Canada's 'natural resources'. More recently in Australia, a House of Representatives committee put conservation firmly on the agenda for the twenty-first century (Commonwealth of Australia, 2001).

While these developments are significant, many on-ground implementation issues remain unresolved. The issue of compensation to land owners who lose particular rights is highly contentious and problematic. Australia's constitution allows the federal government to extinguish ownership in return for payment of 'just compensation'. However, the rise of new property related restrictions, which

impact upon but do not extinguish ownership, has resulted in a situation where compensation might not be required even when value has significantly diminished.

States in the USA have also struggled with such issues. Robertson (2003) describes the case in the state of Oregon. In 2000, a small group of land owners sponsored a citizen-initiated referendum called Measure 7. It aimed to have landholders compensated for any loss in value of their land whenever the State or council passed a restriction on property rights. The majority of voters agreed with the proposal and Measure 7 succeeded. The effect of the proposal was dramatic. It was estimated that the annual cost to state and local councils would be \$US 54 billion. At this estimate, it was calculated that in 15 years, the State would have paid as much in compensation as the total value of all property in the State. Even at a lower estimate, taxes would still have to rise significantly in order for government to continue to provide services. As the number of property restrictions and responsibilities continues to increase the issue of compensation/sustainability will require more attention.

In summary, environmentalism has increased the number and diversity of stakeholders in relation to land (Ting, 2002). It has changed societal attitudes and led governments to institute land policies aimed at conserving and improving the environment. Much of the activity has been uncoordinated and has resulted in the formulation of many ad hoc legal land interests. In many cases this has frustrated private property owners who feel their rights have been impinged upon. Issues of compensation and economic feasibility have inevitably surfaced. To counter this tension economics is now being incorporated into environmentalism. Indeed, environmental controls are being reframed as economic opportunities. This is important because increasingly economic systems will be judged by how they respond to the wide range of environmental concerns (Yergin and Stanislaw, 1998). Consideration is now given to the economic component of sustainable development and how it too is driving the creation of interests over land.

THE ECONOMIC COMPONENT

The birth of modern economics is usually traced back to the classical economists of the eighteenth century. This laissez-faire economics was based on the belief that markets and the private sector operate well on their own, without state intervention (Backhouse, 2002). During this period land was seen as a commodity (Ting et al, 1998). The economic process was based on continuous improvement in potential output. However, boom bust cycles and high unemployment and deflation of the sort seen during the 1930s prompted British economist John Maynard Keynes to propose a new economic theory: Keynesian economics promoted a mixed economy where both the state and the private sector played an important role (Keynes, 1936). Keynes believed that government policies could be used to promote demand at a macro level during times of down turns.

The Post-World War II reconstruction era saw a shift away from Keynesian economics. Laissez-faire economists, such as von Mises (von Mises, 1994), Hayek (1944) and others, sought to limit the rights of government over land. All sounded their concern about the capacity of people who are not the owners of property to make sound decisions about the use of that property (Kasper, 2003). They firmly believed that such decisions would be economically efficient when in the hands of the owner: the person who would achieve benefits and suffer losses on account of his or her actions. The solution offered by this theory was the withdrawal of government from interventionist and restrictive interference (Norris, 2000; Ting 2002). Ting (2002) suggests that as a result of withdrawal three notable trends emerged: privatization, decentralization and globalization of activities. All three have impacted on the amount of interests over land and their administration.

Privatization theory places state-owned utilities and services and related decision-making powers into the hands of private owners and urges government to work more efficiently and accountably for the public (Hodge, 2006; Bishop et al, 1994). The objective is to move away from governmental control as a substitute for the market and toward reliance on competition in the marketplace as a more efficient

way to protect the public (Yergin and Stanislaw, 1998). Privatization was a trend in many countries throughout the 1980s and 1990s. The most prominent examples include the Reagan administration in the USA, and Thatcher administration in the UK. The privatization trend saw government departments either outsourced to private bodies or restructured to prove their worth through quality assurance schemes and efficiency measures.

In relation to land, privatization resulted in large amounts of resources and infrastructure being transferred to the private sector. Examples in Australia include the now highly privatized telecommunications, water, electricity and gas utility infrastructure. The private asset management systems created to manage these assets can greatly impact upon individual land owners. The management of these private sector assets is generally less transparent and accessible to the public. The result of privatization has been a recurring theme of 'winners and losers' (Hodge, 2000 and 2006; Ting, 2002). To counter this, a role for government is being re-recognized and there is a belief that not everything should be privatized. The balance of privatization will be decided within each society and nation (Ting, 2002). Regardless of these outcomes, privatization has created a sizeable number of private land interests that impact upon other private lands, traditional administrative systems are struggling.

Decentralization of government has provided another economic driver (Ting, 2002). Decentralization involves regionalizing central government and improving local input into policy design in order to improve policy efficiency (OECD, 2001). It should shorten the decision making process and increase policy effectiveness by bringing decision-making closer to the people affected (OECD, 2001). Importantly it also assists the decisions on issues of national importance by improving the transmission of information up the administrative chain (Mckinlay, 2005). Decentralization empowers local governments and communities. In Australia, this has resulted in many local governments producing policies and laws to govern their local environments. Many of these have been successful in improving the

management of natural environments. However, their effectiveness is often limited because central governments can easily overrule any regulations created. Regardless, decentralization has added to the complexity of interests created over land.

Globalization has also contributed to the number of interests over land. In the global economy, events in one part of the world have increased potential to impact upon peoples and societies in other parts of the world (Ting, 2002). It is marked by free trade, free flow of capital, and the use of cheaper foreign labor markets (Merriam-Webster, 2007). Specific international instruments developed within and beyond the UN have gained wide-ranging influence over national agendas for change. Examples include the General Agreement on Tariffs and Trade (WTO) and Agenda 21 (Ting, 2002).

The macro economic policies of privatization, decentralization and globalization have all contributed to the large number of controls over land. However, the tools and theories of economics are increasingly being used to address the need for better land and environmental management. A prominent example within Australia has been the rise of Market Based Instruments (MBIs) also referred to as economic interests (Bari, 2002). MBIs attempt to bring environmental values into private economic decision making. In contrast to the legislated regulations and controls of government, MBIs make use of markets to ensure sustainable resource usage and minimal waste, encourage reuse and recycling, ensure efficient allocation of natural resources and provide incentives for the development of water efficient technologies (Grimble, 1999).

A number of justifications for MBIs can be found in the literature. Firstly, the government regulatory approach has been found to perform poorly in some cases. While land regulations have in some cases been effective in meeting environmental objectives they tend to be inflexible and can impose high costs on the community. Several authors found that common and control systems can be extremely costly if

poorly designed and administered (Hufschmidt et al, 1983; Tietenberg 1985 and 1990). The genesis for many of these arguments dates back to work by Hardin (1968) on the problems of common tenures. Secondly, the growing scarcity of natural resources has led to a realization that these resources have to be allocated and used more effectively. Markets are synonymous with theories of efficiency, resource allocation and cost reduction and as such are seen as the ideal tool for addressing this pressing need (James, 1997). Thirdly, international institutions such as the OECD, IMF and the World Bank all advocate the use of MBIs (World Bank, 1999, 2000a, 2000b).

Bari (2002) outlines the potential of MBIs, however, he also highlights the disadvantages and problems associated with their use. Examples include the potential for monopolies to emerge, the inevitable uncertainties of distributing power over a resource to many individuals, and the possibilities of tax burden on individuals.

Four main categories of MBI are outlined by Bari (2002). These include pollution charges, tradable permits, market barrier reductions and government subsidy reforms or reductions. Stern (2006) provides an example of the pollution charge typology. The aim of the MBI is to introduce taxes so as to reduce the emission of greenhouse gases. The tax imposed should be based on the marginal damages caused by carbon emissions and would be equal to the social cost of carbon at the point where it is equal to the marginal abatement cost. Faced with this tax, the emitters would choose the appropriate level of abatement (Stern, 2006). Bari (2002) also provides other examples for Australia: effluent charges in South Australia, waste charges at state and local levels; salinity trading scheme (tradable credits) in the Hunter River area; and stewardship schemes in Western Australia (Gibbons et al, 2002). The European Union has instituted a carbon trading scheme and in early 2007 the Australian Federal Government were also looking at instituting a similar scheme (Hannam, 2007).

In summary, economics is an important part of sustainable development. Economic policies and theories have made significant contributions to the proliferation and management of land interests. This role is increasing and any framework attempting to manage interests holistically must take the discipline and accompanying issues into account. The final pillar of sustainable development is social equity. Consideration is now given to this component and its role in the increase in property interests.

THE SOCIAL EQUITY COMPONENT

After the late nineteenth century social equity became an increasingly important part of larger social policies. The rise in state funded welfare, the rights of women, civil liberties and later the rights of minority and indigenous groups were significant developments. Land ownership, land access and land management were important parts of the greater movement. The ability of indigenous groups to access and maintain their traditional lands in traditional ways was a subject of much debate. These debates made a significant impact upon existing property systems and resulted in an increase in the number of interests over land.

In Australia, the Aboriginal rights movement rose to prominence around the same time as the American civil rights movements. In Australia, indigenous peoples won the right to vote in 1967 (Attwood and Markus, 1997). The High Court of Australia overturned the traditional legal norms that described Australia as 'terra nullius' in the historic *Mabo decision* of 1992 (Bartlett, 1993). International experiences from Canada and New Zealand informed the Australian High Court's decision in *Mabo* and the subsequent development and implementation of the Native Title Act 1993.

New Zealand's recognition indigenous rights dates back to the 1840s. The degradation of their land and culture prompted the Maori people to petition the Queen, resulting in the Treaty of Waitangi (1840). Importantly the treaty gave the Crown the right to purchase land at a fair price and this resulted in much acquisition and confiscation throughout the 1860s (Morad and Jay 1997; Brazenor, 2000). The Native Lands Court was established to ensure fairness, however, the Treaty of Waitangi became a widely disliked symbol of colonization. In the 1970s there was a movement for change and in the 1980s the treaty was transformed to better recognize Maori interests in land (Ting, 2002). Attempts have also been made to increase the control of Maori land by Maori populations through the Te Turee Whenua Act 1993 (Brazenor, 2000). More recently, the Maori peoples of New Zealand have lodged and negotiated many claims to land (Ting, 2002).

In Canada during the early 1970s successive court cases (*Calder v Attorney-General of British Columbia*, 1973; *Delgamuukw v British Columbia* 1977) confirmed and developed the existence of indigenous rights (Brazenor, 2000; Rakai and Nichols, 1998). The Canadian Constitution (1982) was amended in 1982 to recognize and reaffirm existing indigenous rights. Since this time the Crown has been unable to extinguish such rights and they have slowly been defined through the courts (Brazenor, 2000). For example, the court decision in *R v. Sparrow* 1 S.C.R. 1075 (1990) determined that the Musqueam Indian Band had an existing traditional right to fish. Official efforts to improve relations with the native peoples reached a high point in 1999 with the establishment of a new territory to serve as a self-governing homeland for the Inuit (Brazenor, 2000).

The World Conference on Human Rights (14-25 June 1993 in Vienna, Austria) gave indigenous people a prominence on the international agenda (UN, 1993). Their rights were discussed in sections 28-32 of the Declaration and it was recommended to the UN General Assembly that an international decade of the world's indigenous peoples be declared from 1994.

In summary, social rights movements have led to new or re-recognized interests over land. These have added complexity to other types of rights and interests. Because indigenous people do not define rights and interests in traditional Western ways, defining them to fit within a western framework is very difficult, particularly when boundaries may be evolving and the focus is more communal than individual. This will continue to challenge traditional land administration systems. Any system for managing interests in land will need to attend to these issues.

SUMMARY

The concept of an overarching comprehensive land policy is relatively new. Today, the concept of sustainable development is central to the land policies of most developed countries. The 'three pillars' of societies, economic, environmental and social, must be balanced in order to achieve the vision. Each policy pillar has

developed disparately in relation to land and this has resulted in the formulation of many ad hoc legal land interests. Any framework aimed at improving the management of all rights, restrictions and responsibilities needs to include a more organized approach for designing and implementing land policies.

CONCLUSIONS

The three perspectives of tenure, legal objectives and policy objectives illustrate how the rise in land interests occurred. A diverse range of economic, social and environmental drivers all contribute to the influx. Each perspective demonstrates the inability of existing theories to describe and manage the many interests over land. Such theories need re-evaluation. A new framework must consider and incorporate these findings. In summary, questions arising from each of the three perspectives are as follows:

Environmental, economic and social sustainability drivers resulted in a more collective or systems view of land and led to more land policy being created. The creation of policy was often ad hoc and unorganized. *How many disparate reasons have driven the creation of land policies? How should land policies be designed and, implemented to improve the management of rights, restrictions and responsibilities?*

Legal systems have responded to land policy demands by creating many new formalized land interests through legislation. This too was done in a reactive, ad hoc and uncoordinated manner. The statute books are now immensely complex making it impossible to create a holistic view of land management. *How many land interests are there? Are they emerging at an increasing rate? How long do they apply for? Do any not exist where they ought to? What principles should guide the creation of legal rights, restrictions and responsibilities over land? How do we make the rules acceptable to the community and change human behavior?*

Existing tenure models used to describe how people and land relate are simplistic. They do not capture the multitude of new rights, restrictions and responsibilities that exist on land. Consequently they can only provide limited guidance as to how the interests should be administered. *How many different types of tenure are there? Who do the new interests*

benefit? Who do they disadvantage? How can we describe and classify rights, restrictions and responsibilities in a holistic way?

The issues raised in the chapter are wide reaching and complex. They feed into the research design and ultimately help in the formulation of a framework for managing the majority of property interests. However, not all the issues discussed here are resolved within this thesis. Fundamentally, a society must decide what type of relationships people can have with land: whether Con Puican can or cannot build his dream retirement home. The land administration system can only help implement and guide these desires.

This chapter sought to understand the causes of the problem from a theoretical level. The next chapter gives consideration to the impact new land interests have on traditional land administration systems: the structures which are supposed make tenure systems, legal systems and policy statements work on the ground.

CHAPTER 3

THE GREAT EXPECTATIONS OF LAND ADMINISTRATION

A modern land administration system must include several elements: land policies, a legal framework, a tenure model, cadastral surveying and mapping, an institutional framework, information and spatial technology infrastructures and capacity building mechanisms (Williamson, 2001). A new framework for managing all rights, restrictions and responsibilities must address each of these elements or risk being irrelevant. Chapter Two considered the first of these elements: land policies, legal frameworks and tenure models. This chapter considers the more practical elements of land administration: cadastral surveying and mapping and the associated institutional frameworks. It describes how these elements have responded, and sometimes failed to respond, to the increased number of property interests over land.

INTRODUCTION

In 2003, the State Library of Victoria's celebrated domed reading room was reopened after renovations. Added to the extensive book collection were some of Victoria's most significant historical artifacts. Items on display included the outlawed Ned Kelly's armor and the last words scrawled by explorer Robert O'Hara Burke as he lay dying in the Australian outback. The exhibition also contained a number of less remarkable items: a surveyor's Gunter chain complete with rusting metallic rods and an old leather bound exercise book opened to a page with neatly ruled columns, its pages detailing dates, names and locations of what appear to be land sales. Why were these unexceptional items displayed alongside such well known historical artifacts? The answer may be found in Victoria's beginnings.

In early 1836 news of unease in the still unnamed settlement of Melbourne reached Governor Richard Bourke in Sydney, New South Wales (King, 1966). Barely a year had passed since the first settler John Batman had landed upon the banks of the Yarra River; however, land disputes and attacks on indigenous people were common. Bourke responded by formally recognizing the settlement. He appointed and dispatched a police magistrate, William Lonsdale, along with three surveyors, two customs officials, a commissariat clerk, thirty privates of the 4th Regiment, and thirty convicts (King, 1966). This provided a basic administrative structure upon which the future city could be built.

While Lonsdale could settle minor civil disputes, it was only the surveyors who could solve the bigger problems of the fledgling colony: land access, use and development. Robert Russell was the first surveyor in charge and he undertook topographic surveys of Werribee, Geelong and Melbourne (Preston, 1967). Russell was eventually replaced by the more senior Robert Hoddle (Tripping, 1966). Hoddle plotted Melbourne's first network of streets on Russell's topographic map and then, using survey equipment, draped them over the settlement's undulating topography. Later he divided the streets into plots and conducted the first official

land sales. The formalization of the colony and its land tenures encouraged the arrival of more settlers. Melbourne was beginning to boom. By 1839 it had established its own police force and customs office. More importantly, for the purposes of wealth creation, it separated its lands office from New South Wales and commenced selling real estate for significantly high prices (Flannery, 2005). Over the next fifty years the discovery of gold and good grazing lands allowed the population of Melbourne to overtake that of Sydney. It became the economic centre of Australia. Melbourne's achievements were directly linked to the work of surveyors and their creation of efficient land administration systems. It is for this reason that the survey equipment and land records sit proudly in the State Library.

The era of Robert Russell and Robert Hoddle has passed. Surveyors and their tools have modernized. They are now just one component of the complex land administration systems used by governments. The International Federation of Surveyors (FIG) defines this new discipline of land administration as the processes of determining, recording and disseminating all information about the tenure, value and use of land for the purposes of sustainable development (UN-FIG, 1999). A modern land administration system must include several elements: land policies, a legal framework, a tenure model, cadastral surveying and mapping, an institutional framework, information and spatial technology infrastructures and capacity building mechanisms (Williamson, 2001). A new framework for managing all rights, restrictions and responsibilities must address each of these elements or risk being irrelevant. Chapter Two considered the first of these elements: land policies, legal frameworks and tenure models. This chapter considers the more practical elements of land administration: cadastral surveying and mapping and the associated institutional frameworks. It describes how these elements have responded, and sometimes failed to respond, to the increased number of property interests over land.

THE CHALLENGE FOR CADASTRES

DEFINING THE CADASTRE

The meaning of the term cadastre has evolved as its role in societies has changed. At the most generic level, a cadastre is a record of how land is divided within a community. The need for cadastres arose when societies began individualising access to land. The earliest chthonic societies were nomadic and saw land as a shared community resource (Patrick Glenn, 2004). Having no concept of individual ownership meant there was no requirement for cadastres. As these societies evolved into agricultural, industrial and information societies the need for cadastres emerged. Since the 1990s, FIG has defined a cadastre as a:

“...parcel-based, and up to date land information system containing a record of interests in land. 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. planning), and enables sustainable development and environmental protection.” (FIG, 1995)

A modern day cadastre is therefore composed of two parts: maps identifying where individual parcels of land are located and registers or lists identifying who owns the parcel of land (FIG, 1995) (Figure 3.1). For a range of political and practical reasons the two components evolved quite separately. These two components and the impact of new property rights, restrictions and responsibilities upon them are now considered separately.

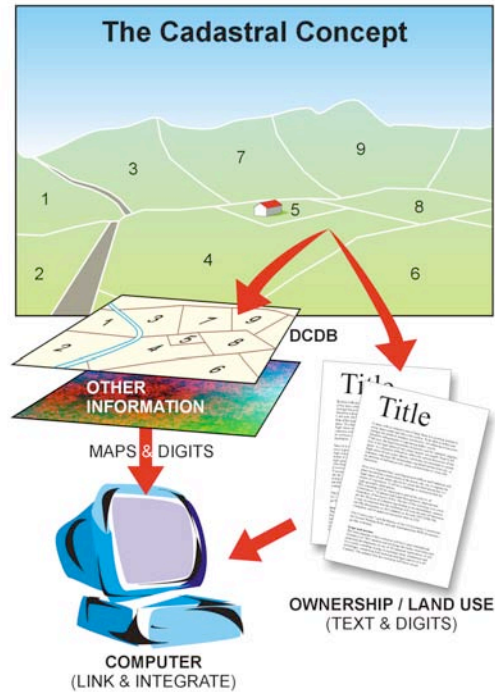


Figure 3.1: Maps and lists are the two fundamental components of a cadastre (FIG, 1995)

THE REGISTRY COMPONENT OF CADASTRES

The registry component of cadastres emerged in early civilisations because of the difficulties in transferring immovable objects (Zevenbergen, 2002). Immovable objects, such as land, could not readily be ‘possessed’. This was in contrast to moveable objects such as tools and clothing where ownership was identified through possession: transfer of possession equated to transfer of ownership. In order to own or transfer immovable objects a different approach was required. A range of systems evolved, each including a means of enabling and evidencing the transaction (Larsson, 1991). The first systems used oral agreements, symbolic gestures and eye witnesses. The advent of written script saw private conveyancing emerge with the introduction of written transactions, or “deeds”. These systems tended to be highly technical and lost deeds were a major cause of fraud (Simpson, 1976). As a result centralised systems of registration emerged whereby the evidence component of the transaction was stored and secured by an independent body.

Two main systems of registration are now evident: deeds registration and title registration. Deeds registration allows the deed to provide evidence of the transaction and transfer the interest. However, an individual deed transaction does not result in transfer of the actual rights to the land (Simpson, 1976). To acquire the rights one must have the complete unbroken chain of transaction deeds (Larsson, 1991; Henssen, 1995). Every time the land is transferred a new deed is created and must be added to the 'chain'. Deeds registration overcomes some private conveyancing problems. Each deed is copied or abstracted into a public register. This central registry dramatically reduces the chance of fraud and other failures. Deeds transfer does not perfect the transfer of title though; it simply gives priority over unregistered instruments. A forged deed which is registered is still useless and a 'good' one subsequently registered is also useless. Deeds registration has a number of disadvantages as outlined by Zevenbergen (2002). Firstly, it is not compulsory to register each change in many systems. Secondly, land parcels are not generally well defined. Finally, the chronology of deeds is usually difficult to search. Examples of deeds registration may be found in most states of the USA and in South Africa. In the USA, the limitations of the deeds system were improved by private sector insurance of individual properties against fraud and title failure.

Title registration is the most recently evolved system of registration (Dowson and Sheppard, 1952; Simpson, 1976). In title registration a right is created by registering a land parcel with a defined position (Henssen, 1995). A single registered document acts as evidence of who owns the land and where the land is located (Dowson and Sheppard, 1952). Most title registration systems are based around the principles of mirror, curtain and insurance (Ruoff, 1957). The mirror principle suggests that what is on the title should reflect what is occurring in the real world. The curtain principle demands that what is held in the register overrules all other claims. The insurance principle suggests that where errors exist in the register and sure evidence of these errors can be provided, the disadvantaged owners will be compensated by the government. A single document acts as overriding evidence and there is little need for lengthy investigations like those

required in deeds systems. Disadvantages include the high initial outlay and the ongoing requirement for skilled personnel (Dale and McLaughlin, 1999). Malaysia is one exception: its qualified title model is an example of a system that does not require such highly skilled personnel (FIG, 2003). Title registration requires each transaction must be checked to ensure it meets official requirements (Zevenbergen, 2002). Hennsen (1995) divides title registration into three sub-typologies: English, German or Swiss, and Torrens. Each group reflects differences in land law rather than in registration principles or technical differences in the way land is described (Zevenbergen, 2002).

Both deeds and title registration systems have their advocates (Zevenbergen, 2002). Debate was particularly heated throughout the 1970s and 1980s as developing countries undertook land administration projects and adopted new systems of registration. Zevenbergen (2006) provides a discussion of the main issues, highlighting that while title registration is the best approach, many countries still lack the competencies to maintain the system and simpler methods are more appropriate. The reality is that both systems will be used in the future. Indeed, most countries now employ a combination of the two systems (McLaughlin and Williamson, 1985). The greater issue for this thesis is how each of the systems has dealt with and might deal with the emerging property rights, restrictions and responsibilities.

In general, both title and deeds registration systems have failed to address new land interests: most new interests are managed outside these systems (Van der Molen, 2003 and 2005). They tend to have specific systems of registration. In many cases the alternate systems adhere to neither the principles of title nor those of deeds registration (Bennett et al, 2007). There are a number of reasons the deeds and titling systems have not been used. First, until the advent of computerised databases it would have been impossible to integrate the management of such large amounts of information. Secondly, registration systems traditionally recorded private rather than public ownership interests (Ruoff, 1957; Dowson and Sheppard, 1952): the

systems existed to enable the specific tasks of taxation and secure property transfer. Public land interests are generally not taxed and do not require security as governments always have overriding power. Unfortunately this mindset tends to disregard the requirements of private citizens. There has been a lack of political action on new property interests. Prior to governments adopting 'whole-of-government' approaches to satisfy 'customer' needs during the 1980s and 1990s, individual government departments, especially in countries with English heritage, were highly autonomous (Wallace and Williamson, 2005). This allowed departments, particularly those dealing with registration and taxation, to focus internally (Bennett et al, 2005). Changing the structures and processes of government was and still remains difficult. A final reason for the lack of integration is the lack of an underlying theoretical framework for managing all rights, restrictions and responsibilities (Bennett, 2006). It was not until the 1990s that new land interests were considered in the same context as parcel based ownership rights. Policies for integrating land interests have only emerged since that time.

It is wrong to suggest that title and deeds registration systems do not manage any interests outside of ownership. Australia's state titling systems have registered many private interests since their inception including restrictive covenants, mortgages, caveats and easements. There are even cases where the title registration system has been used to record the newer forms of land interests. In Victoria planning restrictions dealing with the appearances of properties may now be included on titles (s173, Planning and Environment Act 1987) (Bennett et al, 2005a). South Australia's registry is even more inclusive.

During the early 2000s a number of Australian states moved towards the use of registration systems to record all interests over land (Bennett et al, 2006a). At the federal level this has been driven by a desire to better manage complex commodity markets such as water (ACIL Tasman et al, 2004; Young and McColl, 2002). At the state level the motivation was a desire for more accountable and informative land administration systems (Lyons et al, 2004; Williamson et al, 2005). These

discussions were at a high level and largely focused upon need, rather than cost and the more detailed questions about whether information and parcels would be secured by government, how integration would occur and who would manage the system. At any rate, efforts were neither concerted nor consistent. A clearly defined role of deeds and title registration systems in the management of all rights, restrictions and responsibilities is yet to emerge.

There are a number of other approaches to analysing systems of registration, aside from the standard deed versus title approach. A number of these are relevant when considering the management of rights, restrictions and responsibilities. Zevenbergen (2002) provides an overview of these perspectives. “Negative vs. positive” models define registration systems in terms of government guarantee of title. In a positive system the state guarantees the titles that are registered and registration itself creates the interest or conveys the land. In a negative system registration does not improve the title: no guarantee is given to a registered title. This is the most widely understood definition, but there are others (Zevenbergen, 2002). This debate is highly important for new land interests: if governments create a new interest and publish its existence via a registry should the system be positive or negative? In general, systems for providing information on public interests are negative. It would be most desirable to make them positive; however, this exposes government to more significant risks. It would require more accurate information management processes, which are of course more costly. On the other hand, if the systems remain negative, the value of the registry is greatly reduced: there is little use for an inaccurate and unreliable registry. These issues are yet to be resolved.

Another perspective, “above the line vs. below the line”, originates in Australia (Lyons, 2002). It considers registration systems in terms of what types of interests are recorded on title. ‘Above the line’ systems are deeds or title systems, which are responsible for managing ownership and any other interests on the title. The interests are government secured and receive all the benefits of being placed on title. When a new interest is placed on a title or deed it becomes ‘above the line’.

'Below the line' interests do not appear on title, instead they are recorded in disparate databases or registers. They may be publicly or privately managed and are generally not secured by government. This simple typology has allowed for discussion and diagnosis of the land interest management problem. However, what should be 'above the line' and what should remain 'below the line' is still unresolved.

Other registration schemes identified by Zevenbergen (2002) include 'systematic vs. sporadic' schemes of adjudication, 'general vs. fixed' boundary schemes and 'index vs. plans vs. graphic/numeric' forms of publication. These perspectives tend to relate more to the map component of cadastres which are now considered.

THE MAPPING COMPONENT OF CADASTRES

The map component of cadastres only re-emerged substantially in the sixteenth and seventeenth centuries, however, cadastral mapping dates back much further. Cadastral maps emerged when societies began individualising concepts of ownership. Pre-agrarian societies had only required maps of surrounding topologies and topographies; Australia's indigenous communities, for example, used paintings to depict landscapes, flood waters and water soakage (Sutton, 1998). The concept of individual ownership generated a need for parcel based maps.

Literature detailing the early cadastral maps is extensive (Binns, 1953; Larsson, 1991; Kain and Baigent, 1992; Ting, 2002; Steudler, 2004). The first known cadastral maps were created in ancient Mesopotamia and Egypt (Binns, 1953). In Mesopotamia from 2300BC scribes drew plans of properties and buildings on clay tablets. This probably occurred when land was sold or boundaries disputed. Egyptians possessed instruments for measuring land as early as about 3000BC, however, the only maps of landed property are from the Ptolemaic period of 305-30BC (Figure 3.2; Figure 3.3). The Egyptians used maps for land taxation and they were an important tool in revenue collection. The Greeks also employed systematic urban and rural land divisions; however, there is no evidence that the survey work

was mapped. Mapping began in the area now known as Italy as early as 1600BC and by 300AD the Roman Empire had a very well developed understanding of maps. Their maps allowed control to be exerted and maintained over far flung outposts.

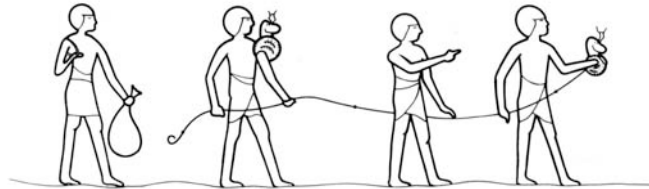


Figure 3.2 Egyptian surveyors (Larsson, 1991)

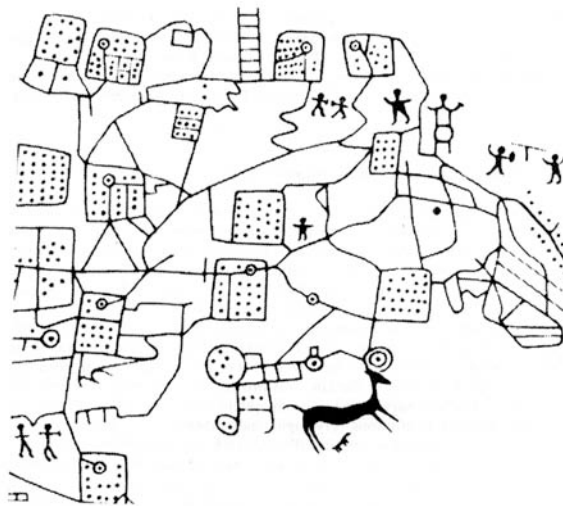


Figure 3.3: Egyptian maps from 300BC (Larsson, 1991)

The fall of the Roman Empire prompted a sharp decline in cadastral maps and a trend towards written descriptions. William the Conqueror compiled perhaps the most notable example of a text based cadastre, the Domesday Book (Steudler, 2004). In England during the 1080s he conducted a survey of who owned what land and assets to assist taxation. The census covered all England and showed names of landowners, acreage and tenures as well as arable meadow, pasture and forest land uses, numbers of tenants, and quantity and type of livestock (Larsson, 1991).

Maps re-emerged during the early period of the Western European Renaissance. Unlike the central archives maintained by the Romans, the new cadastral maps were created and held privately (Kain and Baigent, 1991). They were used for dispute resolution and, as feudalism gave way to capitalism, became a tool for securing land transfer (Ting, 2002). In the sixteenth and seventeenth centuries there was an increase in cadastral mapping by public authorities and state governments. The first developments occurred in sixteenth century in Holland where maps were used in the making and management of polders and to resolve disputes over tithes and boundaries (Kain and Baigent, 1991). Other regions followed. The most notable reason for the development of cadastres was tax reform (Kain and Baigent, 1991). The Swedish Land Survey in the early seventeenth century provides an early example of the establishment of maps for taxation purposes (Larsson, 1991). In continental Europe, similar attempts were made to enhance the quality of taxation by adding map information (Steudler, 2004). In the early eighteenth century the Austro-Hungarian Empire introduced the Theresian Cadastre to facilitate land taxation, although mapping was only undertaken in one province (Steudler, 2004; Kain and Baigent, 1992).

During the nineteenth century most of the countries in continental Europe established systematic cadastral systems of varying quality and range (Kain and Baigent, 1992). France's dominance over Europe during the early nineteenth century allowed the Napoleonic cadastre to strongly influence cadastral design in Europe (Larsson, 1991). Colonization and imperialism saw cadastral mapping spread to newly colonized settlements in Asia, Africa, the Americas and the Pacific. Local conditions produced evolutions of the cadastral concept and its role within societies. Williamson et al (2007) suggest that by the twentieth century three main typologies were evident: fiscal cadastres, juridical cadastres and multipurpose cadastres. Each of these typologies is now considered in more depth, in particular, the ability of each to respond to the increased numbers of property interests.

FISCAL CADASTRES

A fiscal cadastre exists primarily to produce tax revenue for the state (Williamson et al, 2007). Many European cadastral systems of the sixteenth and seventeenth century were created with this express objective; however, the Napoleonic cadastre popularized and standardized the model. The cadastre was created to compliment the new unifying civil code which was itself aimed at producing more equitable land taxation (Kain and Baigent, 1992). The cadastre was recorded in large-scale maps called ‘plans parcellaires’ and the records contained parcel numbers, area, use and values. The maps were established systematically by relatively uniform cadastral surveys. The basic principle was that the cadastre should include two main parts: a verbal description and a map showing the locations and boundaries of all land units (Steudler, 2004). The French cadastre became a model for other European countries (Steudler, 2004). The unique cadastral number of each land unit served as a link between map and description (Larsson, 1991).

Countries using this model include France, Spain, Greece, Portugal and the Spanish or Portuguese speaking countries of Latin and South America. The cadastres are usually prepared and managed by the jurisdiction’s taxation authority (Williamson et al, 2007), with varying levels of accuracy and currency. The primary purpose of the cadastre is to identify parcels and their value: the responsibility for securing ownership and its transfer lies in a separate or loosely connected deeds registry. For example, France maintains a separate deeds registration system alongside its cadastre. Public land information and transparency is also often a secondary concern as demonstrated by the highly corrupted cadastral systems of Spain (Clark, 2007).

Administration of fiscal cadastres often falls outside the expertise of the surveyor and consequently the model often lacks a well designed spatial component (Williamson, 2007). This is important because modern computerized maps allow information to be integrated according to location. There are thus significant implications for the management of the different property rights, restrictions and

responsibilities. Many government funded projects over the last ten years have sought to better manage rights, restrictions and responsibilities focusing heavily on maps and, in particular, the map based cadastre (Bennett et al, 2007a). Without a map based cadastre these approaches are unavailable.

JURIDICAL CADASTRES

The second typology of cadastre, juridical cadastres, emerged in Europe and in those countries influenced by English Common Law and the British colonial period. Land ownership and transfer were increasingly available and security and reliability of cadastral records became more important (Ting, 2002). Between 1858 and 1874, each Australian colony adopted the new system of title registration which had been developed by Sir Robert Torrens and Ulrich Ubbe (Stuedler, 2004). It was much simpler and therefore cheaper than the system used in England. Cadastral maps and plans were created and deposited by licensed surveyors and became an integral part of the registration process. The Torrens system established a precise and pivotal role for cadastral maps in the land registration process (Kain and Baigent, 1992). Its simplicity saw it introduced into many other British colonies in the late nineteenth and early twentieth century as well as countries such as Thailand, Brazil and Hawaii, before it became a state of the USA (Williamson, 2001). Korea, many African countries and many Pacific island nations now also use the system. The original fiscal aspect of cadastres became less pronounced, while the juridical aspect became more important (Stuedler, 2004).

Up until the 1970s the management of juridical cadastres was the domain of specialist land registry or land titles offices. Land registries had a dual function of supporting titles and deeds as well as legal surveys and cadastral mapping (Williamson et al, 2007). Individual isolated surveys were applied to individual parcels and individual land transfers. Indexes were used to reference charting maps of various accuracy and currency. The focus was not usually on the charting maps but on the individual surveys: the charting maps simply assisted in locating isolated cadastral surveys (Williamson et al, 2007).

Since the 1970s, the more advanced countries have upgraded their juridical cadastres. The charting/index maps now include all land parcels (Williamson, 1987). In many developed systems these maps achieved a high degree of accuracy and currency (Williamson et al, 2005). However, even today many land registries in these jurisdictions still focus on their land market function with the spatial cadastre being a secondary objective, if at all. An accurate and up-to-date spatial cadastral map is an additional benefit of the registration system (Williamson et al, 2007). However, unlike many fiscal cadastres, juridical cadastres deliver a complete map to some level of accuracy. When these maps are digitized and geo-referenced they become very powerful for managing land activities and interests. Information pertaining to all rights, restrictions and responsibilities can be overlaid on a single digital map (Bennett, 2007). Many projects undertaken in the early 2000s focused on upgrading the juridical cadastre so that it could be used more widely for land management (Williamson et al, 2005).

MULTIPURPOSE CADASTRES

The final typology of cadastre, the multipurpose cadastre, has the most utility and is considered the most recent advancement in cadastral systems (Williamson et al, 2007). Literature on multi-purpose cadastres began emerging in the 1970s and 1980s. Interestingly it was researchers from Common law jurisdictions that led the push: authors such as McLaughlin (1975) and Williamson (1985) modernized, developed and promoted the cadastral concept. These works prompted substantial publications from the National Research Council in the USA (NRC, 1980; NRC, 1982; NRC, 1983).

The historical foundations of multipurpose cadastres lie in the early French fiscal cadastral model. However, unlike fiscal cadastres which maintained deeds registries alongside their cadastres, multipurpose cadastres took the additional step of converting their deeds registers into title registers using cadastral surveying. Unlike juridical cadastres, multipurpose cadastres also separated land market activity from

the primary objective of creating and maintaining a complete and up-to-date cadastre (Williamson et al, 2007). The operation of the land market is generally separate from the management of cadastres. Countries with multipurpose cadastres include Germany, Austria, much of Eastern and Central Europe and parts of Scandinavia.

Germany is a prominent example. Prior to the establishment of the German Reich in 1871, Germany used deeds registration; however, registration of title was adopted in Prussia and by 1900 extended to the whole of Germany. The registration of ownership titles, rather than transaction deeds, led to the introduction of the Grundbuch (title registration system) (Kain and Baigent, 1992). Each page or 'folio' of the register corresponds to one ownership parcel on the ground: the folio principle (Steudler, 2003). Each folio has a unique number and contains all information about the corresponding parcel. The unique definitions made it possible to introduce systems of title registration with a high degree of security and reliability (Larsson, 1991). The Grundbuch or land registry was an institution found in the Ministry of Justice; it contributes and makes use of the cadastre but does not control its administration.

Multipurpose cadastres have more purposes than juridical and fiscal cadastres. While they contribute to the management of land tenure and land taxation, they also underpin the important activities of land use planning and land development (Kain and Baigent, 1992). Such activities emerged during the nineteenth century while urban populations in Europe were growing rapidly as a result from industrialization. Increasing concern about public health, fire safety and transportation led local authorities to take more responsibility for drainage, water supply and roads in their communities. This phenomenon occurred in the cities of London and Paris in the 1850s before emerging in Germany, North America and New Zealand in later decades (Ting 2002; Steudler, 2003). Maps and plans played an important role in the land use planning process: the cadastre was used for city planning and the

delivery of vital services like electricity, water and sewerage (Dale and McLaughlin, 1999; Steudler, 2003).

By the late twentieth century the use of multipurpose cadastres was considered 'best practice' (Kaufmann and Steudler, 1998; Steudler and Williamson, 2002). It was the most appropriate model for the management of new land interests. Since the 1970s many of the cadastres had been digitized and were thus already providing fundamental datasets for land management across government (Williamson et al, 2006). In many countries, multi-purpose cadastres have been in place for more than a century and could, with the aid of technology, easily be extended to rights, restrictions and responsibilities. The agencies responsible for maintaining cadastre are also experienced at dealing with many stakeholders. This is particularly important in the domain of new land interests which are currently being managed by several different agencies. However, as yet, no country with a multipurpose cadastre has fully implemented a solution for the holistic management of rights, restrictions and responsibilities.

In summary, multipurpose cadastres are better equipped than fiscal and juridical cadastre to manage and organize new land interests. For this reason many countries have spent the last twenty years attempting to achieve the multipurpose model. However, even those countries with multipurpose cadastres have struggled to improve the management of land interests. This is because other factors, aside from cadastral design, are hindering progress. One such factor is institutional arrangements, another key element of land administration systems. Consideration is now given to institutions and how they have assisted and impeded the management of rights, restrictions and responsibilities.

THE CHALLENGE FOR INSTITUTIONS

THE TRADITIONAL ROLE OF LAND ADMINISTRATION INSTITUTIONS

The institutional component of land administration refers broadly to all organizations, private and public, that are involved in the processes of land administration. The institutions that manage land information evolved alongside cadastral maps and registration systems (Ting and Williamson, 1998). After the re-emergence of government cadastral maps in the sixteenth and seventeenth century the institutions that dealt with maps and registries tended to operate separately. This situation still prevails in many countries. Victoria, a state of Australia, provides an example. Victoria's management systems developed from the British model: large bureaucratic institutions headed by generals who were responsible for a particular land administration function (Wallace and Williamson, 2005). Crown land was originally the domain of the Surveyor General; however, once sold to private citizens it became the domain of the Land Titles Office. These two institutions remained separate until 1996 when they were brought under a single organisational body called 'Land Victoria'. However, the separate processes and institutional cultures still prevailed well into the 2000s. In many jurisdictions it has been a struggle to merge mapping and registration institutions.

One reason for this struggle is that different land administration institutions sit in very different arms of government. Zevenbergen (2002) provides examples of how, in different countries, registration is performed by a range of organizations: the judiciary in Austria, the Ministry of Justice in England and the Lands Department in New South Wales. Cadastral management is performed by cadastral departments which exist within a range of government ministries: the Ministry of Finance in Bavaria, the Ministry of Building in Berlin and Hamburg, the Department of Lands in NSW, the Spatial Information Infrastructure in Victoria, the Ministry of Economy in Austria and the Ministry of Internal Affairs in some other German states. Additionally, different types of mapping can be undertaken by different departments. Williamson et al (2007) describes how the cadastral/registration

institutions are often separated from small scale national mapping institutions. Each institution applies different technical standards and cultures to the creation and maintenance of its data.

Adding to the institutional difficulties is the reality that the institutions administering new rights, restrictions and responsibilities often operate in complete isolation from cadastral and registration systems. They are often less accountable to the public, particularly regarding processing times and the release of information. For example, in Victoria applicants for a mining license face delays of up to two years (Bennett et al, 2007a). In Queensland, land owners can be fined for illegal vegetation clearing despite the fact that laws governing such activities are inadequately promulgated (Bennett et al, 2007). The existence of multiple institutions for land interest management not only undermines the role of traditional registries, it creates administrative inefficiencies, complicates land transactions and can result in administrative voids.

LAND ADMINISTRATION INSTITUTIONS: THE MODERN PERSPECTIVE

Modern land administration literature recognizes that inappropriate institutional arrangements are often the biggest hindrance to effective land administration (NRC, 1983; Williamson, 2001). The literature suggests that modern institutional design be driven by:

“...land policy principles and legal developments. Institutional principles should be concerned with government structures including ministerial responsibilities, departmental structures and decentralisation/deconcentration principles, as well as government-private sector relationships and partnerships, and the operation of professional organisations. Arguably the most important principle is the recognition that some of the most successful land administration or cadastral systems have been established as a result of all land administration activities being combined into one government agency. A particularly important trend has been the bringing together of mapping, land information, cadastral, valuation and land registration agencies.” (Williamson, 2001)

These ‘best practice’ guidelines were first implemented during the late 1990s with the amalgamation of land registries and cadastres (Williamson et al, 2007). The Netherlands and Sweden were two of the first countries to implement the new guidelines. Interestingly, the emergence of computer databases that could handle spatial data led many to question the need for government restructure. Rather than spending large amounts on costly government restructures, land administration organizations could be linked ‘virtually’ using technology (Williamson et al, 2005). These virtual links are now being used in Western Australia to join registries and cadastres with other information providers (Searle and Britton, 2005; Bennett et al 2007).

Cadastre 2014 (Kaufman and Steudler, 1998), a vision statement for cadastres published by Commission 7 of the FIG in 1998, has also provided a vision for the future management of land administration institutions. Like Williamson (2001) it highlighted the need to integrate cadastral and registration institutions. Additionally, it suggests that private institutions could play a more prominent role. These two demands have implications for the holistic administration of rights, restrictions and responsibilities.

Private institutions have played an important role in land administration for a number of centuries. In many countries private practitioners convey land and perform cadastral surveying. The privatization of government services was prominent during the 1980s and 1990s (Hodge, 2006). In the Netherlands and the Australian states of Western Australia, New South Wales and Victoria, the cadastral and registration institutions were partially privatized; however, they still exist as government provided monopolies. In other cases institutions that create and manage land information were fully privatized. Australia’s electricity, telecommunications and water providers were pertinent examples. While privatization is believed to make service provision more efficient it also resulted in private assets, including spatial information sets, being lost to the public. In Victoria, information sets dealing with telecommunication, gas and electricity

networks were no longer in public hands. These information sets dealt with rights, restrictions and responsibilities, for example, a water pipeline equates to an easement. When information is privatized it becomes less available to the public. Privatization strategies must therefore be carefully planned.

The negative aspects of private control are balanced by the ability of the private sector to contribute to the delivery of land information. Already in Switzerland a group of private surveyors have developed a computerized system for querying land parcels and the land interests that apply to them (Dütschler, 2006).

Cadastré 2014 was intended to provide a vision for cadastrés; however, overall its focus was limited to existing cadastral institutions. The emergence of new rights, restrictions and responsibilities has led to an increase in the number of institutions dealing with land interest information. They exist at local, state and federal levels of government. Cadastré 2014 does not articulate the role of these institutions. Some of the biggest challenges for land administration lie in overcoming the ‘silo’ mentality of government departments, who must effectively collaborate and cooperate in exchanging land information. Warnest (2005) and McDougall (2006) provide theoretical models for improved collaboration between levels of government; however, as yet no ‘best practice’ models have emerged.

Having seen how existing cadastral and institutional theories and systems have struggled to deal with new land rights, restrictions and responsibilities consideration is now given to how the discipline of land administration has responded to the challenge.

RESPONSES TO THE CHALLENGES

DEFINING THE PROBLEM: THE EMERGENCE OF LAND ADMINISTRATION

In the final decades of the twentieth century, cadastrés, registries and the institutions that administered them underwent a series of advancements. The

traditional perception of cadastres as tools for enabling taxation and land markets was broadened to include the wider areas of environmental and social management. Researchers began to recognize the potential of the cadastre to assist in the management of new laws and information. This potential was first recognized by authors such as Peter Dale, John McLaughlin and Ian Williamson (McLaughlin, 1975; Dale and McLaughlin, 1988; Williamson, 1985 and 1993). They saw that cadastres could be of more use than just fiscal and juridical management: they could assist in the management of natural resource information.

The early work undertaken by the pioneers of multi-purpose cadastres blossomed into large bodies of literature and substantial research projects (NRC, 1980; NRC, 1982; NRC, 1983; UN-FIG, 1999; Dale and McLaughlin, 1999; NRC, 1980). These advancements were driven by a number of key academics and international forums, most prominently the United Nations, National Research Council (U.S.) and the International Federation of Surveyors.

It was during the 1990s that the discipline of 'land administration' formally emerged through a series of statements. The FIG statement on the cadastre (FIG, 1995) provided, for the first time, a generic description of the cadastre and its importance in underpinning economies and other management activities. The Bogor declaration (FIG, 1996) outlined the importance of the cadastre in economic and environmental management. In 1998, Cadastre 2014 emerged (Kaufmann and Steudler, 1998). It suggested that the role of the cadastral system was to disclose the complete legal situation of land, including all public rights and restrictions and introduced the concept of the legal land object. It presented rights, restrictions and responsibilities as like terms to be managed in the same systems. The Bathurst Declaration (UN-FIG, 1999) also affirmed the need for better disclosure of land information. It formally identified the discipline of land administration and drew a link between wider sustainable development policies and land interest management (Figure 3.4).

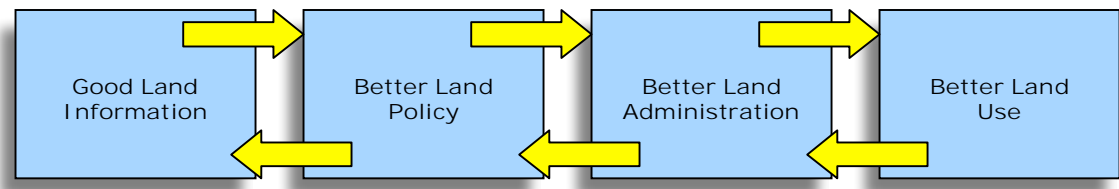


Figure 3.4: Sustainable Development is not attainable without Land Administration (UN-FIG, 1999)

A more contemporary model of land administration emerged during the early 2000s which integrated land administration with the goals of sustainable development. Enemark et al's (2005) land management paradigm demonstrated how the four main functions of land administration: land tenure, land valuation, land use and land development: underpin the practical implementation of sustainable land policies (Figure 3.5). The model outlined how the various administrative systems generate economic wealth through taxation and land transfer; strengthen social cohesion by providing tenure security; and limit environmental degradation of land for the benefit of the wider community (Enemark et al, 2005). Williamson et al (2005) later proposed that information integration was not enough: governments needed to integrate the actual management processes involved in land use, valuation, tenure and development.

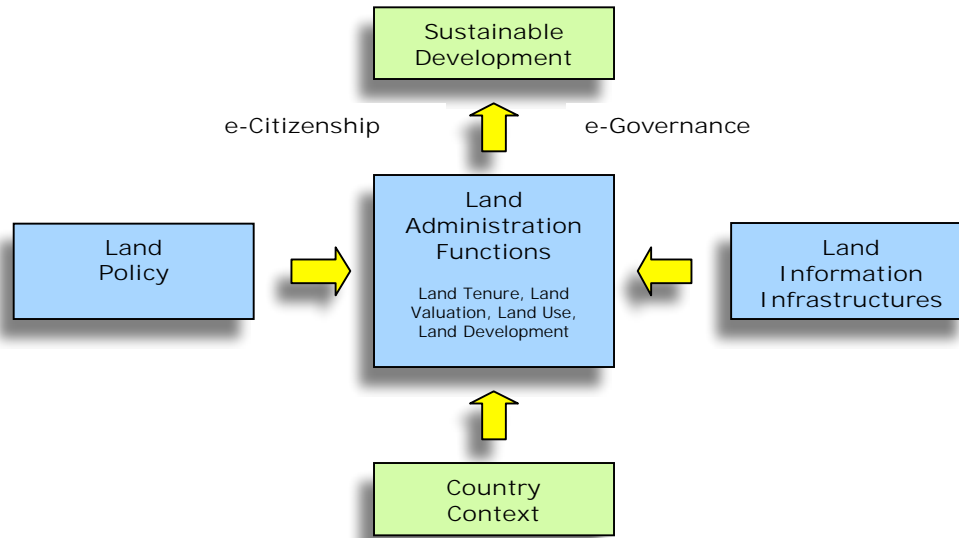


Figure 3.5: The Land Management Paradigm (Enemark et al, 2005)

These were significant statements and visions; they highlighted the problem underlying this thesis, gave it international prominence and provided a high level vision. They, along with numerous government initiatives, suggested that all interests, especially those created by public administration, should be treated more holistically if sustainability objectives were to be achieved. Holistic treatment of land information generated by a nation’s administration and land market was no longer simply a topic for discussion; it was essential.

While there existed much literature on the need for holistic management of interests, there was little that addressed practical implementation. Paul van der Molen (2003) commented:

“A serious omission in current land administrating systems is the absence of records of encumbrances and restrictions pursuant to public law. Government measures can restrict the right of disposal by the rightful claimant (the main element in private-property rights) to a certain and on occasion substantial degree. These restrictions can vary from a very mild form (such as the obligation to accept the presence of a lamppost on the land, or a slight financial burden) to a very severe form (such as a mandatory use of the land and, in the

most extreme form, expropriation). ... It is important that attention should be devoted to the retention of up-to-date records of this information.”

Bennett et al (2007) also suggested that the three main problems for property interest management had not yet been solved:

“First, some interests are poorly designed. They may be practically unenforceable by authorities or may provide little incentive for those who are supposed to adhere to them. Second, some interests are poorly administered. The administration system may offer only limited public information access, have slow permit and licence processing times, or might be administered in complete isolation to other related interests. Finally, some interests do not exist where they ought to. For example, in the Australian state of Victoria, there are minimal controls preventing people from building on contaminated land. “

It is wrong, however, to say that no literature exists regarding practical implementation. Consideration is now given to developments in the practical implementation of strategies to better manage the majority of land interests.

ADDRESSING THE PROBLEM: GOVERNMENT RESTRUCTURES

The most organized recommendations for the management of land and resources, including restrictions and responsibilities, come from the work of land administrators Dale and Baldwin (1999) and Dale (2000). This work grew out of the earlier publications such as McLaughlin (1975), NRC (1980) and Williamson (1985). Dale and Baldwin recommend the use of markets to improve the management of new land interests. They provide a new conceptual model for understanding property markets (Figure 3.6). Underpinning the land market is a policy/legal framework and three pillars: land registration/cadastre, land valuation and financial services. Using these basic foundations, market participants can create and use financial instruments relating to goods and services. For sound management of transferable land interests, these essential components are required. However, Wallace and Williamson (2006) suggest a fourth essential pillar should be included: cognitive capacity. If a society has no cognition of value/trading of

resources, then markets will fail. Whatever the number of pillars, the model has great utility in the realm of new land interests: it could be extended further to incorporate the management of new restrictions and responsibilities (Bennett, 2007).

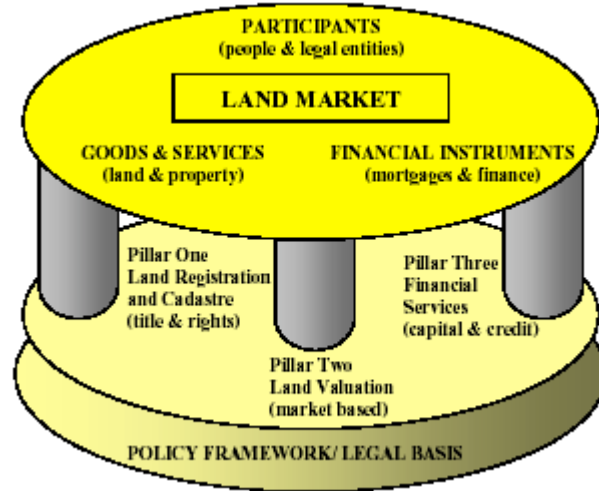


Figure 3.6: The three pillars of a land market (Dale, 2000)

Dale and Baldwin’s work was highly relevant to Australia during the late 1990s and early 2000s, when the topic was hotly debated and the phrase ‘rights, restrictions and responsibilities’ (RRRs) entered into the dialogue. The phrase was used to describe all the interests in land, public and private, which had proliferated for over fifty years (Ting and Williamson, 1998). The most prominent Australian contributions came from Lyons, Cottrell and Davies (2002; 2004), who undertook a number of studies into the management of land interests using the term ‘rights, obligations and restrictions’ (RORs). Their professional interest lay in ensuring accountability and transparency for the management of restrictions and responsibilities. They sought to decrease the significant transaction costs associated with identifying restrictions on land. The research revealed that in most Western countries restrictions and responsibilities were not only numerous, but they were also badly organized and, in contradistinction to land rights, often impossible to discover. The researchers’ frustration was palpable in their overstatements of the problem: “[R]esearch uncovered 24 major pieces of state legislation affecting land

rights, and 188 separate pieces of legislation that defined land-related property rights or impact on them. Federal legislation (a further 19 Acts) also has an important impact” (Fairall, 2004).

Lyons et al (2002) built on Dale and Baldwin’s 1999 work, providing a more detailed and somewhat more complicated model for the integrated management of rights, restrictions and responsibilities (Figure 3.7). They identified that a land market can be unbundled into sub-markets for other types of resources such as minerals and water. They specified the same three pillars for each market; however, they broke the registration pillar into sub categories. Each form of land interest requires its own registration process. They recommended that the management of each of pillar be divided into three components: policy/regulatory, administrations institutions and service/processes and data. Together these components achieve six key functions: policy and legal formation, determination and declaration of interests, handling of transactions, information creation and provision, compliance and appeals.

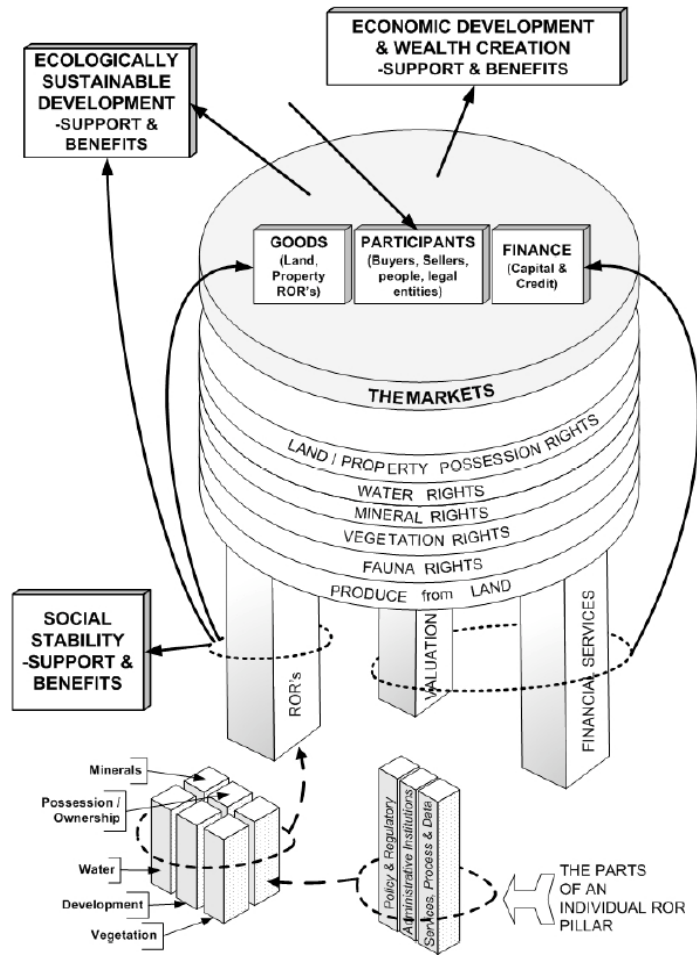


Figure 3.7: The Property Rights Market Model (Lyons et al, 2002)

The work of Lyons, Cottrell and Davies (2002; 2004) was a significant step towards the integrated management of rights, restrictions and responsibilities. To build these markets a complete overhaul of all existing land administration functions would be required. They proposed a large scale institutional recentralization. Individual restrictions and responsibilities should be managed holistically by six functions. The disparate management of different restrictions and responsibilities (e.g. environment, heritage, planning, water, and mining) with their separate policy drivers, administration/permits, customer service processes, appeals and compliance functions would be overhauled. Governments would establish a single point of Ministerial responsibility for all aspects of property rights, along with a high level consultative committee comprising all stakeholder groups.

Composite information on all restrictions and responsibilities relating to a specific parcel or area should be easily accessible and at low cost. The cadastre would play an important role in integrating the different land interests.

The model provides one way to deliver holistic management of rights, restrictions and responsibilities and confirms the demand for standards and performance measures. However, it raises a number of questions. Firstly, would the proposal be too costly? It does not provide a business model or funding regime. Secondly, is the focus on land parcels as an organizational entry point too narrow for management of the majority of land interests? Thirdly, if the land interest or restriction is not marketable or transferable, for example a restrictive covenant, does it still require a market based administration system? Also, should the model extend beyond the internal institutions of government; and include, for example, end-user requirements, the private sector and ICT? Could existing registration systems be used to manage all new interests; or would the register be kept separate, acting within a much larger, integrated, whole-of-government land information system? Furthermore, what would be the costs of reform? Finally, would the model interact with already existing administrative systems? For example, the Victorian planning, building and liquor control systems are not linked to the land registration system but remain well organized. If the land registry was used to administer all interests the system would risk becoming cluttered and unworkable.

Other commentators in Australia suggested using the pre-existing Torrens systems for the management of new land interests (Young and McColl, 2002; ACIL Tasman, 2004). A scaled-up Torrens system incorporating all restrictions and responsibilities was proposed. Rather than integrating all the activities of the separate land administration departments, the registry could be used as a single storage repository of all interests (Roberts, 2004). Indeed, the institutions that manage registries are keen to exploit the digitization and automation investments made in ICT during the 80s and 90s: expanding their core function from mere

registration to land information management is one way to do this (Bennett et al, 2005). In Australia the Torrens system has always been used to manage certain types of restrictions known as paramount interests. These include easements, leases, adverse possession, fraud, land tax and restrictive covenants. The management of such interests varies between States (Neave et al, 1996).

The Torrens system would enable holistic management; however, it also appears to have limitations. When Torrens was implemented 150 years ago, a limited number of paramount interests applied to a given parcel. The Torrens system was primarily designed for the management of private ownership. Ownership is the most important interest in land; it creates wealth and promotes investment. Did we want to risk cluttering up the working ownership registry with multitudes of restrictions that have minimal impact on a property? Burdening the registry with large amounts of property information could impair its functioning.

Discussions about the merits of large scale re-engineered land administration systems continue. However, by the year 2007 none of the top-down solutions being offered were financially sound enough to succeed. Meanwhile, smaller scale technological and bottom-up solutions took precedence in most countries. The technological approach also removed the need to restructure government by enabling the creation of virtual links between departments and their information. This is very attractive to governments who will greatly reduce the costs of implementing solutions. Consideration is now given to these approaches.

ADDRESSING THE PROBLEM: TECHNOLOGICAL SOLUTIONS

Technology has been used by a number of countries to tackle the problem. Modern information and communication technology (ICT) was first applied to the management of cadastres and registration systems in the 1970s. Williamson et al (2006) provide a generic model for understanding the evolution of ICT in land administration (Figure 3.8). By the early 1980s digital cadastral databases (DCDB) and accompanying digital indexes were appearing in many developed countries.

The process required a large scale digitization of hard copy maps. In the late 1980s and early 1990s many countries and academics were putting forward strategic visions for the future use of GIS in wider government (Williamson, 1996). By the mid 1990s the internet had taken off and many developed jurisdictions were using the technology to deliver basic land information to citizens and by the year 2000 customers were beginning to undertake land based transactions online.

Improvements in the data, standards and access regimes are slowly producing meaningful integration of land administration functions: governments are increasingly integrating their once disparate land information sets. ICT pervaded all areas of land administration to such an extent that systems could not function without it. Williamson (2001) recognized the significance of ICT when he included ICT and SDI as two of the seven core tools in the land administration tool box.



Figure 3.8: The evolution of ICT in land administration (Williamson et al, 2006)

Only recently has technology been applied to wider realm of managing land restrictions and responsibilities. Jacoby et al (2002) proposed a comprehensive point and click model for land administration system in Victoria: “enabling customers to point to a piece of land on an electronic map and have all the information relevant to that piece of land at their fingertips”. While the model is yet to appear in that jurisdiction, it provides an important vision.

Cadastrre 2014 also promotes the use of technology in its vision for future cadastres. It recommended that future cadastral systems record and show all interests in land. A technology-based, centralized or integrated register was required to store information and inform the public. Importantly, Cadastre 2014 recognized that not

all rights, restrictions and responsibilities are parcel based: they may cut across individual parcels or multiple parcels. Later it was recognized that rights, restrictions and responsibilities could assume many more spatial forms including networks and lines (Bennett et al, 2005a). This was the reason for developing the legal land object: a geo-referenced entity that could be represented on a map along with other land interests. These concepts have received much attention. Since 2002 members of Commission 7 of the FIG have focused on developing a core cadastral data model which could be used to manage rights, restrictions and responsibilities collectively (Van Oosterom et al, 2006). The model would provide a standard for all agencies managing and storing information about land interests. Data from different departments would then be easily transferable. The model challenges existing cadastres which are based around the ownership parcel. It was released in 2006 but has not yet been implemented in any jurisdiction. Iceland is currently considering its introduction (Ingvarsson et al, 2006). This innovation clearly appeals to countries who are seeking a computerized land administration system.

Australian governments are also utilizing technological options, with the majority of work being undertaken at a state level. At the Expert Group Meeting on Sustainability and Land Administration held at the University of Melbourne in 2005, all of the States represented were undertaking projects to improve land information management (Williamson et al, 2005). There was a particular focus upon the utilization of newly available spatial technologies and concepts, including spatial data infrastructures (SDI), spatial databases and web mapping services. These tools allow for complex legislative and administrative systems to be integrated without reorganizing government institutions. They also assist in the distribution of land information to citizens. Western Australia's Shared Land Information Platform (SLIP) and accompanying Register of Interests (ROI) web application provides very good examples of the tools in action (Searle and Britton, 2005).

ADDRESSING THE PROBLEM: LEGISLATIVE STRATEGIES

Technology, of course, is not a panacea. It cannot create land policy, prevent governments from creating masses of legislation, nor can it tell us what types of tenures are most appropriate for our societies. Technology will most likely be a large part of the solution, but not the whole solution which must incorporate such aspects as governance and legislative design (Williamson, 2001).

Australia has considered using legislation to improve the availability of land information. For a number of years the Victorian registry has recorded planning restrictions on title (Planning and Environment Act 1997 s173). New South Wales has gone even further. In 2003 it produced new surveying legislation and created a public interest register containing spatial definitions in which all land interests would go (NSW Surveying Act 2002, Section 7(NSW)). This was called the Virtual register. Laws were created which compelled public authorities to put information in the register, however, invocation of these powers is unlikely and ultimately a more collaborative approach will be needed. By 2004, the NSW registry had extended the registration system to manage water licenses (Bennett, 2005).

Arguably the most ambitious state is Western Australia (WALC, 2004). The Public Administration and Finance of the Legislative Council of Western Australia, report No 7 on 'Impact of State Government actions on use and enjoyment of freehold and leasehold land in Western Australia' recommended a thorough reorganization of the relationship between citizens as land owners and their government, using parcel based identification of government decisions, even in relation to "plans, policies and strategies". Recommendations 35 and 36 on page 530 state:

"In the short term, the DoLI continue to implement its aim of establishing itself as a 'one stop shop' database of all interests affecting land as an urgent priority. For the long term, the DOLI introduce as soon as practical, an electronic 3D Certificate of Title which records all interests affecting the land on the Certificate of Title."

The most far reaching recommendation is 37:

“...that the Government introduce after a 2 year phase in legislation –

(a) Any policy, strategy, plan or other document impacting on administrative decision-making with respect to land use that affects one or more specific certificates of title, is to be of no effect unless registered with Department of Land Information and

(b) all policies, strategies, plans or other documents impacting on administrative decision-making with respect to land use that are specific to a certificate of title are to be on registration with the Department of Land Information, cross-referenced with the relevant certificate of title.” (Emphasis added.)

This proposal raises some serious questions. While the recommendations were a clear attempt to allay public concern, they are naïve in their desire to use certificates of title, rather than generic databases, as the supply chain for information. Moreover, there are fundamental problems with the belief that governments must assume total responsibility for land information. The effort required to determine what land, rather than which citizens, might be affected by policies, strategies, plans and other documents is significantly large. It is not feasible to include all land interests within the realm of existing administration systems. The important question is which interests should be included and how. Thus, the real problem lies with the disorganization of land interest management, not lack of land interest information.

Western European countries are also taking a leading role in the use of legislative solutions, with new laws and codes being introduced to improve information management. The Netherlands recently passed a law on the Registration of Public Encumbrances 2005 that obliges all municipalities to establish and maintain a publicly available register of the land interests that they impose upon real estate (Van der Molen, 2005; Zevenbergen and De Jong, 2002). Switzerland is in the process of passing similar laws (Miserez, 2006). Additionally, the European Union has introduced requirements for the publication of land information documents like ‘EuroStat, 2000 Statistical Requirements Compendium’- a 10 year agricultural

survey (Statistical Office of the European Communities, 2007). The administrative practicalities of these new laws are still being resolved; however, legislative burdens on government appear to be an important component of any solution.

APPROACHING THE PROBLEM: TITLE INSURANCE

In the United States, where the federal system encourages a decentralisation of rights, restrictions and responsibilities, the private sector is prominent in the management of restrictions and responsibilities through private title insurance. Title insurance is offered by private organisations and it has been proposed as an ‘add-on’ to the title security already offered by governments. Title insurance is considered a no-fault insurance policy that insures the ‘title’ or legal ownership of land for an owner or lender (Oldcorn, 2004). Oldcorn believes that Australia is too slow in reforming its land processes: many bottom-up solutions such as title insurance will be well established by the time such large scale projects are completed. Title Insurance can solve some of the compensation and risk management issues relating to land. However, it does not integrate restrictions and responsibility management systems; and such integration is essential if we are to achieve sustainable development.

A PATHWAY FORWARD

THE NEED FOR A HOLISTIC APPROACH

This chapter has shown that land administrators at national and international levels now recognize the problems with rights, restrictions and responsibilities management. They acknowledge that existing land administration models do not incorporate all rights, restrictions and responsibilities and that it is their role to improve the management of land interests. The above approaches show that different tools can be used to address the problem. However, focusing solely on technology, legislation or institutions will result only in short term success: no single tool can have provided a sustained long-term solution. A more holistic approach is required.

John McLaughlin promotes such holistic approaches. He suggests that restrictions and responsibilities management be based upon coherent and shared approaches to managing major land and environmental issues (MacLauchlan and McLaughlin, 1998). Williamson (2001) also promotes a holistic approach to land administration with his 'land administration toolbox'. According to the land administration toolbox, all land administrative systems must incorporate eight principles in order to be sustained (Williamson, 2001; Williamson, 2004). These include land policy aspects, legal components, tenure organization, institutional arrangements, cadastral methods, technological components, SDI initiatives and human capacity building aspects. To achieve each principle a range of options are available, the selection of which is based on a country's context.

This literature is an important first step in creating discourse and raising awareness of the need for holistic approaches, however, a fully implemented model does not yet exist, so no best practice can emerge. Additionally, the focus of Williamson's toolbox is on the management of ownership rights. It does not necessarily cover the new rights, restrictions and responsibilities that have been placed on land. Bennett (2007) showed that many of the new interests being created are very different to ownership rights and may need to be managed in different ways. It appears that the land administration toolbox must be extended to include appropriate tools for the creation and administration of 'all' land rights, restrictions and responsibilities.

REAPPRAISING THE TERM "RIGHTS, RESTRICTIONS AND RESPONSIBILITIES"

Along with the lack of holistic approaches, another limitation on existing theoretical and practical solutions has been the tendency to refer to all interests collectively as rights, restrictions and responsibilities (Ting, 2002). There is no differentiation in terms of what action the land interest will permit on the land, where and when it applies, who it affects, or how it will be enforced. The assumption that all property interests are the same impedes the development of alternative solutions. It leads academia and governments to tentatively propose

single administrative solutions with a focus on one size fits all models such as the traditional land ownership registry (Young and McColl, 2002; ACIL Tasman, 2004).

Given the diversity of rights, restrictions and responsibilities, governments have many options when creating interests. Depending on the choices made, different human behaviours will prevail and different administrative responses will be required. For example, in Victoria, the right to own private property (Property Law Act 1958, Vic, Section 18A-19) and the right of a cadastral surveyor to enter private space (Surveying Act 2004, Vic, Section 58) are considered property interests from the point of view of land administration; however, they are very different in nature. A private owner is entitled to transfer, alter and profit from the use of the property; a surveyor cannot do any of this, he or she may only enter the property. Conversely, a surveyor's interest applies to all land in a jurisdiction, whereas, the private owner's interest only applies to the single parcel. Only registered surveyors can hold the entry right, whereas anyone can own private property. Although both are defined as property interests, the reasons for their creation, the actual interests created, who they apply to, when they apply and where they apply, are very different. Consequently the administrative arrangements are different. The surveyor's right has few variables and does not need to be listed on a title; it does not require anywhere near the same amount of administration as the rights of a private property owner.

It seems likely that unless there are more finely tuned descriptions of rights, restrictions and responsibilities the administration of land interests will continue to be a problem. In order to provide more meaningful advice to governments and policy makers, a framework for describing, classifying and differentiating between property interests is required. The framework must be generic: it must be capable of application to any legal, policy and institutional systems. It must be a precise

but flexible analytical framework which includes the great majority of property interests whilst identifying their specific characteristics. It must be an advanced, descriptive framework containing the key attributes that make up an individual property interest. It must permit holistic treatment of the majority of property interests, from ownership down to simple access powers, and also allow for a meaningful contrast between different interests. The framework must convey the essential information needed by governments and citizens about land and resources to deliver sustainable development objectives.

CONCLUSIONS

This chapter provides a historical examination of land interests from the perspective of cadastral systems and the institutions which administer them. The complexities of these systems and how they have struggled with the emergence of new land rights, restrictions and responsibilities is now apparent. The efforts of the land administration discipline in tackling the problem demonstrate that more work is required to determine what role these systems and institutions should play. In particular, there is a need to develop new systems for organizing, understanding and managing land interests holistically. In summary, the questions arising from this chapter are as follows:

The role of the registration and mapping components of cadastral systems in the management of new rights, restrictions and responsibilities is unclear. To date they have played only a limited role, however, recently their potential has been recognized. Some cadastral systems are better equipped than others to manage with the new land interests. *How many of these new interests are mapped and registered appropriately? What is the role of existing cadastral mapping and registration systems in the management of rights, restrictions and responsibilities?*

The roles and structures of private and public institutions in the management of land interests are also unclear; however, the need for collaboration between and across governments is certain. *How many institutions are actually involved managing land*

interests? How should institutions be structured? How should agencies managing the different rights, restrictions and responsibilities be organized?

Contemporary theoretical approaches for improving the management of land interests are too simplistic, 'one size fits all' and deterministic. Contemporary practical approaches for improving the management of land interests are not holistic and focus on specific areas of the larger problem. *How can these approaches be included into a more complete framework for managing rights, restrictions and responsibilities?*

An historical analysis provides a better understanding of the problem and its context. However, before considering what new systems for managing land interests might look like, future developments in areas outside the discipline must be considered. The next chapter considers new theories, technologies and approaches in other fields and how they may be applicable to the management of new land rights, restrictions and responsibilities.

CHAPTER 4

BRAVE NEW WORLD: INNOVATIVE TOOLS FOR LAND ADMINISTRATION

Land administration is now multidisciplinary: its ability to use of the tools and theories of diverse disciplines is its underlying strength. This thesis must take a similar approach. In order to develop a new framework for understanding and managing all land interests, new theories and concepts from outside the discipline must be explored. Ontological design, capacity building, spatial technologies, uncertainty theory and funding models are five areas worthy of consideration. Together they could profoundly impact upon existing land administration systems and the management of rights, restrictions and responsibilities.

INTRODUCTION

The term 'silo effect' gained prominence in government and business circles during the 1990s (Williamson, 2007). It denotes the entrenched lack of communication and collaboration between organisations and their systems. For decades organisations held onto their capital, information and skills for internal use only. All this changed with the introduction of information and communication technologies: by sharing resources with its business partners and customers a company could decrease costs, streamline processes and create better customer relations. The silo effect had to be overcome.

The discipline of land administration emerged partially in response to the silo effect: the institutions dealing with registration, cadastral mapping, natural resource management and so on, needed to be integrated at some level. The theorists suggested that integration of processes and information would result in better land management (UN-FIG, 1999). The collaboration of ideas began in the 1990s and has resulted in use of academic theories to enhance understandings of practical issues. Prominent examples include: hierarchal spatial reasoning being applied to spatial data infrastructures (Rajabifard, 2002); policy design concepts re-energizing land policies (Ting, 2002); benchmarking applied to land administration systems (Steudler, 2003); and cost benefit analysis being used to aid decision making about land (Paez, 2005). Additionally, organizational theory has been used to advance collaboration within land administration agencies (Warnest, 2005; McDougall, 2006) and tenure theories have been applied to the rural areas of developing countries (Dalrymple, 2006).

Land administration is now multidisciplinary: its ability to use the tools and theories of diverse disciplines has been its underlying strength. While this thesis centres on the fundamentals of traditional land administration, it must take a similar exploratory approach. In order to develop a new framework for understanding and managing the majority land interests, new theories and concepts from outside the discipline must be explored. Ontological design, capacity building, spatial

technologies, uncertainty theory and funding models are five areas that emerged through the background research as areas worthy of consideration. Each could profoundly impact upon existing land administration systems and the management of rights, restrictions and responsibilities. Each is examined below.

ONTOLOGICAL DESIGN

A BACKGROUND TO ONTOLOGY

Ontology is the branch of philosophy which deals with the nature of being (Craig, 2005). The field emerged in ancient Greece and occupied the minds of Plato and Aristotle (Leinfellner et al, 1981). Ontology asks, “What are the knowable things?” It provides basic categories and subcategories for describing and classifying the physical realm. It is intertwined with complex philosophical discussions about the nature of existence and physical objects which have been debated for millennia.

More recently the disciplines of computer science and information systems applied ontology to the development of software and the management of digital information. People, organizations and software programs relied upon seamless communication, however, different needs and backgrounds created different viewpoints (Nieto, 2003). This natural divergence was valuable, but, it led to problems in communication, interaction and understanding (Farquhar et al, 1997). Ontology helped to address these problems by creating shared conceptual understandings. Computer science, rather than attempting to decipher the nature of being, used ontology more generically: it was simply a tool for describing a “formal, explicit specification of a shared conceptualization” (Gruber, 1993). These shared conceptualizations allowed for the design of computer software and systems that could function across organizations.

Farquhar et al (1997) provided an example classification model (ontology) which classified items stored in a library (Figure 4.1). Objects or classes were represented as rectangular boxes and relationships between sub classes were identified with lines and small circles. The characteristics of each class were included within the

rectangles. While hierarchies of classes, class definitions and subclasses are a standard way to represent ontologies, they need not be limited to these forms (Gruber, 1993a).

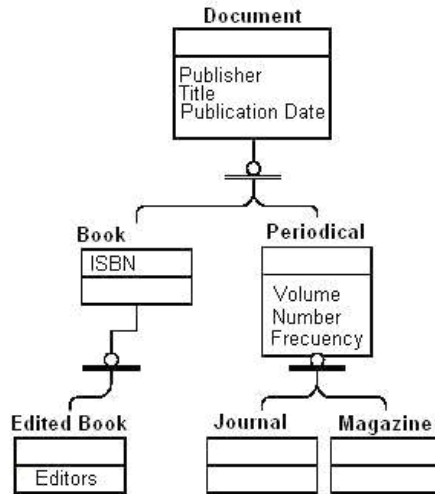


Figure 4.1: An ontology for documents (Farquhar et al, 1997).

While computer science and information management aided the reemergence of ontology, some practitioners were quick to point out its weaknesses. Shirky (2005) suggested that such traditional categorizing techniques were overrated and gave power to the classifiers rather than the user. He believed that modern technologies such as the Web democratized the process of classification and allowed the user to become the classifier: ontology was out of date. He used the example of Google.com to demonstrate his hypothesis. The internet search engines of the mid 1990s, such as yahoo.com and altavista.com, used a team of classifiers to provide extensive categorization menus for users. This worked up to a point, but, the ontologies began to fail when the numbers of web pages reached the millions. No classification system could organize the masses of diverse information. The yahoo.com approach was superseded by Google.com. Google understood that there were no shelves and no file system on the Web. It categorized items *after* hearing from the user, rather than trying to predict in advance what the user needed to know (Shirky, 2005). In essence, ontology was flawed because it assumed itself to be the point of truth where none existed. The need for shared understandings and

classifications was superseded by the ability of computers to organize and reorganize large amounts of information in very small amounts of time.

Ontology still has strong proponents. Shadbolt, Hall and Burners-Lee (2006) suggest that since 2001, the argument in favour of using ontologies has been won. Indeed, Shirky (2005) himself conceded that ontology may be relevant in some cases; however, two requirements must be met. Firstly, the domain must be organized. It must contain a small corpus of objects (less than a few hundred); have formal categories, stable entities, restricted entities and clear edges. Secondly, the participants or users of the ontology must have certain characteristics: they should be expert catalogers, an authoritative source of judgment, and coordinated and expert users. The periodic table is an example that meets these requirements. It is also likely that modern ontologies will require continual updating, streamlining and reformulation. They must remain flexible and open-ended in order to promote creativity and change. The domain of property rights, restrictions and responsibilities also appears to have these characteristics: ontology is applicable.

DEVELOPING AN ONTOLOGY

Stevens (2001) described the field of ontological engineering to be in its infancy. While Gruber (1993) provided the most well known guidelines for design, there were still no standardized methodologies for ontology construction. Uschold and Gruninger (1996) suggested a methodology might include a set of stages to follow, guidelines and principles to assist each stage, and a life-cycle to represent the relationships among stages. Stevens (2001) built upon this idea, advancing two conceptual models for iteratively developing ontologies. Noy and McGuinness (2001) also provided a model for ontology design, based on three principles:

- “1) There is no one correct way to model a domain— there are always viable alternatives. The best solution almost always depends on the application that you have in mind and the extensions that you anticipate.
- 2) Ontology development is necessarily an iterative process.

3) Concepts in the ontology should be close to objects (physical or logical) and relationships in your domain of interest. These are most likely to be nouns (objects) or verbs (relationships) in sentences that describe your domain.”

The model itself is composed of seven steps:

- “Step 1. Determine the domain and scope of the ontology
- Step 2. Consider reusing existing ontologies
- Step 3. Enumerate important terms in the ontology
- Step 4. Define the classes and the class hierarchy
- Step 5. Define the properties of classes—slots
- Step 6. Define the facets of the slots
- Step 7. Create instances”

Modeling languages can also help to assist the development of ontologies. The Unified Modeling Language (UML) is a well known tool for designing and building logical and physical software systems based on classes and objects. Ostrom et al (2006) used the language to develop the Core Cadastral Domain Model (CCDM): a standardized approach for organizing digital cadastral data.

USING ONTOLOGY TO ORGANIZE LAND INTEREST INFORMATION

How does ontology relate to the management of property rights, restrictions and responsibilities? The answer lies in the first chapters of this thesis. One of the overarching issues identified was the disparate and limited understandings of the term ‘rights, restrictions and responsibilities’. It was suggested that this had inhibited the development of solutions for better managing interests over land. Ontology enables the much needed creation of shared understandings. Ontology could be used to develop a classification model encompassing the majority of property rights, restrictions and responsibilities. The model would assist in determining how to better create and manage different categories of interests. This model would be an important part of any holistic framework aimed at the improved management of rights, restrictions and responsibilities.

A number of classification systems for property interests were discussed in the first chapters. The ‘as is’ and ‘ought’ dichotomy of philosophy, as demonstrated by Cohen (1935), is a useful method for understanding the nature of these systems. Cohen suggested that there are only two significant questions in the field of law: “How do courts actually decide cases of a given kind?” and “How ought they decide cases of a given kind?” Applying this dichotomy to the property rights systems we can see that the majority of classification systems fall into the ‘as is’ category: they describe property interest organisation as it currently is (or once was), *not* what it ought to be. Moreover, they are focused on legal aspects, not information organisation. Additionally, they deal only with ownership rights not the wider realm of restrictions and responsibilities.

The question of how property interests ‘ought’ to be classified was briefly addressed by Lyons et al (2002). Their wide reaching empirical analysis of the property interest system in the state of Queensland, Australia, first concentrated on understanding the system ‘as is’, before proposing how the government institutions ‘ought’ to be managed. However, a robust classification system and reframed view of property interests were lacking. The UN-ECE (2003) also developed a tool that, in time, may lead to a better understanding of how property interests ‘ought’ to be classified. The tool features a comprehensive questionnaire on restrictions, enabling international comparison and the modeling of transactions. The tool operates at the most sophisticated level, including access to international financing. It is in four parts: ownership, leases, transfer and mortgaging.

Wallace et al (2006) also examined how property interests ‘ought’ to be classified (Figure 4.2), with a focus upon the management of land related activities. Classes included core land information interests important to all properties; interests related to buildings, business related interests, private interests, environmental interests and emerging interests. The model represented a starting point and attempted to raise awareness of the difference between interests, their importance, their histories and

who they impacted upon. More work is required to refine the classes and what they actually mean.

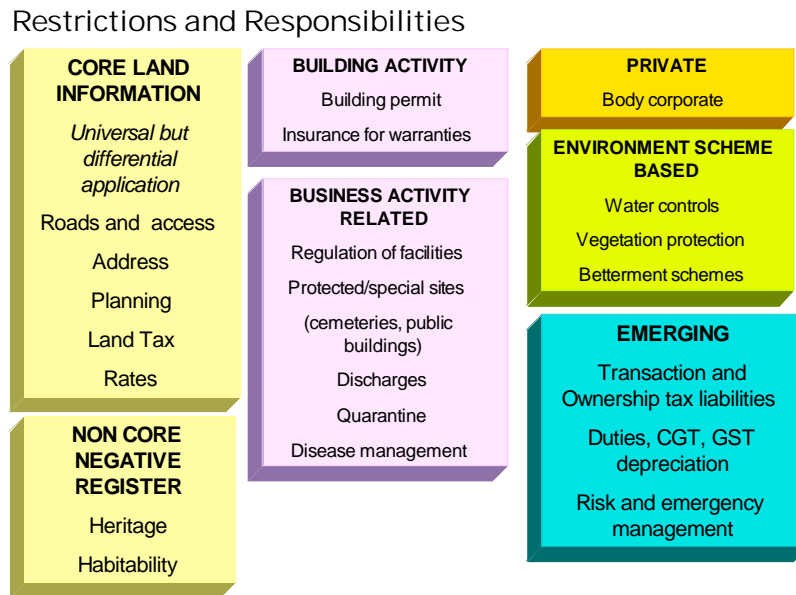


Figure 4.2: A classification system for land interests (Wallace et al, 2006)

The above tools provide a starting point; however, the question of how property interests ought to be classified is still largely unanswered. What do we base the system on? The options are numerous and include: pre-existing models based on property rights; distinctions between personal and contractual interests; below the line versus above the line interests; the capacity of the interest to run with land; the purpose of the interest; the accessibility of the interest; the information requirements of business; the importance of the interest as perceived by citizens, the importance as perceived by government; the role of the interest in supporting sustainable development, the number of interests and cost of administration; and the spatial extent of the interest. A combination of these possibilities could provide the most appropriate solution.

SUMMARY

A framework for managing all interests over land will require some form of classification system. The scheme must work across legal systems and

jurisdictional boundaries and sit above current administrative systems. This chapter now considers another emerging area: human resource and capacity building.

HUMAN RESOURCE AND CAPACITY BUILDING

THE EMERGENCE OF CAPACITY BUILDING

In the late 1990s the concept of capacity building gained prominence in the land administration community. Land administration projects in developing countries could only enjoy long term success if they included capacity building as a significant component of the project design (Enemark and Williamson, 2004). Williamson's (2001) land administration toolbox emphasized the importance of the concept and included it as one of the eight key principles of all land administration systems:

“...there are two key outcomes required from building or re-engineering land administration systems; first the establishment of an appropriate land administration system and secondly ensuring that there is sustainable long term capacity of educated and trained personnel to operate the system in both the public and private sectors. All human resource development (HRD) and capacity building principles are central to these objectives. For example it is critical that capacity building is a mainstream component of a project, not an “add-on”. Also that capacity building is equally applicable to the private sector and the establishment of professions, as it is to the public sector. In this context, there are a whole range of capacity building and HRD principles and options within the land administration tool box.”

Enemark and Williamson (2004) described how the term capacity building was often used in a narrow sense and projects focused only on staff development through formal education and training programs. They hypothesized that capacity building measures could be focused on the much wider realm of institutional and societal infrastructures which support the long term implementation of land policies. Capacity building must be a mainstream component of the projects; in fact the projects should be considered as capacity building projects.

Enemark and Williamson (2004) break capacity building into three classes: individual capacity, organizational capacity and societal capacity. The process of capacity building involves the assessment and development of each of these classes (Figure 4.3). Each class has its appropriate tools for assessment and development. This simple model has been very useful in assisting meaningful capacity building in developing countries.

Capacity Building in Land Administration		
Level	Dimensions of Capacity Assessment	Dimensions of Capacity Development
Societal/Systems Level	<ul style="list-style-type: none"> ▪ Policy dimension ▪ Social and institutional dimension ▪ System dimension ▪ Legal and regulatory dimension 	<ul style="list-style-type: none"> ▪ Land policy issues ▪ Land administration vision and system ▪ Land administration system ▪ Land tenure principles ▪ Legal principles
Organisational/Entity Level	<ul style="list-style-type: none"> ▪ Cultural issues ▪ Managerial and resource issues ▪ Institutional issues and processes 	<ul style="list-style-type: none"> ▪ Institutional infrastructures ▪ Spatial Data Infrastructures (SDI) ▪ Professional institutions
Individual Level	<ul style="list-style-type: none"> ▪ Professional competence ▪ Human resources needs ▪ Educational resources 	<ul style="list-style-type: none"> ▪ Educational programs ▪ Sandwich or franchise programs ▪ Training programs ▪ CPD programs ▪ Virtual programs ▪ Other measures ▪ Education and research centre

Figure 4.3: The three levels of capacity building in land administration (Enemark and Williamson, 2004)

CAPACITY BUILDING AND LAND INTEREST MANAGEMENT

The concept of capacity building in land administration is often linked exclusively with developing countries; however, the concepts described above are equally applicable in the developed context. The previous chapters highlighted the inability of governments to manage, and citizens to understand the increased numbers of interests over land. This indicates that there are deficiencies in capacity at all three levels espoused by Enemark and Williamson (2004). The framework for improving

the management of rights, restrictions and responsibilities must deal with the improvement of capacity at individual, organizational and societal levels. The cognitive capacity of intended beneficiaries is a core component of any system (Wallace and Williamson 2006a).

Projects aimed at improving the management of interests have tended to ignore the individual and societal levels of capacity. In the early 2000s projects aimed at improving the management of land interests had a predominately top-down approach with a focus on technology (c.f. Jacoby et al 2002; Lyons et al, 2002). The problem with technical approaches is that they tend to leave out the essential element of participation. This can be likened to markets. It is participants, not governments, who are the key to successful market operations (von Mises, 1949). A technical solution that is not understood will not be used and will therefore fail. Public commitment and involvement is important. Indeed, for land regulation to attain practical success, the theoretical focus should be on the role of the public, not the role of government.

There have been some attempts to engage individuals and organizations in the determination of information and service requirements. The “National Summit on the Administration of Land & Property Rights & Restrictions” (ANZLIC, 2004) offered some insights into the information requirements of end-users. Industries such as property development, finance and agriculture all require access to ownership, title restrictions and planning information. However, beyond the basic information requirements there was significant divergence in opinion. Moreover, other issues were not considered, including the potential role of the private sector. Future investigations will need to address these areas.

The Netherlands is now focused upon changing perceptions within the community, as exemplified by the shift away from the parcel based approach. Most Western societies view land as a jigsaw of discrete parcels; however, the Netherlands is introducing laws to enable greater flexibility and support the complex management

of land interests. In the Netherlands, the Supreme Court has ruled that telecom cables be considered as immovable property, thus influencing the way these cables are administered by taxation and cadastral registration (Kap, 2005). A strong case for the registration of cables was developed. The private and public sector processes of asset management, disaster management, minimizing excavation damage, assessing liability for damage and legal security will all utilize the information set. In earlier times a single centralised register would have been considered the best option, however, developments in ICT and the increased capacity of utility companies are presenting new solutions. Applying the Dutch rule of horizontal accession, the cables underneath properties could be registered in the name of the relevant utility company. Different utility companies would be the custodians and maintainers of the spatial data and the information could be linked using web architecture. The next step could be to view the cable networks as separate legal entities, which are not necessarily connected to a ground parcel other than through coordination. This is a novel concept that moves away from the parcel based approach and signals improved cognitive capacity at organisational and societal levels. There are other novel approaches. This chapter now considers one of them: social learning.

SOCIAL LEARNING: UTILIZING CAPACITY TO IMPROVE LAND MANAGEMENT

All legislated land rights, restrictions and responsibilities use incentives and penalties to control human behaviours. However, ‘regulations’ are just one of three tools that can be used to control behaviour. The SLIM project (2004) commissioned by the European Commission identifies two other methods (Figure 4.4). ‘Markets’ can also change behaviour by allowing market forces to resolve problems, or by adjusting market forces through fiscal policies (e.g. carbon trading). ‘Awareness’ is another valuable factor: the dissemination of information can result in proactive behaviours by citizens within a community. All three methods rely on applying a fixed form of knowledge to a problem.

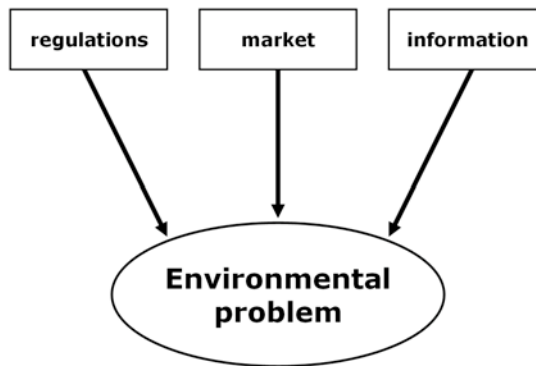


Figure 4.4: The three established methods for addressing an environmental problem (SLIM, 2004)

The Social Learning and Integrated Management Project (SLIM, 2004) suggested a fourth method (Figure 4.5): higher levels of education and easy access to information allow citizens to communicate with policy makers and scientists. This provides a new and dynamic line of input to problem solving: local and changing forms of knowledge, emerging concerns and constraints all feed into an ongoing decision making process. This process is called ‘concerted action,’ where knowledge occurs within the act of constructing the issues and solutions.

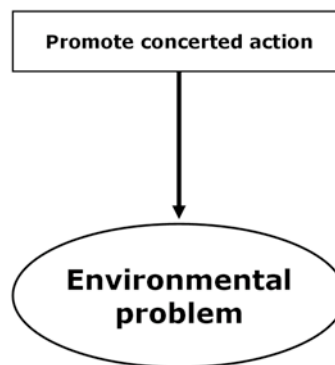


Figure 4.5: Knowledge occurs within the act of constructing the issues and solutions (SLIM, 2004)

Social learning is a dynamic process which allows individuals to engage in new ways of collaborative thinking to address problems such as the unsustainable use of water (SLIM, 2004). This approach is useful because it takes into account the main features of natural resource and environmental issues (SLIM, 2004): the high interdependencies involved with the use of natural resources; the complex

ecological, social, and technical processes occurring on natural resources; and the uncertainties proposed by complex solutions and the controversies that arise because of different perspectives. Each of these issues is best dealt with through shared dialogue, learning and integrated management. Approaching the problem with no fixed solutions enables a dynamic approach: changes in understanding result in continuous changes in practice (Figure 4.6).

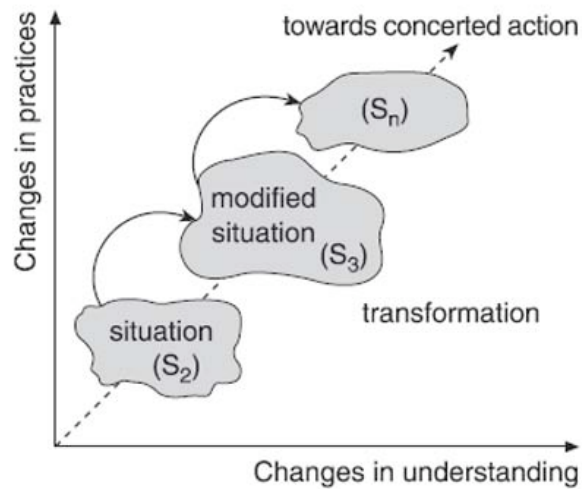


Figure 4.6: Changes in understanding result in changes in practice (s = situation) (SLIM, 2004)

SLIM (2004) described how “social learning” helps to continuously reframe mental models. It enables issues to be understood from new perspectives and allows for the articulation of what is valuable. It provides a powerful alternative where regulation and markets fail to achieve adequate outcomes for the environment. In the future it may also reduce the need for regulations which have spiralled out of control in recent times. This potentially reduces administrative complications and costs in the long run.

SUMMARY

Social learning uses the existing capacity and builds upon it through collaboration. Its application to regions outside of Europe must be explored. This new and more positive way of changing human behaviours could potentially be an important part of any framework for the improved management of interests over land, and even

more fundamentally, for the way people behave in relation to land. This chapter now considers emerging information and spatial technologies and their application to land interest management.

INFORMATION AND SPATIAL TECHNOLOGIES

THE EMERGENCE OF SPATIALLY ENABLED SOCIETIES

Any system attempting to manage land and people relationships employs some form of technology. Technology can be considered the man-made methods and objects designed to achieve a particular function (Merriam-Webster, 2007). Chapter 3 charted the historical developments of technology in land administration: the technologies used for surveying, mapping and registering information evolved from simple hand tools into complex digital systems. Modern survey tools now include the global positioning system (GPS) (satellites and hand held units), electronic distance and angle measuring machines (total stations) and digital leveling machines. Maps are produced automatically by feeding digital data collected in the field into computers. Most developed countries have some form of digital cadastral databases (DCDBs) which are stored in databases and can be manipulated and integrated with other data sets using geographic information systems (GIS). Registration systems use digital databases and computer systems to store people, land and transaction information. Increasingly land administration systems are using the Internet to deliver information and transaction capabilities to citizens and other arms of government (Williamson et al, 2006).

In 2004 the private Internet organization, Google, prompted a mini-revolution. Its freely available 3D digital globe, “Google Earth”, composed of slick graphics, easy navigation and satellite imagery, demonstrated the power of spatial information and technologies to the general public. Spatial technologies and tools, once almost exclusively the niche domain of land and natural resource management, were commoditized and then proliferated in the mainstream. Microsoft soon joined the market with Microsoft maps, Google released its 2D Google Maps service, location

based services became a standard component of many search engines and in-car navigation systems were sold in large numbers.

The potential of spatial technologies when combined with other information technologies was now clear. They could radically reform governmental and social functions. Spatial technologies could unite seemingly disparate information sets and display them as pictures, a simple mechanism for people to understand. By the mid 2000s the concept of a ‘spatially enabled society’ was defined by Williamson et al (2006a) and was generating significant discussion at national and international levels. In 2007 the Australian Government conducted a two day-conference in Canberra on a concept entitled “Spatially Enabled Government: Manage, extend, plan and deliver on spatial capability” (IQPC, 2007). In 2006 The Permanent Committee on GIS Infrastructure for Asia-Pacific (PCGIAP) endorsed Working Group 3 to focus activities on ‘Spatially Enabling Government’ (PCGIAP, 2006).

Spatial technologies, which began as tools for assisting land administration, had broken away from the traditional discipline. New tools and applications, unrelated to land administration, were emerging to suit different needs and markets. It is worth considering a number of these new tools including web services, location based database platforms, next generation GIS, sensor networks and SDIs. They have the potential to profoundly impact upon the management of land interests when they are applied back to land administration systems.

WEB MAPPING SERVICES

OGC (2005) describes web services as “self contained, self described, modular applications that can be published, located, and invoked across the web”. Web services can perform functions that can be anything from simple requests to complicated business processes. Once a web service is deployed, other applications can discover and invoke the deployed service. A number of web services specific to spatial interoperability have been developed: examples include web map services (WMS), web feature services (WFS) and web coverage services (WCS). The WMS

is the simplest model. It can be used to build a map in the form of an image on demand. An organisation's server can transmit it to a client's browser. The WFS is a service that provides for the delivery of spatial features. While a WMS delivers a complete map in the form of an image, WFS delivers individual features that may be integrated and used as spatial data layers in the client's system. WFS allow for encoding and delivery of spatial data in a number of encoding formats (e.g. XML, eXtensible mark-up language). The WCS also sends a map from the server to the client computer like the WFS. The data is live vector (feature) and raster (image) together with live attribute and coverage information (SIDP, 2005). Clearly these services could provide a cheap alternative for publication and access to land interest spatial information without the need for recentralising land registers. The more complex WCS services could be used as part of a complete search/transaction service e.g. creation, updating and removing particular land interests.

Catalogue Services for the Web (CSW) are used by client applications to register and discover spatial information dynamically in a manner similar to a search engine (SIDP, 2005). The CSW interfaces support 'one stop shopping' for "the registration, metadata harvesting and descriptor ingest, push and pull update of descriptors, and discovery of OGC Web Service types and instances" (OGC, 2005). This type of service could be employed by custodians and users as a centralised register of restriction and responsibility spatial information. Importantly, land information datasets and services could be distributed and would not necessarily need to be parcel based.

LOCATION BASED DATABASE PLATFORMS

Another emerging spatial technology is location-enabled database platforms. These platforms are being developed by large software vendors such as ESRI, Oracle and Microsoft. Effective management requires that traditionally separate spatial datasets be merged with non-spatial platforms. New platforms are being developed to facilitate this merge. All types of location data, such as parcels (polygons), networks (lines), addresses (geo-coded points), locations (points), imagery (raster)

and structured networks (topology), will be all stored and managed on the one platform (Farley, 2004). A single data store could more easily allow for uniform storage, integration and a 'one stop shop' for information on property interests. Such a system would remove the need for all restrictions, responsibilities and even rights to be parcel based. Each could operate as an independent, but, interrelated object. For example, cable infrastructure could be stored as a network and attributed with ownership information relating to a utility company, or a building footprint could be included in land boundaries.

NEXT GENERATION GIS

Elfick (2005) demonstrates the possibilities of the next generation of GIS packages. Existing GIS use coordinates to define a point. The precision of these point coordinates is limited by the integer arithmetic used in such systems. Next generation GIS will use 64bit technology and will be able to provide coordinate data to sub millimetre precision (Elfick, 2005a). This increase in precision could have great utility in the management of property restrictions and responsibilities.

Restrictions and responsibilities are managed by many organisations. Many of these organisations have no spatial enablement of their information. The activities that do include spatially enabled information (e.g. zoning, underground services, Aboriginal land claims, road widening proposals) store the information in a positioned based GIS, not dimension based like cadastral boundaries. If the titles in the cadastre were to be coordinated the title could be linked to all the restrictions and responsibility systems by virtue of its position. Thus, the spatial component could be employed as an integrating and enabling attribute. In this way it would become a 'one stop shop' for all rights, restrictions and responsibility information instead of only pointing to selected legal conditions.

WIRELESS SENSOR NETWORKS

A wireless sensor network (WSN) consists of a spatially distributed network of autonomous devices or nodes (Kay and Mattern, 2004). Each device is capable of

monitoring and collecting information about its surrounding environment. Devices may be as large as a shoe-box or as small as a grain of dust (Kay and Mattern, 2004). They are usually low cost, battery powered and use a radio-transceiver to communicate information. Information might include temperature, sound, vibration, pressure, motion or pollutants (Haenselmann, 2006; Kay and Mattern, 2004). When aggregated, the information from the individual sensors can be used to understand the changes occurring across a large physical area. The technology is now being applied to many applications including environmental management, healthcare and traffic control (Hadim and Mohamed, 2006).

A geosensor network (GSN) is a WSN that emphasizes that the monitoring devices are located somewhere (Worboys and Duckham, 2006; Nittel et al, 2004). These networks are still generally small, comprising tens or hundreds of sensors. Worboys and Duckham (2006) provide an example from Szewczyk et al (2004) where the habitat conditions of a rare species of petrel in Maine, USA, was monitored by using between 50 and 150 sensors. These sensor networks provide a new way of thinking about data collection and monitoring. Higher spatial and temporal granularity of information can be achieved (Worboys and Duckham, 2006).

Research is still needed in a number of areas including device size constraints, cost constraints, power constraints, refining distributed computing and policy issues such as privacy (Duckham et al, 2007; Kay and Mattern, 2004). However, as computing technology evolves these issues will be overcome and GSNs will be applied to many practical situations.

The GSN concept has potential utility in the management of property interests, particularly, the new land interests requiring certain actions to be taken, or not taken, by land owners. For example, a government agency might reimburse a land owner for caring or rejuvenating a water body and surrounding flora on their property. A private organization might financially reimburse a farmer who plants trees on his/her property and therefore gains carbon credits in a carbon trading scheme. These types of interests are emerging in response to community demands for better conservation of their environment: governments are prepared to compensate land owners in order to fast track stewardship over areas of environmental significance. In Victoria, the Conservation, Forests and Lands Act 1987 allows for the creation of these agreements. While the drafting process has some complexities, a larger problem exists in the long term monitoring and evaluation of agreements. How do governments ensure that the land owner being reimbursed is actually a steward of the land? Using government agents for monitoring is potentially very costly, especially as the number of

agreements grows. GSNs may provide a solution in the long term as they will provide detailed information about habitats over large areas.

SDI

Spatial Data Infrastructures (SDI) will also be an important component of any framework for the improved management of land interests. The basic components of an SDI are provided in Figure 4.7. A physical access network, overarching policy statement mandated by an empowered leadership agency and operational standards are the three essential components (Rajabifard et al, 2003).

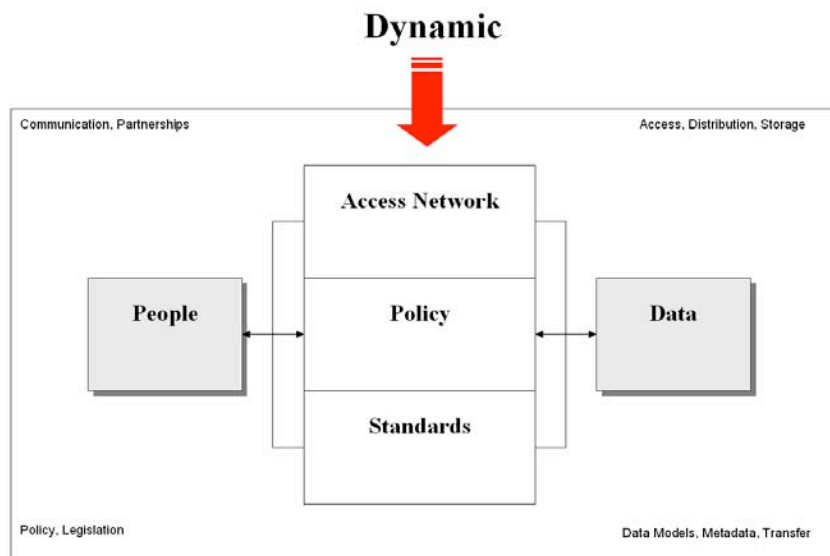


Figure 4.7: The basic components of an SDI (Rajabifard et al, 2003)

Williamson (2001) included SDIs in the original land administration toolbox; SDIs are already seen as an important component in the integrated management of rights over land:

“Spatial data infrastructures (SDI) are a key component of any land administration infrastructure (Mooney and Grant, 1997; Groot and McLaughlin, 2000). An understanding of the role and potential of SDIs in supporting land administration systems greatly assists any land administration reform process. In particular the generic principles concerned with the development of an “infrastructure”, as distinct from “business systems” which rely on the infrastructure, are very useful (Chan and Williamson, 1999). Also an understanding of the role and maintenance of the cadastral or land parcel layer in an SDI is important (Williamson et al, 1998). At the same time an understanding of key SDI principles, such as

the hierarchy of SDIs in a jurisdiction and the dynamic nature of SDIs, are useful (Rajabifard et al, 2000).”

The way in which information about new land interests are collected, managed, and integrated is integral to improving the management of land interests. SDIs provide both the theoretical and technological capacity to do this. Already a number of jurisdictions are using the SDIs initiated in the early 2000s to assist in the management of land interests. Western Australia’s SLIP model and accompanying Register of Interests described in Chapter 3 provide a good example.

Williamson et al’s (2007a) ‘butterfly’ model depicts the modern conceptual relationships between cadastres, SDIs and the management of land (Figure 4.8). Only with a complete parcel based and functioning SDI can the processes of land management, spatially enabled government and sustainable development be achieved. Interestingly, the model does not suggest where the management of interests other than ownership parcels belongs. Do they belong in the cadastre or are they part of the integrated SDI? A new framework for managing all interests might seek to answer this question.

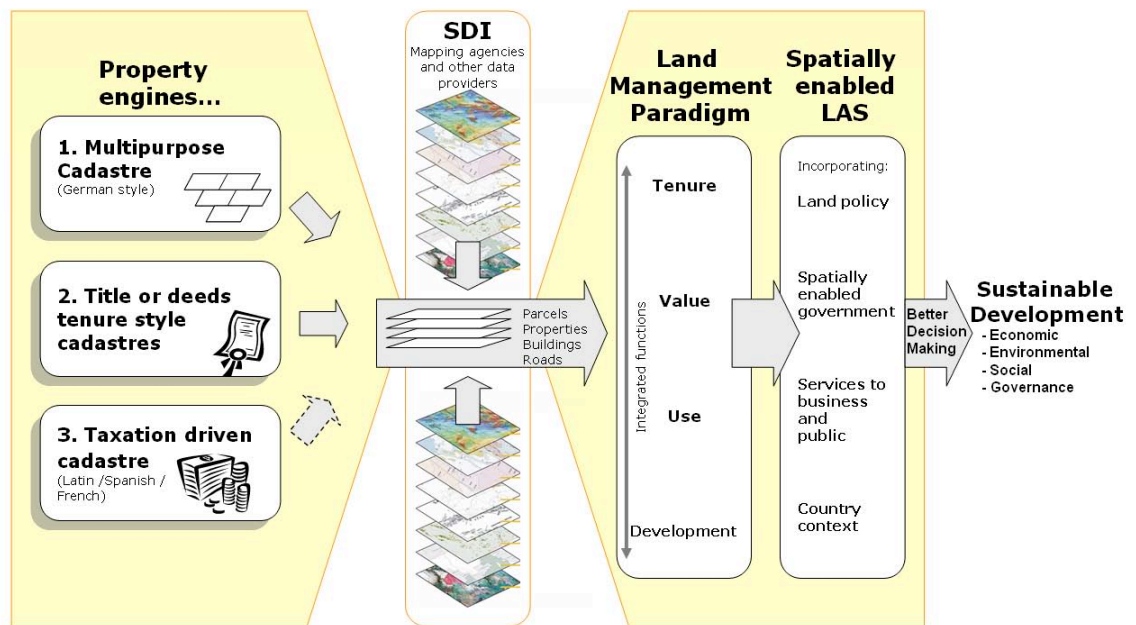


Figure 4.8: The butterfly – integrating cadastres, SDIs and sustainability

SUMMARY

There is an obvious role for information and spatial technologies in the management of land interests. Any overarching framework needs to apply these tools sensibly and in a targeted fashion. Technology is not a panacea for the management of all land interests: it should be part of a larger holistic approach. This chapter now considers the concept of ‘uncertainty’ and its relevance to land interest management.

UNCERTAINTY THEORY

AN INTRODUCTION TO UNCERTAINTY

In general, ‘uncertainty’ is defined as a lack of sureness about something or someone or a future event (Merriam Webster, 2007). The concept gained widespread application in many disciplines during the twentieth century, largely due to the work of Albert Einstein, Niels Bohrs and Werner Karl Heisenberg (Hilgevoord, 2006). Heisenberg proposed that in the world of quantum mechanics and sub-atomic physics the probability of an event was the only available level of knowledge (Heisenberg, 1927). The product of even the most perfect measurement of a system was not deterministic, but instead was distinguished by a probability distribution. The larger the associated standard deviation of the measurement, the more uncertain that characteristic was (Heisenberg, 1927).

This basic premise, that uncertainty is at the heart of all measurements, impacted greatly upon other fields of endeavor. The disciplines of philosophy, economics, engineering, insurance and statistics all grappled with the concept. Methods for understanding, measuring and combating the concept were formulated and are now widely used in decision making.

The history of land administration systems in developed countries is littered with attempts to overcome and remove uncertainty of many kinds. Modern cadastral mapping and registration systems, with their sub centimeter accuracies, are outcomes of these attempts. The desire to create a complete picture of all interests

affecting land is the latest installment. The Western Australian Legislative Council Committee report (WALC, 2004) and Cadastre 2014 (Kaufmann and Steudler, 1998) discussed in Chapter 3 provide excellent examples. This is the standard approach of surveyors and other policy makers who assume accurate measurement and complete inventories are essential. From their perspective, the only solution is a complete vocabulary of all the restrictions and responsibilities, identified on a parcel by parcel basis. They boldly state that all interests in land must be understood and available to government and the public. In practice these statements are very difficult to implement: they do not make allowance for the reality of uncertainty. The discipline of land administration must reassess its position in relation to the basic principles of uncertainty. Understanding and dealing with uncertainty could be an important factor is the design of a framework aimed at improving the management of land interests.

CREATING CERTAINTY THROUGH NEGATIVE REGISTERS

The desire for certainty is reasonable in some cases. For example, it is generally recognized that ownership, planning and taxation interests must be identified: the systems are highly significant and demand well organized systems that can identify the relationship between the planning and tax requirements and a land parcel (Dale and McLaughlin, 1999). However, provision of complete and accurate land information is incredibly expensive and warranted only when the benefits exceed the cost. In many cases this is not achieved.

There are alternate options for use in cases where the cost of supplying information is more than the benefit. These options have largely failed to permeate the land administration literature. One example is negative registries, in which the exclusion of a property from a registry relieves it of the obligation or responsibility. There is no need to state that a property is not affected by an unfit for human habitation order or rebuilding order, or slum reclamation, archeological or historic significance, contamination or quarantine areas, as these features are relatively rare among properties in any given system. In the state of Victoria, Australia, roughly

100 properties among a potential 3 million parcels are affected by historic buildings classification; these can be identified very easily. In such cases, the information system only includes those properties administratively and publicly affected: They can be linked to a deeds or title registry using technology (Bennett et al, 2007a). Thus, for all other parcels there is no information need at all. They are, and will remain, outside these controls.

CREATING CERTAINTY THROUGH OBSERVATION

The power of 'observation' to create certainty is another area often passed over in the land administration literature. That is, some information is simply available by observing the land. This information need not be systematically provided for regulation systems or transaction systems. For example, the state of Victoria uses observation to keep conveyancing and search costs to a minimum (c.f. Transfer of Land Act 1958, Vic). Victoria runs both a Torrens system of land registration and an adverse possession system (Dalrymple et al, 2003). The system guarantees both the ownership and the interest of the owner; but it does not guarantee the space in which these operate (Park, 2003). Boundaries are not guaranteed. The system does not protect the owner from failure to assert entitlement to recover the land after expiration of the period of limitations (15 years, in contrast to similar jurisdictions using 12 year period). Boundaries are legally defined within the cadastral surveying requirements, but should a fence or building not be on a legal boundary, and should this situation exist for over the statutory period, the fence or building cannot be changed to accord with the legal boundary without the permission of the neighbour. While this might seem counter-intuitive, in Victoria, people transacting in and using land are generally confident that they get the land they observe. If parcels are newly established they can generally rely on surveying to match the actual and legal boundaries, but they are still encouraged to make the physical check. Given the improvements in surveying standards in the last thirty years, most transactions are conducted with confidence. The most obvious result is that conveyancing is cheaper; it is not obstructed by check surveys and land disputes about who owns

what. These disputes are almost always handled by simple administrative processes in the land registry allowing alteration of title to accord with occupation.

Observation certainty also allows the Victorian system to remove the need to use the register to record leases of any kind. In practice and in law throughout Australia, residential leases up to 3 years (almost all) are not registered (Neave et al, 1996). In Victoria, even commercial leases are not registered, relieving Victorian businesses from the burden of registering changes of terms, extensions, assignments and so on. Victoria protects all sitting tenants, even if the lease is not on the registry. The registration purist is offended, but the local system has the advantage of simplicity. Victoria's system demonstrates that the cataloguing of interests patent to the observer of land is not necessarily useful.

CREATING CERTAINTY THROUGH DEFINED PROCESSES

The concept of 'process certainty' is another area rarely considered in the land administration literature. The demand for 'knowability' of what land exactly is affected by particular responsibilities and restrictions ignores one of the most common and sensible methods of attaching certainty to a responsibility or restriction: by providing a process capable of identifying the particular situations of application. Lawyers are entirely familiar with process certainties. Under this regime a regulatory system is devised to, say, preserve vegetation in a state or jurisdiction. One way to implement this is to make significant efforts to identify exactly what vegetation should be preserved and what can be removed. The cost of this exercise is large. It also creates anxiety in every case where vegetation is within the "must be preserved" category. It politicizes multiple situations. This model was used by Queensland in the Vegetation Management Act 1999.

By contrast, the other means of implementation is to base certainty on a process of application or a request. For example, it could be based on a vendor providing

information to potential buyers or by an intending buyer. The restriction applies to the process of vegetation removal, not to protecting particular trees. One therefore needs to identify the situations in which the process will be managed. Thus, all the vegetation on land where owners are unconcerned about its retention might remain outside the scope of the restriction. Only when owners decide to remove vegetation are they within the restriction and a process is available to determine the exact application, namely, investigation by appropriately trained people exercising precise powers to categorize vegetation capable of being removed according to public and transparent criteria. Process certainty is expensive, but not as expensive as ‘a priori’ spatial identification of application.

CREATING CERTAINTY THROUGH UNIVERSIAL APPLICATION

The fact that some interests apply to all land within a jurisdiction has also been omitted from the land administration literature. In these situations the need for case-by-case detail of application is virtually non-existent. A desire for “neatness and completeness” might demand expenditure on the particularization of the restriction, but the cost is likely to be out of order (Bennett, 2005a). For example, most of Victoria’s central area is auriferous. Historically, most of it was used for shaft and tunnel, alluvial, and even open cut mining; indeed, the entire area is covered with historical and current mining interests. Practically speaking, no one buys or mortgages land in the area without being conscious that all land is within one or another mining tenement. However, few freeholders care who owns the mining tenement. There are situations of great tension between mining and farming interests, but these can be managed by careful adjustment and appreciation of mutual opportunities. The real concern is whether jurisdictions, such as Victoria, need to go to the trouble of classifying each parcel of land, whether freehold, Crown licence or leasehold, according to which mining company holds a mining right running under their land. Currently it appears the two stand alone systems can satisfy the information needs of the diverse stakeholders.

SUMMARY

Uncertainty is inescapable and is inherent in all land administration systems. Rather than attempting to eliminate uncertainty, land administrators must concentrate on using the emerging tools discussed above to manage and mitigate the phenomenon. This will produce more appropriate management models and reduce costs. This chapter now considers funding models: an important component of any framework attempting to holistically manage interests of land.

FUNDING MODELS

THE FUNDING CHALLENGE

The benefits of land administration systems for national economies and social wellbeing are well documented. Ting et al (1999) track the development of land administration systems in Western societies. A direct correlation can be found between the understanding of the land parcel as an economic opportunity and the nation's wealth. Since the 1990s the majority of work attempting to quantify the economic importance of land administration systems has been directed at developing countries. Dale and McLaughlin (1999) cite Feder and Nishio's (1998) work in Thailand, Alston et al's (1996) work in Brazil and Dowall and Leaf's (1990) work in Indonesia to demonstrate how well-managed tenures improve the economic and social conditions of developing countries. The focus on developing countries has tended to mean that the important role of land administration systems in underpinning the economy is often taken for granted by governments and citizens of developed countries. This focus creates challenges for the land administration systems in developed countries: How do they justify the funding of improvements and substantial changes to existing systems? The answer to this question will be of critical importance to any framework aiming to improve the management of interests over land.

AVAILABLE FUNDING TECHNIQUES

The initial financing of land administration systems such as registration and cadastral mapping institutions has traditionally come from within government (Dale

and McLaughlin, 1999). Where the large amounts of capital required to build these systems are not available, as is the case in most developing countries, international finance institutions such as the World Bank and the Asian Development Bank provide substantial loans and grants. However, sourcing the finance to build a system is very different to funding the long term ongoing maintenance of that system. Increasingly, systems are required to be self sufficient. Indeed, Cadastre 2014 suggests that investment into cadastral systems must be paid for by those who benefit from them (Kaufmann and Steudler, 1998). Dale and McLaughlin (1999) provide three different methods for financing the ongoing operation of land administration systems: taxes, fees and commissions. In general, a combination of the three financing techniques is used in most countries. Each of these is now considered.

Taxation of ownership and land transactions is one way to finance operations. Dale and McLaughlin (1999) consider this method to be flawed as there is no connection between the tax collected and the grant given by the government. The grant is generally allocated regardless of performance and therefore there is often little reason to improve performance. For example, the state government of Victoria collects land taxes on a range of properties. Rather than going directly to land administration institutions, the revenue is consolidated by the Treasury. To provide incentives for improved services and cost cutting, the policies of privatization and economic rationalization (discussed in Chapter 2) are often adopted. These policies result in the other funding methodologies: fees and commissions.

Charging fees for products and services results in a user pays system. Often these fees are established in consultation with government and go directly to the agency providing the service (Dale and McLaughlin, 1999).

Commissions are similar to fees; however, the agency providing the service can determine the amount of commission using a set of rules provided by the government.

In the mid 2000s there was debate as to whether full cost recovery using fees and commissions was a viable policy (Nixon, 2005). For example, in Victoria during the late 1990s, the government department responsible for dissemination of cadastral and land information (Spatial Information Infrastructure Group - SII), made use of fees and commissions. The agency was responsible for managing the digital cadastral database of Victoria. It sold its information products across government and to the private sector (Warnest, 2005). The agency was required to recover all its costs. This tended to push up prices and place the product out of the reach of the general public. The main customers were utility companies and other arms of government. The practice continues today, however, SII does not recover its costs: it appears the market is not large enough. Moreover, cadastral products were not reaching the community as fast as in those jurisdictions where information was being provided for free (or cost of duplications), such as Western Australia, United States and New Zealand (Nixon, 2005; Warnest, 2005). It appears that free provision of cadastral data will become the norm: the Ordnance Survey in UK has also recently adopted a cost-of-duplication policy. However, the topic remains a highly contentious issue for many of the jurisdictions with developed cadastres. How will the funding of managing new land interests occur? The next section ponders this question.

FUNDING THE MANAGEMENT OF 'NEW' LAND INTERESTS

Which funding techniques should be used to improve the information management and provision of new land interests? This issue gained widespread debate at the ANZLIC's National Summit on the Administration of Property Rights, Restrictions and Responsibilities in Brisbane, October, 2004 (ANZLIC, 2004). However, the resulting communiqué provides little guidance. Additionally, the land administration designs studied in Chapter 3 also offer little information in relation to funding. It is doubtful that the large institutional reorganization proposed by Lyons et al (2002) could be funded through any of the techniques outlined by Dale and McLaughlin (1999): it would require substantial government grants. The

technology-driven design presented by Jacoby et al (2002) would require similar grants.

Western Australia provides an example of a working model (Searle and Britton, 2005). It adopted a user-pays approach for new information sets relating to restrictions and responsibilities (as apposed to ownership rights). Landgate (formally DoLI), acts as a broker between government agencies and customers wishing to access land interest information. In general, the higher the accuracy and certainty of information required, the higher the cost. However, the SLIP infrastructure upon which this system is based did require significant start up costs.

If the problem is not seen to be large enough to justify government expenditure, alternative models will be required. Perhaps a mixture of free and pay-per-use services would be the most appropriate: different types of interest could be perceived as more fundamental to citizens than others.

Privatization and the role of the private sector also require further consideration. These issues were discussed in Chapters 2 and 3. Dale and McLaughlin (1999) describe how commercially successful national mapping agencies risked being sold off to the private sector. It is unclear whether this is perceived as a negative possibility given national mapping information is essential government infrastructure; however, privatizing fundamental government functions such as mapping requires very careful consideration as discussed earlier. Cadastre 2014 promotes the increased involvement of the private sector (Kaufmann and Steudler, 1998). It suggests that the private sector is more flexible, consumer orientated and more adept at dealing with land markets. Its record in providing community based services is less convincing.

Market Based Instruments (MBIs), or privatized land interests, are another possibility. These were discussed in Chapter 2. Markets generate commodities which can be taxed by governments and can have fees incurred via transactions.

Therefore, MBIs would provide a potentially very substantial source of revenue for governments, some of which could be used to finance administration systems. Chapter 2 showed that MBIs were currently gaining lots of attention; however, currently the capacity of governments to tax interests such as biota, water and carbon is still very limited.

SUMMARY

Funding models will be an important component of any framework aimed at improving the management of land interests. A framework that fails to provide a funding mechanism risks being irrelevant. The options discussed above provide a starting point; however, further work is required.

CONCLUSIONS

Since the discipline of land administration first emerged in the late twentieth century it made use of emerging concepts and theories from outside the discipline. In this chapter, five areas, relatively new to land administration, are considered. Each could significantly impact the design of a new framework to manage all rights, restrictions and responsibilities over land.

Ontological design could be used to create new conceptual understandings of land interests: this would result in better organization and administration of interests. Capacity building, specifically the concept of social learning, offers a new way of looking at policy design and motivating changes to human behaviour in relation to land. It also mitigates the need to create large bodies of legislation. Information and spatial technologies provide the practical tools for better collecting, integrating and monitoring of information at reduced costs. Uncertainty is a part of any measurable system. Incorporating concepts of uncertainty into land administration systems will

result in more appropriate and realistic designs for information provision. In relation to funding models, a range of methods are available. The ability of systems that manage land interests to be self sufficient will be an important factor in the success of this system. In summary, the questions arising from this chapter are as follows:

Spatial Data Infrastructures and information technology offer new ways to manage property rights, restrictions and responsibilities. *What different spatial extents do land interests have? How many of the interests are managed using modern SDI and information technology principles? How can these tools be incorporated into a framework for managing rights, restrictions and responsibilities?*

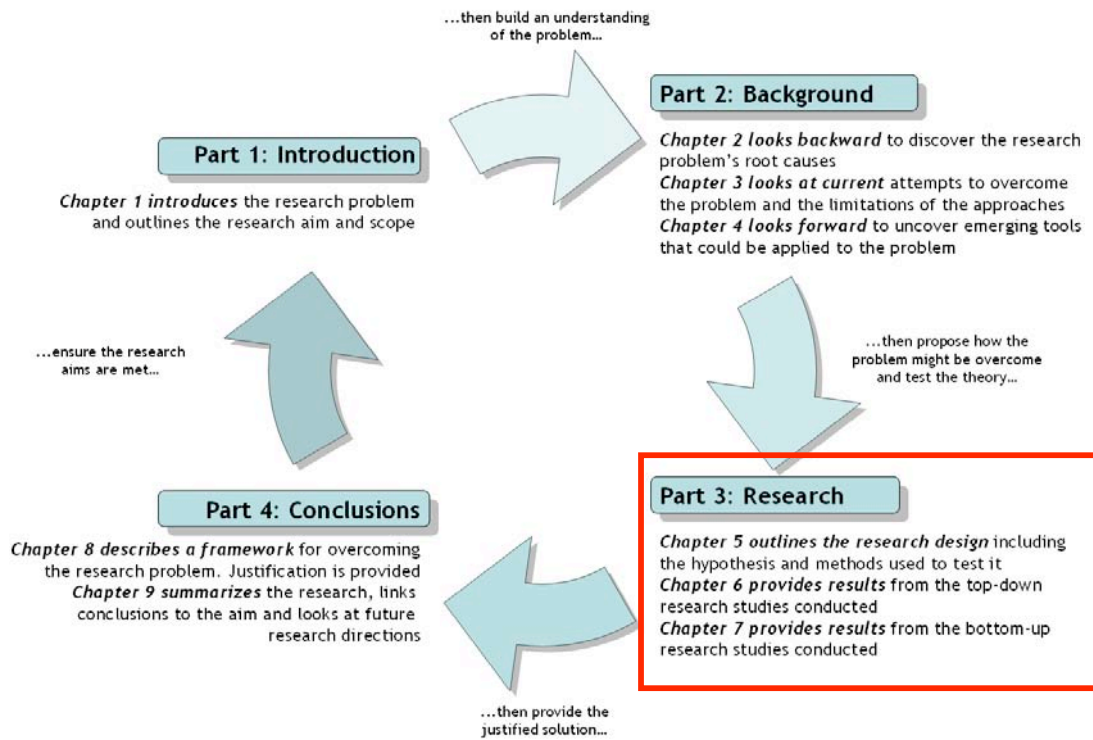
Human resource and capacity building principles have only recently permeated the discipline of land administration. In contrast to legislating new rights, restrictions and responsibilities these tools offer new ways to modify people's behaviour towards land. *How many property rights, restrictions and responsibilities impact on individual properties? How can these new tools be incorporated into a framework for managing rights, restrictions and responsibilities?*

Outside the land administration a swath of tools from other disciplines can be applied to the management of land. These include ontology design and funding tools and uncertainty theory. *How can these tools be incorporated into a framework for managing rights, restrictions and responsibilities?*

The first four chapters of this thesis have considered the problem of property rights, restrictions and responsibilities management from a number of perspectives. The reasons for the emergence of the problem; how existing systems have adapted, and failed to adapt; and early attempts to resolve the problem have all been considered. This chapter looked forward and attempted to relate how new emerging technologies and concepts might be applied to the problem. The next section of the thesis synthesizes all the findings so far. It outlines a hypothesis and methodology for testing a framework aimed at improving management of property rights, restrictions and responsibilities.

PART 3

RESEARCH



CHAPTER 5

RESEARCH DESIGN

This chapter charts the development of the project's research design. It returns to the underlying research problem and explains how the findings of background chapters were used to generate a research hypothesis. The methods available for testing the hypothesis and the chosen approach are outlined and justified.

INTRODUCTION

At the beginning of the twenty first century governments, private organizations, academia and professional bodies were set with a challenge: to develop land administration systems capable of supporting sustainable development objectives. The ideal system would integrate the management of property rights, restrictions and responsibilities (UN-FIG, 1999). Internationally, organizations such as FIG promoted the cause. Western European jurisdictions such as The Netherlands and Switzerland were taking action. In Australia, the Centre for Spatial Data Infrastructures and Land Administration at the University of Melbourne produced a number of papers and theses dealing with the subject with Lisa Ting (2002), Daniel Steudler (2003) and Kate Dalrymple (2005) investigating various aspects. A growing body of tools and approaches was emerging.

Significant work was also being undertaken in Australia's northern states. Researchers Ken Lyons, Kevin Davies and Edward Cottrell undertook a detailed study of Queensland's regulatory environment (Lyons et al, 2002). Their work culminated in the 2004 'National Summit on Administration of Land and Property Rights and Restrictions' (ANZLIC, 2004). The summit was commissioned by ANZLIC, the peak body for land and spatial information in Australia and New Zealand. It attracted surveyors, conveyances, solicitors, valuers, registry officials, local authority officials, land owners and developers from across the region. The resulting communiqué highlighted the problems caused by poorly managed rights, restrictions and responsibilities. It demanded that a more concerted effort be directed at the problem. At a practical level it highlighted several areas requiring urgent attention, particularly noting:

“the absence of any standard method of defining rights, restrictions and responsibilities affecting land and property...,” the need to “establish a framework for cooperation between jurisdictions, and providers and users of land and property information...” and the requirements for “standards and best practice in the creation and administration of rights restrictions and responsibilities” (ANZLIC, 2004).

These demands lead to the research project presented here. The project was undertaken by the author, supervised Ian Williamson and Jude Wallace, and conducted through the Centre for Spatial Data Infrastructures and Land Administration at the Department of Geomatics, The University of Melbourne. This chapter charts the development of the project's research design. It returns to the underlying research problem and explains how the results of background chapters were used to generate a research hypothesis. The methods available for testing the hypothesis and the chosen approach are outlined and justified.

THE SCIENTIFIC METHOD

Fundamentally, the project lay within the field of engineering: it would therefore involve designing, building and testing some kind of system. The scientific method, the paradigm within which engineering operates, would provide an overarching framework for the project. The method, modernized by Kuhn (1962), involves identifying a problem and then generating theories or hypotheses to best explain why the problem is occurring or how it might be overcome (Figure 5.1). The hypotheses are then applied to more specific research questions, which leads to the definition and testing of measurable variables (McDougall, 2006). This deductive approach provides a framework for the entire study and an organizing model for the research questions and data collection procedures (Creswell, 2003). Each of these stages and their application to the research are now discussed.

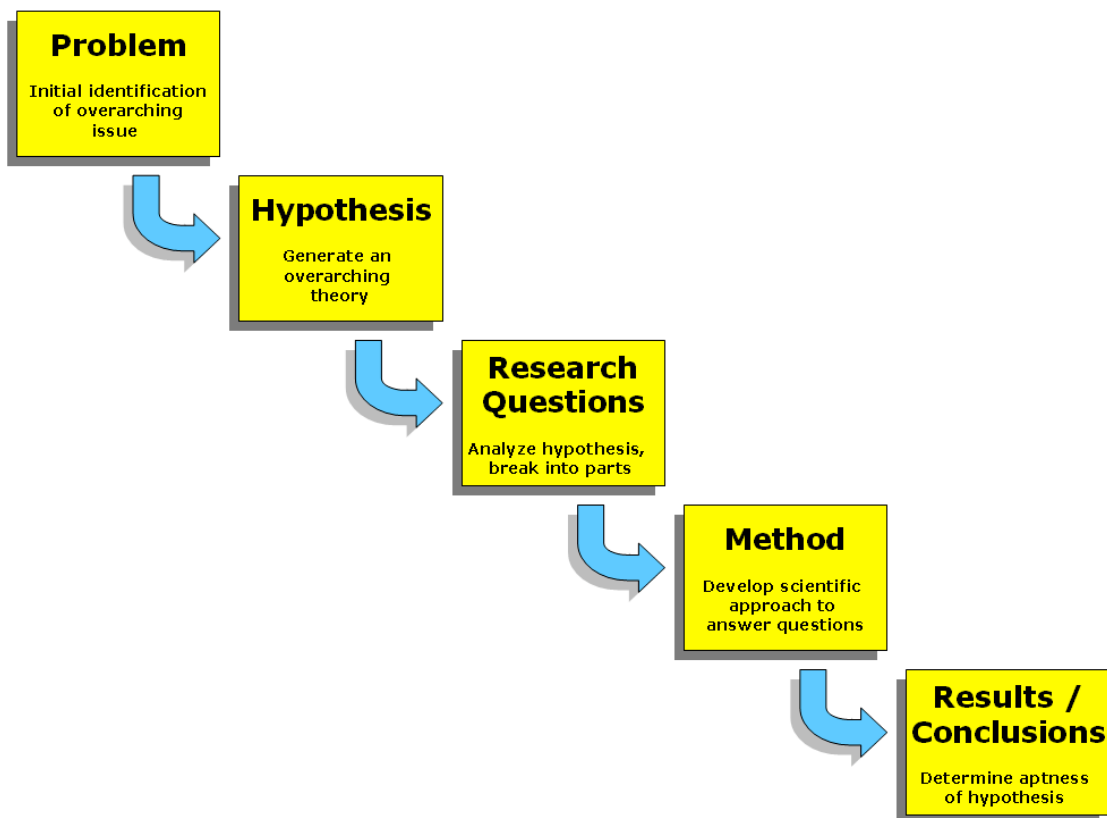


Figure 5.1: The scientific method was used to guide the project design

RESEARCH PROBLEM

The first stage of the scientific method involves clearly articulating the problem. It should identify and provide definitions of the subject. As stated in the introductory chapter, the overarching research problem was articulated as:

Property rights, restrictions and responsibilities over land are designed and administered in a disparate, ad hoc and unorganized fashion. This makes achieving the sustainable development objectives of citizens and governments difficult, if not impossible. How should we organize the management of property rights, restrictions and responsibilities in a way that enables the achievement of sustainable development objectives by citizens and governments?

Where;

‘Property rights, restrictions and responsibilities’ (or land interests) are a generic term used to describe all formal and non formal interests that exist between people and land that are supported by the jurisdiction’s people (See Chapter 2).

‘Sustainable development’ is development that meets the needs of the present generation while enabling future generations to meet their own needs (See Chapter 2).

‘Citizens’ are those people who owe an allegiance to and entitled to the protection of a jurisdiction.

‘Governments’ are the complex political institutions, laws, and customs through which the function of governing a jurisdiction is carried out.

FORMULATING THE HYPOTHESIS

The second stage of the scientific method involves the proposal of a hypothesis that best explains why the problem is occurring or how it might be solved. In the context of this research the land administration toolbox, described in the Chapter 3, appears to provide the best starting point. The background chapters were structured around an analysis of the individual components of the land administration toolbox. While the toolbox provided many tools for managing some land interests, namely ownership rights, the prevailing theme was the failure or limitation of the toolbox to supply the appropriate tools for managing the different land rights, restrictions and responsibilities. With this in mind the research hypothesis was generated:

Expanding the land administration toolbox with new tools and principles will enable better management of property rights, restrictions and responsibilities and consequently assist the achievement of sustainable development objectives by citizens and government.

Where;

‘Land Administration toolbox’ equates to the eight components and accompanying principles defined by Williamson (2001).

‘Expanding’ includes adding new tools to the existing toolbox components and also introducing entirely new components. More specifically expansion would include the creation of a tool for classifying different property rights, restrictions and responsibilities and making use of theories including social learning and capacity building techniques, funding tools and uncertainty theory and emerging spatial and information technologies.

‘Better management’ means the main problems of poor design, poor administration and lack of existence (See Chapter 1) in relation to property rights, restrictions and responsibilities are mitigated or removed in the eyes of citizens and government.

‘Property rights, restrictions and responsibilities’, ‘sustainable development’, ‘citizens’ and ‘government’ have the same definition as the research problem.

ARTICULATING THE RESEARCH QUESTIONS

The third stage of the scientific method involves using the hypothesis to develop a set of research questions. By answering the research questions the appropriateness of the hypothesis can be deduced. In the context of this research the background investigations resulted in a number of questions which relate directly to the hypothesis. The questions are highlighted at the end of each of the previous three chapters. They are based around the components of the land administration toolbox and consider how they might be extended. They are reiterated here:

1. **Policy principles:** Environmental, economic and social sustainability drivers resulted in a more collective perspective of land and led to more land policy being created. The creation of policy was often ad hoc and unorganized (Chapter 2). *How many disparate policies have driven the creation of land interests? How should land policies be designed and, implemented to improve the management of rights, restrictions and responsibilities?*
2. **Legal principles:** Legal systems have responded to land policy demands by creating many new land interests through legislation. This too was done in a reactive, ad hoc and uncoordinated manner. The statute books are now immensely complex making it impossible to create a holistic view of land management (Chapter 2). *How many land interests are there? Are they emerging at an increasing rate? How long do they apply for? Do any not exist where they ought to? What principles should guide the creation of legal rights, restrictions and responsibilities over land? How do we make the rules acceptable to the community and impact on human behaviors?*

3. **Tenure principles:** Existing tenure models used to describe how people and land relate are simplistic. They do not capture the multitude of new rights, restrictions and responsibilities that exist on land. Consequently they can only provide limited guidance as to how the interests should be administered (Chapter 2). *How many different types of tenure are there? Who do the new interests benefit? Who do they disadvantage? How can we describe and classify rights, restrictions and responsibilities in a holistic way?*
4. **Cadastral principles:** The role of the registration and mapping components of cadastral systems in the management of new rights, restrictions and responsibilities is unclear. To date they have played only a limited role, however, recently their potential has been recognized. Some cadastral systems are better equipped than others to manage with the new land interests (Chapter 3). *How many of these new interests are mapped and registered appropriately? What is the role of existing cadastral mapping and registration systems in the management of rights, restrictions and responsibilities?*
5. **Institutional principles:** The roles and structures of private and public institutions in the management of land interests are also unclear; however, the need for collaboration between and across governments is certain (Chapter 3). *How many institutions are actually involved managing land interests? How should institutions be structured? How should agencies managing the different rights, restrictions and responsibilities be organized?*
6. **SDI and ICT principles:** Spatial Data Infrastructures and information technology offer new ways to manage property rights, restrictions and responsibilities (Chapter 4). *What different spatial extents do land interests have? How many of the interests are managed using modern SDI and information technology principles? How can these tools be incorporated into a framework for managing rights, restrictions and responsibilities?*
7. **HR and capacity building principles:** Human resource and capacity building principles have only recently permeated the discipline of land administration (Chapter 4). In contrast to legislating new rights, restrictions and responsibilities these tools offer new ways to modify people's behaviour towards land. *How many property rights, restrictions and responsibilities impact on individual properties? How can these new tools be incorporated into a framework for managing rights, restrictions and responsibilities?*

8. **Emerging principles:** Outside the land administration a swath of tools from other disciplines can be applied to the management of land. These include ontology design and funding tools and uncertainty theory (Chapter 4). *How can these tools be incorporated into a framework for managing rights, restrictions and responsibilities?*
9. **A holistic approach:** Contemporary theoretical approaches for improving the management of land interests are too simplistic, ‘one size fits all’ and deterministic (All chapters). Contemporary practical approaches for improving the management of land interests are not holistic and focus on specific areas of the larger problem. *How can these approaches be included into a more complete framework for managing rights, restrictions and responsibilities?*

DESIGNING THE EXPERIMENTS

The fourth stage of the scientific method involves designing experiments to answer the research questions. This involves designing a number of experiments to answer the questions listed above. In terms of answers, each question can be placed into one of two categories: they either demand qualitative or quantitative responses. For example, “how many legal interests exist over land” is quantitative in nature: a numerical answer is the desired response. However, “how do property rights, restrictions and responsibilities impact on individual properties?” is qualitative in nature; the narrative of the answer would be of more value than a single numerical response. For this reason both qualitative and quantitative experimental methods would be required to answer all the research questions. An overview of each of these methodologies is now given.

QUANTITATIVE METHODS

Quantitative methods are methods that use experiments to produce numerical outcomes, which can then be used to validate hypotheses. McDougall (2006) reviews literature on their design and uses. The focus is on “measurements and amounts (more or less, larger or smaller, often or seldom, similar or different) of the characteristics displayed by people and events that the researcher studies” (Thomas, 2003). Measurable variables, defined within the research questions, are at

the core of this method. They must be defined, collected through experiments, analyzed and then presented. Quantitative methods often incorporate large sample sizes in experiments and subsequently allow for the use of statistical methods. Computers have improved the efficiency of quantitative methods. The methods are well recognized and established in the field of engineering.

In the context of this research, quantitative methods could be used to answer the 'how many...' questions listed above. For example, how many different property rights, restrictions and responsibilities are there? How many property rights, restrictions and responsibilities impact on individual properties? A study of existing land administration systems, which collects variables on amounts of policy, legislation, tenure typologies, mapping, institutions and use of SDIs and information technology, would provide the necessary data.

QUALITATIVE METHODS

Qualitative research deals with principles which are not true all of the time and in all conditions, to explain how and why things actually happen in a complex world (Dalrymple, 2005). It is less commonly used in engineering; therefore more justification is provided here. Qualitative methods involve concentrated exploration of a small number of individual people or events to understand how and why certain phenomena are occurring. The researcher describes the characteristics of the people or events being studied. The underlying assumption is that you must understand something at a specific level if you are to understand it on a generic level (Rubin and Rubin, 1995). Qualitative research differs from quantitative research: the data it produces cannot be statistically analyzed or graphed. It produces descriptive data relating to the people or activities being studied. While the outcomes of quantitative methods can be conclusive, qualitative methods tend to be merely suggestive. Well known techniques for qualitative methods include case studies, ethnographies, personal experience, narrative research, action research, introspection, observation, and visual texts (McDougall, 2006; Denzin and Lincoln, 1994).

The strength of the qualitative methodology lies in its focus on specific situations or people and its emphasis on words rather than numbers (Maxwell, 1996). It enables a much richer understanding of people, individual events and the contexts in which they occur. Qualitative research offers reflexivity; communication is an explicit part of knowledge production, as is the subjectiveness of the research and those being studied (Flick, 2002). It helps develop different lines of enquiry and data collection (Flick, 2002). Specifically qualitative research is a return to the local, which is an important focus for current land policies (Dalrymple, 2005).

Qualitative research is often criticized by the ‘hard’ sciences such as physics and chemistry for its ‘soft’ approach and its inability to strictly adhere to scientific methods (Yin, 2003). It has been described as merely a tool for stand-alone descriptions of phenomena and as preliminary research to the real research of hypotheses and statistic testing (Benbasat, 1984). However, other authors argue that qualitative research has similar standards of credibility when used properly and that frameworks now exist which provide both a rigorous and scientific approach (Lee, 1989; Krefting, 1991; Yin, 1994).

In the context of this research, qualitative research methods could be used to answer all of the ‘how should...’ or ‘why do...’ questions. For example: How should land policies be designed and implemented to improve the management of rights, restrictions and responsibilities? How should agencies managing the different rights, restrictions and responsibilities be organized? Qualitative methods would facilitate greater understanding of the existing land administration systems in terms of how they are managed and how people interact with them. The context in which they exist, their strengths and weaknesses could all be assessed and used to inform the design of new systems.

USING CASE STUDIES

There are many types of qualitative research; however, consideration is now given to the type highly applicable in this research: the 'case study' approach. Case studies examine a trend in its natural setting and use multiple data collection methods along with a small number of entities (Benbasat et al. 1987). Case studies focus on individual examples and on processes and relations, rather than a one-time cross-section of individuals (Feagin et al., 1991). For each individual case study a number of experimental and non-experimental research techniques might be employed (Bordens and Abbots, 1999). Most importantly, they can be used to build theory and arrive at generalizations (Evans and Gruba, 2002). Case studies rely upon multiple sources of evidence (Yin, 2003). Examples include interviews, surveys, legislation, strategic plans, management reports, operational procedures, brochures and independent reports relating to the public and private organizations.

The case study approach is appropriate when the phenomenon under study is not readily distinguishable from its context and when there is a need to define topics broadly and rely on multiple rather than singular sources of evidence (Yin, 1993). Thus, the case study can provide a useful tool across many disciplines including sociology, political science, psychology and information management (Yin, 1989). At a practical level, it is used in public administration research, community planning, city and regional planning and information systems planning (Yin, 1989; Yin, 1994). In the case of information systems and engineering it provides a useful approach for investigating how people, processes and technology interact during development and use.

Yin (1993) makes a distinction between descriptive, explanatory and exploratory case studies. All can be single or multi-case in nature. 'Exploratory' case studies are flexible: no earlier model is used as a basis for the study, usually because the researcher has no alternative. By their very nature exploratory case studies discover new theory. The hypotheses are developed progressively and often after completion of data collection. These studies are sometimes criticized for lacking rigor and

structure. On the other hand, 'descriptive' case studies observe and describe what trends exist in the phenomena being studied. Williamson and Fourie (1998) show how 'exploratory' and 'descriptive' case studies are a useful framework for describing and classifying cases. The resulting hypotheses explain cause-effect relationships. 'Explanatory cases are best suited to causal studies. In very complex and multivariate cases, the analyses rely upon pattern-matching techniques.

The field of land administration advocates the use of case studies. Many recent PhD theses in land administration design and planning have used this approach (see McDougall, 2006; Dalrymple, 2005; Warnest, 2005; Steudler, 2004 and Ting, 2002). Williamson and Fourie (1998) recommended case study methodology for more rigorously research of cadastral reform. They argued that a useful technique was to employ a case study approach, linking human issues (in an anthropological context) with the existing knowledge base. Steudler, (2004) made similar recommendations. He suggested that while different countries have very different land administration arrangements some general indicators do exist. These can be used compare systems, identify underlying problems and recognize benefits at a local and practical level. Indeed the case study approach is the only way to understand the broad field of land administration: cases help to address contextual conditions and not just the overarching phenomenon of the study (Yin, 2003). Any study dealing with land administration that is not informed by an understanding of the contextual conditions such as economic, political and social forces is very much weakened.

In the context of this research, case studies, particularly the 'descriptive' form, appeared highly relevant for a number of reasons. Firstly, they would allow for analysis and description of land administration systems and their impact at the parcel level. The data collected would enable the creation of a more rigorous framework for the classification and management of land interests. Secondly, as outlined by Yin (1993), there was a need to define topics broadly and not narrowly: Land interests, their management and impact were seen as very broad. Thirdly, case

studies allow multiple sources of evidence to be studied. It was anticipated that data would be gathered from a range of sources including interview material, legislation, government policies and literature produced non-government groups. Fourthly, the management of land interests could be studied in their normal settings. This provides the opportunity to learn from current approaches and practice (Benbasat et al. 1987; Maxwell 1996). Fifthly, as already discussed, qualitative methods enable 'how' and why' questions to be answered (Benbasat et al. 1987; Yin 1994). Fifthly, the case study approach provides a system for analyzing and classifying land interests and their management (Lee 1989; Yin 1994). However, descriptive case studies on their own would not be enough. Consideration is now given to mixed methodologies, an emerging form of research design.

MIXED METHODOLOGIES

From the beginning of his 2007 thesis, Kevin McDougall identified that the research questions were difficult to answer through any single qualitative or quantitative approach. While a case study approach addressed the "why" and "how" questions of data sharing partnerships, in order to gauge and evaluate their larger impact, a quantitative approach such as a questionnaire seemed more appropriate. McDougall needed an approach that would allow him to combine these seemingly unrelated methods. This requirement was not specific to McDougall's work; indeed, during the 1990s, the benefit of combining parallel methods had been recognized in both theory and practice and numerous explanations of mixed method research emerged in the design literature (Frechtling and Westat, 1997; Tashakkori and Teddlie, 1998 and 2003; Creswell, 2003; Johnson and Onwuegbuzie, 2003).

Tashakkori and Teddlie (2003) explained how mixed method designs incorporate techniques from both the qualitative and quantitative research traditions, and in doing so answer research questions that could not be answered in another way. They suggested that mixed methods are superior to a single approach for a number of reasons: they provide stronger inferences and allow the opportunity of presenting a greater diversity of views. The approach continues to grow in popularity. In 2003

Creswell (2003) suggested that the debate over research methods had become irrelevant: most research practices now lay on the continuum between qualitative and quantitative analysis. However, the mixed methods approach is not without its problems and care must be taken in the integration and interpretation phases of research (Bryman, 1992). However, when properly combined the mixed methods approach is powerful.

Perhaps the most important consideration in undertaking a mixed method approach is the way that qualitative and quantitative methods are combined (Brannen 1992, McDougall, 2006). As suggested by Creswell (2003), usually one approach will be given supremacy. Bryman (1998) offered three possible scenarios: quantitative over the qualitative; qualitative over the quantitative; and equal weight given to qualitative and quantitative. Where quantitative is more heavily weighted, qualitative studies are taken prior to or after the main quantitative study. It may form the basis for development of the research instrument or clarification of quantitative data. Where qualitative is more heavily weighted, a quantitative study can provide background data to contextualize small intensive studies; test hypotheses derived through qualitative methods or provide a basis for sampling and comparison. Where quantitative and qualitative are given equal weighting the two studies are considered as separate but linked, and can be performed simultaneously or consecutively. The processes may be linked at various stages in the research process and then integrated to formulate the final outcomes.

In the context of this research a mixed method, with equal value given to qualitative and quantitative studies, was considered the most appropriate. Justification is now provided. Firstly, in land administration research, mixed methods research has gained in popularity. Warnest (2005) and McDougall (2006) combined qualitative case study approaches with more quantitative questionnaires. Secondly, like McDougall (2006), the research questions identified in this research are difficult to answer through any single approach. A qualitative approach was deemed as the most suitable approach to addressing the “why do...” and “how should...”

questions, however, in order to measure the management of rights, restrictions and responsibilities, a quantitative approach seemed the only option. A mixed method approach would enable both types of questions to be answered and would consequently test the hypothesis. Thirdly, a mixed method approach would minimize the weaknesses of either single approach: the qualitative case study approach would provide the opportunity to investigate the context and requirements of government and individual properties in greater depth, whilst a quantitative study of the land administration systems would enable a broad understanding of the existing arrangements in practice. Finally, the mixed method provides the opportunity to investigate a greater diversity of perspectives. Both government perspectives and on-ground perspectives can be fed into the final design framework. This was considered important in validating the research findings.

PRACTICAL IMPLEMENTATION

Mixed methodologies are justifiable at a theoretical level; however, further discussion is needed regarding their application to this research. Figure 5.2 shows the mix of methods used in this research.

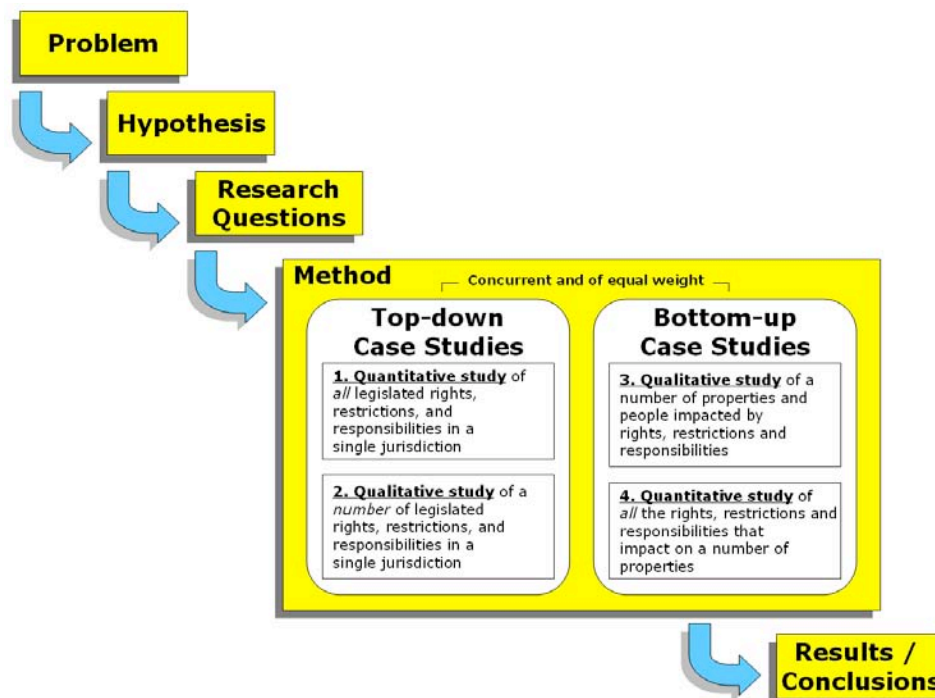


Figure 5.2: The research methodology in practice

The original research problem focused on the requirements of government and citizens. Two perspectives were required: top-down (or government) and bottom-up (or parcel level). Each perspective included a qualitative and quantitative study. Quantitative studies were used to answer the 'how many' research questions and the qualitative studies were used to answer the 'how should' research questions. Thus, the research design could be considered a two-by-two matrix; incorporating case studies from government and citizens' perspectives, each with a quantitative and qualitative component. All four studies undertaken were considered equal in weight. According to Bryman (1992) this meant that the studies could be considered as separate but linked and could be performed simultaneously or consecutively. The separate top-down and bottom-up case studies undertaken are now considered.

TOP DOWN CASE STUDIES

How should we organize the management of property rights, restrictions and responsibilities in a way that enables the achievement of sustainable development objectives by citizens and governments? The top-down case studies address this question from the perspective of government and land administrators.

To begin, a case study jurisdiction was required. The selection of the case study areas was based upon a number of criteria. Firstly, the jurisdiction needed to have policy commitments to sustainability management of land and natural resources and the implementation of such policies. Secondly, the jurisdiction needed to have an easily accessible legal system. Thirdly, the jurisdiction required accessible cadastral mapping, registration systems and institutions. Fourthly, the jurisdiction needed to be sufficiently developed in terms of technological capacity, with a commitment to implementing ICT, SDI and spatial information initiatives. Fifthly, the jurisdiction needed to be democratic with people actively engaged in law making and administration. Finally, the jurisdiction needed to be accessible to the researcher.

Australia, consisting of three formal levels of government, was the chosen jurisdiction. While most OECD countries matched the criteria, Australia was local to the researcher and would offer the easiest means of travel and repeat visits. Australia being a federation of states meant that both a state and local government jurisdiction would also be needed: all three levels of government can create interests over land (Figure 5.3). The state of Victoria and Moreland City Council were the chosen jurisdictions, again for accessibility reasons. New South Wales was nominated as an understudy should problems arise within Victoria. More details regarding these jurisdictions are provided in the following chapters.

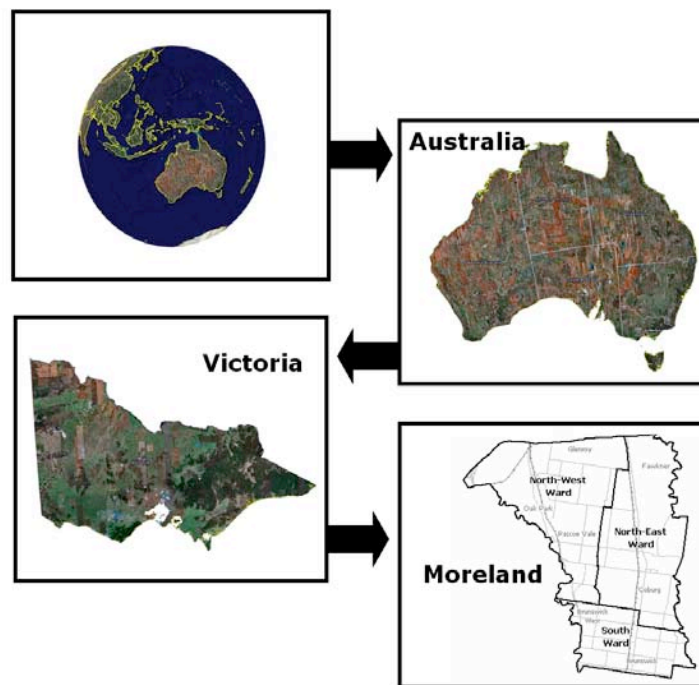


Figure 5.3: The overlapping case study jurisdictions

The ‘quantitative’ component of the top-down study required an analysis of ‘all’ legislated land interests in the study jurisdictions. This enabled a number of the quantitative research questions to be answered. The statute books for each level of government were analyzed with a view to identifying every piece of legislation that placed controls over, or affected land. This was the fastest and most comprehensive way to identify the majority of land interests within the jurisdiction. ‘Land

interests’ were defined broadly. If a formal interest existed between people and land and was supported by the jurisdiction’s people (through legislation) a land interest was considered to exist (see Chapter 1 definitions). A number of authoritative websites were used to access the statute books (Table 5.1) (Victorian Government, 2006; Australasian Legal Information Institute, 2006; Moreland City Council, 2006). As legislation was continually being created and updated, a specific ‘snapshot’ date was chosen for each jurisdiction.

Table 5.1: Statutes book analysis using authoritative websites

Level	Jurisdiction	Snapshot date	Website
Federal	Australian Government	23.08.2005	http://www.austlii.edu.au/au/legis/cth/consol_act/
State	Victorian Government	11.01.2006	http://www.dms.dpc.vic.gov.au/
Local	Moreland City Council	29.03.2006	http://www.moreland.vic.gov.au/publications/1policy-fr.htm

A two stage process was undertaken for each jurisdiction. First an inspection of each statute was conducted in alphabetical order, section by section, in order to determine whether a land interest existed within the statute’s text. This method had to be used as keyword searching through web based search engines was found to be unreliable: different Acts use vastly different terminology and language when referring to similar phenomena.

The second stage focused on the statutes where land interests were found to exist. For each land interest, the details in Table 5.2 were recorded in a Microsoft Access database. A defined set of possible values for each criteria ensured that comparative statistical analysis could be undertaken. The data recorded closely mirrored the high level legal, policy and tenure components of the land administration toolbox. In particular, the nature of interests in terms of objective, actions regulated, spatial extent, people impacted and duration were recorded (Appendix 1 provides more detail relating to the top-down quantitative studies).

Table 5.2: Data collected in the top-down quantitative case study

Category	Criteria	Alternatives
Policy level data	Policy origins	National, State, Local
	Driver for creation	Economic, Social, Environmental, Public Order, Industry Management, Tenure Organisation, Other
Legal level data	Legislative origins	National, State, Local
	Type of legislation drafted	Proscriptive, Descriptive, Performance based
	Period of creation	1900 → 2000
	Type of legal powers created	Access, Management, Exclusion, Withdrawal, Alienation
Tenure level data	Type of tenure created	Private vs. Public vs. Communal vs. Open Access
	Type of tenures impacted	Private vs. Public vs. Communal vs. Open Access
	Duration of tenure	Once, Short term, Set Period, Repeat, Ad-hoc, Not defined
Cadastral and registration data	Spatial extent of interest	Specific Parcel, Multiple Parcels, All Parcels, Point, Network, Polygon, Dynamic

The outcomes of this study were used to answer a number of the quantitative research questions: for example, the underlying reasons why land interests are created, how many land interests actually exist and how many different types of tenure exist. It also assisted in the creation of a preliminary classification scheme for land interests and gave some hints as to how legislation and policy should be designed in the future. To check the validity of the outcomes the same information would also be gathered from New South Wales (making four jurisdictions all up). However, this stage did nothing to indicate whether the interests were managed well or poorly. To make these kinds of assessments a qualitative study was utilized.

The ‘qualitative’ component of the top-down study was deeper but more targeted than the quantitative study. Resource limitations meant that this study was only carried out at the State level. This study helped answer the ‘how should’ questions: for example, what is the best way to create land interests? Or, how should technology be used in the management of land interests? Or, what is the role of the cadastre and registry in the management of land interests. A smaller number of statutes and their associated land interests were analyzed in more depth. The number selected was determined by resource and time limitations. The aim was to

understand the practical implementation of the statutes. Data collected included issues relating to registration techniques, mapping techniques, application of ICT and public access to information (Table 5.3). This phase required more than legislative analysis: government websites and other documentation were consulted. Scenarios were also used (i.e. live interactions with the particular system) (Appendix 1 provides more detail relating to the top-down qualitative studies).

Table 5.3: Data collected in the top-down qualitative case studies

Category	Criteria	Description/ Values
Cadastral and registration data	Allocation Method	Systematic, Sporadic
	Registration Method	Single Register, Multiple Registers, Negative Register, No Register, Torrens, Deeds, NA, Unavailable
	Relationship to the Cadastral Map	Parcel Based (Specific Parcel, Multiple Parcels, All Parcels), Non-Parcel Based (Point, Network, Polygon, Dynamic), Unavailable
	Relationship to Land Registry	Recorded in Registry, Link to Registry using ID, No Relationship, Unavailable
Institutional data	Type of Administration Body	Minister, Government Department, Local Council, Statutory Authority, Unavailable
	Enforcement body	Automated Online, Automated Onsite, Paper Based, Unavailable
	Update Method	Government controlled (systematic vs. on request), Private controlled (systematic vs. on request), None, NA, Unavailable
	Removal Method	Government (systematic vs. on request), Private based (systematic vs. on request), None, NA, Unavailable
	Appeals Process	Available, Unavailable, NA
	Private Sector Involvement	Public-Private Partnership, Private Sector Information Collection, None, Unavailable
Spatial and information technology data	Allocation Method	Systematic, Sporadic, Unavailable
	Registration Method	Single Register, Multiple Registers, Negative Register, No Register, Torrens, Deeds, Unavailable
	Update Method	On request, None, Unavailable
	Removal Method	Time Based, Request Based, None, Unavailable
	Level of ICT	Automated Online (full, partial), Automated Onsite (full, partial), Paper Based, Unavailable
	Information Access Price	Tax, Fee (licence and permits), Commission, Free, Unavailable

	Public Information Access	Yes (Online form, Offline form), No, NA, Unavailable
	Public Alteration of Information	Yes (Online form, offline form), No, NA, Unavailable
	Spatial Units	Parcel (Polygon), Network, Points, Lines, None
	Identifier	Parcel ID, Property ID, Council Number,
	Mapping Status	Complete Automated Online Map, Incomplete Automated Online Map, Automated offline Map, Paper Based Map, None

At the completion of the top-down studies an understanding had been gained of how government creates and manages different land interests. In addition, a growing understanding of the best ways to categorize and manage particular types of interests in order to achieve sustainability was emerging. However, as stated in the initial research problem, the issues relating to land interest management go beyond government: citizens and individual parcels must also be considered. The bottom-up case studies provided this perspective.

BOTTOM UP CASE STUDIES

How should we organize the management of property rights, restrictions and responsibilities in a way that enables the achievement of sustainable development objectives by citizens and governments? The bottom-down case studies would address this question from the perspective of individual parcels and citizens. Previous projects dealing with the management of land interests have concentrated on government driven management solutions. While this is important, it is also necessary to consider the end-users requirements.

Rather than investigate the whole jurisdiction, the bottom-down case studies involved analysis of a much smaller area of land, typically a property or parcel. For each property, both a quantitative and qualitative study was undertaken. This quantitative component would enable a number of the ‘how many...’ research questions to be answered. For example, how many property rights, restrictions and responsibilities impact upon individual properties? The qualitative component

would enable the 'how should' questions to be answered. For example, how do we make legal rules acceptable to the community and impact on human behaviors? The results would also provide checks and validations of the findings arising from the top-down case studies.

The bottom-up case studies could be undertaken in one of two ways: individual property inspections of a small number of properties or a broader survey of many properties. The first option was chosen. It was decided that it would be very difficult to determine which properties and how many should be studied. Additionally, it is doubtful whether a clear understanding of the complex on-ground system could be gained using a broad study (Ting, 2002) and this was fundamentally the aim of the bottom-up studies.

The selection criteria for the bottom-up cases were based upon a number of conditions. Firstly, the property/parcel had to lie within the same jurisdiction as the top-down studies. Otherwise comparisons between results would be meaningless. Secondly, basic documentation relating to the property needed to be available before commencement. Basic documentation was defined as a property title and planning zone information. Thirdly, permission from the owners and primary users of the land to access the parcel/property was required. As this was the only key interaction with the property owner no further ethical considerations were required. Fourthly, each property needed to be unique in its location and use. A better understanding of the bottom-up requirements could be gained by using a range of different cases including urban land, rural land, recreational land, coastal land et cetera. Finally, the property needed to be accessible to the researcher.

Four case study sites were chosen: a dense inner urban property, a medium density property, an agricultural property (dairy), and an isolated rural/recreational property (Figure 5.4). This was considered to be a good range of properties and also fit with the time and resource limitations of the researcher. Three properties were based in Victoria and one in New South Wales.

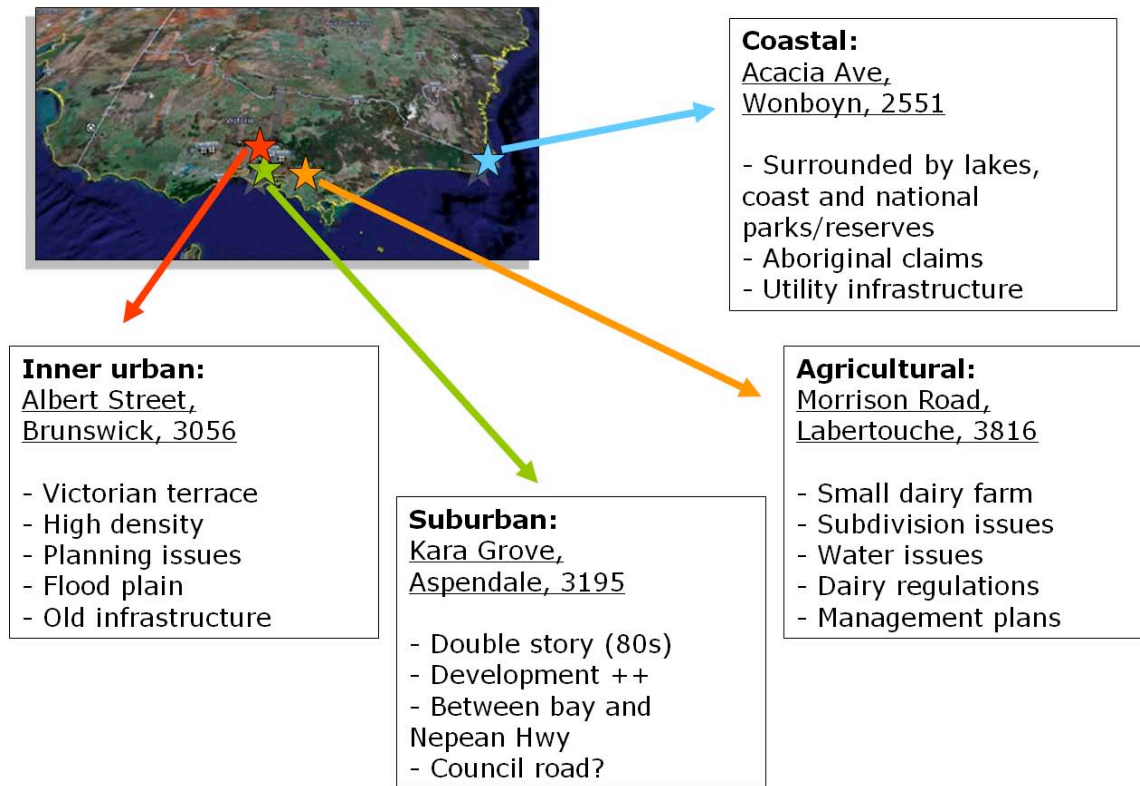


Figure 5.4: The bottom-up case study properties

The ‘qualitative’ component of the bottom-up case studies involved a number of steps (Table 5.4). Firstly, a study of the social, environmental and economic context of each site was undertaken. This involved consulting authoritative websites, government reports and newspaper articles. Secondly, the surrounding parcels and features site were studied. This involved visiting the area and recording visible features of interest. Thirdly, the property itself was visited. Boundaries, dwellings, easements and other visible features were noted. Fourthly, all available documentation relating to property rights, restrictions and responsibilities was collected from owners. A range of different documents was made available at each property. Finally, existing online and offline services for identifying interests on land were utilised (Appendix 2 provides more details relating to the bottom-up qualitative studies).

Table 5.4: Qualitative study for each bottom-up case study

Steps	Resources
1. Analysis of site's surrounding social, environmental and economic context	Local government websites, books, government reports, newspapers, independent reports
2. Analysis of parcels and key features surrounding each site (onsite visit)	Local government websites, State government websites, newspapers, other websites
3. Analysis of site (onsite visit). Boundaries, dwellings, easements and other visible features were noted	Certificate of title, owner compiled documentation (utilities etc.)
4. Analysis of site basic site related documents.	Planning certificate, other owner compiled documentation
5. Analysis of existing online and offline services for identifying interests on site.	Local government websites, State government websites, Service provider websites

This process resulted in a very strong understanding being formed of the properties' context, problems and related land interests. It enabled an understanding to be gained of important land interests and land information/transaction provision issues for different types of parcels.

The 'quantitative' component of the bottom-up studies served a number of purposes. Along with answering some of the 'how many...' questions, it also showed the gaps of the qualitative study. The qualitative study only showed what interests could be observed on the property (and in the documents obtained from websites/owners), it did not uncover all of the interests which applied and could potentially apply to the property. The only way to discover this information was to review the database of legislation compiled in the top-down case studies. The database was used to assess which statutes applied to the individual property and the amount of impact they might have. Table 5.5 shows the data collected (Appendix 2 provides more details regarding bottom-up quantitative studies).

Table 5.5: Data collected in the bottom-up qualitative studies

Data collected	Sources
Number of statutes impacting	National, State and Local statute database
Number of tenures across property	National, State and Local statute database
Number of institutions involved in the administration	National, State and Local statute database
Number of offline/online information services	National, State and Local statute database
Number of interests not identified in qualitative study	National, State and Local statute database

PROCESSING RESULTS AND MAKING CONCLUSIONS

The fifth and final phase of the scientific method involves analysing the results, answering the research questions and consequently making conclusions about the hypothesis (Figure 5.5).

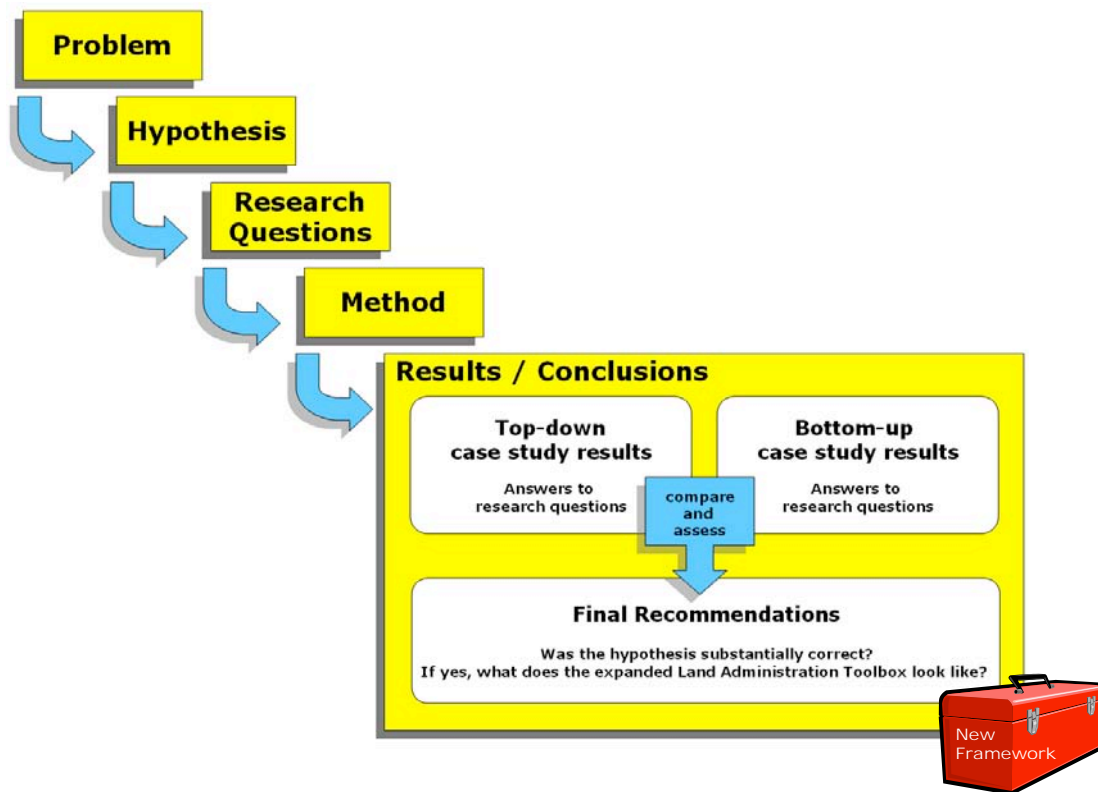


Figure 5.5: The results and conclusions phase of the scientific method

First, the results from the equally weighted case studies were used to answer each of the research questions. The results of these case studies and answers to the research questions are presented in Chapters 6 and 7. Second, the answers were tested or checked. As discussed earlier the research design was a mixed methodology and was therefore self-testing. Using two perspectives (top-down and bottom-up) meant each could be used to test the results of the other: the research loop could be closed. By comparing the results from the two perspectives, ideas

were tested and differences and agreements were identified. Areas of agreement could be considered points of truth. Areas of disagreement could be considered unresolved: no certainty had prevailed. After this analysis the resulting set of robust answers were compiled and the hypothesis had been tested: it was now clear which ideas and principles would improve the management of property rights, restrictions and responsibilities and consequently assist the achievement of sustainable development objectives by citizens and government. This discussion is undertaken in Chapter 9. Finally, the answers to the research questions were organized into a conceptual framework: an expanded toolbox for managing property interests could be articulated. The original components of Williamson's (2001) model were used as a basis and all new components, concepts, principles and tools were included. This new framework and its components are introduced in Chapter 8.

LIMITATIONS AND ETHICAL CONSIDERATIONS

While the research design has been fully justified in this chapter, it is worth noting a number of limitations. These are predominately time and resource constraints. Firstly, no case studies were conducted outside Australia. An in-depth case study of a Western European or North American jurisdiction would have provided additional validation of the Australian case study results. Many Western European (e.g. Netherlands) jurisdictions have highly accurate and relatively complete cadastres and provide alternatives for holistically management of land interests. North American jurisdictions (e.g. Canada) have common law legal systems and are federations of states like Australia: such a jurisdiction would have provided for a good comparison. Secondly, no in-depth studies of emerging users and land information providers were conducted. Emerging users include the utility, development, finance and insurance sectors, local councils, emergency services and agriculture. These case studies could have concentrated on identifying the information needs of each sector and determining innovative tools for the management of restrictions and responsibilities. Industry bodies could have been surveyed to gain an understanding of information needs. Individual organizations could have been consulted to assess any innovative management solutions. Perhaps

these limitations could be used as starting points for future research in the area. In relation to ethics, because no responses from people were directly analysed or published throughout the research ethical considerations were not relevant.

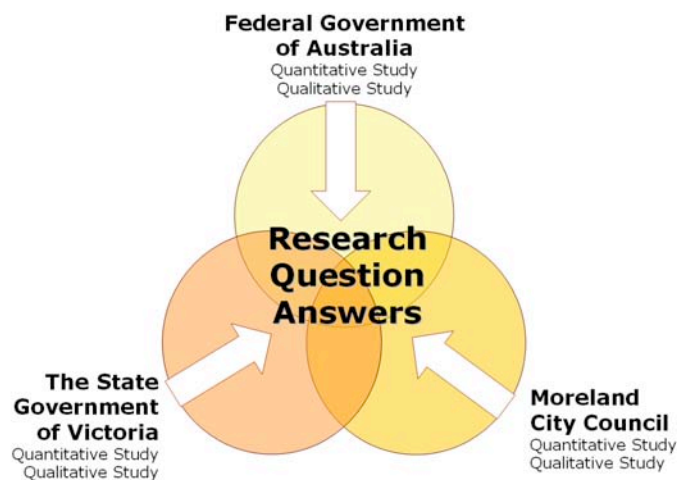
CONCLUSIONS

This chapter fully outlines and justifies each component of the research design. The scientific method was used to guide the design process. The first stages involved developing the research problem and hypothesis, using background research. The research hypothesis led to the creation of a number of research problems, all of which needed to be answered in order to test the hypothesis. A mixed methodology involving both qualitative and quantitative studies was required to answer the questions. Top-down (government) and bottom-up (parcel) perspectives were also required to answer the range of research questions. Together, the results from these equally weighted case studies would be used to test the appropriateness of the hypothesis and to generate components of an updated land administration toolbox, one capable of managing all interests in land. The following two chapters provide the results of studies undertaken in accordance with the research design.

CHAPTER 6

THE TOP-DOWN PERSPECTIVE

Australia's abundance of land law coupled with its emerging desire to achieve sustainable development objectives and a position as world leader in technical land administration systems made the country an ideal case study for the research problems and questions upon which this thesis is based. By first approaching the problem from a governmental top-down perspective the true size of the problem could be ascertained. How the situation might be improved from the perspective of government could also be determined. This chapter presents the results of qualitative and quantitative studies undertaken on Australia's three levels of government. The results from each study are provided separately before a final summary of findings and how they address the research questions is presented.



INTRODUCTION

The Australian continent has always been a land governed by many laws. Prior to European settlement, more than four hundred indigenous communities applied their own customary laws across the land. Some communities were nomadic whilst others were more fixed in their location. Boundaries between communities were fuzzy and use patterns were cyclical. Each community possessed unique languages, social norms, rituals and ways of living in harmony with the land and their laws flourished for over forty thousand years.

In the late eighteenth century the English settled in Port Jackson and began imposing their style of law upon the land. In the decades that followed many colonial outposts were established along the eastern and southern coastline. The continent was being carved up: this time with straight lines of latitude, longitude and precise parcel boundaries. Large distances between the colonies and London meant that colonies needed to govern themselves: between 1855 and 1890 the six major colonies gained their own governments and began creating their own laws. Another level of government had also emerged. These bodies were more local in nature and formed from the ground up as communities sought to control planning and the development of infrastructure in their local areas. Whilst they lacked resources they too possessed the power to create laws over land. By the early 1890s there was a push to unite Australia's colonies and on 1 January 1901 a federal system was established. The new Commonwealth of Australia consisted of six States, with the later addition of two self governing territories. A federal government was also established. Its primary responsibilities were national security, trade and the economy; however, by the late twentieth century its role had increased and it too was creating laws affecting land.

By the start of the twenty-first century Australia's three levels of government were all contributing to the masses of rights, restrictions and responsibilities that existed over land. Australia's abundance of land law coupled with its emerging desire to achieve sustainable development objectives and a position as world leader in

technical land administration systems made the country an ideal case study for the research problems and questions upon which this thesis is based. By first approaching the problem from a governmental top-down perspective the true size of the problem could be ascertained. How the situation might be improved from the perspective of government could also be determined. This chapter presents the results of qualitative and quantitative studies undertaken on Australia's three levels of government. The results from each study are provided separately before a final summary of findings and how they address the research questions is presented.

THE FEDERAL GOVERNMENT OF AUSTRALIA

OVERVIEW

The Australian Government is the only legal body that can create rights, restrictions and responsibilities applicable in all areas of Australia. A quantitative study was conducted on the land interests within this jurisdiction. The study explored all active land-related legislation with a spatial footprint to answer questions concerning numbers and typologies of policies, statutes and tenures. However, qualitative analysis was also used to consider the context in which the government's administrative arm operates.

Australia is a 7.7 million square kilometer island situated in the southern hemisphere. The tropical archipelagos of south-east Asia lie to the north, the vast Pacific and Indian Oceans wash against her east and west coast respectively, and the Southern Ocean rolls largely untamed to the south. Australia claims a large portion of these oceans and the many islands such as Norfolk and Christmas that sit within them. The main land mass is highly diverse: tropical in the northern regions and more temperate along its southern and eastern coasts. The coastal areas are fertile; however, farming and deforestation have produced high levels of salinity. Within a few hundred kilometers of most of its coast Australia becomes a very dry

place. Well over half the land is considered arid and the continent has one of the lowest rainfalls in the world.

Australia has a small, but diverse, population of just over 20 million people. Historically, Aboriginal communities lived across the entire continent; however, the new European settlements were concentrated in coastal areas. This trend remains with populations clustered in cities along the eastern coastline. The population is increasingly well educated with large percentages holding secondary and tertiary education. Economically speaking, Australia fared well in the late twentieth and early twenty-first century. It enjoyed high-growth, low inflation and low interest rates when compared with other periods. However, rising oil prices and the US sub-prime mortgage crisis were beginning to impact on these indicators by late 2007. Great quantities of natural resources and high levels of ecological biodiversity have always been its strongest economical assets.

Governance is complex in Australia. The country is a federation and responsibilities are spread across three levels of government: federal, state and local. The first case study concentrated on the federal level. The federal government is known as the Australian Government. The Constitution of Australia, enacted in 1901, established a government which is elected by and accountable to all citizens within the jurisdiction. Under the Westminster system, the separation of legislative, judicial and executive powers exists to enhance the accountability of those elected.

Legislative power, the power to enact laws, is carried out by two levels of parliament: a lower house which mainly designs bills and an upper house which passes them as legislation. In recent times the amount of legislation passed by parliament increased dramatically. An investigation into the regulatory environment in Australia by the federal government's Regulation Taskforce found that the Australia Parliament passed more legislation since 1990 than in the first ninety

years of federation (Regulation Taskforce, 2006). While not explicitly empowered by the constitution, the Australian parliament does create, and has created, various property interests relating to land.

Judicial power, the power to interpret the laws and to judge whether they apply in individual cases, is carried out by a complex system of common law courts. The highest court in Australia is the High Court which deals with constitutional matters and has the power to create interests over land through interpretation of legislation. Court decisions can force parliaments to design new legislation. A recent and well publicized example is the 1992 *Mabo vs. Queensland (no 2)* case which resulted in native title being recognized for the first time since European settlement. The Australian Parliament responded by enacting the Native Title Act 1994.

Executive power, the power to carry out and enforce laws, is held by ministers mainly from the lower house of parliament (The House of Representatives). Administrative tasks are delegated to a public service. The size and responsibilities of ministerial portfolios change regularly. In April 2007 the ministerial portfolios included: Agriculture, Fisheries and Forestry; Attorney-General's; Communications, Information Technology and the Arts; Defence, Education, Science and Training; Employment and Workplace Relations; Environment and Water Resources; Families, Community Services and Indigenous Affairs; Finance and Administration; Foreign Affairs and Trade; Health and Ageing; Immigration and Citizenship; Industry, Tourism and Resources; Prime Minister and Cabinet; Transport and Regional Services; Treasury; and Courts. Many of these departments administer the land interests created by the federal houses of parliament.

Land administration in Australia has always been the responsibility of the states. It is likely that federation would never have occurred had the states been required to relinquish the power to administer tax land. For this reason there is no reference to land in the Australian Constitution and there is no ministry dealing with land or

land administration at the federal level. The expertise for designing and managing cadastres, tenure systems and valuations systems all exists at the state level. It might be expected that the states would account for the majority of taxation revenue as they collect most land related revenue. However, the Commonwealth dominates with respect to revenue because income tax, by far the largest component of total taxation revenue, is levied federally within Australia. The Australian Government collects almost 80% of the country's total taxation revenue, meaning the remaining 20% is collected between six state governments, two territories and hundreds of local governments. So the Australian government has large amounts of revenue but far less power to regulate and administer the use of land. Consideration is now given to the quantitative component of the study.

QUANTITATIVE RESULTS AT THE FEDERAL LEVEL

The results of the quantitative study are now discussed (Appendix 1 provides actual study data). Despite the states having great control over the administration of land, the research reveals that the Australian Government plays a role in the creation and administration of many land interests. Figure 6.1 presents the total number of active Acts within the Australian Statute books (1427) alongside the number of Acts which allow for the creation of some kind of land interest (514): more than a third of all Acts create some kind of interest over land. While many of the statutes make no mention of "land" or "parcels" they do create interests in land. Examples are discussed below.

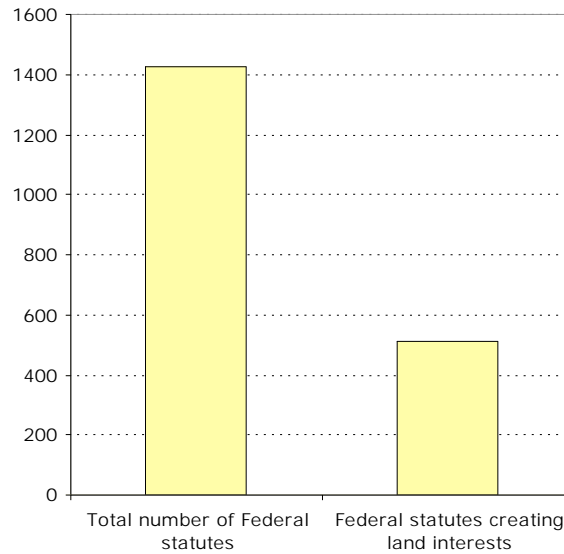


Figure 6.1: Federal statutes creating interests over land

The rate at which the Australian Government is creating land interests is increasing. Figure 6.2 shows the amounts of active legislation per decade that created land interests. The amount of legislation has grown steadily each decade since the 1960s. On current trends the first decade of the twentieth century will see more land related legislation being produced than in any other decade. One reason for this is the increasing involvement of the Federal government in environmental and social issues. Many of these issues require national input and coordination to be successful: environmental systems such as water catchments and river systems do not adhere to the straight lines of state boundaries. A prominent example was the Federal Government's vetoing of the Tasmanian State Government's plan to dam the Franklin River in 1983. More recently, in early 2007, the Federal Government released its \$10 billion plan to federalize the management of all water resources. Importantly, the study only considered active legislation: superseded legislation or those no longer in use were not considered. Therefore, fewer statutes would be expected in the earlier decades.

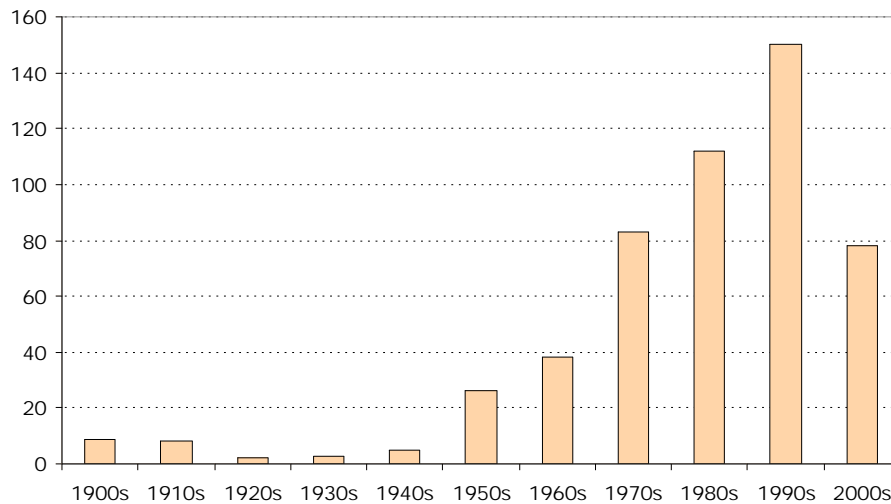


Figure 6.2: Federal land interests by decade of creation

The policy drivers that lead to the creation of land interests can be grouped into six categories: economic growth and savings, social equity, environmental conservation, tenure organization, public order and industry management (Figure 6.3). By far the most predominant driver was ‘economic’ (+160 statutes). These interests are created with the intention of using land and natural resources for the generation of wealth at individual and wider community levels. Examples include interests dealing with minerals, bounties, petroleum, the radio-spectrum, excises, customs, exports, and grants to States and territories. Whilst not traditionally perceived as property interests, all these interests have a spatial footprint and therefore impact on land in some way. As one of the Federal Government’s main responsibilities is macroeconomic management this result was not unexpected.

All other drivers were relatively equal in number (~50 to 80). ‘Tenure organization’ statutes manage the creation, variation and removal of the various public and private tenures. Examples include legislation allowing the government to acquire private land, and legislation creating the jurisdictions of Antarctica and States, and Papua New Guinea. ‘Social equity statutes’ are created to protect cultural landmarks and ensure fair access to land, natural resources and housing. Examples include native

title, housing assistance and social heritage statutes. ‘Public safety and order’ statutes are intended to control public behaviours and promote safety within the community. Examples include statutes dealing with road transport, aviation security, explosives and quarantine. ‘Industry management’ statutes manage the land and non-land based activities of different industries. The industries of dairy, fisheries, health, medical research and telecommunications all have specific land related legislation. ‘Environmental management’ interests emerged after 1975 and aim to conserve, protect and regenerate the flora and fauna of the natural environment. Examples include statutes for the protection of biodiversity, oceans, agriculture, the ozone and forests. A small number of statutes (3) did not fit readily into any category.

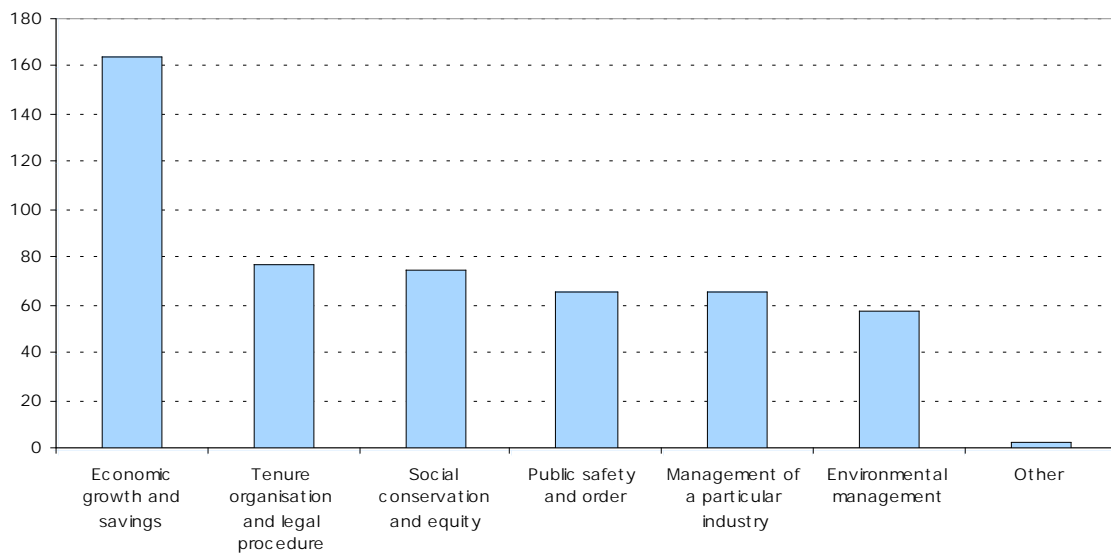


Figure 6.3: Policy drivers behind the creation of land interests at the federal level

The types of power created by each statute was also assessed (Figure 6.4). Ostrom and Schlarger’s (1992) model, discussed in Chapter 2, was found to be a useful tool for classifying powers. The weakest, ‘access’, enables users to enter a defined physical area and enjoy non-subtractive benefits. It was evident in only a small number of Acts: for example, those restricting entry by citizens onto public national parklands or a government agent entering private land. ‘Management’ powers, the ability to transform a resource by making improvements or regulate use patterns

that occur on the resource, made up a significant number of interests (over 150). Examples include the protection of vegetation on public lands within states. ‘Withdrawal’ powers, the ability to obtain resource units or products from the land or resource, account for the most number of statutes. This finding is consistent with the role of economic drivers, which motivate land interest creation at the federal level. The result is inflated because a range of tariffs and excises are also included as land interests. ‘Exclusion’ powers, the ability to determine who will have access rights and withdrawal rights, and how those rights may be transferred, make up only a small number of statutes. ‘Alienation’, the ability to sell, lease or mortgage management and exclusion rights, also made up a significant amount of statutes: An example includes the Federal Government’s ability to acquire any privately held lands. Importantly, where a statute included multiple powers, the higher power was listed. This may explain why the numbers of ‘access’ and ‘exclusion’ interests are so low. For example, many statutes dealing with Exclusion will also allow a government agent to alienate the land.

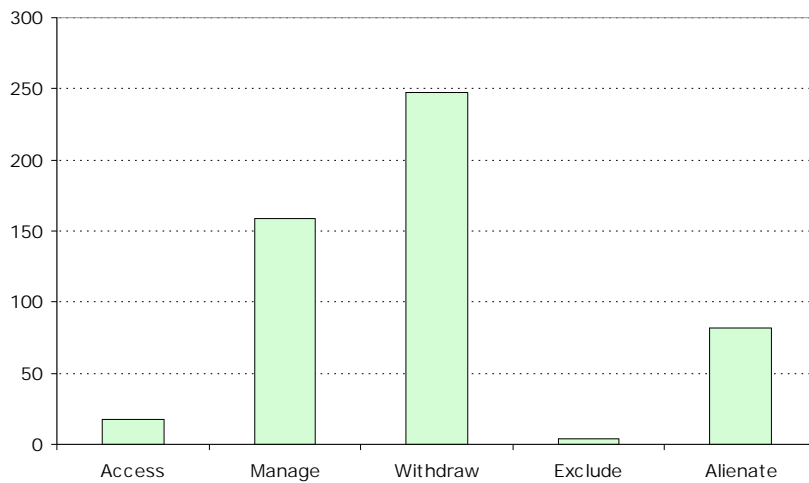


Figure 6.4: Types of powers created by the land related statutes

The study also considered the period of time for which the interest applied (Figure 6.5). Four typologies emerged: ‘once’, ‘repeat’, ‘ad-hoc’ and ‘indefinite’. Interests that apply ‘once’ are usually created for a specific purpose or for a short term or set period: for example, statutes that transfer public assets to private organizations. ‘Repeat’ interests apply for a specific period at the same time every year or cycle:

for example, periodic licences to mine for petroleum or natural gas. A large number of statutes (+120) have this characteristic. ‘Ad-hoc’ interests begin and end at any time desired by the participating parties: for example, tariffs, excises and grants for land activities. A large number of statutes also have this characteristic (+110). ‘Indefinite’ or ill-defined interests are established without a sunset clause: for example, land interests dealing with anti-nuclear activities. Ill-defined durations made up the largest numbers of statutes. A reason for this is poor legislative design rather than a desire for the interest to last indefinitely.

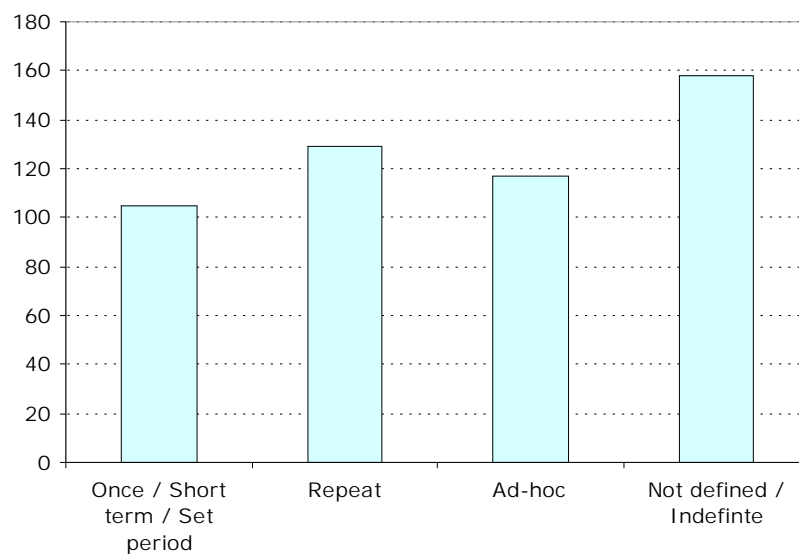


Figure 6.5: The duration of land interests created in federal statutes

The study also considered the type of tenure created by each statute. This component was divided into two parts: those parties ‘benefiting’ from the interest and those parties ‘bound’ by it. Although the standard tenure model has limitations it was used to assess the tenure created. Four typologies were evident: ‘private’, ‘government/public’, ‘communal’ and ‘open space’. Another typology labeled ‘all interests’ was included to recognize that some interest can apply to multiple tenures, such as the ability of the federal government to acquire any land regardless of tenure. ‘Private’ interests are those that apply to privately owned property and other subclasses of private property such as leased land, mortgaged land and land held in trusts. Examples include land conservation agreements between the

government and private land holders. ‘Public’ or Crown interests apply to public lands including land held by statutory authorities, government departments, local councils and other non-private bodies: For example, land held by a government agency. ‘Communal’ interests only apply to land occupied or used by a community: For example, restrictions on the sale of native title land. ‘Open space’ interests apply to unclaimed land, open space or another jurisdiction. By definition no interest can be readily enforced in such areas.

The study showed that most statutes created at the federal level benefit the Crown: over 350 of the 514 Acts created powers over land for the Crown. Private and communal interests made up much smaller numbers (Figure 6.6). With respect to those bound by the federal interests (Figure 6.7) the restrictions were more evenly spread: crown (over 200), private (180) and all (about 100) were impacted heavily.

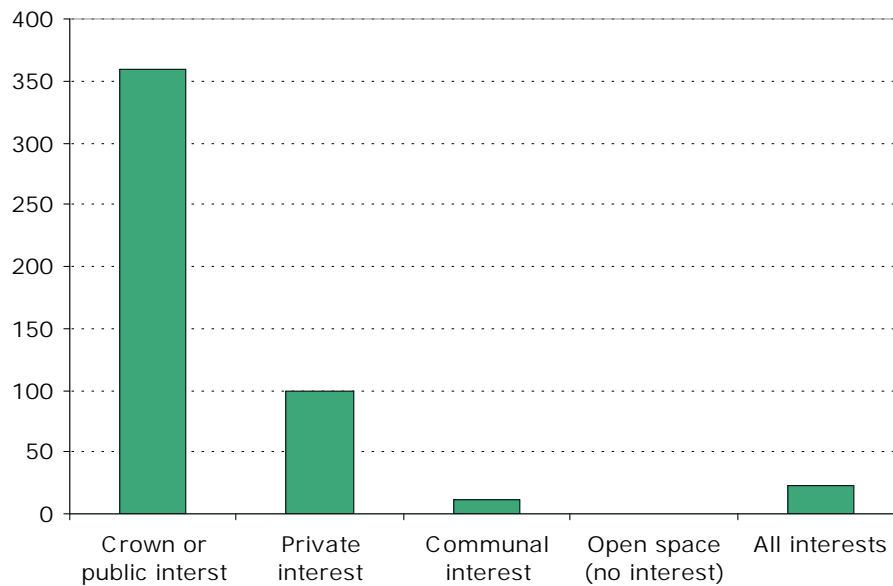


Figure 6.6: Benefiting party from federal statute land interests

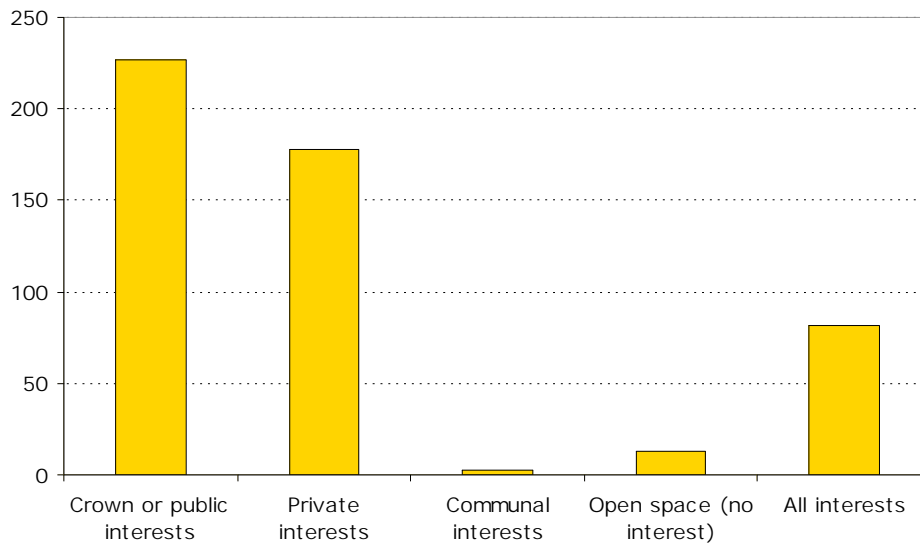


Figure 6.7: Parties bound by federal land interests

The study also considered the spatial extent of the interests (Figure 6.8). Each interest can be classified first as either ‘parcel’ or ‘non-parcel’ based. Even though the cadastre is primarily a tool of the states, the federal level makes use of parcels, more specifically addresses, when creating restrictions. The majority of interests at the federal level were found to be parcel based (350 out of 514). Three types of parcel based interest were evident in the legislation: ‘specific’, ‘patchwork’ and ‘blanket’. ‘Specific’ interests apply to a specific parcel or small number of parcels located within a small geographic area. ‘Patchwork’ interests may or may not apply to a given parcel or may apply to every parcel within a jurisdiction, but, be applied differently in each case, for example, heritage interests. ‘Blanket’ interests are those that apply to all parcels uniformly across the whole jurisdiction: for example, the ability of the federal government to acquire any parcel of land they desire for the greater good of community.

A good deal of land legislation makes no mention of parcels or cadastres at all, instead dealing with non-parcel interests. Non-parcel based restrictions emerged more recently and may be identified by coordinates using the spatial components: points, lines and polygons. ‘Point’ interests are those that apply to non-real property

or specific points rather than a parcel. ‘Network’ or line interests apply to infrastructure networks rather than the parcels they overlay. ‘Polygon’ interests apply to natural boundaries or administrative boundaries other than ownership parcels.

Interestingly, over 40 interests did not have a ready means of describing their spatial extent. This tends to suggest poor legislative design. Additionally, the greater majority are parcel based, suggesting it would be easy to incorporate and integrate their management into the existing cadastre. Non-parcel based interests appear much smaller in number, however, there are still well over one hundred.

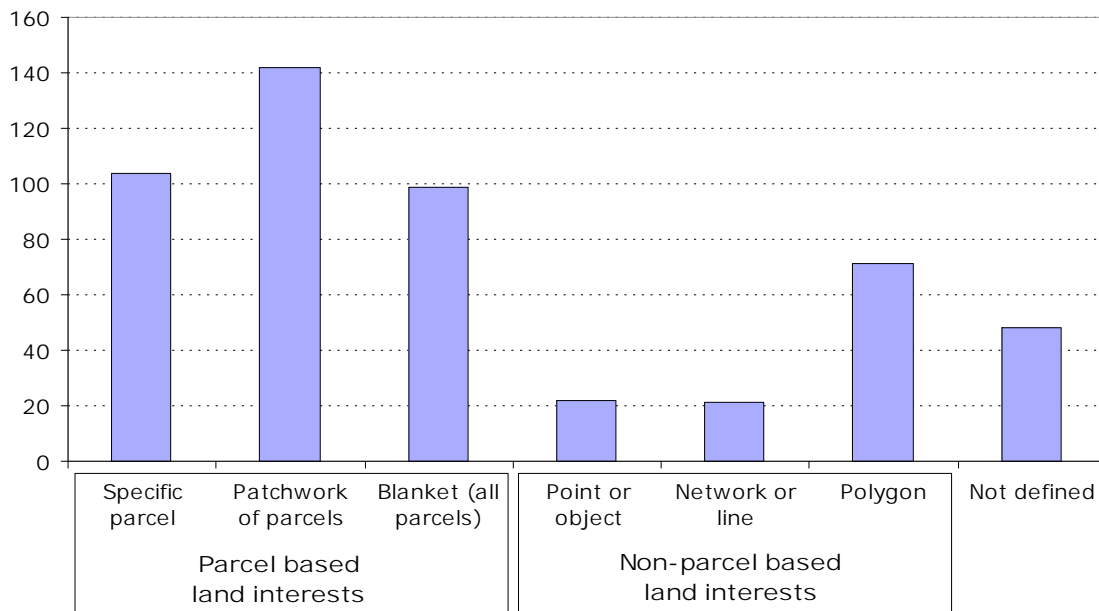


Figure 6.8: The spatial extent of federal land interests

QUALITATIVE RESULTS AT THE FEDERAL LEVEL

The quantitative component of the study looked at policy, legal, tenure and some spatial aspects of federally created land interests. As discussed in the previous chapter, time limitations meant that a more qualitative analysis of each interest with respect to the other toolbox items including cadastral arrangements, institutional arrangements, SDI and technological arrangements and capacity building elements was not possible. However, through studying existing documentation and

publications an understanding of these components was established (Appendix 1 provides more details).

With respect to the cadastral mapping, institutions and capacity building components of the land administration toolbox, the Australian government exhibits very little evidence of organized management of land interests. All private and public ownership land interests are administered at the state level: the federal government has no single database detailing who owns what land in Australia. This includes federally held land. The main government department dealing with land and spatial information was the Commonwealth National Mapping Division, formerly known as AUSLIG, which was responsible for doing the large surveys of the continent post WWII throughout the 1960s and 1970s. However, these surveys related to small-scale topographic maps, not cadastral boundaries. The division is now structured within GeoScience at the Department of Industry, Tourism and Resources (DITR).

Other prominent departments dealing with land interest information are the Department of Agriculture, Forestry and Fisheries (DAFF), Department of Industry, Tourism and Resources (DITR) which incorporates GeoScience Australia, Department of Environment and Water Resources (DEWR) and the Department of Education, Science and Training (DEST), which incorporates the CSIRO. These departments and the agencies within them collect and maintain large amounts of land information; however, the information tends to be related to the management of natural resources on a smaller scale: it deals with the physical characteristics of land rather than large scale parcel information. The federal government conducts a population census every five years which produces important demographic information required by all levels of government, however, state government provide much of the land and property information required to perform the census.

Despite this lack of expertise in dealing with large scale cadastral and land information within the federal government, there are many national institutions that deal with land mapping and cadastral issues. These bodies tend to collaborate between different levels of government, forced by duplication of roles, and may include representatives from private industry and academia. The peak forum for inter-governmental issues is the Council of Australian Governments (COAG). It comprises the Prime Minister, State Premiers, Territory Chief Ministers and the President of the Australian Local Government Association (ALGA). COAG initiates, develops and monitors policies of national significance which require cooperation between Australian governments. Examples relevant to the management of land interests have included the competition policies, gas reform, electricity reform, water reform, environmental regulation, bushfire management and the administration of the vast Murray Darling basin. Land management is an issue of national importance and this is now recognized through COAG. However, the process for forming and creating agreements is lengthy. Debate continues as to the role that the federal government should take on land and natural resources.

Reporting to COAG are forty-two ministerial councils. Most of these require or generate spatial information. Examples include: Ministerial Council for Police and Emergency Management; Great Barrier Reef Ministerial Council; Wet Tropics Ministerial Council; Australian Transport Council; Regional Development Council, Primary Industries Ministerial Council; Natural Resource Management Ministerial Council; Ministerial Council on Mineral and Petroleum Resources; Local Government and Planning Ministers' Council; and Environment Protection and Heritage Council. Despite the need to organize all the information relating to land and resources, COAG had, until recently, been unable to recognize the problem. However, in 2007, two land information initiatives relating to all the councils: 'National addressing' and 'Information Exchange'; were put on the COAG agenda.

At a more practical level, The Australian and New Zealand Land Information Council (ANZLIC) act as the peak intergovernmental council for land and spatial information in Australia and New Zealand. Membership of ANZLIC includes representatives from all jurisdictions and a representative from the Commonwealth. It coordinates and unites the views and interests of spatial data users and providers across government; however, it does not report to any Minister and cannot impose its policies. With respect to land interest management it maintains a sub committee dealing with land administration issues: The Standing Committee on Land Administration (SCOLA) was established in 2002 when ANZLIC sought to take a lead role in national land administration reform and the provision of greater access to information on rights, obligations and interests. To date SCOLA has concentrated on articulating the problem:

“All land rights, obligations and restraints are legislatively based and include the broad themes of land, water, vegetation, native/indigenous title, biodiversity, petroleum exploration, mining and minerals exploration in both terrestrial and marine environments. These property rights, obligations and restrictions and associated constraints such as native vegetation conservation are increasingly becoming major public issues in all jurisdictions. Certainty good management of property rights is one of the key factors underlying the entire economy. As the arena of property rights becomes more and more complex, that level of certainty is being eroded and there is increasing pressure on the existing Torrens System, which primarily provides information about title in land.

It is clear from research already undertaken that there is a lack of awareness within the property industry of the extent of interests in land that are not shown on the Certificate of Title. This issue is exacerbated by the fact that there is no effective mechanism for the discovery of interests. State and territory jurisdictions tend to have separate databases, sometimes spread over different departments within the

same jurisdiction, to record the various interests in a single parcel of land. Few, if any of these databases use consistent models to record the information.” (ANZLIC, 2004)

ANZLIC provides national exposure for the problem of land interest management; however, it does not have the power to enforce its standards and decisions. Additionally, it is yet to put forward any framework or strategy for improving the situation. However, in late 2007 it released a project tender aimed at delivering such a strategy.

ANZLIC also provides an overarching framework for other relevant coordinating bodies such as the Intergovernmental Committee for Surveying and Mapping (ICSM) and the Public Sector Mapping Agencies (PSMA). ICSM undertakes the development of national geodetic, topographic and cadastral standards and reports to the ANZLIC Council. PSMA formed from an intergovernmental consortium in 1993 and was formally incorporated in 2001. It includes all public-sector mapping agencies of the federal, state and territory level and aims to integrate the best available data for national digital map bases including parcel and transport layers. All these products are highly relevant to the management of land interests. PSMA and its accompanying datasets provide a good starting point for the spatial enablement of land interest management at the federal level.

At a federal level, the SDI and spatial technology components have received more attention than any other elements of the land administration toolbox. Commonwealth coordination of land related information commenced as early as 1983; although the effectiveness of these early activities were limited due to a lack of focus on technical issues. In the early 2000s the Office of Spatial Data Management (OSDM) was created to facilitate the implementation of whole-of-government spatial data policy, particularly access and pricing policies. However,

the body had limited powers and dealt broadly with the coordination of information rather than focusing specifically on land rights, restrictions and responsibilities.

By the mid 2000s, OSDM was working closely with ANZLIC, PSMA and ICSM in supporting the push for a national SDI. The integration of property interest information was only one small component of this vision. The bodies were providing national leadership for spatial information and various elements of SDI development. ANZLIC maintained dedicated standing committees working towards the ASDI and development of nationally agreed policies for the management of spatial information. However, the impact of many of these developments could be considered minimal.

In 2007 SDI developments were re-energized at the federal level. The concept of a spatially enabled government was picked up by Gary Nairn, Special Minister for State. Through AGIMO (Australian Government Information Management Office), he articulated a vision for the future use of spatial information across the federal government in administration and decision making. The prominence of these developments also meant the two initiatives in spatially enabled government made it onto the COAG agenda. At the time of writing these developments and their impact on current SDI arrangements at the federal level were still unclear.

SUMMARY

In summary, although the administration of land is primarily a state responsibility, Australia's federal government has created and now administers a large number of land interests. This is largely because it is the only government capable of governing across all administrative boundaries: land issues are continuous; they do not stop at state borders. Additionally, unlike other levels of government, the federal level has the financial capacity to take on new areas of administration. However, the overwhelming amount of land administration is not performed at the federal level.

The federal level often lacks the capacity to design policy and legislation for large scale cadastral data. Moreover, the majority of interests created at the federal level are incidental: their creation is usually a result of an attempt to administer some other activity. The majorities of interests relate to tax collection or grant allocations: they have little impact on parcels or day to day land based activities. However, federal level involvement in SDI coordination activities since the early 1980s has created a strong platform for future integrated management of property rights from both state and federal administrators.

THE STATE GOVERNMENT OF VICTORIA

OVERVIEW

The State of Victoria is the smallest of the mainland states. Located in the south-eastern corner of Australia, it is roughly the shape of an isosceles triangle turned on its side in a clockwise direction. The long northern edge is a mix of physical and measured boundaries: the Murray River and the Allan-Black survey line separate the state from New South Wales. The long southern edge is coastline and fronts onto the waters of Bass Strait and the Tasman Sea. The two edges converge at an isolated strip of pristine coastline, not far from where Cook first spotted the continent at Point Hicks. The short eastern edge is an imaginary line. It divides Victoria from the state of South Australia.

Economically speaking, Victoria has experienced a series of extreme booms and busts since it was declared an official colony in 1851. Its western plains have always provided rich pastoral and agricultural lands. In 1851, gold was discovered in regions to the north of Melbourne and many people were made wealthy. Melbourne remained the financial and manufacturing capital of Australia for the rest of the century. While these industries continue to play a large part of the national economy, the oil and natural gas reserves offshore are now a significant source of

wealth. Melbourne is a strong economic centre for international business and trade in the region. The state government generates the majority of its revenue through property taxes; however, it also receives a significant portion of the goods and services tax (GST) levied at the national level. Victoria's strong economic history meant that it always had a large population relative to other States. In the early twenty first century Victoria still had Australia's second largest population; approaching five million, it provides almost a quarter of the nation's population.

QUANTITATIVE RESULTS AT THE STATE LEVEL

The administration of land tenure and taxation has always been a state power. The revenue generated from land transfer has contributed greatly to consolidated revenue and has strengthened the standing of bodies dealing with registration. The states also play a large role in the administration of land use planning and land development. For this reason it would be expected that the states contribute significantly to the amount of legislation creating land rights, restrictions and responsibilities. This is true (Figure 6.9), well over half of Victoria's statutes create interests over land (620 out of 1045) (Appendix 1 provides actual study data).

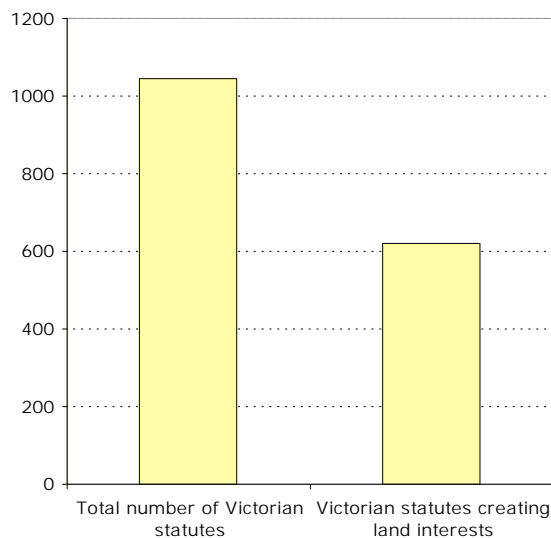


Figure 6.9: Victorian statutes creating interests over land

Similar results were also found in New South Wales (Figure 6.10; 1054 Acts, 497 land related), the study undertaken by Lyons et al (2002) in Queensland, and Western Australia's WALC (2004) report. This indicates that all States are facing the same issue with respect to overwhelming numbers of land interests.

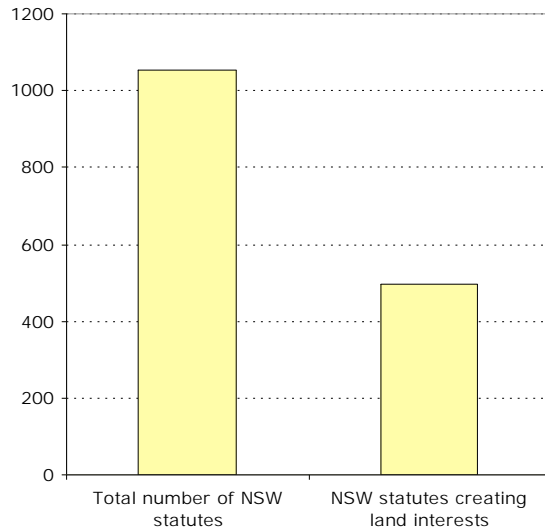


Figure 6.10: NSW statutes creating interests over land

Of the 620 Victorian statutes creating land interests, only 120 were selected for further quantitative analysis. This was due to the time and resource limitations discussed in the previous chapter. These statutes were also analyzed in the qualitative component of the study. It was important that selected statutes have an administrative component. Therefore, selection was based upon two factors. Firstly, there being more than one instance of the interest mentioned in a statute. Secondly, the interests created by the statute needed to apply to a number of different locations. Remarkably, over 500 of the interests lacked this characteristic. That is, they were either highly specific (applied for a short period in one spot) or were highly generic (applied always and at every location in the jurisdiction). The remaining 120 were used in the study.

Victoria, like the federal level, was found to be creating an increasing volume of land related legislation (Figure 6.11). However, it is worth noting that only active legislation was considered. A large increase was evident in the 1950s. This was due

to the last legislative consolidation that occurred in 1958 rather than any new land related policies. This also explains why only 3 statutes are evident between 1900 and 1940. It should also be noted that, unlike the federal level, the States existed and were producing legislation prior to 1900. Therefore, a number of land related statutes can still be found from the 1800s. The 1990s saw the largest number of land related statutes drafted. During this period, under the Kennett government, large policy and administrative changes occurred within Victoria.

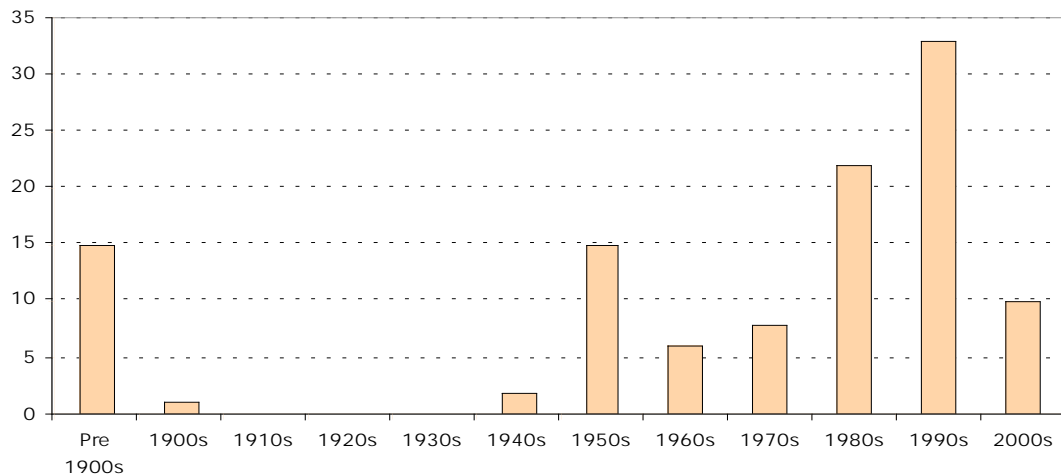


Figure 6.11: Victoria's land related statutes by decade of creation

The Victorian quantitative study also looked at individual sections in statutes. In the 120 statutes studied, over 930 sections created land interests (Figure 6.12).

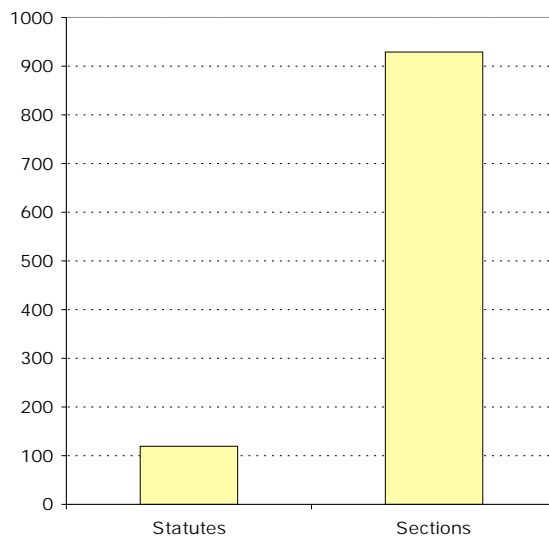


Figure 6.12: Number of individual interests created in Victorian Acts (per section)

The study showed that the policy driver categorizations identified in the federal study also applied at a state level. Unlike the federal level, ‘environmental management’ was found to have driven the creation of the greatest number of statutes. This trend is reflected in the new popular description of environmental controls as ‘green tape’, compared with the old red tape label. This was not unexpected as management of natural resources has, up until recently, been the domain of the states. ‘Economic growth’ and ‘tenure organization’ were other important drivers.

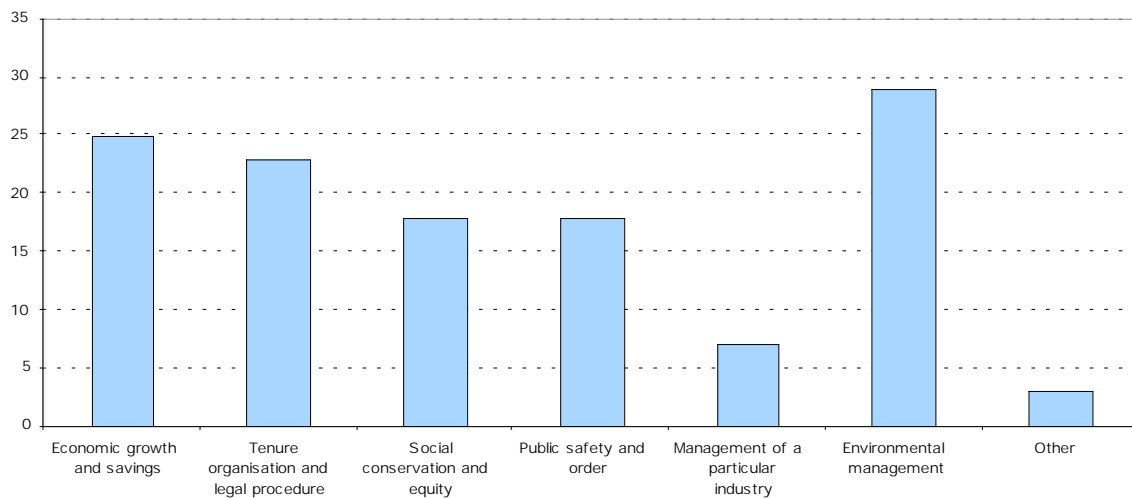


Figure 6.13: Key policy drivers behind the creation of Victorian land interests

To assess the types of powers created by each statute/section, the model provided by Ostrom and Schlarger (1992) was used (Figure 6.14). Where a State created more than one type of power, all were recorded (unlike the federal level study). ‘Management’ powers made up the majority of created interests. This was expected as the states are the jurisdictions primarily responsible for the management of land. ‘Access’ was also a significant category. This was also expected: many agents-of-the-state are provided with land access powers. ‘Alienation’ powers were also significant categories. Again, this was expected as state governments are responsible for allocating and managing land ownership.

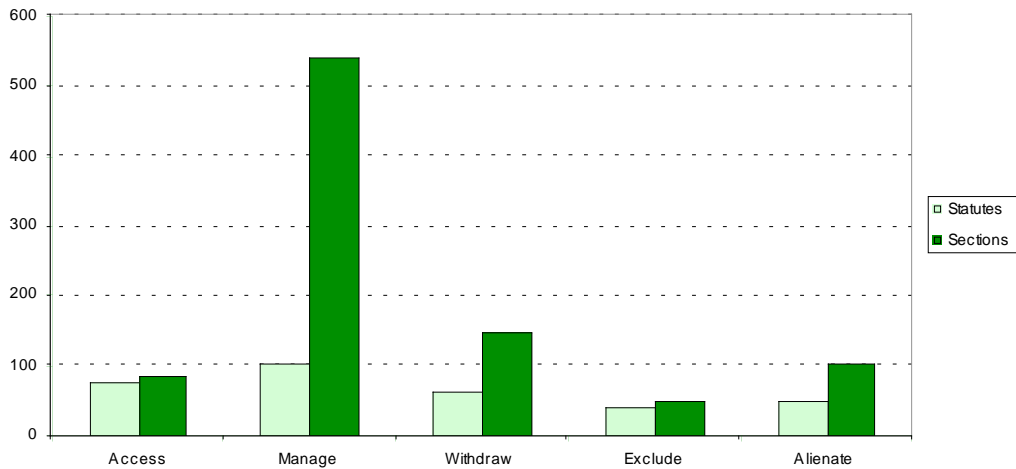


Figure 6.14: Types of legal interests created by the land related statutes

The state quantitative study did not consider the duration of the 120 statutes selected; however, the initial 500 statutes removed showed overwhelmingly that most statutes applied for short periods or indefinitely. Of the remaining 120 statutes, many were ill-defined in terms of duration. The four typologies identified in the federal study (once, repeat, ad-hoc and indefinite) were found to also apply at the state level.

The type of tenure created by the statutes was also considered (Figure 6.15). The main party affected by the interests was noted (benefiting or bound). Many interests created ‘private’ and ‘public’ interests, however, the greater majority of new interests applied to ‘all lands’ in favour of the public.

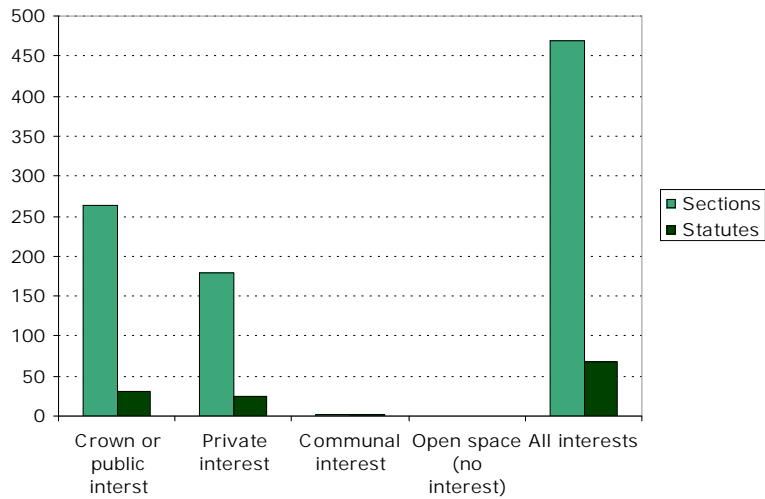


Figure 6.15: Party bound by Victorian statute land interests

The spatial extent of each of the 120 statutes/sections was also analyzed (Figure 6.16). The graph presents non-parcel interests as a single typology. The majority of interests were ‘parcel based’ and, more specifically, ‘patchwork’. This was expected as the states are responsible for cadastral maps. The small number of ‘specific’ interests was expected: the 120 statutes were selected for not having this characteristic.

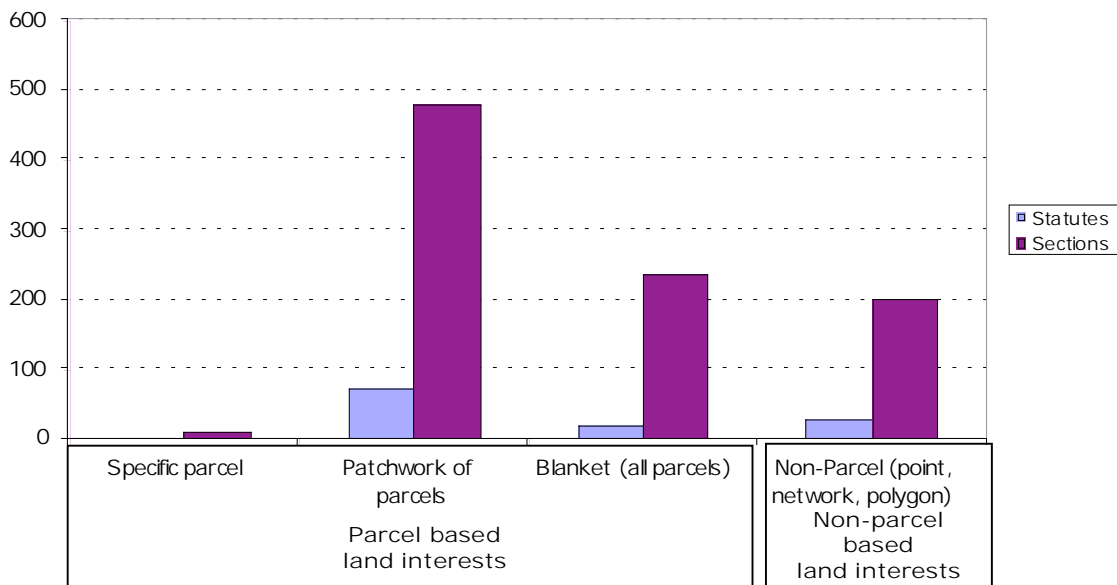


Figure 6.16: The spatial extent of Victorian land interests

FURTHER RESULTS AT THE STATE LEVEL

Of the 120 statutes studied in the quantitative analysis, 60 were selected for qualitative and deeper quantitative analysis (Appendix 1 provides more details). This number was considered the maximum amount that could be studied given the available time and resources (see Chapter 5). As discussed in the previous chapter, the qualitative component of the study looked further into the administrative aspects of the individual land interests. An initial inspection of the 120 statutes revealed that many did not have an underlying management framework equivalent to the land administration toolbox. Furthermore, there did not appear to be the need for such a complex system. For example, the right of a cadastral surveyor to enter any public or private land is a type of interest; however, it applies to all land and is relatively low in impact and simple to administer. Many example interests of this type were identified. Therefore, the 60 statutes deemed to have the largest amount of administrative overhead were selected for further qualitative and quantitative study (Figure 6.17).

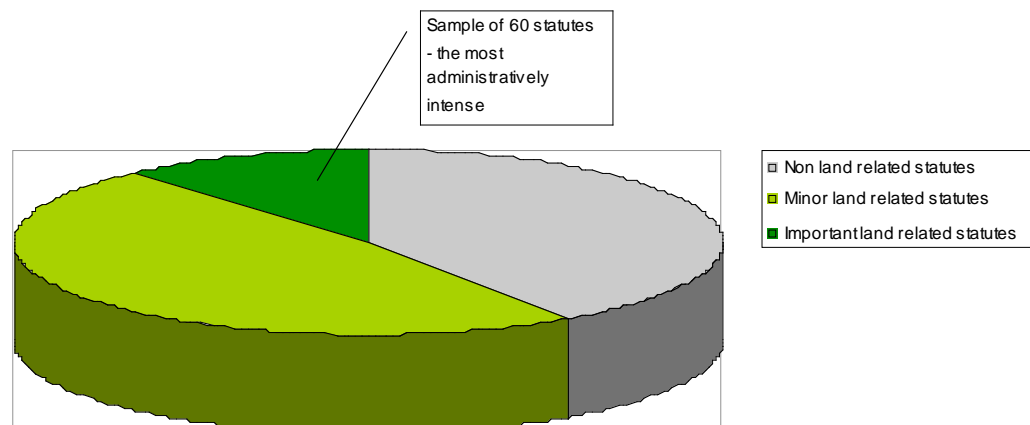


Figure 6.17: The sixty most administratively intense statutes were selected for the further analysis

The analysis concentrated on comparing the administration of the statutes against the cadastral/registration, institutional, spatial technologies and capacity building elements of the land administration toolbox.

INSTITUTIONAL ASPECTS AT THE STATE LEVEL

With respect to the institutional component, the executive arm of the Victorian Government is broken into departments (much like the federal level). The number, names and structure of these departments change often and therefore it is easier to discuss institutions in terms of functions rather than official names. For most of Victoria's history the surveying and registration departments were responsible for land administration. Significant institutional changes during the 1990s and early 2000s saw these functions merged. Figure 6.18 shows where the traditional land administration functions lay in the overarching government structure at the time of the study (early 2006). The functions all sit within the Department of Sustainability and Environment (DSE). Land Victoria houses registration and surveying. Spatial Information Infrastructure (SII) is responsible for the digital cadastre: Vicmap Property. Information technology and privatization policies drastically modified operations; however, these agencies continue to undertake their traditional role: the management of public and private ownership tenures.

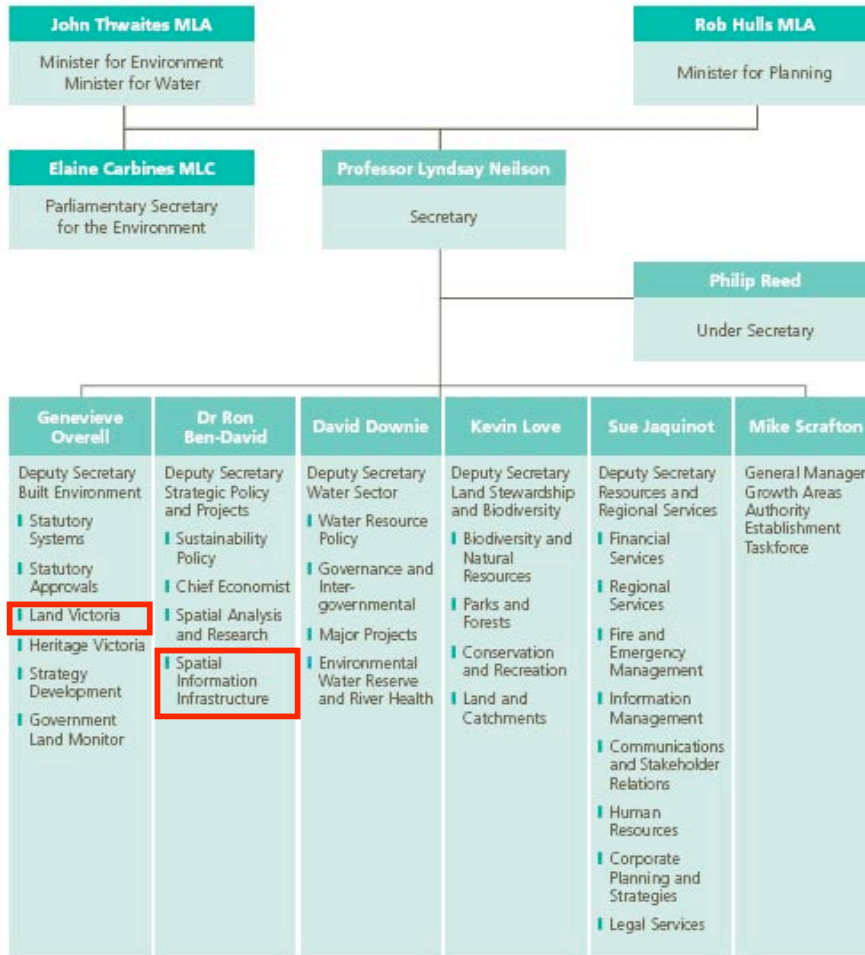


Figure 6.18: The location of traditional land administration institutions

Figure 6.19 demonstrates the proliferation of departments and agencies undertaking land administration related tasks: Land Victoria and SII are now small sub-branches of DSE whose overall agenda is to manage the environment in a sustainable manner. Agencies dealing with parks, rivers, fire and catchments are all incorporated into DSE: each potentially administering a number of legal land interests. Additionally, other departments such as the Department of Primary Industry (DPI) contain many branches dealing with land related activities and land interests (Table 6.1). Importantly, in many cases only the parent department was recorded, suggesting that the study data underscores the number of agencies involved. While DSE had a significant role it did not have a ‘lead’ role: no department or agency is responsible for integrating the different information sets

and processes within the disparate departments. While some agencies have formal collaborative links for sharing information, these are ad-hoc and often take months or years to finalize.

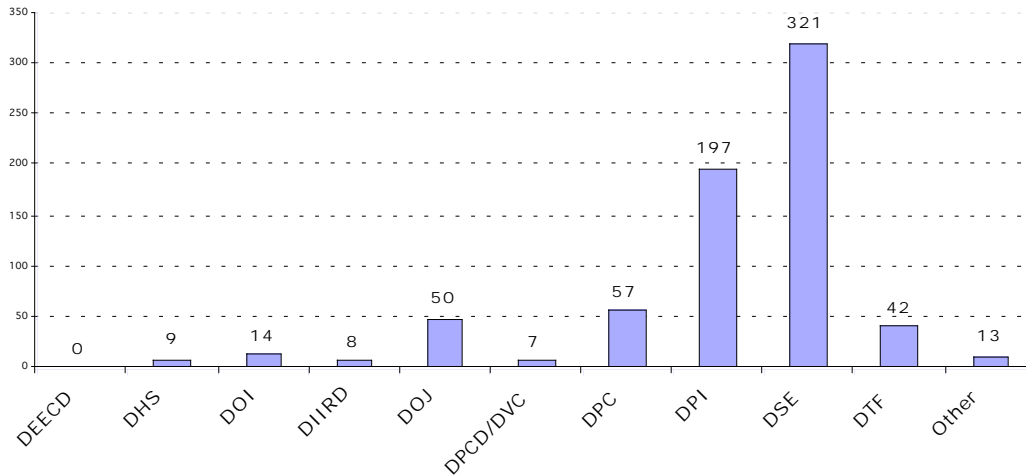


Figure 6.19: Government departments and the number of interests they administer
(See www.vic.gov.au for expanded departmental names)

Table 6.1: Sample of the agencies involved with land interests

Divisions, agencies, commissions and authorities – examples				
Aboriginal Affairs Victoria	Crown Lands Management	Liquor Licensing - Consumer Affairs Victoria	Reference Areas Advisory Committee	Victoria Offshore Petroleum Joint Authority
Attorney-General	Energy Safe Victoria	Marine Safety Victoria	Register of Geographic Names	Victorian Coastal Boards/ Council
Building Commission Victoria	EPA Victoria	Minerals and Petroleum	Residential Tenancies Bond Authority	VicRoads
Catchment Management Authorities	Essential Services Commission	Murray Darling Basin Commission	Rural Finance Corporation of Victoria	Victorian Environment Assessment Council
Chemical Standards Branch, Agriculture and Food Division of DPI	Fisheries Victoria	Office of the Small Business Commissioner	State Revenue Office	Victorian Managed Insurance Authority
Coasts and Marine Division of DPI	Government Land Monitor, Valuer General	Office of Housing	VCAT	Victorian Plantations Corporation
Consumer Affairs Victoria	Heritage Council of Victoria	Parks Victoria	VENcorp	VicUrban
Co-operative Housing Societies Advisory Committee	Land Victoria and Land Registry	Probate Office	VicForests	WorkCover and the Transport Accident Commission

It should be noted that each statute/section creating a land interest also requires an enforcement or regulatory agency. This is potentially different to the agency administering the statute/section and increases the number of agencies involved in administration of land interests.

Many statutes/sections also involved private sector institutions (Figure 6.20). This was particularly evident in statutes influenced by the privatization policies of the 1990s. Many industry management statutes promote self regulation and codes of conduct. Examples include the utility sector and mineral exploitation sector.

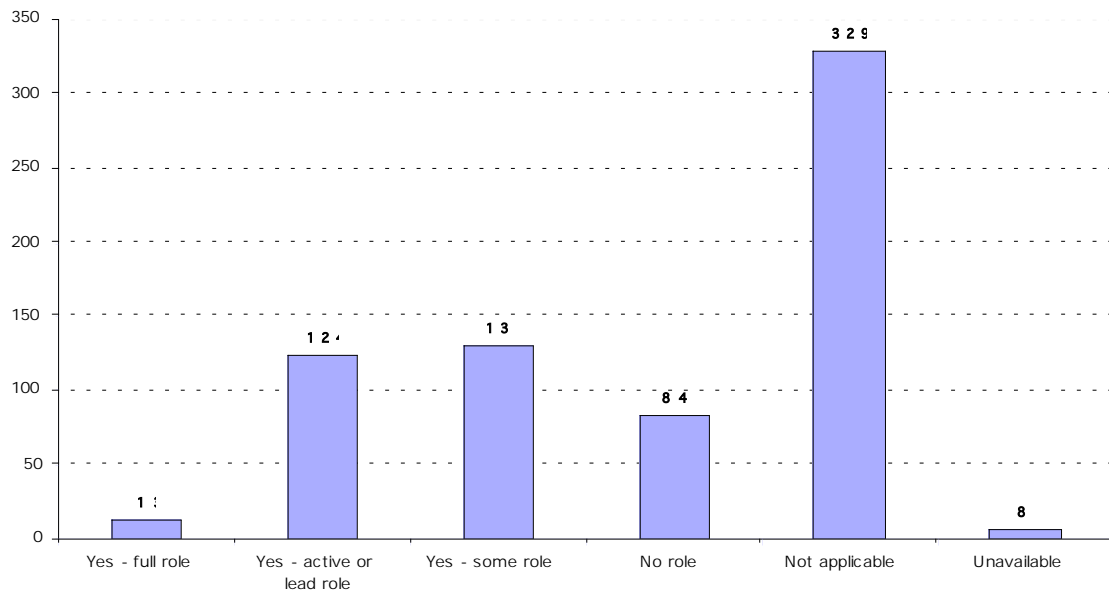


Figure 6.20: Involvement of private sector or self regulations

Victoria's institutional arrangements are not suited to the holistic management of land. This was perhaps best summarized by Professor Michael Batty after his 2004 visit. He suggested that many land management systems had emerged over time and that for each system different models of data and institutional integration had been used. However, there was no coordination of these models. These inefficiencies were further compounded by the institutional and physical separateness of many of

the groups developing such systems. Those responsible for coordination did not have the capacity or mandate to effect such coordination (Batty, 2004). This situation is expected. The disparate institutional regimes were designed to complete specific administrative tasks, not to contribute to whole-of-government integration. Only recently has the technological capacity emerged to allow disparate institutions to collaborate and share data, however, overcoming many decades of 'silo' behaviour will require smart initiatives, strong incentives and strong leadership.

CADASTRAL MAPPING AND REGISTRATION ASPECTS AT THE STATE LEVEL

With respect to the cadastral mapping and registration components of the toolbox, the study demonstrated how most of the new land interests were managed outside the traditional systems. Whilst agencies within Land Victoria are responsible for maintaining the cadastre and land registry, many of the new land interests are not related to these systems in any way. However, these systems still play a very important role in the management of certain interests, namely private and public ownership tenures.

The processes for maintaining the cadastre and registry underwent significant changes during the 1990s and 2000s largely due to the advent of information technologies and privatization policies. The cadastral map base is now known collectively as VicMap Property. It is currently composed of two parts: the Digital Cadastral Map Base (DCMB) and Land and Spatial Survey Information (LASSI). The DCMB existed first and was a result of a project that digitized a large number of paper based crown allotment maps. The DCMB is not available to citizens. LASSI came about in 2001 following the completion of the Victorian Online Title System (VOTS) project. VOTS saw almost 5 million paper titles (3 million 'live') and other land related plans scanned and digitized. LASSI allowed citizens access to information on any piece of freehold land throughout the State including ownership, dimensions, locations (survey maps), some restrictions, caveats and mortgages from within the land registry and online (online services are discussed in

more depth later). It registers land dealings for freehold land and provides a number of electronic forms.

Whilst LASSI is the superior system, both systems require maintenance: surveyors must be able to search plans that are not current and LASSI does not provide this function. LASSI is updated every half hour whereas the DCMB is only updated once every two weeks. The maintenance of both components of VicMap Property is performed by the private sector (Logica CMG). The process was setup under the Property Information Project (PIP). PIP was a project aimed at matching or reconciling the property databases of each local council with the cadastral map base. It would create a state property layer and overcome inconsistencies and duplication. Local governments provide cadastral updates to Logica CMG and inform them of all proposed subdivisions and changes to property information.

VicMap property deals with freehold land; crown or public land has only recently been digitized. The updating of crown parish paper plans officially ceased as recently as 2001. Thereafter, projects were undertaken to completely digitize all crown land maps (known as Crown Land Status Online or CLSO), government gazettes and accompanying documentation. These records are now being integrated with VicMap property to form a single cadastral map base for the state.

The CLSO project was part of the larger Land Exchange project undertaken by Land Victoria in the early 2000s. Other components included: Electronic Conveyancing (EC), an online system for transferring ownership in land; Vendor Statement Certificates Online (VSCO), an online delivery system for certificates required for property transactions; Streamlined Planning via Electronic Applications and Referrals (SPEAR), an online system for managing the planning, building and subdivision process; and Standard Parcel Identifiers (SPI), a project to give every property parcel in the State a unique identifier. By mid-2007 the majority of these projects were complete or nearing completion. Whilst they had

significantly improved a number of the processes for dealing with public and private land, the projects were focused solely on ownership interests and activities. Even the VSCO project, which provided a portal for accessing some land restrictions, was limited to providing information on the interests legally required for an ownership transaction.

How did the administration of new land interests relate to the traditional cadastre and registry processes? The quantitative component of the study revealed the relationship. Figure 6.21 and 6.22 reveal the limited links between the traditional cadastral/registration processes and new administrative processes. Six categories were identified: ‘direct relationship’, those interests formally managed within the cadastre/registry; ‘possible relationship’, those interests which may use a elements of the cadastre/registry for organization, ‘no relationship’; ‘not Applicable (NA’; ‘unavailable’ and ‘in transition’ (administrative systems being redesigned). A large majority of interests have little or nothing to do with the registry. So while there are good registry and cadastral processes in place in Victoria, they are somewhat underutilized.

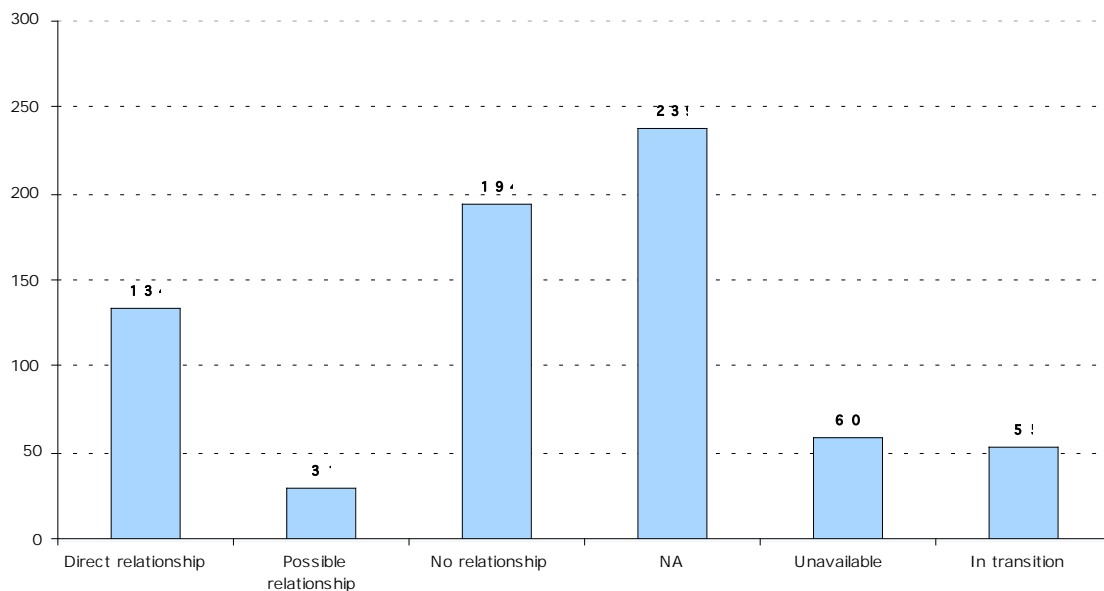


Figure 6.21: Relationship of new land interests to existing cadastre (by section)

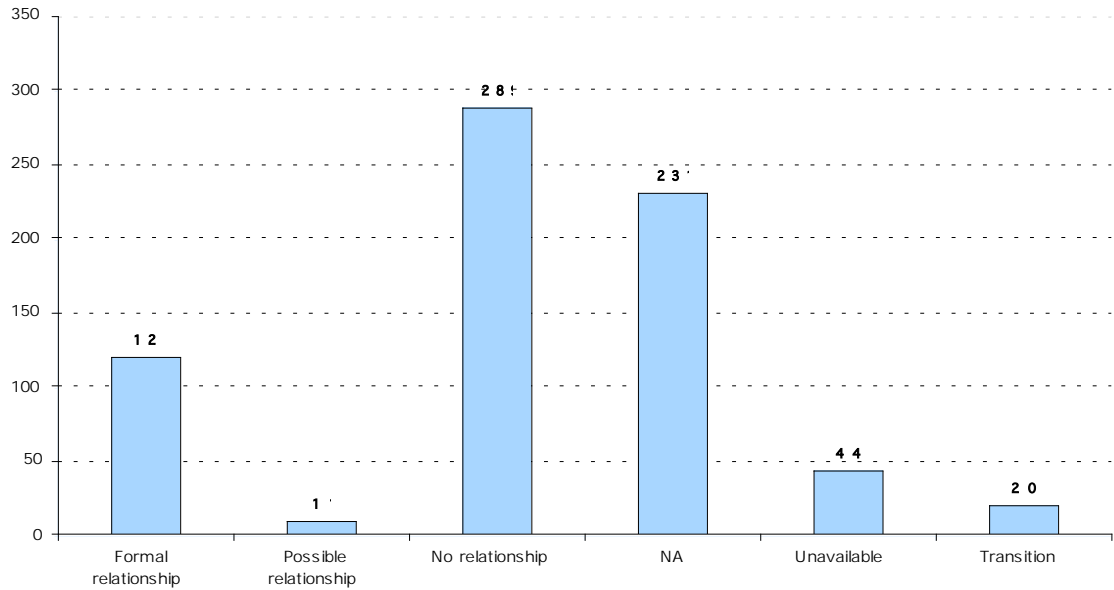


Figure 6.22: Relationship of new land interests to existing land registry (by section)

If the traditional land cadastre and register are not being used for the administration of new land interests, what sorts of registration systems are in place? The quantitative study revealed the alternative systems being used (Figure 6.23). Five categories were identified: ‘land registry (traditional)’, ‘single’, ‘multiple’, ‘not applicable (NA)’ and ‘unavailable’. The ‘land registry’ category represents interests which are managed using the traditional registry. ‘Single’ relates to those interests which are organized in a centralized manner, separate to the traditional registry. ‘Multiple’ represents interests which are managed in a decentralized fashion in many different registries. ‘Not applicable’ and ‘unavailable’ categories are self explanatory. Clearly there are many alternative registries dealing with land interests of various types and styles. Some even have multiple registries for single interests as demonstrated by the hundreds of registries created by the Road Management Act 2004 or those proposed by the Department of Consumer Affairs for the registration of Owners’ corporations. Significantly, a large number of sections or interests were found not to require any form of formal registration method (NA): the limited powers involved or the generic nature of the interest, simply do not warrant it. Examples include the dumping of litter, or access to land by agents-of-the state. Overall, it can be seen that there are hundreds of alternate registration systems in

use. These may or may not adhere to the Torrens principles. Integrating the disparate systems would be a near impossibility in the short to medium term.

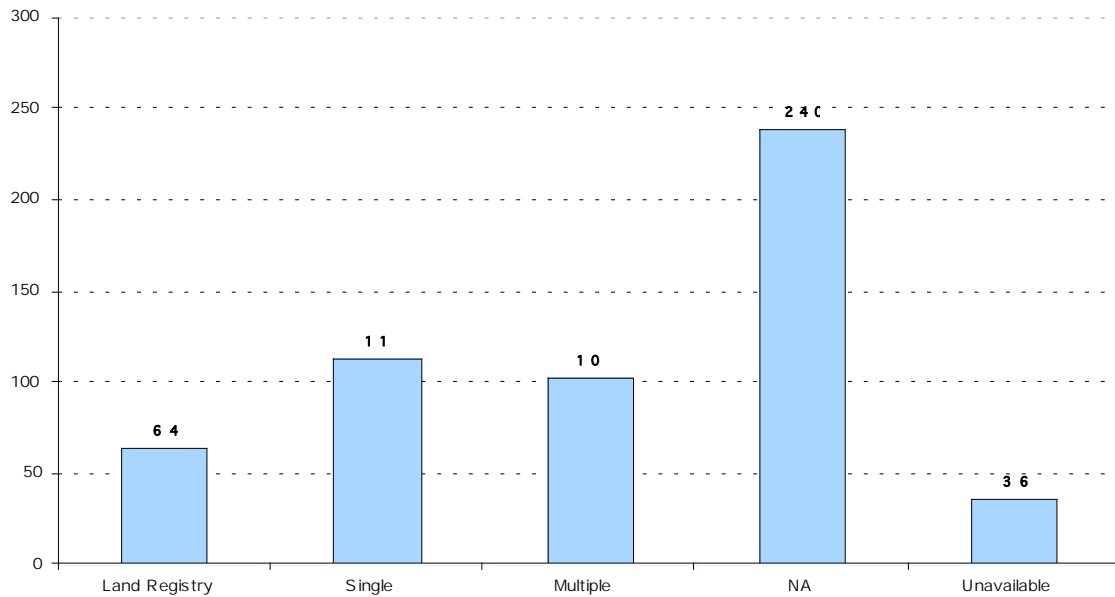


Figure 6.23: Type of registration system being used to manage land interests

Allocation procedures were also studied. This is the way in which the interests are allocated or created. Three typologies were evident: ‘once’ (or a single instance of creation), ‘systematic’ (interests created as part of a government project or methodical process) and ‘sporadic’ (interests created in an ad hoc fashion by both government and private sector). Private ownership tenures are an example of ‘sporadic’. They are generally allocated when a member of the private wishes to transfer land to another party. These processes happen in an ad-hoc fashion. The study showed that most new interests tend to be created in this way (Figure 6.24). The result was expected as the study had initially selected the more administratively complex statutes: ‘sporadic’ allocation tends to demand more on-going expenses and overheads. However, many interests were still created by a one-off process. A small number were found to be created ‘systematically’. These require less ongoing administration in relation to mapping and registration.

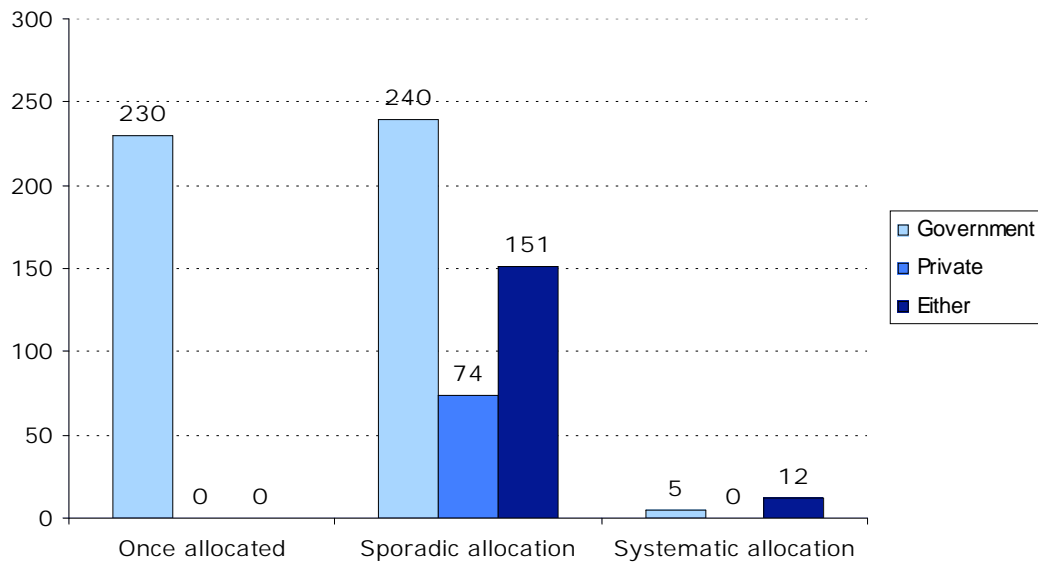


Figure 6.24: Type of allocation method for creation of land interests

Update procedures were also considered. These are the processes for updating and maintaining the land interest in the registration system. Three categories were identified: ‘no update process’, ‘sporadic’ (as above), and ‘systematic’ (as above). Private ownership interests tend to be updated in a ‘sporadic’ fashion, usually as a result of some member of the public requesting a change to information in the land registry. The study showed that most new interests were updated in this way (Figure 6.25). Again, this was expected as statutes that required complex some form of administrative update were initially selected. However, many interests did not have update procedures as they applied indefinitely. It should also be noted that 39 statute sections could not be classified as the information was either unavailable or the administrative process was undergoing redesign.

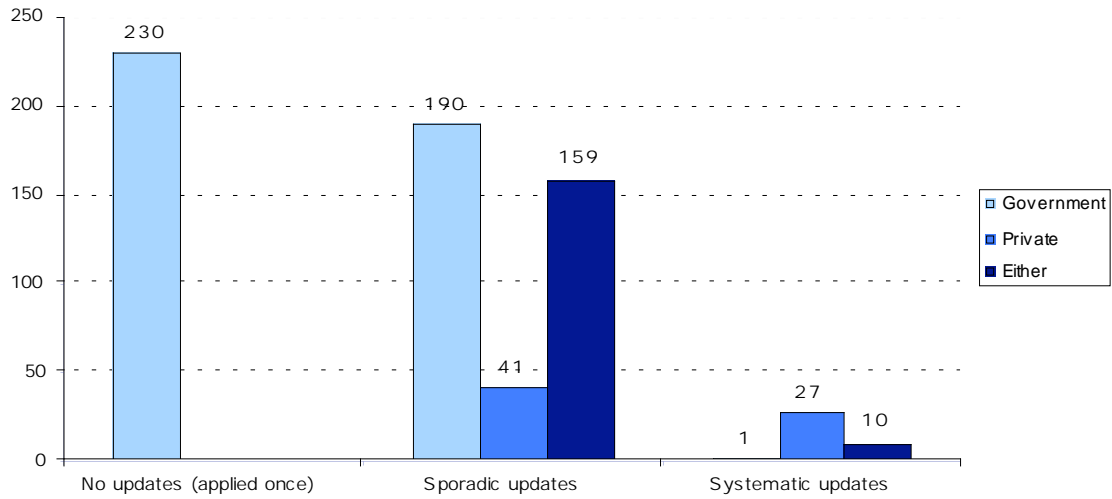


Figure 6.25: Type of update procedures used in land interest administration

Removal procedures were also examined. This is the way in which interests are removed from the registration system. Four typologies were identified: ‘once’ (as above), ‘no removal procedure’, ‘sporadic’ (as above), and ‘systematic’ (as above). Private ownership interests are removed through a formal, ‘sporadic’ transfer process. Many of the new interests also exhibited this procedure; however, many had no mechanism for being removed (Figure 6.26). The result was expected for reasons that were recognized in the previous chapters: removal mechanisms are often poorly drafted in legislation and accompanying regulations.

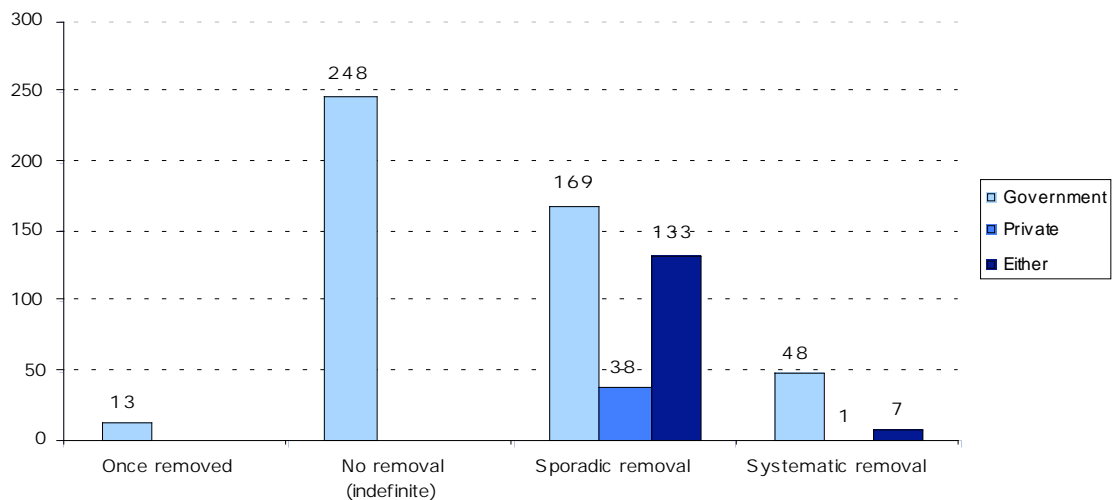


Figure 6.26: Type of removal mechanism used for land interests

Dispute procedures, specifically whether they existed, were also considered in the study. These procedures are utilized when problems occur during standard administrative processes. Three categories were used: ‘yes’ (identifiable process), ‘no’ (process not identified) and ‘not applicable (NA)’. Existing cadastral and registration systems typically have very well organized processes for dealing with disputes. While many of the new interests had similar processes, many did not. In some cases a procedure simply could not be found.

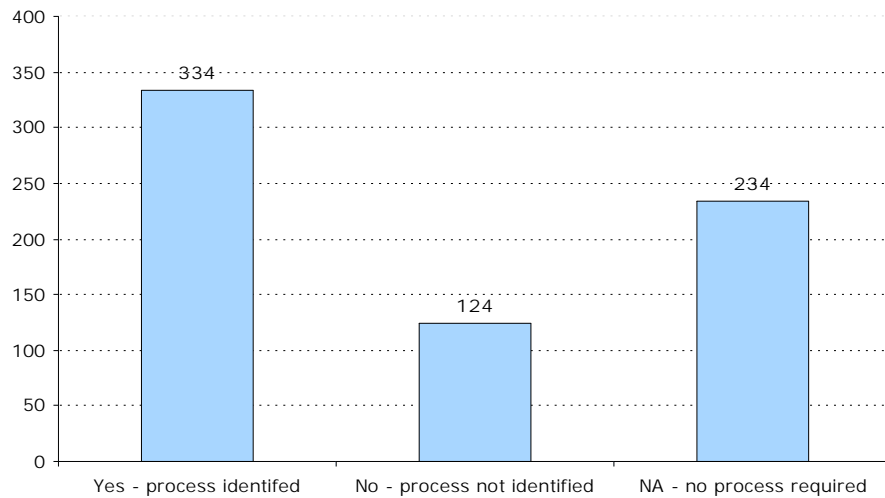


Figure 6.27: Appeals and Disputes procedures

In summary, Victoria’s cadastral and registration toolbox component is still focused on organizing land ownership interests. While it has undergone significant upgrades since the mid 1990s, it cannot be considered truly multi-purpose in terms of application: hundreds of land interests have no relation to the digital cadastre and even fewer are linked to the registry. This in itself does not mean that new interests are poorly managed: many are registered and mapped in other well organized administrative structures (e.g. Liquor Control Commission). However, a large number do appear to lack organization. A system for determining which interests require integration or linking with the land registry and which interests require administrative re-design is required. Moreover, a set of uniform requirements for the creation of administrative systems relating to land interests also appears

necessary: the current system of hundreds of registries is unworkable in the context of sustainable development.

SDI AND SPATIAL TECHNOLOGY ASPECTS AT THE STATE LEVEL

In relation to the SDI and spatial technology component of the land administration toolbox, Victoria was an innovator throughout the 1990s and early 2000s. Victoria's first formal spatial policy was the Strategy for Geographical Data Management in Victoria 1991-2000, however, the Tomlinson report published in 1993 is more widely cited as beginning the push towards a state SDI. The report created a vision for the wide-spread and shared use of spatial information and GIS within state government and society. The Tomlinson report led to the creation of Land Victoria, the Geospatial Information Reference Group (GIRG) and Victoria's Geospatial Information Strategic Plan 1997-2000 (VGIS). While VGIS and GIRG aimed to provide whole-of-government strategies, they lacked a high-level government mandate and therefore failed to fully engage with areas such as emergency management, socio-economic planning and the private sector.

Since VGIS 1997-2000, there have been two updates: VGIS 2000-2003 and VSIS 2004-2007. The documents lay guidelines and strategies for framework information, key business information, custody, metadata, access infrastructure, pricing, accuracy and awareness. VSIS 2004-2007 replaced GIRG with the Victorian Spatial Council (VSC) and the Victorian Government Spatial Council (VGSC) and a secretary. These bodies are linked with high-level government and aim to mandate the coordination of spatial information use and management within government and across Victoria. Whilst progress towards a 'single view' platform is being undertaken by these councils, a large number of spatial information and related initiatives are still managed in silo based departments.

Victoria, through the Spatial Information Infrastructure, Department of Sustainability and Environment, also participates in the national spatial and SDI

policies. They have representation at ANZLIC, ICSM and within PSMA. They are actively involved in national metadata projects and were involved in the 2007 Spatially Enabling Government conference in Canberra.

At a more practical level, Victoria's SDI is based around a fundamental set of digital maps, collectively known as Vicmap. The Vicmap suite consists of several layers: Vicmap Control and Position (control network), Vicmap Property (parcel and property layers), Vicmap Address, Vicmap Administrative (administrative boundaries), Vicmap Transport (roads, rail), Vicmap Elevation and Bathymetry, Vicmap Hydrography (water features), Vicmap Imagery (satellite and aerial). SII are the custodians of Vicmap. All are routinely maintained with the more dynamic datasets (Property and Transport) being updated by the private sector. The Vicmap datasets represent the foundations of SDI in Victoria. Vicmap is extremely well documented and administered, however, Vicmap is only a base; there are many thousands of other spatial datasets. These are owned and managed elsewhere, often using different standards and techniques for representation and storage. SII's Mapshare initiative has brought some of these datasets together; however, this tends to happen on an ad hoc basis.

The quantitative study looked at the new land interests in the context of Victoria's SDI. In particular, how the interests were spatially represented and how spatial and information technologies were utilized were examined. In terms of ICT usage, the great majority of land interests had some component of ICT involved with administration. Five categories were established: 'onsite' (information and administrative services are only available at a physical location), 'online – partial' (information and administrative services are partially available online and from a physical location), 'online – full' (all information and administrative services can be located online), 'not applicable' and 'unavailable'. Most interests fitted into the 'online-partial' category (Figure 6.28): information about the interest was available online and often printable forms were also provided; however, to undertake

transactions phone/fax/mail and physical visits were required. This tends to suggest that while Victoria embraced the internet as a mechanism for service delivery it still has some way to go if it wishes to achieve *e*Government visions.

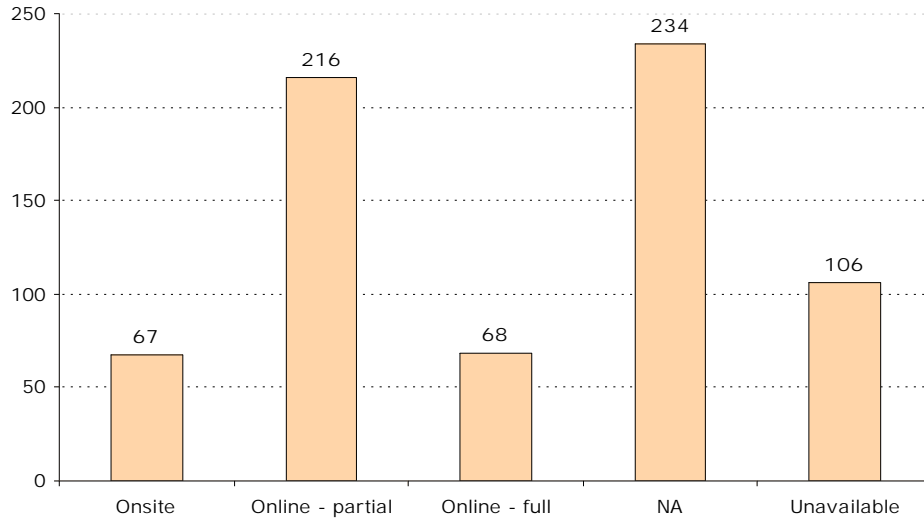


Figure 6.28: Utilization of ICT in administration of land interests

The mapping status of individual land interests was also considered. This refers to the extent to which an interest had been mapped. Seven categories were evident (Figure 6.29 and 6.30). In decreasing order of sophistication they were: ‘online-dynamic’ (fully automated online GIS with transaction services incorporated), ‘online-static’ (non-automated map provided online e.g. .pdf or .gif files), ‘offline-computer’ (automated map available offline only), ‘offline-paper based’ (paper based map available offline), ‘none’ (no evidence of mapping), ‘not applicable’ (NA) and ‘unavailable’. Pleasingly many ‘online-dynamic’ maps were found. Additionally, over time it is expected that the online-static and offline map categories will eventually become full online digital map products. These were mainly controlled by DSE and DPI. On the negative side, a large percentage interests had no evidence of any mapping, or if maps did exist, they were simply unavailable. This tends to suggest that any framework intending to use spatial technologies as an integration tool would need to recognize the lack of mapping and mapping capacity across government. Simple mechanisms and strong incentives for creating and incorporating spatial information would be required. G-

NAF, the Geo-coded National Address File provides an example mechanism: address data, used by many government departments, can quickly be represented on a digital map.

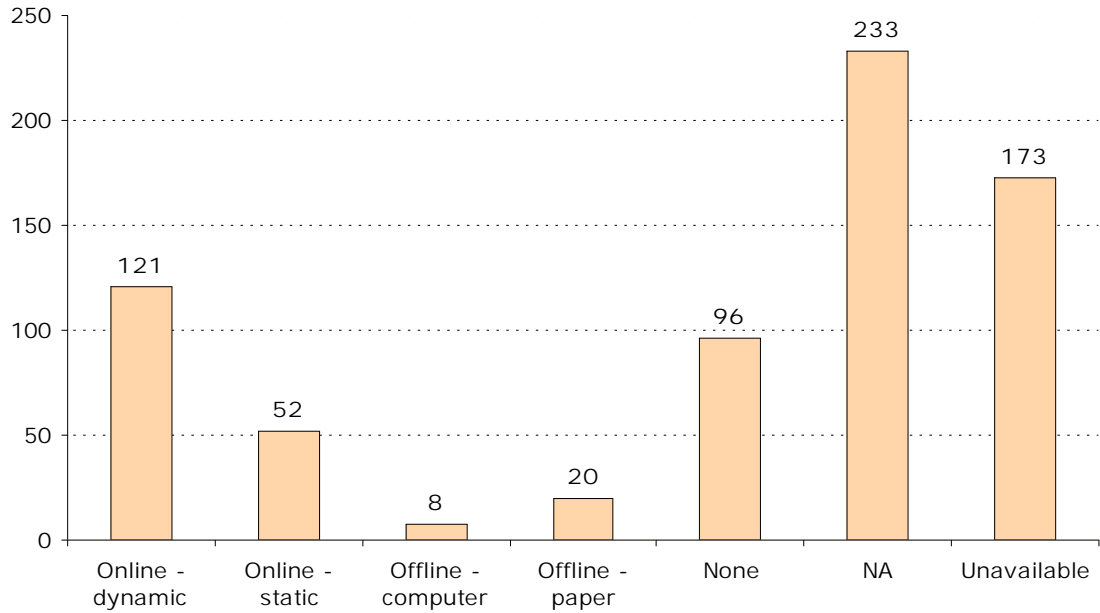


Figure 6.29: Mapping status of individual land interests

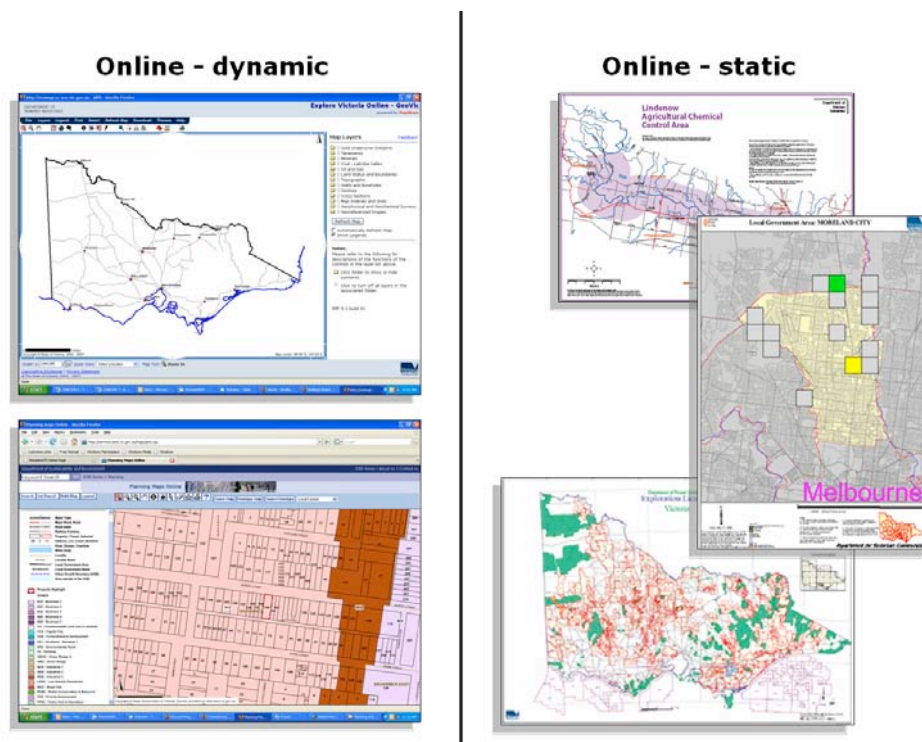


Figure 6.30: Online-dynamic versus Online-static maps (Appendix 1 provides many more examples)

The spatial identifier of the interests was also considered. Spatial identifier refers to the way in which the interest can be identified spatially. Five categories were used: ‘registry/cadastré’ (identifiers used by the traditional land administration systems e.g. Volume/Folio, Crown Allotment number, Lot/Plan number); ‘address’ (Stems from the postal system and is the most commonly understood spatial identifier); ‘other’ (incorporates all other identification methods e.g. GDA coordinates); ‘not applicable (NA) and ‘unavailable’ (Figure 6.31). A large number of interests still make use of ‘registry/cadastral’ identifiers, however, G-NAF and VMAS (Victorian Mapping and Address Service) will see ‘address’ become a more common and reliable method of spatially identifying an interest. Those using ‘registry/cadastral’ identifiers tended to have a close relationship or formal link to those systems. Results may be skewed because a large number (145) of identifiers could not be discovered. Interests classified as ‘other’ tended to be non-parcel based and related to mining and the management of natural resources.

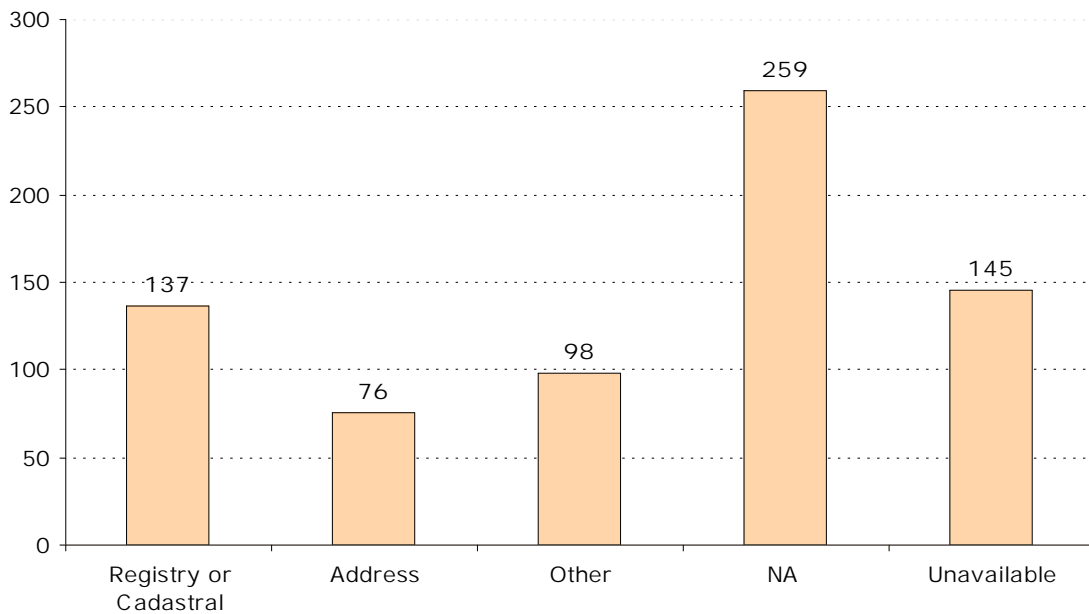


Figure 6.31: Identifiers used to spatially recognize land interests

Mechanisms for the delivery of information were also studied. The traditional land registry/cadastral systems deliver information both onsite (information provided at

a physical location) and online. In relation to onsite information provisions, the Land Victoria office located at Marland House, 560 Bourke Street in Melbourne provides a number of services. All are computer based. The PVS (public view system) enables both the DCMB and LASSI (land and spatial survey information) to be accessed.

In relation to online information provision, three main websites (partially integrated) are available. Land Channel, a ten year old web portal, allows a number of Vicmap products to be overlaid and viewed as online maps. Simple property reports and GIS functions can be utilized. These datasets themselves can be purchased from Value Added Resellers (VARs) in the private sector. Land Channel was originally intended to act as a portal to provide all land related information and services; however, this vision remains largely unmet. Land Channel still concentrates on information provision rather than service provision. Landata, another related web portal provides access to all the documents stored in the land registry: For example, titles, plans, mortgages and covenants. It aims to be a one-stop-shop for all information required to complete a land transaction, however, in essence it only provides registry documents: all other data documents (e.g. other interests) are accessed from other agencies and can take up to ten days to be sourced. Land Exchange is the most recent addition to the suit of government related land information websites. It is loosely connected to Land Channel and aims to establish a number of new services including SPEAR (streamlined organization of planning documents) and eConveyancing.

These websites are some of the most highly visited Government sites. They are an integral part of Victoria's online service delivery; however, they focus on traditional land administration datasets. The hundreds of new interests are generally not available from these sites. Information relating to many of the interests is still not online and can only be accessed onsite at multiple government agencies. Figure 6.32

shows the access point for all interests. Those considered fully online tend to be those relating to the registry/cadaastre. Many are partially online, however, an overwhelming number are still not online or are simply unavailable. Figure 6.33 shows the prices involved with accessing information. Pleasingly a large number of interests can be accessed for free. Again the large number of unavailable interests potentially skewed the results. Figure 6.34 shows the method available for altering land interest information. While the information relating to a small number of interests (38) can be fully edited online, the majority can still only be edited offline or at best have printable online forms. Again the large amount of unavailable information could skew results.

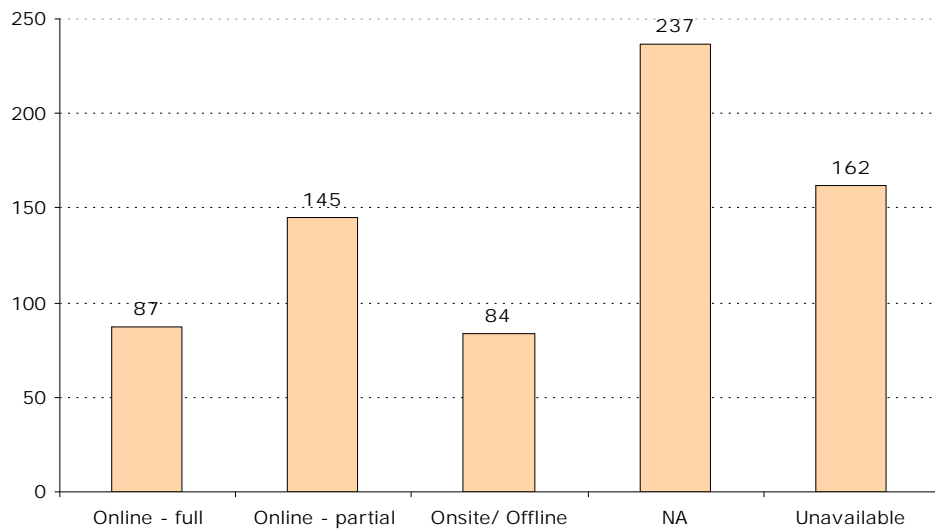


Figure 6.32: Access points for information regarding different land interests

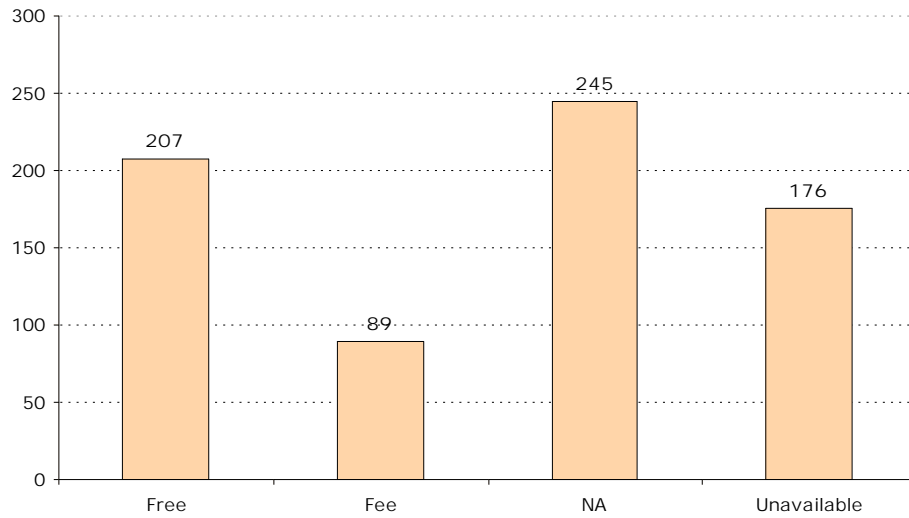


Figure 6.33: Access price for information relating to different land interests

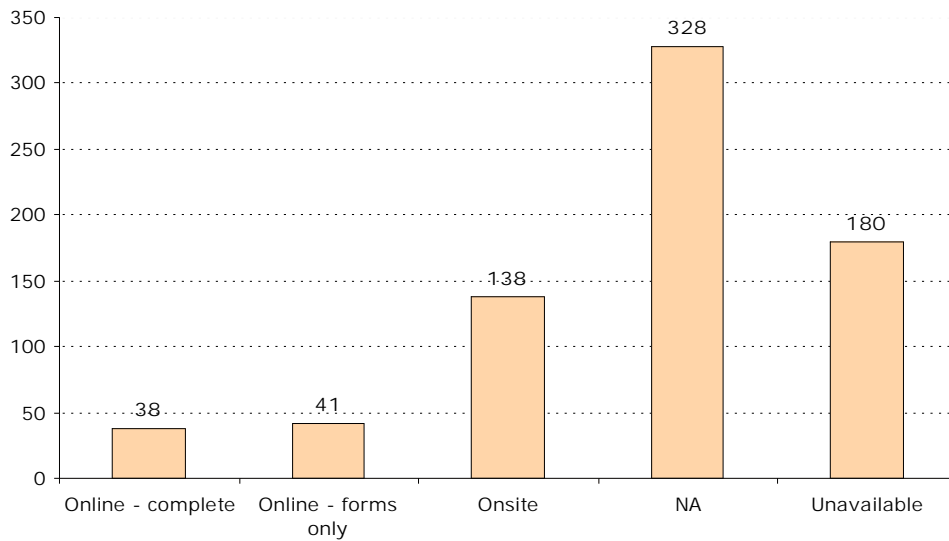


Figure 6.34: Method for altering land interest information

In summary, Victoria has a strong background in SDI and spatial technology policies and had some early success in implementation. It was an early leader in spatial information provision; however, these early systems are now dating rapidly and reassessment is needed to ensure most appropriate further development. It is still unclear whether existing systems are capable of underpinning the spatial enablement of the entire government (including the land interests). Is new

government provided infrastructure required or should more use be made out of products such as Google Earth and G-NAF(Geo-coded National Address File)? Whatever direction is chosen, stronger leadership is required, in particular the administrators of the hundreds of land interests organized outside the existing Victorian SDI need to be engaged. Standards for identifiers and mapping land interests need to be mandated. Successful innovations in similar jurisdictions also need to be studied (e.g. SLIP in Western Australia).

HUMAN RESOURCES AND CAPACITY BUILDING ASPECTS AT THE STATE LEVEL

In terms of the human resource and capacity building component of the land administration toolbox, Victoria fairs reasonably well on individual, institutional and societal levels. On the ‘individual level’ Victoria has an increasingly well educated population with a good appreciation of the importance of land administration systems. Large proportions of the population have access to internet, increasingly at broadband speeds. Individuals are comfortable with the idea of e-service delivery and are increasingly demanding it, especially in relation to land. The Land Channel, Land Exchange and Landata web portals are some of the most accessed government sites. However, if anything, Victoria’s online information and service provision lags behind the expectations of citizens. Citizens are now not concerned with government structures and the custodians of data; they are interested in accessing services and information seamlessly and quickly.

The proceeding sections have already covered some capacity building issues arising at the ‘institutional level’. While the state has embraced e-government service delivery and undertaken many projects to streamline and enhance land information and service delivery, there is still an inherent inertia within many Government departments. Despite initiatives such as Land Exchange, Land Channel, the PIP project and the creation of VSC and VGSC, a lack of formal collaboration between holders and managers of land interest information exists. Silos are still prevalent. In part this is due to the government business models introduced during the 1990s which restricted data sharing and pushed departments and agencies towards

commercialization. There is now a need to overcome these structures and push for more cross-agency coordination of spatial information; specifically, dialogue between built environment information managers and natural environment information managers needs to be nurtured. The Spatial Information Infrastructure (SII) forming links to the high-level Victorian Government Chief Information Officer (CIO) may assist this process; however, as SII moves away from property information management into the wider realm of information management, it potentially risks trivializing the cadastre: arguably the most important spatial information layer.

At the ‘societal level’, Victoria is like most western democracies: individualist, capitalist and highly supportive of individual rights and freedoms. While this approach enables markets to flourish and provides for efficient use of resources (usually), it comes at the expense of communal approaches for dealing with land. In the context of sustainable development this is a large hurdle to overcome: sustainability requires recognition of multiple land interests and requires that land is viewed as a system. This is a big hurdle to overcome: the “not in my backyard” catch-cry is an embedded part of Australian politics. Once individual rights over land are granted, it is hard to take them away. It is for this reason that market-based instruments (transferable interests) have emerged as the most likely tool for incorporating sustainability objectives into Victorian land administration systems. However, it is still too early to judge how successful this approach will be.

SUMMARY

In summary, Victoria has played a huge role in the creation and management of new interests outside traditional land administration frameworks. The process has not been systematic and only now is research being undertaken to discover the extent of the legislative and administrative sprawl. Updates to existing cadastral/registry systems have improved process efficiency and accessibility; however, it is highly doubtful whether these digitized systems would be capable of incorporating the hundreds of new interests: the systems were not re-engineered

and are still encumbered with the legacy of paper based transactions. Victoria's institutional arrangements are also encumbered with historical legacies: a large scale re-organization would be costly and unlikely to improve land interest management. SDI and spatial technologies appear to provide the best option for reform of land interest reform. Web services are prevalent in Victoria's land management systems, however, strong leadership, collaborative approaches and more investment is required.

MORELAND CITY COUNCIL

OVERVIEW

Local government forms the third tier of government in Australia. These governments are created by legislation at the state level. The size and number of local governments is decided by the states. Prior to the early 1990s Victoria had over 300 local governments; however, the Kennett government's amalgamation policy reduced the number to 78. Local governments are elected and accountable to the citizens living within their administrative boundaries. They are responsible for the provision of local services, such as waste disposal, and the management of local infrastructure, such as local roads, parks and drainage. However, the biggest responsibility of local governments is land use planning. Whilst tenure management is the domain of the states, planning is fundamentally a local government activity.

This research focused on the Moreland City Council. The council was established in the early 1990s and its boundaries include some of Melbourne's oldest inner northern suburbs, for example, Brunswick, Coburg and Pascoe Vale. These suburbs have traditionally been working class and home to various migrant groups. There are large numbers of mixed use areas which allow warehouses and factories to co-exist with housing and retail precincts. The land parcels are generally small; however, a large diversity of architectural styles can be found. In recent times the area has gentrified by more people moving back to the inner suburbs. The jurisdiction also includes the newer outer northern suburbs of Hadfield, Fawkner,

Oak Park and Glenroy; these suburbs grew in spectacular fashion following the Second World War. Land parcels tend to be larger in the outer areas; however, the suburbs are less serviced with public transport and other facilities.

Local governments fund their activities largely through the collection of property taxes (called rates) and other fees and fines such as those collected from parking meters. However, local governments only account for about 5% of government taxation nationally; meaning their ability to undertake large scale infrastructure improvements is limited. Additionally, laws created at a local level can easily be overruled by those created at the state level. Nevertheless, local governments create and administer interests over land and these were considered in the research.

QUANTITATIVE RESULTS AT THE LOCAL LEVEL

While Moreland City Council has many strategic plans and policy statements to guide its decision making, the jurisdiction had only six active statutes (Figure 6.35) (Appendix 1 provides study data). Of these statutes only four related to land: those regulating private land, public land, domestic animals and parking. The other two statutes related to the formation, administration and functions of the council. Moreland has a very active role in administering a number of Victorian state laws (7 statutes) including acts related to planning, litter, domestic animals and road safety. The small number of statutes was in some ways surprising; however, given the ability of state governments to override most local decisions, it was expected. Moreover, as the jurisdiction only formed in the mid 1990s, small numbers of statutes would be expected.

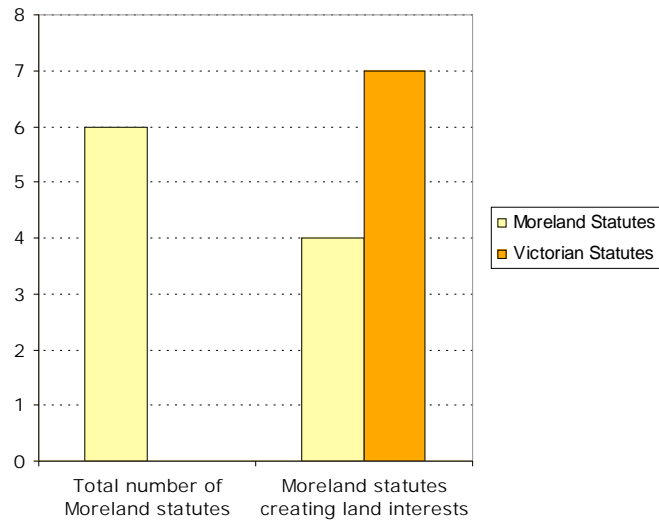


Figure 6.35: Local statutes creating interests over land

The local study also considered the individual sections of each statute. The 11 statutes analyzed were found to include 73 land interests (Figure 6.36), the majority of which came from the Moreland Planning Scheme a component of Victoria’s Planning and Environment Act 1987. This confirmed that the key role of local government is planning.

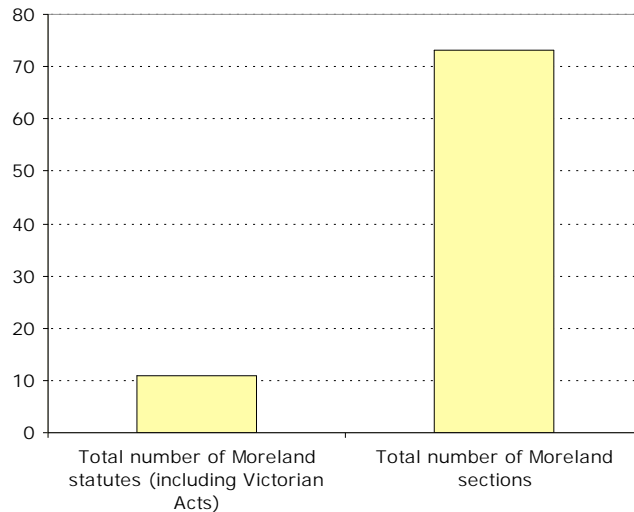


Figure 6.36: Number of individual interests created in local statutes (per section)

The policy driver categorizations that emerged during the state and federal case studies were used in the local study (Figure 6.37). Where more than one was driver was evident, all were recorded (this explains why there is more than 11 statutes in the graph). ‘Public safety and order’ was found to be the most significant driver. ‘Environmental management’ and ‘social conservation’ were also found to be significant drivers. ‘Tenure organization’ and ‘industry management’ drove the creation of no statutes: This was expected as these are state and federal responsibilities.

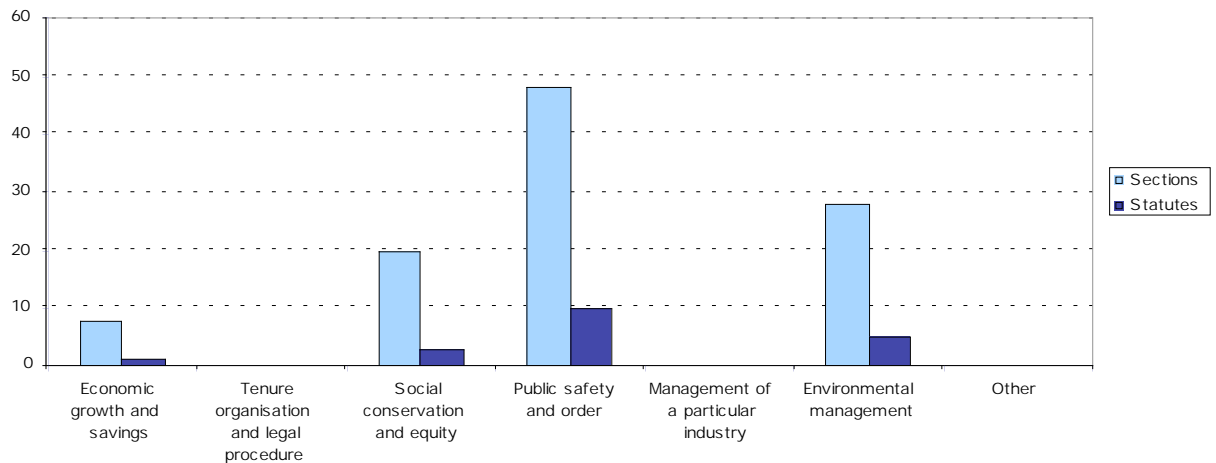


Figure 6.37: Key policy drivers behind the creation of local land interests

Like the other studies, Ostrum and Schlager’s (1992) classification was used to assess the powers created in each statute and section (Figure 6.38). Only the most significant power was recorded for each section, however, all powers were recorded for each statute. ‘Management’ powers were the most common (71 of 73 sections); however, ‘access’ powers were also evident (not recorded) and the ability of local government to ‘withdraw’ (fines and planning charges) was also significant (not recorded). These results were expected as tenure management (e.g. ‘alienation’ and ‘exclusion’) is a state responsibility.

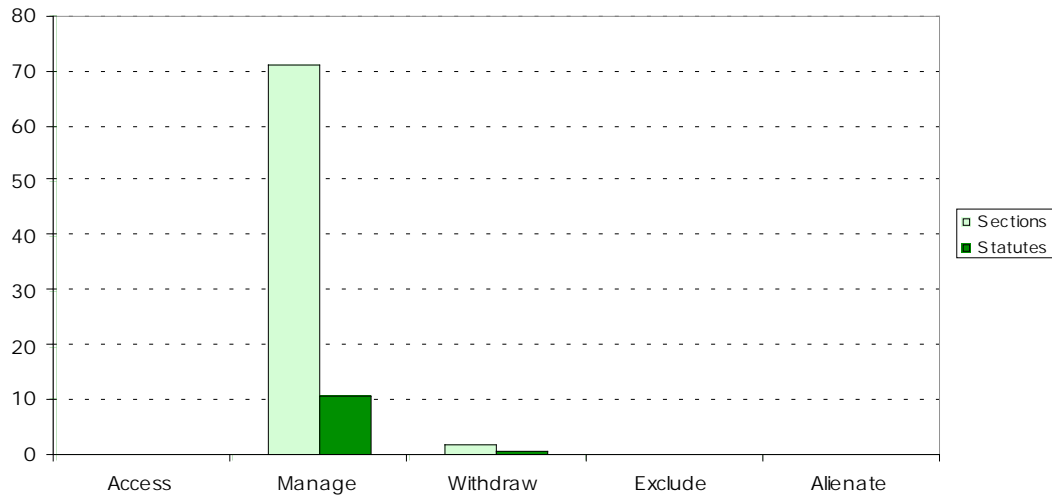


Figure 6.38: Types of legal interests created by the land related local statutes and sections

The duration of the interests created by each statute and section was also analyzed (Figure 6.39). A large majority of interests were found to exist ‘indefinitely’, indicating that their durations were ‘ill-defined’. This was not unlike the results found at the state and federal levels.

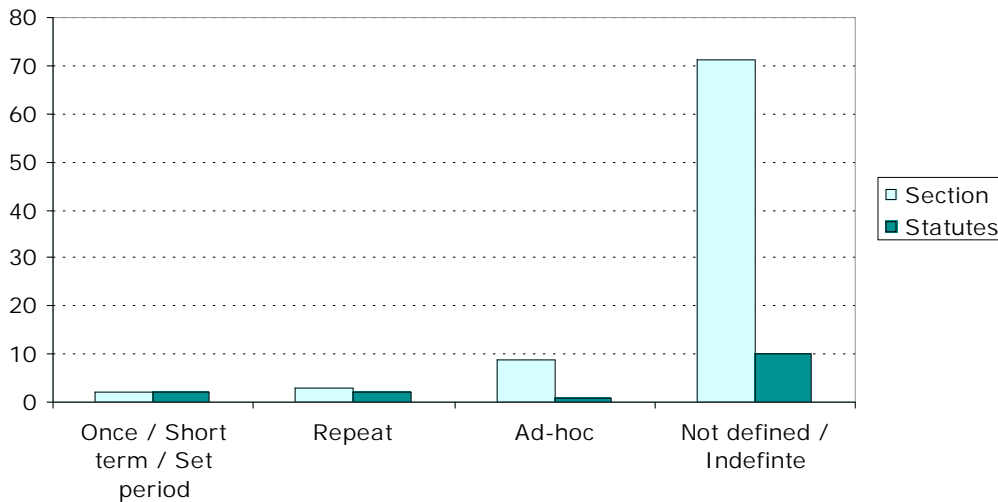


Figure 6.39: The duration of land interests created in local statutes

The tenure typology created by the statute/section was also considered (Figure 6.40; Figure 6.41). The same classifications as in the state and federal studies were found to apply. Most statutes/sections created interests in favour of the ‘public’

(government) and were found to bind ‘private’ land. This was consistent with the policy drivers: regulations at a local level are driven by the need to create public order and safety and tend to favour governments and limit the activities of citizens.

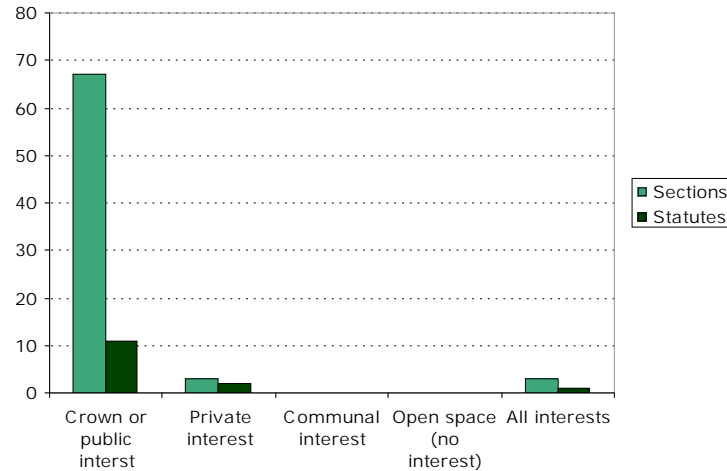


Figure 6.40: Benefiting party bound by local statute land interests

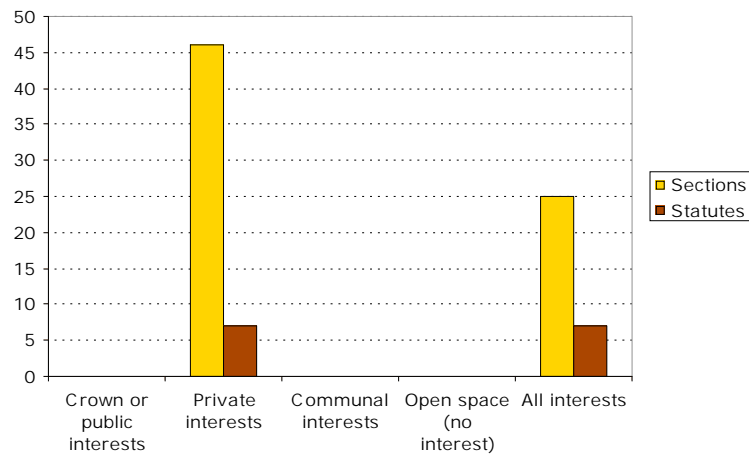


Figure 6.41: Party bound by local statute land interests

The study also considered the spatial extent of each statute/section (Figure 6.42). The same categorizations used in the state and federal studies were found to apply to local statutes. The majority of interests were ‘blanket’ (applied to all parcels); however, a significant number applied on a ‘patchwork’ basis: these were found mainly in the planning scheme. A substantial number of ‘polygon’ interests were

also identified. These tended to relate to planning controls over specific areas or ad hoc interests allowing for trading on public land.

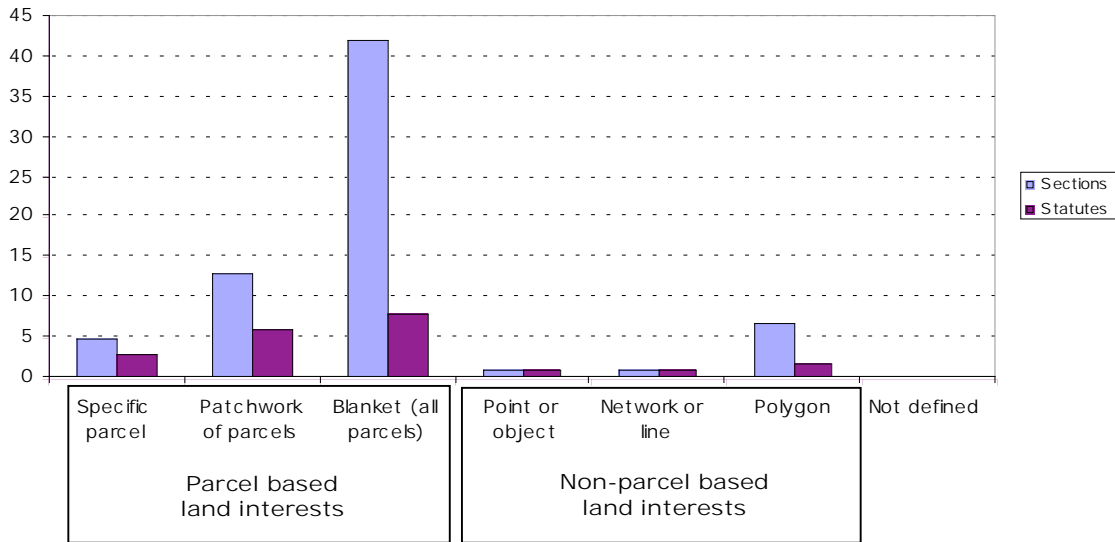


Figure 6.42: The spatial extent of local land interests

QUALITATIVE RESULTS AT THE LOCAL LEVEL

The quantitative component of the study looked at policy, legal, tenure and some spatial aspects of locally created land interests. As discussed in the previous chapter, time limitations meant that a more qualitative analysis of each interest with respect to the other toolbox items (cadastral arrangements, institutional arrangements, SDI and technological arrangements and capacity building elements) was not possible. However, by studying existing documentation and publications, a general understanding of these components was established (Refer Appendix 1 for more details).

There is no specific office or department of land within the council. However, a complete database of all properties in the jurisdiction does exist. The database is a centrally administered GIS with distributed access to users across council (client-server). The GIS is managed by the IT department. A single person, the IT Systems Coordinator, is responsible for its maintenance and development, although a

contractor from the private sector assists with data updates. A support agreement with the software vendor, ESRI also exists.

The council's departments are structured around core administrative activities. A large number make use of the property information in the GIS. The core users are Planning, Valuations, Sustainable Development, Roads, Street Cleaning and Transport. Each of these departments has customized access enabling them to complete their specific administrative responsibilities. Other areas will employ the parcel database as layers specific to their activities are added.

The council is party to the Property Information Project (PIP) managed at state level. As discussed earlier this involves providing the State Information Infrastructure (SII) with updates to the parcel base through the planning and subdivision process. Again, the IT Systems Coordinator is responsible for providing these updates. In return, the councils receive access to the State version of the cadastre, Vicmap Property.

In relation to citizen access, only limited land information is available online. No online web mapping services are currently available. The only maps available are scanned copies of the planning schemes and accompanying overlays. No online spatially enabled transactions such as rate payment are available either. While there are plans to make GIS functionality available online, resource limitations and other more pressing priorities will prevent this from happening in the short to medium term.

SUMMARY

In summary, a large number of local government activities relate to land. Almost all statutes created at the local level deal directly with controls over land; planning controls and rate payments are the largest interests created. Others focus on public safety and order. However, the statutory analysis underscores the amount of land administration being undertaken: there are not many statutes at a local level but the

amount of land related activities administered is large. Despite this the local council studied had minimal resources and capacity in relation to the land use information and GIS: a single IT person was responsible for all database maintenance and development; in contrast to the state level where entire arms of government deal with land map bases. Local government has limited resources and capacity in terms of information technology developments and acquisition of spatial professionals. The higher levels of government must provide more financial assistance or underlying infrastructure (such as the up-to-date parcel based cadastre) if systems are to be improved. It should be noted that larger councils in more affluent areas often have very sophisticated systems.

CONCLUSIONS

The top-down case studies provided a detailed insight into the creation, organization and management of land interests within Australia’s three levels of government. The quantitative and qualitative results obtained, directly related to the research questions underpinning this research and provided substantial input into management framework proposed in the final chapters of this research (Figure 6.43).



Figure 6.43: Top-down results feed into research questions and the new management framework

Responses to the research questions can be summarized as follows:

1. **Policy principles:** In relation to land policy the following information was desired to answer the research questions: the number of disparate reasons driving new land policies; and the best methods for designing and implementing land policies to improve the management of rights, restrictions and responsibilities. Some of this information can now be provided. Six overarching drivers were identified: Economic development, Social equity, Environmental conservation, Tenure organization, Public safety and Industry Management, however, these were not organized coherently across or between any levels of government. Importantly, the drivers could be uniformly applied to each level of government, meaning dialogue is possible. Agreement and uniformity of view-points on each of the policy six drivers would lead to better integrated land policies between levels of government and more chance of the policies being successful when implemented.
2. **Legal principles:** In relation to legal systems the following information was desired: the number of land interests in existence; the rate at which the number of interests is increasing; the time/place/person they apply to, areas where interests do not exist and ought to; the principles that should guide the creation of legal interests over land; and tools for making new interests acceptable to the community. Some of this information can now be provided. Hundreds of interests were found at federal and state levels. The local level had a much smaller amount. The rate of legislative creation is increasing and needs serious attention. A set of guidelines for legislative drafting in relation to the creation of land interests is desperately needed, especially in relation to uniformly defining the time, places and people impacted by different interests.
3. **Tenure principles:** In relation to land tenure the following information was desired: the different types of tenure in existence; the parties who benefit from new interests; the parties who are bound by new interests; and the best way to describe and classify rights, restrictions and responsibilities in a holistic way. Some of this information can now be provided. Ostrum and Schlarger's (1992) model was found to be the most flexible way to describe the range of land tenures: Access, Withdraw, Manage, Exclude, and Alienate. Manage and Withdrawal were found to be the most common. While these are less powerful than Alienate and Exclude, they can have a significant impact on land values as they can severely limit what can occur on land. For this reason their guarantee, publication and better integration with ownership datasets is required. Access powers were also very prominent; however, these tend not to be a large administrative issue. Additionally they have little impact on land values and land use. Most new

interests tend to be in favour of government, although they tend to bind both public and private land equally. In general, existing tenure models (public/private/common/open) were found to be anachronistic and failed to adequately describe and differentiate the range of interests available over land. A more holistic, yet flexible model for describing tenure is required, perhaps focused around information requirements and incorporating details relating people, time, place and activities involved.

4. **Cadastral principles:** In relation to the registration and mapping components of cadastral systems the following information was desired: the number of interests mapped and registered appropriately; and the best role of existing cadastral mapping and registration systems in the management of rights, restrictions and responsibilities. Some of this information can now be provided. A large number of interests were found to be appropriately mapped and registered, however, there tended to be little and ad-hoc relationships between these systems. The state based cadastre and registry could be considered under-utilized and not truly multi-purpose. The digital cadastre and registry should be utilized further; however, their role needs to be carefully articulated: a middle ground between lack of information and pointless information saturation of the registry is required. A large number of interests had little evidence of mapping and registration at all. Federal and local levels were found to have limited mapping capacity: the federal level lacked experience with large scale datasets while the local level lacked resources and personnel.
5. **Institutional principles:** In relation to the roles and structures of private and public institutions in the management of land interests the following information was desired: the number of institutions involved in managing land interests; and the best way to structure these institutions. Some of this information can now be provided. Every government department, apart from one, at the state level was found to be actively involved in administering at least one interest. When broken into agencies and sub-departments, hundreds of organizational units were involved with the management of land interests. These structures are extremely complex and embedded in history, reorganizing these departments for the purposes of land administration would be cost more than the benefits received and is unrealistic. More coordination across governments is required; however, this will only occur if strong incentives and a coordination body with mandates are put in place. Information technology appears to be the cheapest option for integrating institutions and presenting them seamlessly to the public. This also applies between the federal, state and local levels of government.
6. **SDI and ICT principles:** In relation to Spatial Data Infrastructures and information technology the following information was desired: the number of different spatial extents of land interests;

the number of interests managed using modern SDI and information technology principles; and the ways SDI and spatial technologies might be incorporated into a framework for managing rights, restrictions and responsibilities. Some of this information can now be provided. Spatial extents can be broken into parcel and non-parcel interests. The large majority of interests relate to parcels, however, the number of non-parcel interests is increasing. In the future a coordinated parcel based will provide the only mechanism for spatially integrating different land interest data sets. The majority of statutes relate to a single parcel or to all parcels (blanket): these require less administrative overhead and are not considered a large part of the problem. Over two hundred interests were found to be spatially mapped in some way at the state level, however, more than that were found not to be mapped in any way. The state level has the most significant amount invested in spatial technologies, however, outside of the VicMap products much of it is unorganized. The state also lacks an underlying infrastructure for easily incorporating new land interests into VicMap.

7. **HR and capacity building principles:** In relation to human resource and capacity building the following information was desired: the number and impact of property rights, restrictions and responsibilities on individual properties; and the ways which the social learning tools discussed in Chapter 4 can be incorporated into a framework for managing rights, restrictions and responsibilities. Some of this information can now be provided. All levels of government suffered from lack of capacity in relation to deeply understanding, creating and using spatial information. However, this may become less of an issue as mapping tools are incorporated into standard software and become ubiquitous.

The remaining research questions:

8. **Emerging principles:** Outside the land administration a swath of tools from other disciplines can be applied to the management of land. These include ontology design and funding tools and uncertainty theory (Chapter 4). *How can these tools be incorporated into a framework for managing rights, restrictions and responsibilities?*

and:

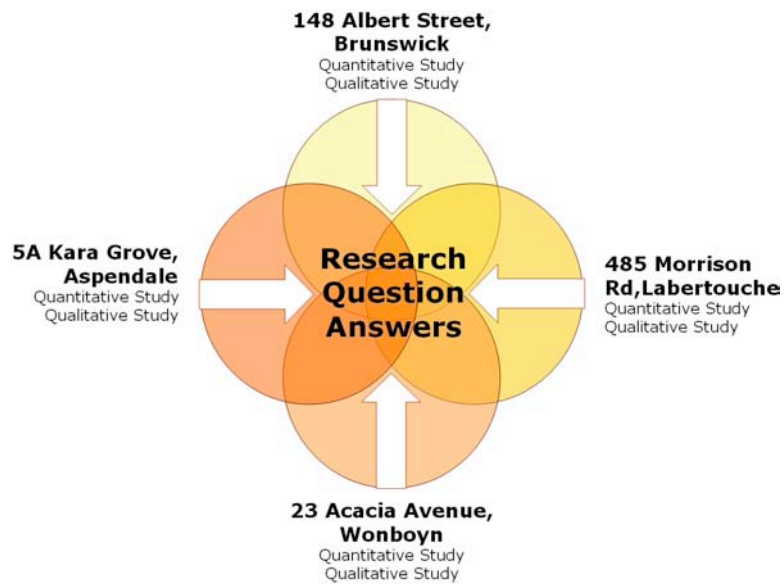
9. **A holistic approach:** Contemporary theoretical approaches for improving the management of land interests are too simplistic, 'one size fits all' and deterministic (Chapter 3). Contemporary practical approaches for improving the management of land interests are not holistic and focus on specific areas of the larger problem. *How can these approaches be included into a more complete framework for managing rights, restrictions and responsibilities?*

cannot yet be properly assessed without more information from the bottom-up case studies. These results and findings are provided in the next chapter.

CHAPTER 7

THE BOTTOM-UP PERSPECTIVE

To answer the questions behind this research a number of on-ground case studies needed to be conducted. Real properties had to be visited in order to understand what type of land interests applied, how they affected the land and how they were managed on-ground. Four diverse sites were chosen and visited. This chapter reports the results of these field trips. It presents each case independently before providing an overall summary of the findings and their implications on the research questions.



INTRODUCTION

The media often employs real life stories to embellish its news items. For example, a report outlining the damage caused by a bush fire will often be accompanied by accounts of someone whose home was destroyed. These personal accounts help us relate to the news: we are better able to grasp its significance and are thus more likely to respond. They also give us an indication of the reality occurring at ground level.

The early research into the management of new property rights, restrictions and responsibilities lacked these personal stories. The research tended to focus upon legislative structures and government administration systems rather than the issues faced by ordinary people. Where were the individual stories underpinning the larger problem? Did the community even see the administration of property rights, restrictions and responsibilities as problematic or was this a government driven issue? Such questions could be answered by looking at print and digital media outlets: an overwhelming collection of stories were out there, they just lacked organization.

In an effort to add clarity to the situation, a study of the print media was undertaken in addition to the case studies underpinning this thesis. Over twelve months, between June 2005 and 2006, stories were collected about the poor design and administration of land interests and the people who were affected. Two local papers and one statewide paper were studied: The Moreland Leader, the Melbourne Times and the Age. The Australian Broadcasting Corporation's (ABC) online website was also regularly consulted for any other major stories.

Despite the study's rather unscientific nature, its results remained compelling. In total, over one hundred and sixty stories were collected: an average of just over three per week (Figure 7.1). Seventy-eight local stories were collected from the Moreland Leader with topics including the acquisition of parkland, building on contaminated land, the management of derelict factories, permits for curbside

eateries, noise controls on music venues, protecting heritage buildings, and various planning controversies. Thirty-eight stories were collected from *The Age*, which included such topics as statewide planning and subdivision policies, freeways impinging on private land, Ned Kelly heritage areas, controversies over traditional indigenous lands, the management of contaminated rivers, water markets, the management of housing markets, illegal logging and grazing on the southern highlands. Forty-four other stories were also collected, ranging from contaminated land, water rights, native title, land tenure organization issues, home owner grants and illegal logging. The quantity of articles along with the diversity of individual stories tended to indicate a large degree of community disquiet.



Figure 7.1: Some of the one hundred and sixty newsprint stories collected

While media stories shed some light on individual cases, they are certainly not a rigorous foundation for conclusions. Moreover, they tend to focus upon the emotional issues rather than the more technical elements of land administration systems. To answer the questions behind this research a number of on-ground case studies needed to be conducted. Real properties had to be visited in order to understand what type of land interests applied, how they affected the land and how

they were managed on-ground. Four diverse sites were chosen and visited. This chapter reports the results of these field trips. It presents each case independently before providing an overall summary of the findings and their implications on the research questions.

148 ALBERT STREET: INNER CITY LIVING

SETTING THE SCENE

Melbourne's Flinders Street Station separates the Yarra River from its central business district grid, which contains the city's oldest streets. The station stands at the corner of Flinders and Elizabeth streets. Elizabeth Street sits in a low lying basin and runs northward. For the first few kilometers it is lined with an eclectic collection of buildings, which include Victorian arcades, Art Deco facades and modern commercial skyscrapers. Further north the street widens and becomes Royal Parade. The roadway is lined with trees, spacious parks, grand Victorian terraces, and much of The University of Melbourne buildings. Still further to the north, Royal Parade intersects Park Street. The boulevard quickly becomes the narrow thoroughfare called Sydney Road. Activity dramatically increases: trees are replaced by tightly clustered shop fronts, old warehouses and older pubs. Trams, trucks, cars, and bikes all slowly filter to and from the city through the patchwork of asphalt, concrete and metal. This hub of commotion is the suburb of Brunswick.

Prior to the arrival of Europeans, Aboriginal communities met and traded in and around Brunswick. Robert Hoddle surveyed the region in the 1830s, creating twenty-two farm sites in the space bounded by the Merri Creek, Moonee Ponds Creek and two east-west survey lines, which became Moreland Road and Park Street respectively. Pentridge Road, later renamed Sydney Road, cut down the middle. The first land sales were in 1839 and 1840. Thomas Wilkinson and another man, Edward Parker, purchased a farm from a speculator. They named the property Brunswick in honour of the royal house of the bride who had been wedded back in England. The two tracks to their property were named after the bride and groom: Victoria and Albert.

When gold was discovered in the early 1850s, the quickest way to the goldfields was through Brunswick. Camps were set up and equipment stores opened. Numerous pubs emerged along Sydney Road. As the population increased so too did the need for housing and Brunswick was found to be an ideal site for quarrying clay. A number of large quarries and brick making yards were established, employing many. After the First World War, hosiery and textile manufacturing began to emerge. In the 1930s the brick and clay industries declined as much of the clay and bluestone was used up. Many of the quarries were filled in, later becoming parks and reserves. Post-World War Two migration saw thousands of people come first from Italy, then Greece, Turkey, Lebanon and other countries. In the early 1990s the Brunswick City Council was amalgamated with other suburbs further north and became the Moreland City council. The suburbs to the north are younger and more spacious, but remain under serviced and of less value in the current land market.

In the mid 2000s Brunswick was still a very diverse suburb, although gentrification was on the rise. Aging first generation migrants lived side by side with inner city professionals and young families. Old Victorian terraces sat next to modern imposing apartment blocks. Small laneways fed into major traffic routes. Factories and warehouses lay in close proximity to housing and retail outlets and many housed students, artists and musicians. Within this maze of built environment pockets of reinvigorated parkland, community farms and waterways succeeded.

Thomas Wilkinson's two tracks, Albert and Victoria, still exist. Albert Street runs almost the entire width of Brunswick: from the Merri Creek in the east to Moonee Ponds Creek in the west. A walk down its length reveals Brunswick's history: at the western end lies an old brick quarry, now a park and residential estate; the eastern end hosts a number of old unused hosiery factories. The street was designed before cars and is very narrow. Two rows of parked cars and two lanes of traffic manage to fit, albeit uncomfortably. The street is now predominately residential. The

section between Lygon Street and Sydney Road includes an array of the last one hundred and fifty years of Melbourne's residential building styles: old workers cottages, lines of terraced houses, double fronted Californian bungalows, blocks of orange-cream brick flats from the 1970s and modern townhouses with off-street parking.

148 Albert Street faces north and fronts Albert Street between Sydney Road and Lygon Street (Figure 7.2). A laneway runs along the rear of the parcel and two residential blocks abut either side. The majority of the block is occupied by a terrace house which shares common walls with matching houses either side. It appears terraces once ran up the street for a large number of parcels; however, many have since been demolished, replaced or remodeled over time. For reasons that will be discussed later, it is difficult to know the exact age of the building, however, it is estimated that it was erected in the 1890s or early 1900s. The house itself consists of a hallway, from which two small bedrooms, a small living area, a small kitchen and a bathroom all connect. An old outhouse sits at the rear of the property but is no longer in use. The renovated kitchen and bathroom were probably added sometime in the 1960s or 1970s. The property is currently occupied by a small family: a married couple and child. They lease the property from the sole proprietor and have done so for almost two years.

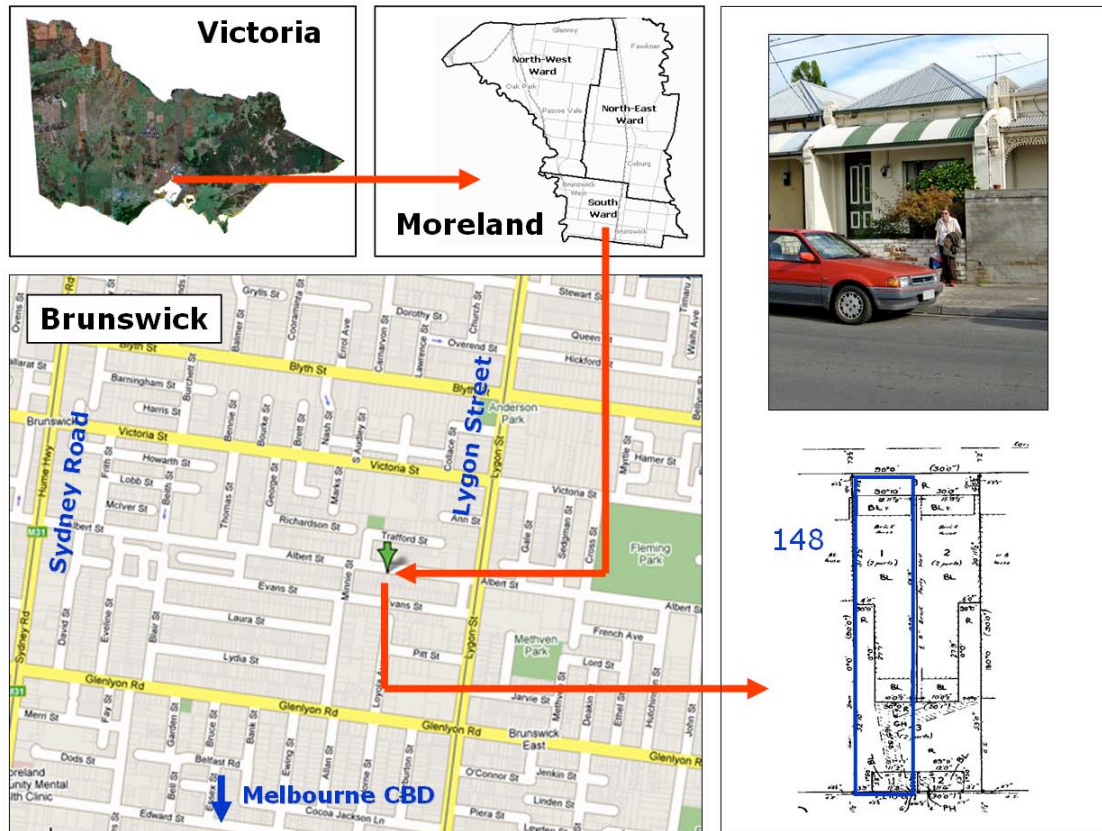


Figure 7.2: Location of 148 Albert Street, Brunswick, Victoria

ABOVE THE LINE INTERESTS

In relation to property rights, restrictions and responsibilities, the study consisted of two parts: a title search and a wider legislative search of interests which included an on-ground visit (Appendix 2 contains more study details). The title search revealed all interests ‘above the line’, while the wider legislative search and on-ground visit revealed those interests recorded elsewhere or not at all. Above the line interests (ownership rights, easements etc.) were investigated using Victoria’s traditional registration and cadastral systems. The online services, Landata and Land Channel (see Chapter 6), were used to acquire the information which is stored on digital certificates of title and scanned plans. It was thought that ownership information would be the easiest to acquire; however, even this first stage encountered complexities. The online map and address searches indicated that the property did not exist: the online map service merged 148 Albert Street with 146 Albert Street

into a single parcel and labeled it 146. A search of 146 Albert Street revealed two documents: a digital title (Vol 08417 Fol 345) and a lot plan diagram (LP 053417). LP 053417 is shown on the left in Figure 7.3.

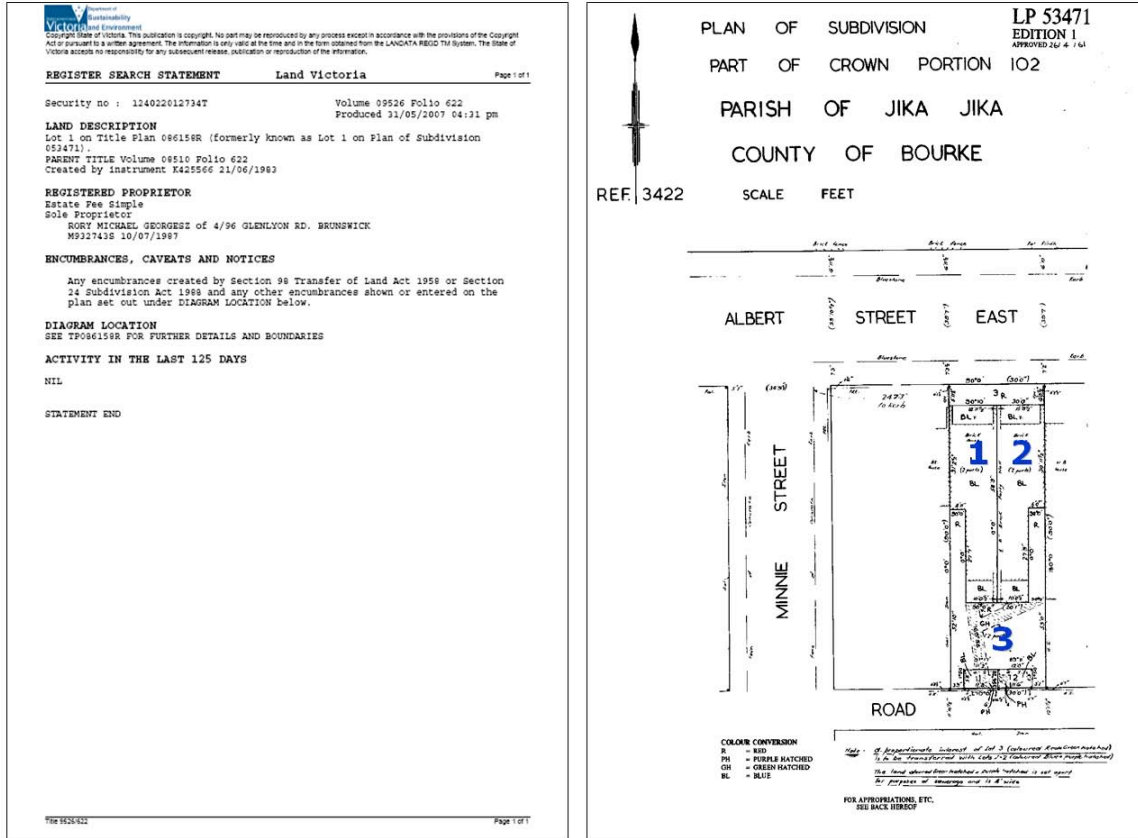


Figure 7.3: Title and plan for 148 Albert Street, Brunswick, Victoria

Ownership interests are contained under the “Registered proprietor” section of the title. In this case, a fee simple estate to lot 2 in LP 053417 was granted in 2007. On inspection of the plan, lot 2 was made up of the terrace house and outhouse constructed on 146 Albert Street; lot 1 was made up of the terrace house and the outhouse constructed on 148 Albert Street; lot 3 contained the rest of the land in the parcels (both backyards, front yards and other uncovered spaces).

At this stage no title for lot 1 or 3 had been found. A historical search of 146 Albert Street was conducted, allowing digitized parent titles and previous transactions of

the parcel to be viewed. The parent title was originally created in 1962. It itself referred to another parent title. This chain could be followed back to the original crown allotment created in the mid 1800s but it revealed little about the ownership of 148 Albert Street. A complex set of mortgage searches, based on the document numbers of the already acquired titles, failed to reveal titles for lot 1 or 3 in the original lot plan. A phone call to the registry revealed that the missing titles were incorrectly lodged in the systems: the titles to lots 1 and 3 had not been electronically linked to the digital map or the scanned lot/plan diagram. These corrections were made, allowing the title to lot 1 and lot 3 to be searched.

Lot 1 had a single title (Vol 09526 Fol 622) (Figure 7.3) and had been held by one sole proprietor since 1987: it referred to the same lot plan and included the footprints of the terrace house and outhouse. It should be noted that no other information about buildings are kept in Victoria's cadastral records. Information about building age and construction methodology are either kept privately for older houses or not kept at all. New houses are captured by the local council approval system. Lot 3 had two titles (Vol 09478 Fol374; Vol 08417 Fol 346), one for each of the owners in lot 1 and 2. They are of equal share although fences now separate the land in the front and rear. This situation dates back to before the 1960s; it is feasible, however, that these interests could be sold or mortgaged to a third party if the current proprietors desired. A consolidation of the titles has probably never been undertaken because of the legal and survey costs involved.

In summary, the seemingly simple process of searching for owner information revealed that 148 Albert Street comprised a complex set of plans and titles which could not be deciphered without the help of a lawyer. Moreover, these documents were not correctly linked, stored or represented within the new electronic titling system and online digital cadastre. The complexities of the land registration system need to be recognized: It is a system burdened with historical legal and administrative idiosyncrasies. Attempting to use the current system for the

registration of all new interests would most likely create further complexities rather than certainties for owners.

In addition to ownership, other interests are also recorded on the title. These are generally private in nature (i.e. between two private parties) and are listed under “Encumbrances, caveats and notices”. Both lot 1 and 2 (outhouse components) and lot 3 (the backyard) have a four foot wide forked easement that leads into the rear laneway. The dimensions of these easements are provided on title, however, little other information regarding use and alterations is provided. Mortgages are also listed on this section of the title: the title points to mortgage documents which are kept in the registry. Lot 1 (house and outhouse) is subject to no mortgage, however, lot 3 (remaining land) was found to be encumbered (AD302180Q). The mortgagee is with the Commonwealth Bank of Australia and dates back to 2004. Considering lot 1 and the interest in lot 3 have been transferred together for over 40 years, it seemed odd that a mortgage would apply to only one of the titles. After further inquiries with the land registry it was discovered that when the mortgage was discharged from lot 1 there was a failure to discharge the same mortgage from lot 3: another registration error. This issue is currently being resolved by the proprietor.

In relation to above the line interests, this case demonstrates how one hundred and fifty years of land activity have complicated the Torrens system. New technologies may have helped speed up search times; however, digitization and new electronic processes have also increased the number of errors in the stored information. As shown by the initial search, Victoria’s digital cadastral map is certainly not authoritative, the scanned plans are. The current systems used within Victoria are ill-equipped to manage multiple interests per property: the current model of scanned paper plans needs a radical overhaul if it is to accommodate an increasing range of interests. Attention is now given to interests not kept on title, those which are below the line.

BELOW THE LINE INTERESTS: GOOD, BAD AND ABSENT

Interests on title are only a small portion of the total interests that apply to an area of land. Many exist off the title and these are considered “below the line” (see Chapter 3). There is no organized way to find these on a given property: no title to search, no single government office or identified multiple offices to visit. Instead, as shown in the previous chapter, there are many government offices and computer systems that administer the interests. To find out whether a parcel or area of land is impacted by these interests, one must search each of these individually. The most systematic and comprehensive way to conduct this search was by using the statute books as a guide. Once a potential interest was found to apply to the parcel, the appropriate government office or computer system was approached (Appendix 2 contains more study details). For the purposes of this discussion interests are categorized into good (well organized and easily accessible), bad (poorly organized and difficult to access) and absent (those which do not exist, but ought to) (Refer to Appendix for study data).

The first good interests identified were those most notably absent from the Victorian cadastral and registry records: land value, planning and development interests. Victoria’s registry and cadastre has never dealt with this information, however, modern land management paradigms suggest strong relationships should exist. 148 Albert Street is subject to a planning zone which was created and remains governed at a state and local level: the Planning and Environment (Planning Schemes) Act 1996, the Planning and Environment Act 1987 and the Moreland Planning Scheme. These statutes were designed to control what is built, what activities can and cannot take place, and which activities require a permit to occur on the parcel. The parcel and the surrounding area are zoned Residential Zone 1 (R1Z). The interest benefits the community, encumbers the owner and applies indefinitely. This information is freely accessible from several state government websites, one of which is spatially enabled (Land Channel). Parcels may be searched via a map: zones and overlays are displayed graphically. However, the only authoritative planning information is from a planning certificate, which is

provided by the Moreland City Council or DSE for a fee. A person wishing to have the zoning or overlays on a parcel changed must use established processes, however, this is very difficult to achieve.

Land tax (Land Tax Act 1958) is payable on properties which do not fit into any of the exempted land categories. This information can be found and purchased on the Land Exchange web portal (see Chapter 6). However, because the tax payment is periodical, the government's State Revenue Office has a notification process in place for property owners. In the case of 148 Albert Street, land tax is payable because the property is not the primary residence of the proprietor. This interest relies largely on good will: there are limited resources for policing primary places of residence. The cost of land tax has been the subject of much debate in recent years: as the tax is based on the site's value, land that rapidly increases in value can force long established, low margin businesses and low income residents out of an area. Regardless, the process for the allocation and payment of land tax at the parcel level is relatively straight forward.

Other statutes which applied to 148 Albert Street and fitted into the well organized and easily accessible category included the Sale of Land Act 1962, the Subdivision Act 1988, the Transfer of Land Act 1958, the Property Law Act 1958 and the Fences Act 1968. Most of these are long established and include details about transfer, sale, subdivision, joint tenancies, bodies corporate, fences and marital arrangements related to land. Upon the sale of property, the vendor is required to produce a number of documents (Sale of Land Act 1962, Section 32) relating to the land. This task can now be completed online using the Vendor Statement Certificate Online portal, a parcel based information brokerage service, which lies within Land Exchange.

Because the property contains a residential lease, it is subject to the Landlord and Tenant Act 1958 and the Residential Tenancies Act 1997. In cases where a residential property is not owner-occupied no-one knows who lives where: there is

no record except those held by the utilities and postal services. Leases are not kept on title. This appears sensible as in Victoria leases tend to run for only a year and encumbering the registry with these interests would be pointless. Implementation of lease legislation and bonds is managed by Consumer Affairs Victoria. They provide relatively straight forward processes for accessing this information, some of which are available online. Privacy laws limit the search capacities of these databases and in many cases actually visiting the residence could provide the quickest means of identifying the occupier. Another often cited complaint relating to residential leases is the weak tenure provided to the leasee and poor controls relating to the lessor; however, such issues are the subject of a much larger debate relating to ownership and are not solely the responsibility of land administration to resolve.

Other well organized interests that potentially relate to the parcel include the Liquor Control Reform Act 1998 and the Gambling Regulation Act 2003. These interests are not recorded on title and this is sensible. These statutes place controls on all residential land, they apply to all parcels, and listing the rules from these statutes on title would be pointless.

The utility sectors, both their public and private components, have a number of interests in their favour that relate to 148 Albert Street. The Gas Industry Act 2001, the Electricity Safety Act 1998, the Pipelines Act 1967, Telecommunications Act 1997 (Cth) and the Gas Safety Act 1997 all govern how certain work relating to utility networks is done, who it is done by and when it is done. Again, many of these are blanket interests and are not required on the on title. Detailed information relating to these utility networks tends to be held privately which could be considered a limitation.

Other miscellaneous interests considered well managed include the Lands Acquisition Act 1989 (federal level), the Domestic (Feral and Nuisance) Animals Act 1994 (state), the Animals Local Legislation (local) and the Domestic Building

Contracts Act 1995. Information relating to all of these was found to be easily accessible.

In the poorly organized interests category, nine statutes relating to the parcel were identified and the four greatest are discussed here. At the state level the Road Management Act 2004 was recognized as being particularly troublesome. The statute requires all owners/managers of roads including government agencies, local councils and private bodies to create their own registers of roads. The information requirements of these registers are vague. For example, spatial identification is not required. The process for creating registers was completed hastily and has resulted in many roads being incorrectly recorded or not recorded at all. Albert Street is listed in Moreland's register; however, when inspected it is hard to see how the register has improved the management of the road. The road is clearly only suitable for residential traffic but is used as a commercial thoroughfare, causing conflict between drivers, and sometimes residents. The legislation does not appear to have improved the situation; rather it has created more administrative overheads.

The Building Act 1993 is another poorly administered statute which applies to 148 Albert Street. The bathroom and toilet portions of the building which lie at the back of the property appear to be illegally constructed like many of the older structures in the suburb, reflecting its colourful history. The building materials are flimsy and construction techniques are highly questionable. The only way to determine if the structure was approved would be to search the Moreland's paper records in chronological order. A record would most likely not be found. A potential buyer could use a certified building inspector to ensure the structure is safe; however, a negative response would result in no purchase rather than removal of the unsafe structure. Unauthorized extensions of this kind were prevalent in the 1960s and 1970s. On anecdotal evidence, they were often undertaken by migrants owners who either did not understand the laws or did not wish to deal with government agencies. While the Building Act 1993 does well to administer the construction of

new buildings, many unsafe older buildings and extensions still exist and are unable to be effectively policed.

The Private Land Local Legislation is also problematic. 148 Albert Street is in close proximity to many ageing derelict warehouses and factories. Developers often sit on these properties, 'land-bank' them and wait for an opportunity to redevelop or sell during economic up-turns (Kelly, 2006). In the interests of public safety, Section 9.1 of the Private Land Local Legislation states that all buildings on privately held land must be safe and secure at all times; otherwise fines can be applied to individual parcels/properties. Property owners who have been served with these fines often ignore them (Lucas, 2006). While they still pay their local service rates, they do not respond to safety enforcement notices, most probably because it is cheaper to ignore them. An enforcement problem exists with this law and the initial policy objective of community safety is clearly not being met.

The Environmental Protection Act 1970 is also problematic. A few hundred meters south of 148 Albert Street, on Barkly Street, \$12 million worth of apartments were constructed. Unfortunately the land was contaminated with dry-cleaning chemicals which had leached into the soil from a neighbouring block. This was only recognized after construction. The Environmental Protection Agency (EPA) demanded the site be cleaned up; however, the developer and the dry-cleaning firm are still disputing their respective liabilities (*Premier Building Consulting Pty Ltd v Spotless Group Ltd (No 7) [2005] VSC 275 (1 September 2005)*). Complications arose because the firm was merged many years earlier. Meanwhile, the land remains contaminated and the apartments unusable. This kind of issue creates uncertainty in the surrounding properties, including 148 Albert Street: while the parcel is not itself physically affected, the surrounding areas are and this impacts on market values. Cleaning up sites like these will take many years and the method for determining who is liable will probably be pursued on a case-by-case basis through the courts. While the statute could be used to force a clean-up it does not appear to tackle the problem at the right level: what is more pressing is the need to identify

which parcels have been affected and to make this information available to the public and potential developers. This would negate the need to create a law against building on contaminated land. The market would decide whether land is valuable enough to clean-up and redevelop. The concept of using markets or public education to negate the need for copious amounts of legislation was discussed in Chapter 4 and offers some potential opportunities for the improved management of property interests.

In relation to interests/laws that appear to be absent, a number of issues were identified in relation to 148 Albert Street. Anecdotal evidence from the tenants of 148 Albert Street and surrounding occupants suggests that Albert Street flash floods on average once every two to three years. 148 Albert Street lies at a low point and water from Sydney Road and Lygon Street collects into four large drains along the street located near 148. The drains are old and often clogged with debris. When large amounts of rain fall in short periods of time the drain backfills and water laps over the curb and sometimes into houses. It is probably for this reason that the houses in the area are built upon high foundations. It is also likely that this is why 140 Albert Street lies vacant and the block on the other side of the road is used for parking. The problem is worsening as backyards which once soaked up and held the backfill of water are crammed with new developments and apartments: less open land means higher water levels during a flash flood. This is a serious issue, perhaps more important than any of the statutes discussed above: the amount of property damage that can be caused by the flash floods could run into the tens of thousands of dollars. Lack of information and laws mean prospective purchasers would have little idea that the area floods: there are no planning restrictions or flood overlays on the area.

The risk of increased flash flooding due to more dense development leads to another concern: the need to balance the development of dwellings with the development of infrastructure. The Albert Street area has seen hyperactive developed since the late 1990s. Many warehouses and older homes were replaced

with large apartment blocks. The apartment blocks create more water run off which require larger drains. They house more residents who require parking, transport and other local amenities. So far the update of existing infrastructure and the development of new infrastructure have been slow. Systems of public transport and traffic movement are starting to break down. Dense development in Brunswick is encouraged at both the state and local level as part of a thirty year strategic plan for the sustainability of greater Melbourne. At the parcel level along Albert Street the plan appears to be flawed: lack of capital expenditure and densification could make the street unworkable. There appears to be information gaps at both local and state level in relation to planning. If more metrics (e.g. population) and interests (e.g. infrastructure) were represented and integrated spatially into planning systems more appropriate development decisions could follow.

A final issue relates to the size of the block. Many financial institutions will not provide a mortgage to parcels under certain sizes. This is not a restriction created by government, it is private in nature. A buyer may sign a contract of sale only to later realize the finance they had pre-approved from a bank is not available. The common property attached to the property means that 148 Albert Street is large enough to overcome this issue, however, if only the building was to be mortgaged (lot 1) issues could potentially arise. Private restrictions such as these are prevalent in any complicated land market. Another example is the ability of an insurance company to refuse to insure the property. These are issues which are not even considered in the realm of this research, but, which greatly affect the use, development and value of land, and in particular cases, they can be more significant than government restrictions.

SUMMARY

148 Albert Street is a relatively small, common, urban, residential parcel which hosts a large number of interests and issues, both legal and non-legal. Many of these are difficult to understand and equally difficult to research. Even sourcing information about “above the line” interests such as ownership and mortgages was

difficult: the information was burdened with historical quirks and a number of documents were incorrectly stored. It is only by using this paper based system that one can appreciate the impossibility of it ever encompassing all parcel-related interests, especially those relating to portions of a parcel. However, the system does provide the two core requirements of a reliable cadastre: a title identifying ownership and a map identifying location.

The ability to source information on “below the line” interests was variable. Over thirty statutes were found to apply directly to the parcel (if blanket interests were included the number would be much higher). Of these, many were well managed and easily available to the public, even if they were managed outside the cadastre and registry. A number were found to be poorly managed from the perspective of a citizen trying to source information. The majority of these related to the roads and land surrounding the parcel rather than the parcel itself. This finding indicates that information systems based around parcels will only satisfy a small portion of the information needs relating to a parcel. Detailed information about the parcel and the surrounding areas are still required.

Overall, an overwhelming number of the interests identified in Chapter 6 simply did not apply. Identification of the tenure, land use and development information provides a very good picture of the land and its utility. From here we can greatly reduce the list of applicable interests. For example, 148 Albert Street is freehold and urban residential; any interests relating to public land, common land, conducting commerce, agriculture, industry, the marine environment etc. are immediately not applicable. This framework may provide some utility for organizing land interest information and could be part of an overall framework for managing land interests.

5A KARA GROVE: BAYSIDE SUBURBIA

SETTING THE SCENE

Historians have often used the Yarra River, Melbourne's major waterway, as a means of discussing the social and economic landscape of Melbourne. To the north the industrial suburbs of Brunswick, Richmond, Collingwood, Fitzroy, and North Melbourne housed the working classes. In the south, leafier bayside suburbs such as South Yarra, Toorak, Hawthorn, Brighton and St Kilda housed the bourgeois. By the late twentieth century this framework had lost some of its relevance: a recentralized white collar workforce and higher petrol costs had increased the value of all inner suburbs. The distance one lived from the city's centre was becoming a better indicator of economic and social conditions. The Melbourne suburb of Aspendale sits on the bay and to the south of the Yarra River, but it remains more than twenty kilometers from the city centre. It does not fit comfortably into any of the frameworks and makes for a very interesting case study.

To get to Aspendale from the central business district one heads south, away from Flinders Street Station, along the tree lined boulevard called St Kilda Road. At St Kilda junction the road widens into the Nepean Highway. The highway divides the bayside suburbs: St Kilda, Elwood, Elsternwick, Brighton, Cheltenham and Mordialloc lie to the east, while Balaclava, Caulfield, Bentleigh and Moorabbin lie to the west. Just out of Mordialloc, the Nepean Highway and the Frankston railway line converge and cut in close to the bay. This is Aspendale, a small suburb made up of a stretch of beach, Regents Park, a short row of shops and the residential streets that sit either side of the railway and highway.

The land that makes up Aspendale was purchased by Elijah Crook in the 1870s from Peter Carroll. His son James Robert Crooke (note name change), a horse trainer, later established a racecourse and gardens on the land. He named the course Aspendale after Aspen, one of his horses. By the turn of the century the park was available to the public as a summer picnic locality and was later used as a motor

racing track. Throughout the later twentieth century the parklands and surrounding mixed-use land were subdivided into the residential areas that now prevail.

In terms of local governance, the area was originally administered by the Moorabbin Roads Board. Formed in 1862 it became a shire council in 1871. As the population grew campaigning for more local representation arose in the southern areas of the shire and it reformed as the "Borough of Mordialloc and Mentone" in 1920. It became a town in 1923 and the City of Mordialloc in 1926. In 1994 the State government amalgamated local councils all over Victoria, creating the City of Kingston which encompassed most of the old Mordialloc area and Moorabbin.

The City of Kingston's local economy is mixed. It has over 4,000 industrial sites and a number of village shopping centres. The population of 135,000 is diverse with 34% being born outside Australia. The majority arrived prior to 1986. They are mainly located in the northern areas of Clayton South, Clarinda and Oakleigh. The population is ageing with more than 26,000 aged over 60, significantly more than the Melbourne average. This ageing population is more evident in the older western and northern suburbs. Newer suburbs such as Aspendale Gardens and Chelsea Heights have high proportions of pre-school children.

The property in this case study lies roughly a kilometer north of the centre of Aspendale. In this area a small strip of land, roughly a hundred meters wide, runs parallel to Port Phillip Bay on the west and the Nepean Highway and Frankston rail line on the east. Kara Grove is a small unmade gravel road that comes off the Highway (Figure 7.4). It is easily identified by the large Cypress trees that line it. The grove leads to a dead-end, off which a common stone driveway provides access to 5A Kara Grove. 5A is double story single dwelling with three bedrooms and open living spaces up stairs and down. Views of the bay are available from the top level and considerably appreciate the property value. A garage connects to the dwelling which leads into a fenced off backyard which also provides access to the beach via a side fence.



Figure 7.4: Location of 5A Kara Grove, Aspendale, Victoria

ABOVE THE LINE INTERESTS

The 5A Kara Grove study was carried out in a similar fashion to the previous case study (Appendix 2 contains more study details). An online map based search of the Landata system (See Chapter 6) revealed the title and map of 5A Kara Grove. 5A Kara Grove relates to Volume 09477 Folio 833 (Figure 7.5). The parcel is jointly owned and has been occupied by these owners since 1982. The dwelling was created at this time, however, information was provided by the owners: building information is not kept within the registry or cadastre (although its recent construction would mean the original planning permits and certificates of occupancy would be stored within the council's records). The title links the ownership interest to Unit 2 on strata plan 017981 (Figure 7.5). Strata plans relate to stacked layers of ownership and are made available under the Subdivision Act

1988, which was first developed in the 1960s. The title also provides for a share of the common property (all that is not the buildings) between 5A and 5 Kara Grove. The stone driveway is part of this common property. Strata plan 017981 shows the footprint of Unit 2. Unit 1 is also shown, however, it is owned by another party. In this case the search for ownership was relatively straight forward, although again, the situation on paper was more complex than appeared on ground, with the addition of common property and strata interests.

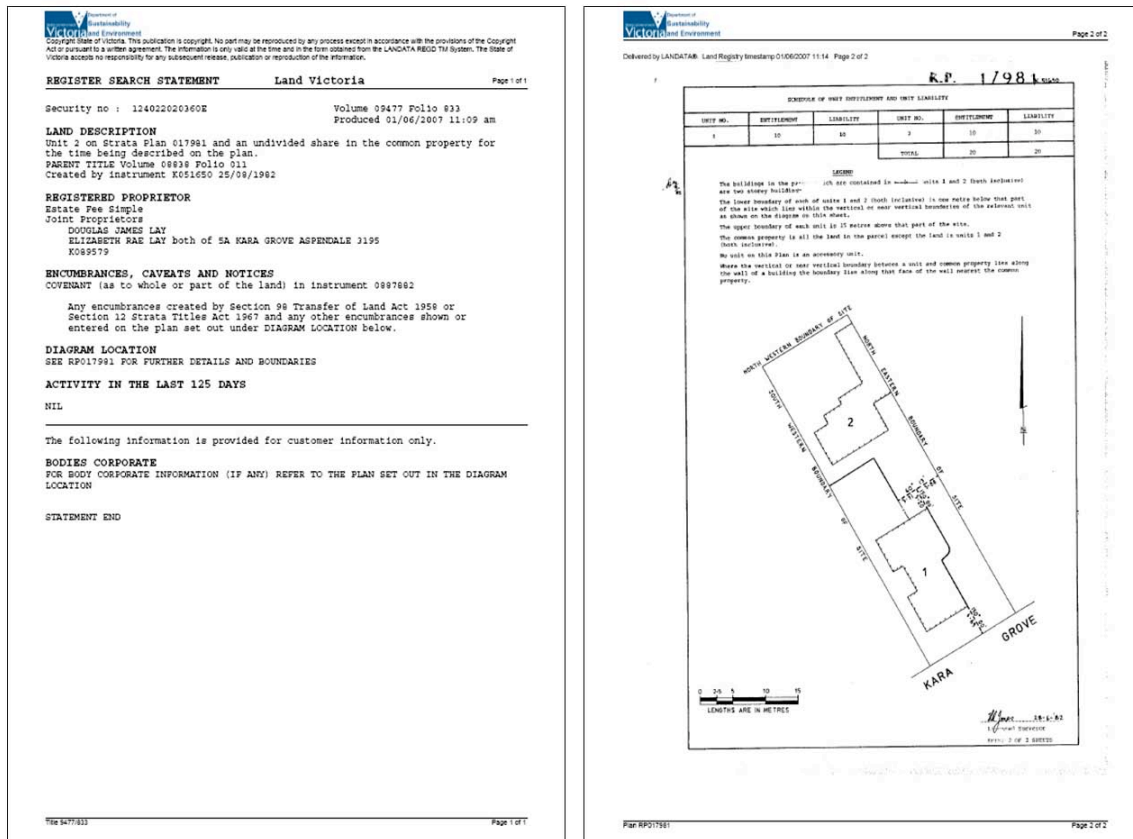


Figure 7.5: Title and plan for 5A Kara Grove, Aspendale, Victoria

Other above the line interests include a drainage easement which runs along the northern edge of the property. This easement can be seen visually on the strata plan; however, it is not listed on the title: there is a statutory provision that creates legal easements through strata and subdivision plans. This illustrates the importance of having both title and plan. It should be noted that the plan does not give any

information about where the drain comes from, whether it is still in use, or who it benefits. Inspection of the Land Channel online map reveals its connection to other easements: it collects water from roads and dwellings to the north of 5A Kara Grove and drains it into the bay. In addition to the easement, a restrictive covenant (887882) is also listed on the title. The document dates back to 1919 and was originally attached to lots 6 and 7 on Vol 3912 Fol 385 (a parent title) which in turn relates to the lot/plan diagram LP 013. Lot 6 was converted into Units 1 and 2 in the diagrams discussed earlier (Figure 7.5). The covenant restricts a number of actions. It stops any building or dwelling that does not face Kara Grove being built on the land in Units 1 and 2. The dwelling must be residential. It also restricts sand being removed from the land. The covenant originally bound the owner of lot 6 (now 1 and 2) and was in favour of the owner of all the surrounding lands on the parent title. It was passed along to new titles as they emerged through land transfer and subdivision. The covenant still applies; however, it is debatable whether it holds any relevance. Units 1 and 2 were built in 1982 despite the fact that neither really fronts Kara Grove. This document shows the longevity of any interest that is placed on title. Removing it would probably consume more time and cost than is necessary: legacy documents like this tend to remain, even though they have limited relevance and use. Again this illustrates the anachronistic tendency of the existing formalized registration system.

BELOW THE LINE INTERESTS: GOOD, BAD AND ABSENT

A swathe of below the line interests and issues apply to 5A Kara Grove, and particularly to its surrounding area (Appendix 2 provides more study details). Indeed, the case study highlights the importance of taking a much wider, multi-parcel view rather than focusing on a single parcel. As will be demonstrated, it is often the surrounding interests which impact most upon the parcel's value, amenity and the activities that can be undertaken on it. For the purposes of discussion, the interests are again classified into good (well organized and easily accessible), bad (poorly organized and difficult to access) and absent (those which do not exist, but ought to).

In considering well organized interests, all those recognized in the 148 Albert Street case study applied again: the Lands Acquisition Act 1989 (federal), the Sale of Land Act 1962 (state), the Property Law Act 1958 (state), the Subdivision Act 1988 (state), the Transfer of Land Act 1958 (state) and the Fences Act 1968 (state) were all considered well managed and not problematic. In addition, the state level industry management statutes were also well organized. However, these also had a very limited impact on the property. Acts included the Liquor Control Reform Act 1998, the Gambling Regulation Act 2003, the Gas Industry Act 2001, the Gas Safety Act 1997 and the Electricity Safety Act 1998. The Domestic (Feral and Nuisance) Animals Act 1994 was also considered well managed.

In relation to bad or poorly organized interests, planning legislation (the Planning and Environment (Planning Schemes) Act 1996 State, the Planning and Environment Act 1987) and the Road Management Act 2004 created the most problems. The property and surrounding properties were all zoned Residential 1 (R1Z) and were subject to a Design and Development overlay (Figure 7.6). The overlay requires any new development undertaken on the property to contribute financially to the creation of public amenity and open space. In addition, the parcel abutting the eastern side of 5A, 3 Kara Grove was subject to a heritage overlay: the property and buildings are considered historically important to the City of Kingston.

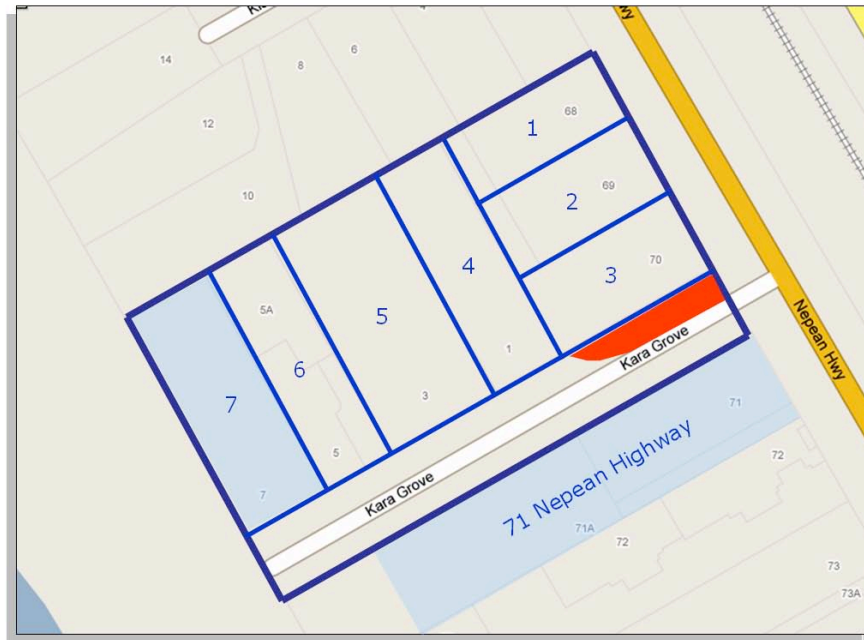


Figure 7.6: Planning zones and overlays for 5A Kara Grove and surrounds

As shown, the planning zones and overlays were quickly discovered on state and local websites, however, the development assessment and dispute resolution processes associated with the planning legislation were found to be both time consuming, costly and open to manipulation. To understand the reasons for this, the history of 5A Kara Grove needs to be explored.

In the first decades of the twentieth century, 5A Kara Grove was part of a large one acre (three roods, 39.7 perches) estate known as Kara (Vol 3912 Fol 365). Figure 7.7 illustrates the original boundaries. On the 28th August 1915, John Lamont Dow became the registered proprietor. The title abutted the Nepean highway on the east and ran in a westerly direction to the foreshore in the west. In 1916 he divided the estate into 7 lots (Figure 7.7). Lots 1, 2 and 3 faced the highway, while lots 3, 4, 5, 6 and 7 ran in a line away from the Nepean highway towards the foreshore. It was

at this time that a private road called Kara Grove, 50 foot in length, was created. It ran along the entire southern portion of the original title.



Original Kara Estate
 Original Subdivision Boundaries
 Proposed developments
 Adverse possession claim

Figure 7.7: Original Kara Estate

Dow began transferring lots to other parties. In 1919 lots 6 and 7 were transferred to Frank Lancelot White Ashby. Ashby and another man named Charles Hugh Lucas were also registered as proprietors of the fee simple in Kara Grove: each having a half share of the private road. In the 1990s Ashby's share in Kara Grove was transferred to the current proprietors of 7 Kara Grove. Over the decades, the surface of Kara Grove was never sealed and owners of adjacent blocks extended their gardens into the road reserve. Attractive vegetation landscaping resulted. In the early 2000s the same proprietors commenced the development of 7 Kara Grove. They planned to replace the existing double story dwelling with four double story apartments, each with separate parking. To achieve these plans Kara Grove, the unmade private road, would need to be upgraded and sealed. However, first it needed to be reclaimed from the owners of the surrounding parcels whose gardens,

over time, had encroached upon the grove. Of course, these owners preferred the picturesque grove to remain as it stood.

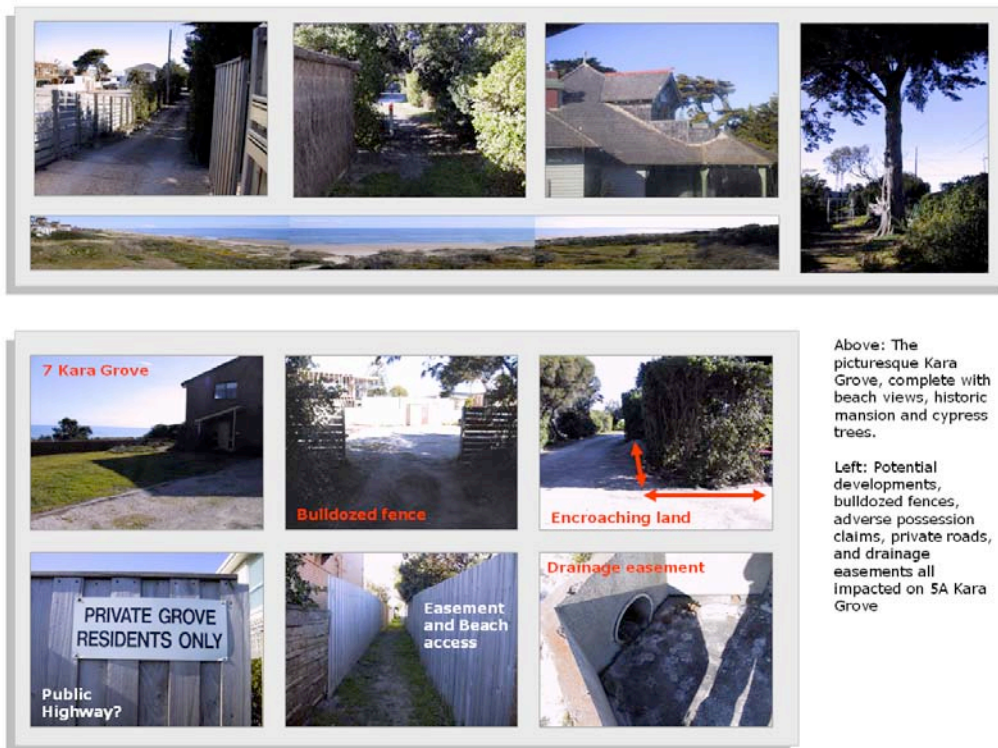
In order for the development to proceed, the proprietors of 7A Kara Grove required the other half of the title to Kara Grove. It was eventually discovered that this title was registered in the name of an elderly woman suffering Alzheimer's disease: she had long since left the property and power of attorney rested with her son. He resided outside Australia, was not interested in pursuing his interest and eventually forfeited it: the matter could proceed.

Meanwhile, the proprietor of 70 Nepean Highway (Lot 3 in original title) (Figure 7.7) had lodged an adverse possession claim using section 60 of the Transfer of Land Act 1958. They planned to acquire the portions of Kara Grove abutting their land: all conditions required by law were satisfied in accordance with the Limitations of Action Act 1958. This prompted the proprietors of 7 Kara Grove to serve a writ to the proprietors of 70 Nepean Highway. The writ argued that adverse possession was not available and that court proceedings may be appropriate.

At this time 71 Nepean Highway (Figure 7.7), not part of the original title, was also being redeveloped. Assuming that Kara Grove was a public road, the developers removed a portion of the fence between 71 Nepean Highway and the grove and began using it as a service road to bring materials and vehicles into the property (Figure 7.8). This increased tensions along the grove and led to a dispute hearing at a Kingston City Council meeting. The proprietors of 71 Nepean Highway suggested Kara Grove was a public road: it had been recorded as such on Kingston City Council's road registry. This was a new registry required by the Road Management Act 2004 (state level). The Act demanded that all road owners (mainly local councils) keep an inventory of their roads. Of course, this was an administrative error, Kara Grove had been a private road for over 80s years and had never been the public highway it was now listed in the council's road register. This was a convenient quirk of fate for the proprietors of 7 Kara Grove as it would mean

Kara Grove could not be adversely possessed. Indeed the council would be required to upgrade and maintain the grove itself: the four apartments could seemingly go ahead. Despite objections from other Kara Grove residents the Council declined to remove Kara from the register and took possession of the Kara Grove titles believing their actions were sound.

As a result of the Council decision, the developers of 71 Nepean Highway hastily began using Kara Grove to access to their property and facilitate the new development. At the urging of residents Council refused to grant a permit (to use Kara Grove for access) to the developers arguing that adequate access already existed from the Nepean Highway. The developer went to VCAT, a state level planning tribunal, and the Council's decision was overturned. In the process the developer had to agree to the widening of Kara Grove at the entrance using land from No 71 (Figure 7.8). This was to overcome a perceived safety issue of a minor road joining a major highway.



Above: The picturesque Kara Grove, complete with beach views, historic mansion and cypress trees.

Left: Potential developments, bulldozed fences, adverse possession claims, private roads, and drainage easements all impacted on 5A Kara Grove

Figure 7.8: The Kara Grove story in pictures

After further meetings with residents, the Council proposed to make Kara Grove a discontinued road and create reserves (Figure 7.9). At the time of writing the intention is to create individual titles for each reserve which will be held by Council. Council also intends to place an environmental overlay on the Grove so that it must remain unsealed and single laneway. Council has assumed responsibility for maintenance and trimming trees, however, the only evidence of this to date has been the Council Arborist's condemnation of a large landmark pine tree and its subsequent destruction. Meanwhile the 4 unit development proposed by 7 Kara Grove has been rejected by Council on numerous grounds. The developer has gone to VCAT but a hearing date is yet to be set.

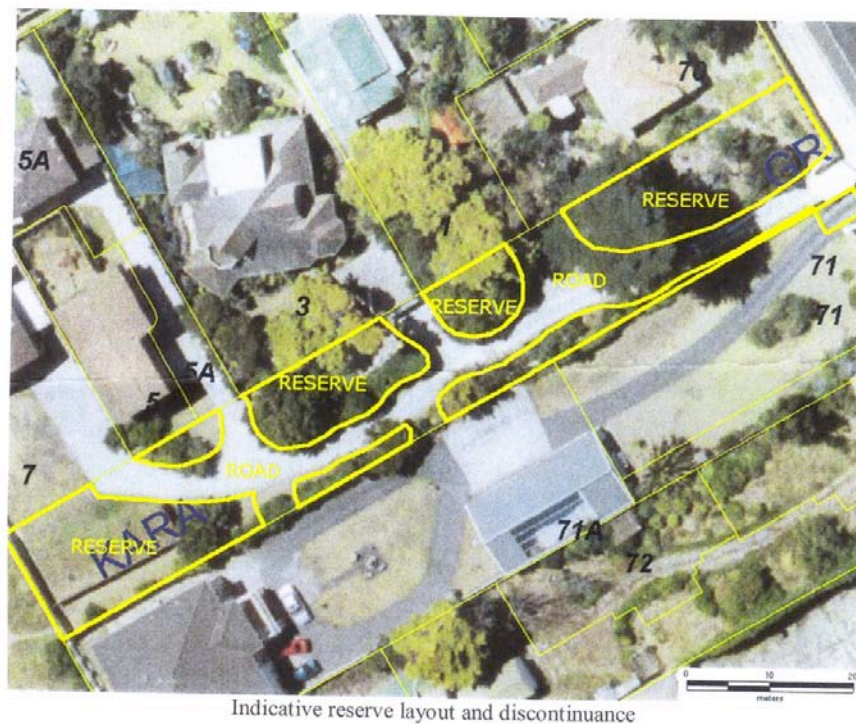


Figure 7.9: Planned road reserves for Kara Grove

The main issue with the planning legislation was the slowness of the process but perhaps this is unavoidable: decisions on competing interests need to be carefully thought out and justified. The same cannot be said for the Road Management Act

2004. The speed at which this legislation was passed resulted in a significant administrative error. It led to the extinguishment of title and adverse possession claims which had matured into ownership, the highest form of interest a private citizen can hold over land. The case demonstrates how all laws with a spatial footprint can potentially overlap on the ground. This cross-over leads to complications, unforeseen side effects and, eventually, manipulation.

Other interests that could be considered poorly organized (rather than poorly managed) are those arising from legislation dealing with coastlines. A strip of council land exists beyond 7 Kara Grove. This reserve is subject to a Kingston City Council local law aimed at protecting and preserving the foreshore. Beyond the reserve all land and water is officially state owned. At 3 nautical miles from the shoreline the federal government takes control. A body of laws at the state and federal level apply to this marine environment, regulating shipping, pollution, fishing, and mining. While the spatial extent of these laws might appear clear in legislation, the online maps provided at the state level (Land Channel) show that these boundaries are very unclear, particularly when overlaid with imagery. Similarly, on the ground there are no viewable boundaries. While this may not be an issue for the average beach-dweller, determining which level of government presides over accidents occurring in these areas or which agency is responsible for maintenance would be problematic.

In relation to absent interests, one issue is worth discussion. An historic mansion sits on 3 Kara Grove. Originally it was the only building on the estate known as Kara and was owned by a Melbourne opera company. Local legend suggests Dame Nellie Melba sang on the balcony during one of the many evening parties held in the building. While it is heritage listed by Council, the tree lined road (Kara Grove) leading to the mansion was not. Many of these cypress trees were removed after a violent storm in the 1980s: listing the remaining trees and roadway could have prevented the damage which occurred when 71 Nepean Highway was being developed.

SUMMARY

5A Kara Grove again demonstrates the importance of looking outside the parcel: while the property may not have been directly subject to many below the line interests it remained affected by a significant number of them. The parcel boundaries of 5A Kara Grove were irrelevant to the planning issues and road management disputes. Interests applying almost hundreds of meters away could potentially have a large impact on future land uses and value. Systems attempting to improve information provision to citizens must take this into account.

5A Kara Grove also illustrates the large amount of knowledge kept at the local level. Like the floodplain issue at 148 Albert Street, many of the most important issues were not listed on the title or any other registry. It was only by visiting the site and learning of the on-ground issues that one could gain a reasonable understanding of the parcel and its surroundings. Creating systems to easily capture this information from locals would be of great benefit to the government and other citizens. It could negate the need for many restrictive statutes: parcel limitations would be freely available to the public. However, in a market based system, land owners are encouraged to hide problems and potential issues relating to their land. It is difficult to see how this can be overcome in the short-term.

Finally, 5A Kara Grove again highlighted the major problems underpinning this research: lack of a coherent system for managing land interests, compounded by poor legislative drafting and overlapping laws. The wider impact of the Road Management Act 2004 was not properly accounted for, particularly its impact on other laws. The law also led to many administrative errors at the Kingston City Council. The existing system encouraged disputation and tension, leaving administrators and legal systems to arbitrate fractured issues. No one could take a holistic view or encourage mediated and negotiated solutions. Legislative guidelines and limitations on legislation clearly need to be a consideration for any framework improving the management of property rights, restrictions and responsibilities.

485 MORRISON ROAD: LIFE ON THE FARM

SETTING THE SCENE

Victoria's east is much wilder than the flat pastoral plains of her west. The Great Dividing Range dominates the landscape: mountains blanketed with dense native forests link together to form a barrier between the coast and the rest of Australia. Despite the rougher climate, pioneers, including the infamous Kelly family, moved into the area. To occupy the land they were legally required to remove the dense forest, erect fences and make the land suitable for farming. To the south of the ranges, massive brown coal fields provide the raw materials used to power the state. The climate is usually cooler and wetter than the rest of the state and has many ideal places for dairy farming. Labertouche is one such place.

To get to Labertouche, you must head east along Flinders Street away from the station. At Exhibition Street a right turn is made onto Batman Avenue which leads onto the Monash Freeway. The Monash Freeway provides a portal through the old leafy eastern suburbs of South Yarra, Toorak, Burnley, Hawthorn, Kooyong, Glen Iris and Malvern. After these come the post WWII suburbs which housed a large part of the city's baby boom: Chadstone, Murumbeena, Oakleigh and Mulgrave to name a few. Beyond these the newest contributors to urban sprawl can be found: Berwick, Narre Warren and Pakenham have all been transformed from small towns into large satellite suburbs. Beyond these enclaves, activity dramatically decreases and the rolling hills of farmlands appear. The deep green hills of the Dandenong Ranges can be seen close by to the north. At this point the driver has traveled one hundred kilometers from the centre of Melbourne.

Labertouche is located at the foot of the Dandenong Ranges. At a local level it is governed by Baw Baw Shire Council which is located in West Gippsland and consists of over one hundred localities and almost four thousand square kilometers. The jurisdiction includes prime farming land, towns and densely forested mountains which are the subject of the forestry industry. Mt Baw Baw, the Tarago

and Thomson Rivers, Blue Rock Dam, Toorong Falls Reserve, Glen Nayook, Mount Worth, Moondarra and Tarago Reservoirs all lie within the Shire. The Shire has a population of over thirty eight thousand people and is growing at an increasing rate. The population is expected to reach forty-one thousand by 2010. Managing this growth is the most pressing issue facing the council in the short to medium term.

Morrison's Road begins near the Princess Freeway. The road is unmade and in Spring its pale orange gravel contrasts with the lush green dairy grazing paddocks that it intersects. A small creek lies a few kilometers to the north (Figure 7.10). A reasonably modern 1970s style farmhouse fronts the road. The farm consists of roughly 140 hectares of paddocks and is bounded by Morrison's Road to the east, two neighboring farms on the northern and southern sides and Bunyip Creek in the east. Farm infrastructure (milking sheds) and equipment also occupy the land.

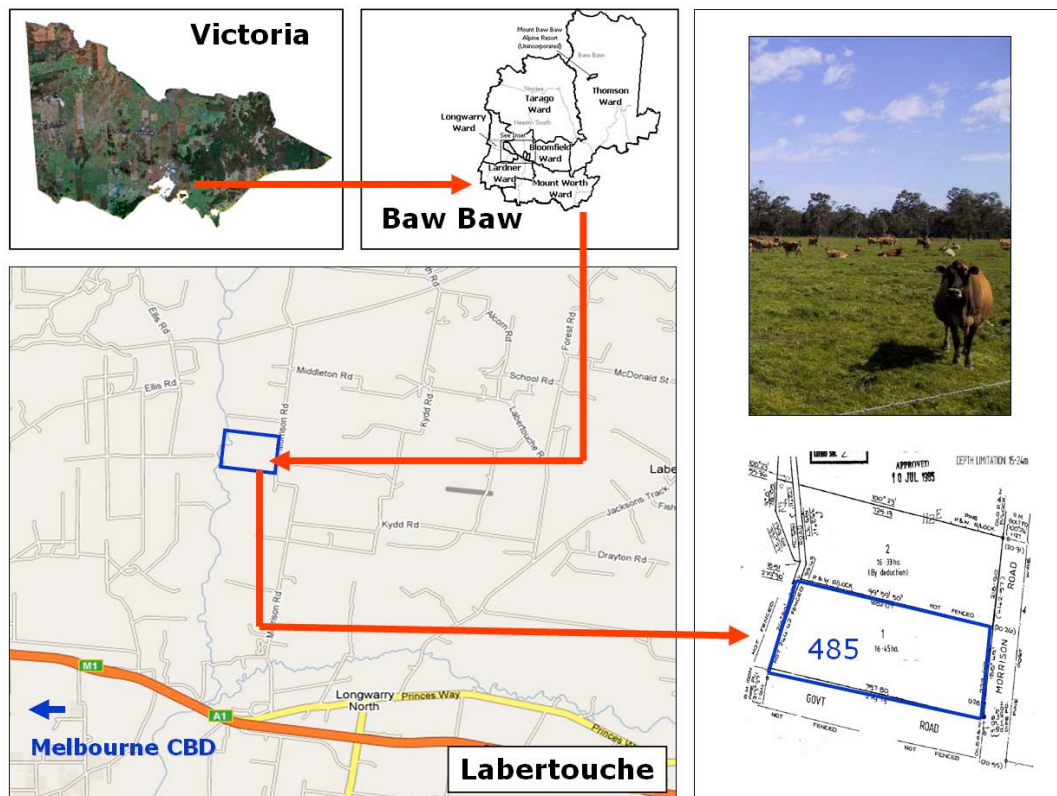



Figure 7.10: Location of 485 Morrison's Road, Labertouche

ABOVE THE LINE INTERESTS

The study revealed 485 Morrison Road actually consists of two addresses: 485 Morrison Road and 515 Morrison Road (Appendix 2 provides more study details). While the owners consider these addresses to be a single entity, both local and state governments define them as separate parcels and properties. The two addresses correspond to two different titles: Vol 08754 Fol 012 and Vol 09620 Fol 013 respectively.

Vol 08754 Fol 012 (485) denotes Crown Allotment 113C in the Parish of Jindivick: the parcel has not been subdivided or consolidated since its initial alienation by the Crown. The proprietors have occupied the block since 1985 and it is subject to no encumbrances such as mortgages, covenants or caveats. All the permanent farm infrastructure and buildings relate to this title, however, no location and construction information of these buildings kept in state government registries. The location of on-ground fences is also not recorded.

Vol 09620 Fol 013 (515) denotes Lot 1 on LP 216471 (Figure 7.11). It sits to the north of 485 Morrison Road and has the same proprietors, who only acquired the land in 1999. It is encumbered by a mortgage to the Commonwealth Bank of Australia. A depth limitation of 15.24m is also listed on the lot/plan diagram.


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REGISTER SEARCH STATEMENT Land Victoria Page 1 of 1

Security no : 124019360058M Volume 09620 Folio 013
 Produced 10/10/2006 02:08 pm

LAND DESCRIPTION
 Lot 1 on Plan of Subdivision 149957P.
 PARENT TITLE Volume 08309 Folio 102
 Created by Instrument LP149957P 10/07/1985

REGISTERED PROPRIETOR
 Estate Fee Simple
 Joint Proprietors
 PHILLIP BARNON GREENALL
 SUSAN MARIE GREENALL both of 485 MORRISONS RD LABERTOUCHE 3616
 V897501U 17/02/1999

ENCUMBRANCES, CAVEATS AND NOTICES
 MORTGAGE V897501R 17/02/1999
 COMMONWEALTH BANK OF AUSTRALIA
 Any encumbrances created by Section 98 Transfer of Land Act 1958 or Section 24 Subdivision Act 1988 and any other encumbrances shown or entered on the plan or imaged folio set out under DIAGRAM LOCATION below.

DIAGRAM LOCATION
 SEE LP149957P FOR FURTHER DETAILS AND BOUNDARIES

ACTIVITY IN THE LAST 125 DAYS
 NIL

STATEMENT END

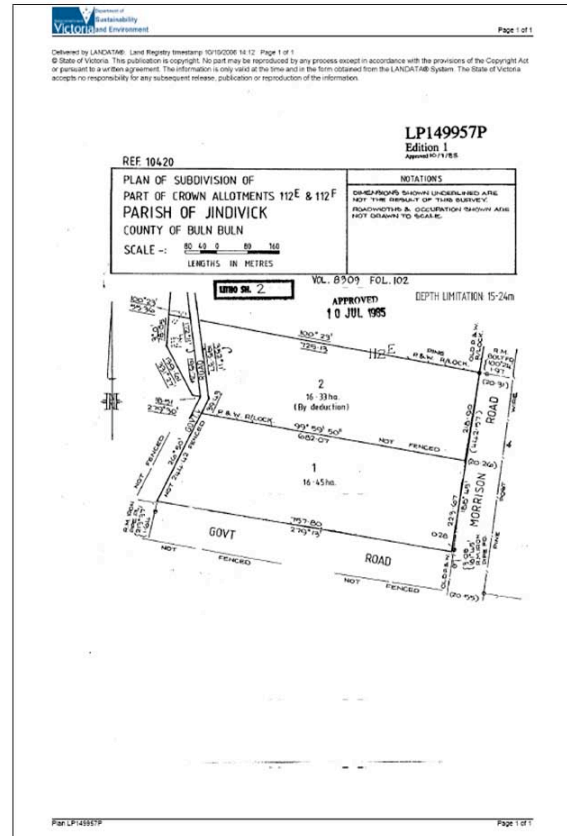


Figure 7.11: One of the two titles/plans for 485 Morrisons Road

While the proprietors have occupied 485 Morrison Road since 1985, an administrative error meant that they were not actually listed as the owners for some time. The initial purchase required a mortgage to be taken out from a local finance group. When one of the members of the finance group later died, a survivorship application (an application to amend the mortgage to surviving mortgagors) was completed to remove him as a mortgagor. However, during the transaction the land registry mistakenly removed the proprietor's names and replaced them with those of the remaining finance group members. This error was only discovered in 1999 when the proprietors, planning to refinance 485 Morrison Road as security to purchase the neighbouring block, discovered they were not registered as owners. Only the assistance of an experienced lawyer allowed for this situation to be remedied expeditiously. The land registry is fallible, errors occur and it is important that fair systems of dispute resolution be made available. The land registry does this quite well; however, the maintenance of such systems and assurances is costly and

must be funded through relatively highly transaction fees. If the register contained the majority of land interests and applied a broad guarantee, funded by fees, land transactions could become prohibitively expensive. It appears that only those interests with the highest value attached to them should be registered, maintained and guaranteed in the traditional way.

This case again demonstrates the complexities of the existing registration system. An owner's perceptions of his/her land can be very different from those kept in the registry: the farm consists of multiple parcels and the boundaries of these parcels do not match with the existing physical fences. In addition, other parties and government agencies might perceive the land and boundaries differently. These different perceptions inhibit the integration of information and, while in some cases they may be necessary, a more universal model of the parcel layer is needed. The PIP project tries to achieve this as integration between local level governments and the land registry; however, many other agencies and private bodies continue to operate very different datasets relating to parcels, properties and addresses.

BELOW THE LINE INTERESTS: DAIRY, DEVELOPMENT AND THE ENVIRONMENT

While a large number of below the line interests applied to the two previous case studies, many more were found to apply to 485 Morrison Road (Appendix 2 provides more study details). Those perceived to be of most interest are discussed here (Refer to Appendix for study data). For the purposes of discussion the interests identified are categorized according to activities occurring on the land: dairy production, land development and environmental conservation.

A range of federal laws apply to dairy production including the Dairy Adjustment Act 1974, the Dairy Adjustment Levy (Customs) Act 2000, the Dairy Adjustment Levy (Excise) Act 2000, the Dairy Adjustment Levy (General) Act 2000, the Dairy Industry Adjustment Act 2000, the Dairy Industry Legislation Adjustment Act 2002, the Dairy Industry Service Reform Act 2003 and the Dairy Produce Act

1986. As would be expected these statutes govern the industry from a high level. They deal with international exports, marketing, privatization, and the application of customs, duties and excises. These laws tend to have limited impact at ground level: they do not affect the day to day activities of a dairy producer. The interests that do affect dairy farmers on a daily basis are administered at the state level and these are now discussed.

Two key activities are required to run a successful dairy: breeding and feeding. Attention is first given to the feeding component. The cheapest feed available is the grass that grows in the dairy farmers own paddocks. The challenge is to continually maintain good quality pastures for grazing by rotating paddocks and ensuring there is enough water to keep them green. DSE provides methods for monitoring grass and tools for improving growth through seminars and monthly newsletters, however, these strategies are not in legislation. A big issue for 485 Morrison Road and most farms is ensuring constant water supply. A large body of rules governs what can and cannot be done in relation to water on the property, many of these can be found in the Water Act of 1989. DSE, Southern Rural Water and Baw Baw Shire Council all administer and enforce parts of the law. Most importantly, no dams may be built and irrigation channels are unavailable: all the water flowing down the Bunyip river at the rear of the property is “spoken for” or pre-allocated. The property does have a pumping licence, administered by Southern Rural Water, which allows it to pump water from the river into the property at certain pre-determined amounts (Figure 7.12). Bore holes, drilled deep into the water table, are also licensed: 485 Morrison Road has two of these (Figure 7.12).

To improve the yield of grass, farmers often use fertilizer, herbicides and pesticides. The use of these chemicals is now governed by DPI and DSE under the Agricultural and Veterinary Chemicals (Victoria) Act 1994 and the Agricultural and Veterinary Chemicals (Control of Use) Act 1992 (Figure 7.12). Users must be certified and applications controlled. The types of chemicals which can be used are also controlled and users must keep a set of records which are audited every two

years. If paddock grass is not available (e.g. drought) any other feed must be certified: DPI administers this process.

Rules applying to the collection and storage of milk have increased substantially over the last 20 years. The Dairy Act 2000 embodies many of these rules. The statute is administered by Dairy Food Safety Victoria; however, there is a strong emphasis on self-regulation. Any private organization that a dairy farmer deals with (e.g. dairy wholesaler) may also be subject to the large body of private regulations governing the milk production process. Morrison Road requires an annual licence to operate from Dairy Food Safety Victoria. The milk is collected twice a day, stored in a sterilized vat and collected daily by the private company Bonlack. During collection the milk is tested and an electronic report generated for Bonlack and the property owner. These records must be kept. Dairy Safety Victoria also requires food safety plans and encourages the implementation of sustainable farm management plans. Evidence on the ground suggests farmers generally agree with the amount of regulation: it helps promote a clean and green image on which the industry can promote itself.

The livestock held on 485 Morrison Road are subject to another set of legislative rules (e.g. the Livestock Disease Control Act 1994). These are designed to prevent disease and enable prompt action to be taken in the event of an outbreak. There are rules for ongoing testing, the disposal of dead animals, the application of antibiotics and the process of artificial insemination (most calves are bred in this way). All livestock must be traceable and are tagged for their lifetimes. The National Livestock Identification Scheme (NLIS) assists this process: it is managed at the state level by DPI. Cows can be tracked from birth to death. Male calves and older cows are sent to market in Colac: these must be accompanied by a declaration of health. Should problems arise, the responsible farmer can be identified.

Dairy cows produce large amounts of effluent. The pumping and dispersal of this effluent is one of the largest problems for dairy farmers. A body of rules, largely

managed by the Environmental Protection Agency (EPA), governs the management of waste. The EPA demands that effluent be allowed to settle before it is put elsewhere which requires the construction of ponds. 485 Morrison Road currently has two small ponds in operation. After the effluent has settled, 20% is dropped in the yard near the farmhouse and 80% is spread across paddocks and laneways.



Figure 7.12: Most aspects of dairy farming are subject to land restrictions and responsibilities

In summary, there are many land interests relating to farming and dairy farming in particular. It is only through experience that one can discover them and understand how they apply. However, this tends not to be a problem: many farmers belong to generations of family farmers and understand the laws inherently. Moreover, dairy farmers are generally not isolated: the existence of neighbouring farms, industry groups and government agencies means a strong network of support is available. In essence, those who need to know the laws generally do: others outside the dairy

industry would most likely not be interested in their application. The laws and their management are organized around an activity (i.e. dairy production): the legal system is actually based around a set of layered activity objects (which have a spatial component) rather than parcels. There is no need to include dairy regulations on a title or deed: they apply to an activity so their location is a secondary (but vital) concern. Indeed, there appears little reason to include any business activity information on a guaranteed title, be it lavender farming, liquor retailing or yoga classes: registries are designed to manage and secure ownership interests. Nevertheless the availability of a business site licence can be a major asset, adding high value to land and premises.

Nonetheless, there is clearly a role for spatial technologies and information in the dairy industry and other business ventures. Farmers and any other agencies involved could benefit from the integration of their datasets. The proprietors of 485 Morrison Road currently use a paper based system to manage their farm (Figure 7.13). An online, map based system would allow direct uploading of chemical usage reports, milk test results, yields and other required records relating to the parcel. This information could be fed into state based systems (DPI) to improve wider management of the industry. State information sets could also be used by farmers to understand and improve the efficiency of their own businesses.



Figure 7.13: Paper based farm management systems

According to local sources, small-scale dairy production is reducing in the Labertouche area. In the future, farms will require a minimum of 400 to 500 head of stock to be viable. 485 Morrison Road can only accommodate 200 cattle. The current proprietors are assessing the available options: expand, sell-up, or retire and live on the farm. Ideally, as the owners are nearing retirement, they would like to construct a new dwelling at the rear of the property, alienate the surrounding area and sell off the remaining land (including farm house and infrastructure). However, state level planning legislation restricts these actions (Planning and Environment (Planning Schemes) Act 1996 State, Planning and Environment Act 1987). The farm is currently zoned farm land (FZ): rules introduced in 2005 stop secondary dwellings being constructed on land in these areas. Additionally, any land over 100 hectares cannot be subdivided. The reasoning behind these obscure restrictions relates to the perceived need to maintain the amount of agricultural land in the state and the size of farms (efficiency). Allowing farmers to build multiple dwellings and subdivide potentially decreases farmland and farm sizes. However, these blanket restrictions also severely limit land owner options: they must either continue to farm or attempt to sell raw land that is no longer suitable for the activity it supported for decades. Moreover, the arrival of drought and the move of the southern Australian rain belt to the Tasman Sea require flexible land use decisions, including higher density and intensified land uses as parched land demands greater stewardship efforts. These state laws appear unfair when applied to the local context: a larger role for the local level seems necessary.

Another quirk also exists in relation to the development of 485 Morrison Road. The two parcels making up the farm cannot be consolidated: an unmarked and unused government road divides them. While the proprietors of 485 hold a licence to use the road, they are prevented from obtaining title and consolidating the parcels. The road can be viewed on the state government's online maps; however, it is not linked to any registry information. This is because a significant amount of crown land has yet to be included in these systems. A paper based search of government gazettes

would be the only way to source the information. Much of this knowledge is held only locally: the licence agreement to use the road is held in a local registry office in Warragul and is administered and understood by a single person. This example shows that Victoria's cadastral map is not complete: systems for managing Crown land have lagged and require urgent re-organization and integration with the land registry. The land registry cannot successfully manage any other interests if the cadastral map base is incomplete.

The final body of regulation impacting significantly on 485 Morrison Road relates to environmental conservation. Farming and conservation have often been portrayed as mutually exclusive activities, however, at 485 Morrison Road and the surrounding farms it appeared the principles of conservation were embraced. While a set of laws protecting native flora and fauna exists (Wildlife Act 1975 (e.g. wombats), Environment Protection Act 1970, Flora and Fauna Guarantee Act 1988, Planning and Environment Act 1987), the main conservation activities in the area were being driven by individuals, not legislation.

The Bunyip River runs along the back or eastern part of the property. It snakes down from the high country and flows into Western Port Bay, roughly 100 kilometers to the south. The river bed, banks and lands in close proximity to the river are state owned. At 485 Morrison Road the river was once used to water and shade cattle, however, for a number of reasons this no longer occurs. In 1910 swampy parts of Western Port Bay were drained. Removing these swampy impediments increased the speed of the river and caused the banks to gradually erode. Several large floods in the 1980s saw the amount of erosion dramatically increase. The river created a gorge and its level dropped. It became largely inaccessible to farm animals and the trees along the banks collapsed. This prompted locals to begin a Landcare project, a state and federal organized programme for assisting conservation on farms. The project requires all involved to pay a yearly levee which is returned to the local community in environmental benefits. DSE and Melbourne Water both joined the initiative as consultants. Initially, they removed

all the trees and snags within the waterway; however, this produced even more rapid erosion. A 12m drop between the surface level and the bed formed (Figure 7.14). ‘Rock-drops’ were placed on the bed in response which slowed erosion. New fences, subsidized by Landcare funding, were erected to stop cows accessing the dangerous river banks. This allowed the vegetation to regenerate and greatly reduced the amount of effluent entering the waterway. Melbourne Water checks vegetation and effluent levels every two years, however, the majority of monitoring and conservation is performed by local farmers. In this case, where the benefits to owners were clear, regulation was not required.



Figure 7.14: Environmental issues relating to 485 Morrison Road

SUMMARY

In summary, 485 Morrison Road revealed some of the same issues as the earlier studies but it also offered some differences. With respect to above the line interests,

many of the same issues were encountered: the complex system of maps and titles tended to complicate the on-ground situation. The systems for managing above the line interests were found to contain errors and were ill-equipped to deal with the diverse range of interests existing below the line.

The property was subject to many below the line interests, more than the inner city properties. Many of these did not fit comfortably into the parcel based framework: they were better viewed as spatial objects or polygons layered above the parcel. In terms of organizing the interests, classifying them according to what activity they governed (e.g. development, dairy production, and environmental conservation) appeared to be useful. However, some interests such as those relating to planning and development are relevant across many activity categories.

Activities such as dairy production would greatly benefit from spatial enablement, both at the individual (farm) and industry management level. Paper based management maps need to be replaced. The sharing of metrics between government (DSE and DPI) and individual farmers could be automated and visualized using online maps. Whilst the parcel layer would be an important component, these systems would not need to be managed by traditional land administration systems. The responsibility for managing the dairy industry and its information logically belongs with the dairy industry itself.

The local level was again shown to have high levels of tangible and intangible knowledge. Systems for encouraging the capture and transfer of this knowledge are required. These knowledge networks reduce the need for legislative action. The state's policy and decision making structures in some cases (e.g. planning) require more flexibility, decentralization and inclusion of the local level. Additionally, the knowledge held at this level must be efficiently communicated with the state level.

23 ACACIA AVENUE: COASTAL WILDERNESS

SETTING THE SCENE

Wonboyn lies on the eastern coastline of Australia, just past the Victorian/New South Wales border. After leaving Labertouche one must continue along the Princess Freeway through Gippsland and the brown coal fields of Traralgon. At Bairnsdale one heads north into Victoria's high country along the great Great Alpine Way or continues in an easterly direction along the coast. The coastal option leads to Lakes Entrance, beyond which the terrain and surroundings grow wilder. The views of the coast, beaches and grazing land soon disappear, replaced by dense timber bush lands which encroach upon the snaking highway. The Victorian / NSW north-eastern border, the imaginary line measured by surveyors Black and Allen in the late nineteenth century, is now close.

A first time traveler will struggle to recognize when they have crossed the border into New South Wales. While the laws of the land change, the vegetation and scenery do not. Wonboyn lies twenty five kilometers north of the border. One must turn right off the highway and head towards the eastern coast. The town itself consists entirely of a small shop, camping ground and a diverse collection of houses. It is perched upon the side of a ridge which rolls down into Wonboyn Lake.

Village activity is centered on the lake, local shop and local fire shed. A small permanent population of one hundred and fifty caters to the needs of eager fishermen and campers. Towards the end of the twentieth century the lake was declared a recreational fishing haven by the New South Wales government. It is off limits to commercial fishing to ensure that fish stocks remain sustainable. Out to the east the lake flows into Disaster Bay at Baycliff. Here lies many kilometers of empty untouched beach. Upstream, the lake narrows and becomes an estuary river. These beaches and river systems are protected by the New South Wales government. To the south of the lake lies the Nadgee Nature Reserve: one of twelve World Biosphere Reserves in Australia. To the north and west lie Ben Boyd

National Park and Ben Boyd State Forest. The area is laden with conservation regulation from all levels of government (Figure 7.15).

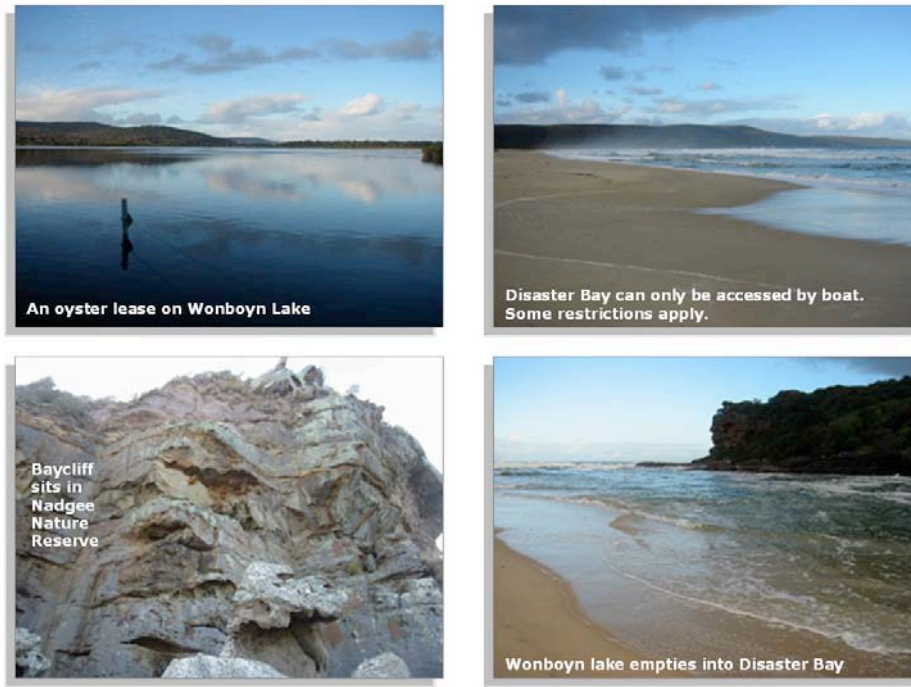


Figure 7.15: The biodiversity and scenic beauty of Wonboyn are heavily protected

Wonboyn lies within Bega Valley Shire which runs from the Victorian border in the south to Wallaga Lake, one hundred kilometers north. The Shire covers an area of 6,052 square kilometres and has a relatively small population of approximately 30,500 people. Agriculture, tourism, fishing and forestry are the dominant industries. The area's traditional inhabitants are the communities of the Monaro and Yuin nation, who occupied the land for six thousand years before white settlement. Areas close to Wonboyn are currently the subject of Native Title claims. Colonization and white settlement of the area occurred in the early nineteenth century and was centered around the port of Eden twenty kilometers to the north. The area provided an important source of food for the fledgling colonies of Botany Bay and Tasmania. Farming and agricultural activity was supported by timber

acquisition (barged from Wonboyn to Eden), fishing, whale processing at Twofold Bay (Eden) and the occasional discovery of gold.

The area remained relatively isolated due to a lack of road and rail access until well into the twentieth century (regardless of the excellent port facilities). After WWII, improved road access ended coastal shipping as markets for local production shrank. Modernization and economic consolidation swept through the area. During the 1970s the area was 'rediscovered' by city dwellers as a holiday and escape destination. These annual forays produced many future residents in the form of retirees and environmentally conscious residents. The new migration suggested a new and somewhat uncertain future for the area.

Back in Wonboyn, a number of properties are now used primarily for recreational and retirement purposes. Some of the most impressive homes lie at the end of Acacia Avenue, a cul-de-sac off the main road. 23 Acacia Road sits at the very end of the road and was the chosen case study site (Figure 7.16). A person standing at the entrance to 23 Acacia Avenue looking down the incline of the property has little idea of the complex rights, restrictions and responsibilities that exist. The gravel driveway dips immediately and forks into two. One route leads towards a cottage with two stories, three bedrooms, open kitchen, lounge area and an attached double carport and barbeque area. It sits on a stone base, has a metal roof and includes decking. The other route snakes around the house and runs down towards the lake and large boat shed. A stone retaining wall runs next to the road and secures the land from slippage. The land is relatively clear of large vegetation, although many trees and smaller shrubs have recently been planted. A dam collects drinking water at the lower end of the property. The only other structure is another garage east of the house. Each of the three structures has a water tank attached.

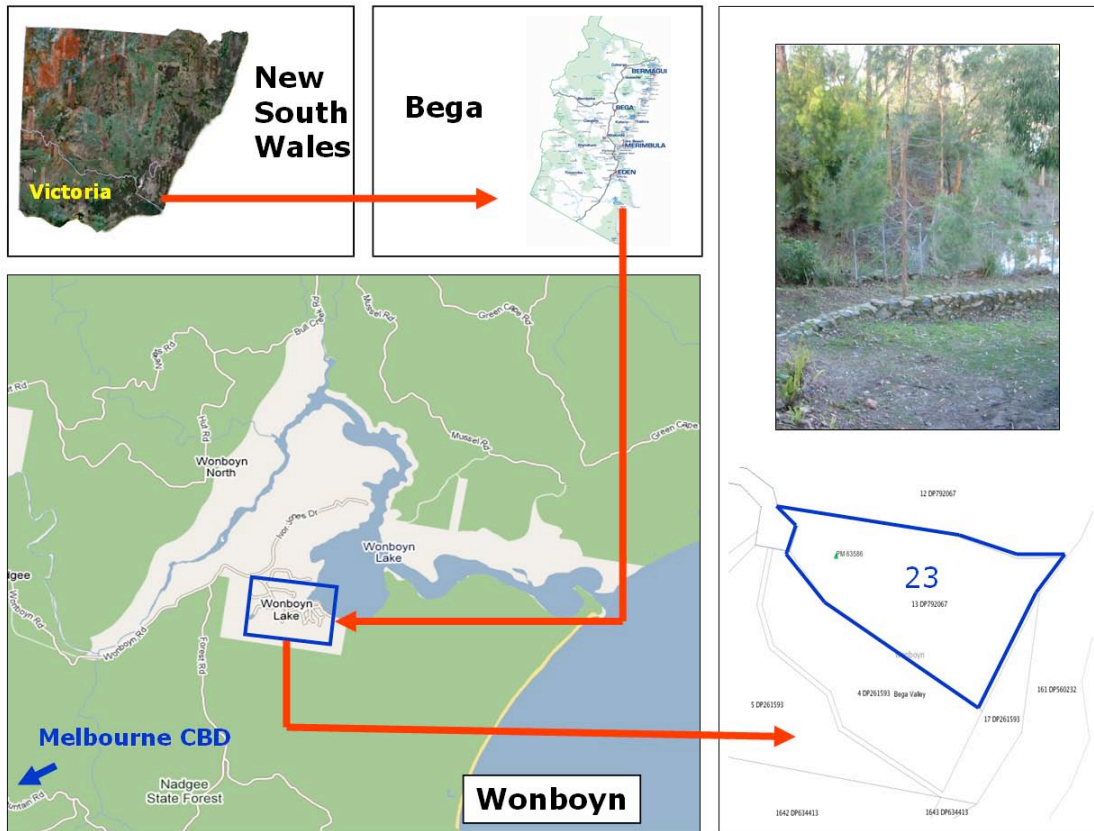


Figure 7.16: Location of 23 Acacia Avenue, Wonboyn

ABOVE THE LINE INTERESTS

In relation to ownership, New South Wales has similar online systems for sourcing title and plan information (Appendix 2 provides more study details). New South Wales uses a Torrens style system; however, its implementation is quite different to Victoria's. The system is administered by the Department of Lands. Like Victoria, it does not use postal addresses to organize ownership information instead employing folio identification numbers that date back to paper based storage systems. Folio numbers relate to lot/plan diagrams. 23 Acacia Avenue relates to Folio identifier 13/792067. The title links to Lot 13 in deposited plan 792067. The title is held by joint proprietors, however, no information about the length of ownership is provided. Unlike Victoria, the New South Wales Government does not allow for adverse possession to occur. Additionally, boundaries on title are authoritative, but, the dimensions are not guaranteed. Ownership information for this case study was considered relatively easy to discover.

Other interests are also recorded on title: these are listed under the second schedule and notations sections, equivalent to the Encumbrances section of a Victoria title. The second schedule states that the ownership title excludes minerals and is subject to reservations and conditions in favour of crown. Additionally, it is burdened by covenant number V349590. The covenant protects the vegetation on the southern side of the property. The location of the covenant is shown on the deposited plan and in Figure 7.18. The neighbouring parcel is also affected by the covenant.

The notations section suggests that the folio may be associated with a Crown tenure which is subject to payment of an annual rent. That is, the proprietor can make use of a portion of Crown land for a fee. The only way to attain more information about the tenure is to contact the local crown lands office located in Nowra. Further enquiries revealed that the folio is related to a jetty licence (LI 379605) (Figure 7.17). The licence agreement is a complex 20 page document. Until recently, links between these licences and ownership titles were non-existent. If one wished to transfer land and a licence, either two separate transactions were required or the transfer needed to be written into the contract of sale. This may appear to be a minor issue; however, in the case of 23 Acacia Avenue, the jetty licence is responsible for a significant part of the property's value: without it much of the associated recreational activities would be unavailable. Attaching these types of interests to a title appears sensible. Additionally, the transfer of the licence is not simple: a number of forms must be completed. Interestingly, the jetty does not actually abut 23 Acacia Avenue (Figure 7.17). A council reserve and strip of crown land separate the two interests as it does for all private land abutting the lake. On the ground these boundaries are not evident; however, they are important with regard to access to Wonboyn Lake.



Figure 7.17: 23 Acacia Avenue has a complex set of boundaries and also comes with a jetty licence

BELOW THE LINE INTERESTS: GOOD, BAD AND ABSENT

A large number of interests and issues were found below the line (Appendix 2 provides more study details). For the purposes of discussion the interests are again divided into good (well organized and easily accessible), bad (poorly organized and difficult to access) and absent (those which do not exist, but ought to) (Refer Appendix for study data).

In terms of well organized interests, a number are worth discussion. Crown and council boundaries at the rear, while not defined on ground, can easily be re-established and understood: ample information about the location and dimensions of these boundaries is available.

Planning interests and controls are also well organized. Local residents are active around the Wonboyn area: the residents are good contributors to the council

planning policy and also closely monitor building activities around the area. An abundance of planning information is available on the Bega Valley Shire Council website: official planning certificates relating to individual parcels and the wider development control plan and strategic plan can be obtained. Any development activities will generally require an environment impact assessment. The procedures and dispute resolution processes for development are well established and understood.

In such an isolated and pristine environment, infrastructure and services need careful design. Again, the residents, local level government and state authorities are working together to provide adequate services whilst conserving the environment. Wonboyn once had a garbage depot located just north of the town; however, this area has now been capped and regenerated with local vegetation. The works were undertaken by the NSW Department of Environment and Conservation. Other local programmes manage septic tanks and vegetation. Removal of certain types of large trees on private and public land is subject to consultation and discussion.

At the state level, many generic blanket restrictions apply to 23 Acacia Avenue and the wider Wonboyn community. Kangaroos, wallabies and native birds are in abundance and all native flora and fauna are protected. Waterways and their use are also heavily controlled. In recent times, the state government has moved to limit the amount of commercial activity occurring on the lake. Commercial fishing no longer takes place and oyster leases and oyster farming are now heavily controlled. The township is surrounded by state and federal national parks (Ben Boyd National Park, Nadgee Nature Reserve) and each of these is subject to individual sets of regulations. Nadgee Nature Reserve in particular has very strict controls on access and available activities. Areas upstream of Wonboyn estuary are also subject to Native Title Claims.

In terms of poorly organized and absent interests a few issues warrant discussion. Power lines cross the width of 23 Acacia Avenue. The power lines potentially

restrict the activities than can occur on the property, however, no record of this implied or perhaps statutory easement or its location is available from the titles office. The power company involved does not make maps of its infrastructure publicly available. Some form of record should be publicly available to enable property owners and local government to understand the situation and properly plan around it.

Whilst tree clearing laws, water diversion controls and environmental protections are in place, a great deal of goodwill is required. The local community tends to regulate itself to ensure compliance and perhaps this form of regulation is a model worth pursuing.

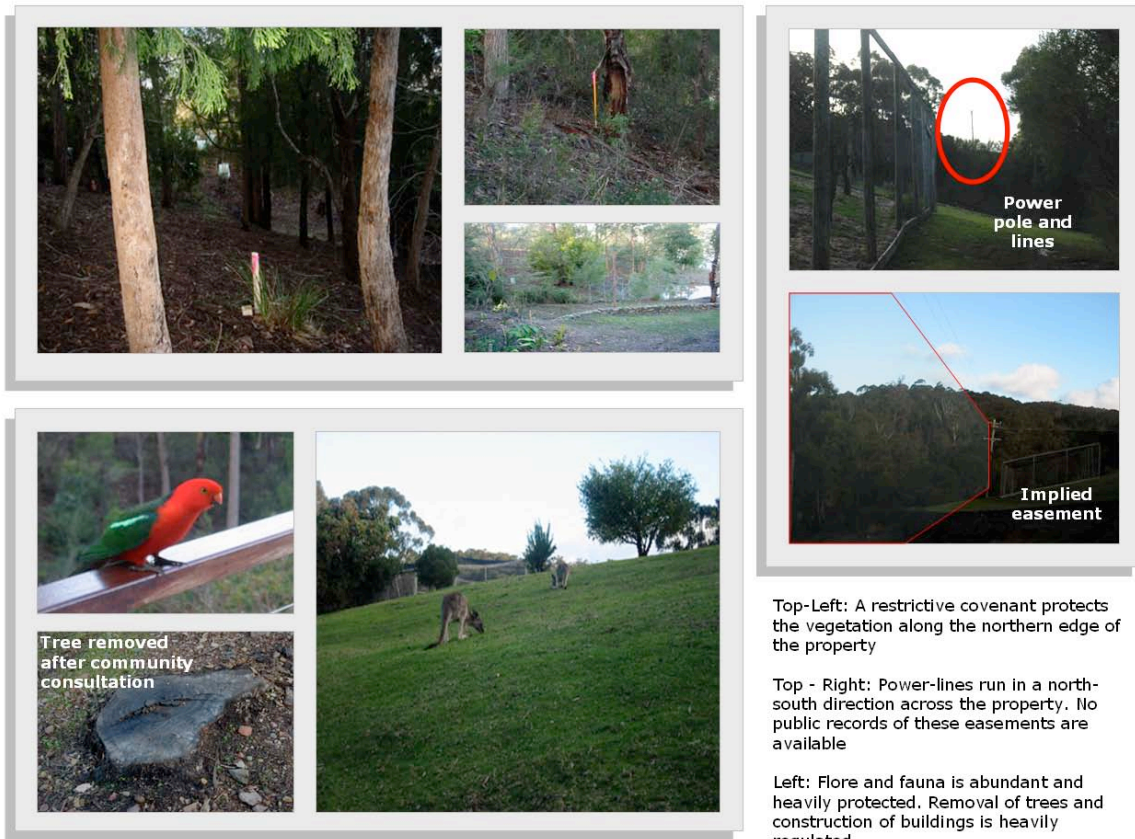


Figure 7.18: Example of ‘below the line’ restrictions relating to 23 Acacia Avenue

SUMMARY

23 Acacia Avenue provided a very unique case study. Its isolation and proximity to the coast and pristine wilderness meant a whole new realm of interests applied. New South Wales' above the line interests were found to be a slight improvement on Victoria's: title plans were more up-to-date and contained more information (e.g. jetty licence). The digital titles were being used to link crown tenures to titles: this still does not occur in Victoria. Where an interest creates or removes significant value or utility to a property, and is not fixed (i.e. removable or transferable), it appears sensible to link it to the title.

Below the line interests were prevalent, including the same issues relating to planning and development identified in all other case studies. Again, surrounding interests, not necessarily parcel in nature, were found to be of equal importance to those that applied to the case study parcel. Wonboyn's community again demonstrated the power of local activity: they largely have significant input into what developments and improvements were made to the local environment. Additionally, they help enforce local laws.

CONCLUSIONS

The bottom-up case studies provided a detailed insight into the effect of old and new land interests on individual parcels. The impact of their creation, modification and removal was assessed. The lack of integration between policy, legal and administrative systems was experienced first hand. Additionally, the applicability of interests to different places, people, times and activities also became apparent. The results obtained directly related to the questions underpinning this research and provided substantial input into the management framework proposed in the final chapters of this research (Figure 7.19).



Figure 7.19: Bottom-up results feed into research questions and the new management framework

Responses to the research questions can be summarized as follows:

1. **Policy principles:** In relation to land policy, the following information was sought: the number of disparate reasons driving new land policies, and the best methods for designing and implementing land policies to improve the management of rights, restrictions and responsibilities. Some of this information can now be provided. Land policies appear to work better when they are driven from the ground up and involve plenty of local consultation. While governments may have large amounts of information relating to parcels, local communities provide vast amounts of tangible and intangible information that should be utilized in land administration. If policies are created at higher levels, flexibility for local contexts needs to be embedded.
2. **Legal principles:** In relation to legal systems, the following information was sought: the number of land interests in existence, the rate at which the number of interests is increasing, the time/place/person they apply to, the areas where interests do not exist and ought to, the principles that should guide the creation of legal interests over land, and the tools required to make new interests acceptable to the community. Some of this information can now be

provided. Individual parcels are affected in different ways by legislative sprawl; however, the important point is that potentially all will be affected. Legislative controls should be the last option for modifying human behaviour. It is costly to produce and administer. It tends to be designed for governments rather than individual citizens. Many of the case studies reveal how the local level is capable of regulating itself and was proactive in terms of land management and conservation. When legislation is created, it must define place, people, time and activity in uniform ways in order to promote integration and ease of administration. Finally, while many interests were found to apply to the parcels, the majority of them did not have a large impact on the activities that could occur on the property: solutions to legislative and administrative sprawl must concentrate on the problematic interests rather than on all of them.

3. **Tenure principles:** In relation to land tenure, the following information was sought: the different types of tenure in existence, the parties who benefit from new interests, the parties bound by new interests, and the best way to describe and classify rights, restrictions and responsibilities in a holistic way. Some of this information can now be provided. Traditional means of classifying tenure concentrate too much on ownership parcels. A whole new realm of interests now exists over land parcels: they may relate to different people (not owners), different places (portions of the parcel), different activities (i.e. not just alienation and transfer e.g. dairy production), and different times (i.e. applying for short periods and even indeterminate periods). New systems for understanding and organizing tenure must be flexible and incorporate this reality: even though some interests apply to all properties, different properties face very different issues. Importantly, it should be noted that only residential properties were considered (although one doubled as a dairy business and one historically as an oyster farming business). Had commercial, industrial and government properties been studied an even wider realm of tenures would have been discovered.
4. **Cadastral principles:** In relation to the registration and mapping components of cadastral systems, the following information was desired: the number of interests mapped and registered appropriately, and the best role for existing cadastral mapping and registration systems in the management of rights, restrictions and responsibilities. Some of this information can now be provided. Cadastral systems, although modernized using ICT, are still encumbered with historical complexities and quirks. Unless property law and the administrative systems used to manage property are completely overhauled and re-engineered, the systems will become increasingly ill-equipped to deal with the majority of new interests. An extensive overhaul is unrealistic and unnecessary. The registry should concentrate on managing interests that can be owned, transferred and require government security (these may or may not relate to parcels).

The actual parcel map has much wider application: it can be used in the management processes of most activities and industries (e.g. dairy production).

5. **Institutional principles:** In relation to the roles and structures of private and public institutions in the management of land interests, the following information was desired: the number of institutions involved in managing land interests and the best way to structure these institutions. Some of this information can now be provided. While local level governments were found to have limited legislative powers in the previous chapter, they played a significant role in each of the case studies. Similarly, local community groups, where they existed, were also found to be powerful institutions for activating projects and enforcing laws. Greater empowerment of these institutions and their decision making abilities would be beneficial.
6. **SDI and ICT principles:** In relation to Spatial Data Infrastructures and information technology, the following information was desired: the number of different spatial extents of land interests, the number of interests managed using modern SDI and information technology principles, and the that ways SDI and spatial technologies might be incorporated into a framework for managing rights, restrictions and responsibilities. Some of this information can now be provided. A range of systems were used to access information, however, most of the information collected was still in paper based form. Paper and the mailing systems is still the greatest means of communication between government service providers and individual citizens. Traditional land administration information was the easiest to access: maps relating to below the line interests were generally available on a piece-meal basis. The lack of organization of spatial information did not stop procedures from occurring or tasks being completed, however, it increased search and transaction times.
7. **HR and capacity building principles:** In relation to human resource and capacity building, the following information was desired: the number of property rights, restrictions and responsibilities impacting on properties and people at the individual level; and the ways in which the emerging tools (e.g. social learning, uncertainty) discussed in Chapter 4 can be incorporated into a framework for managing rights, restrictions and responsibilities. Some of this information can now be provided. All properties (and therefore individual people) are impacted by new land interests. Because so many interests apply to all properties in the jurisdiction, it could be said that each property (and the people who use it) is subject to well over 100 interests. Therefore, there is clearly a strong need to educate individuals and wider society about the existence and nature of these interests. However, in reality a only few key interests (tenure, taxation, rates, planning zones and overlays) were relevant to all properties, then depending on the land's location and use (e.g. business, residential, coastal, rental) a set of

other interests were important. This suggests a blanket approach to community education would be a waste of resources. At any rate, in general, proprietors and occupiers accepted the need for most restrictions; it is the allocation, identification and dispute resolution procedures that are more contentious. This suggests the institutional capacity of government is a greater issue than that of individuals on the land.

There remain two research questions:

8. **Emerging tools:** Contemporary theoretical approaches for improving the management of land interests are too simplistic, 'one size fits all' and deterministic (Chapter 3). Contemporary practical approaches for improving the management of land interests are not holistic and focus on specific areas of the larger problem. *How can these approaches be included into a more complete framework for managing rights, restrictions and responsibilities?*

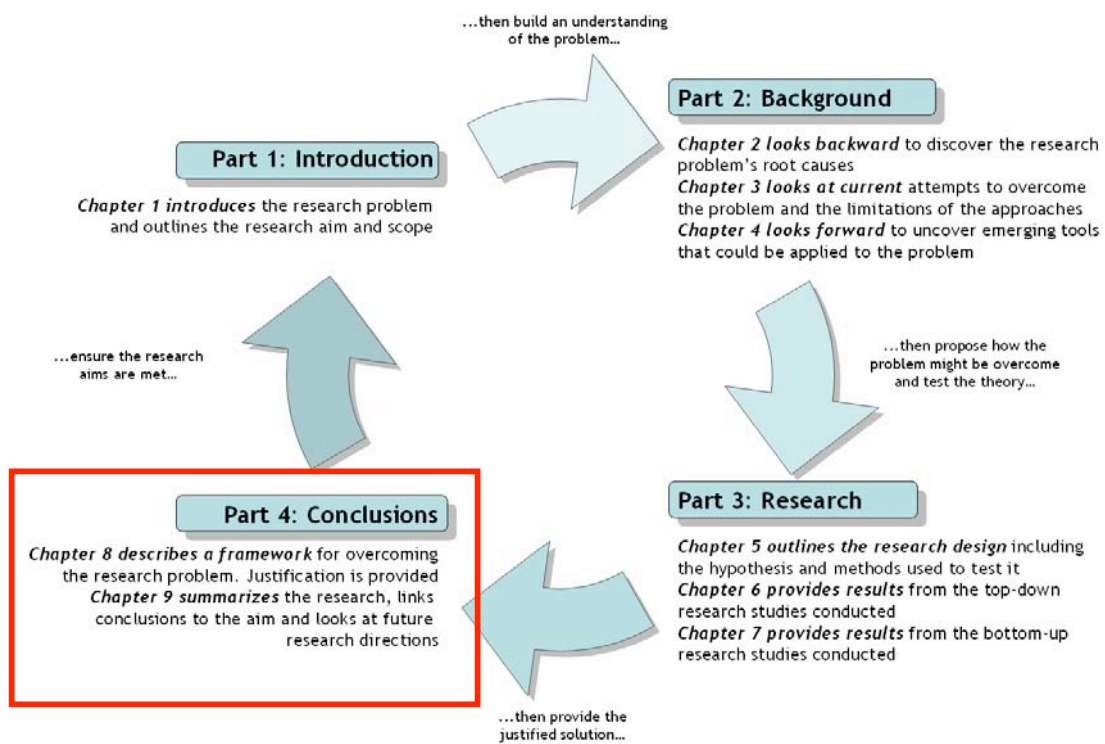
and:

9. **A holistic approach:** Outside land administration, a swath of tools from other disciplines can be applied to the management of land. These include ontology design, funding tools and uncertainty theory (Chapter 4). *How can these tools be incorporated into a framework for managing rights, restrictions and responsibilities?*

These may now also be answered, however, to do so requires more than a few sentences. The questions will be more fully explored in the next chapter. Chapter 8 compiles the findings and ideas of the previous two chapters and synthesizes them into a framework for holistically managing all property rights, restrictions and responsibilities.

PART 4

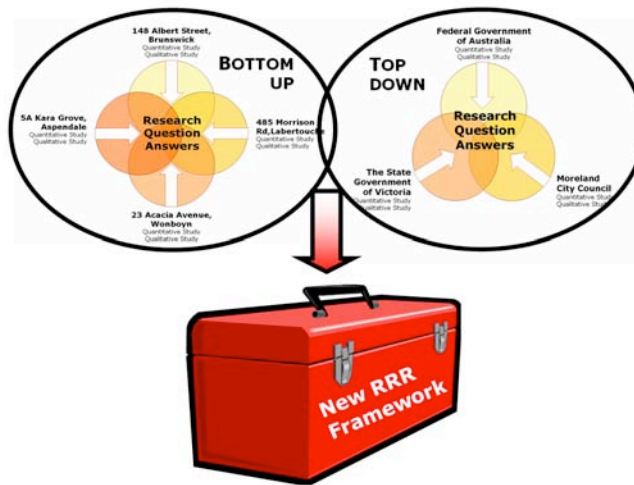
CONCLUSIONS



CHAPTER 8

A FRAMEWORK FOR MANAGING PROPERTY RIGHTS, RESTRICTIONS AND RESPONSIBILITIES

The underlying aim of this thesis has been to broaden and deepen the existing body of knowledge relating to the management of all property rights, restrictions and responsibilities. To this end, this chapter synthesizes the research underpinning this thesis into a framework for managing land interests that is understandable and applicable to individuals, institutions and the wider society.



INTRODUCTION

How do we organize the management of property rights, restrictions and responsibilities to enable the achievement of sustainable development objectives by citizens and governments? This question has driven the research activities of land administrators in government and academia for a good many years. The work resulted in new legislative and technical achievements; however, many questions still remain unanswered. The underlying aim of this thesis is to broaden and deepen the existing body of knowledge. To this end, this chapter synthesizes the research into a framework for managing land interests that is understandable and applicable to individuals, institutions and the wider society.

The framework is introduced in the following way. First, the framework is introduced broadly. The overarching structure, main components and underlying assumptions of the framework are described. Second, each of the eight key components, their importance and utility is described in detail. Examples are used to articulate the utility of each component and how it can be applied in real contexts.

THE RRR TOOLBOX

In the second section of this thesis (Chapters 2, 3 and 4) some important assumptions were made. First, any attempts to improve the design and management of property interests needed to be holistic in nature. That is, not only did they need to consider technical issues, they also needed to consider, amongst others matters, legal, policy and institutional components. Secondly, Williamson's (2001) Land Administration Toolbox, provided the most complete example of a holistic approach to managing land interests and therefore provided a good basis upon which to build. However, it was noted that Williamson's Land Administration Toolbox focused was on the management of ownership rights. It did not necessarily cover all the new interests, restrictions and responsibilities that had been placed on land. Therefore, the toolbox needed to be extended into a broader framework for

assisting the creation and management of ‘all’ land rights, restrictions and responsibilities.

In the third section of the thesis (Chapters, 5, 6 and 7) a number of specific questions were generated in order to discover how Williamson’s (2001) toolbox might be extended. These questions guided the research activities, of which the raw results were described in Chapters 6 and 7. Bringing the key findings together from the top-down and bottom-up studies allowed for the articulation of the new framework. Additionally, the two different perspectives acted as a check (or test) of the results obtained and hence the final framework is robust and justified.

The extended Land Administration Toolbox, or as it is referred to hence forth, The RRR Toolbox, is conceptually presented in Figure 8.1. If a jurisdiction wishes to coherently manage all its land rights, restrictions and responsibilities then each of the eight components needs to be addressed and acted upon. From an overarching perspective, the toolbox is organized into the categories similar to those in Williamson’s (2001) land administration toolbox. However, a number of alterations are made:

Legal principles and HR capacity building principles are included. These tools did not appear in the original toolbox, however, they were added in later versions and therefore appear here also.

Cadastral principles now include registration principles. A wide range of registration options are available for dealing with land interests that do not equate to full ownership; these are included in this component.

SDI and technology principles are merged, reflecting the convergence of spatial technologies and ICT that occurred after the original toolbox was developed.

A new component, emerging principles, is also included. This component groups the emerging concepts and theories discovered throughout this thesis and that are highly applicable to land interest management.

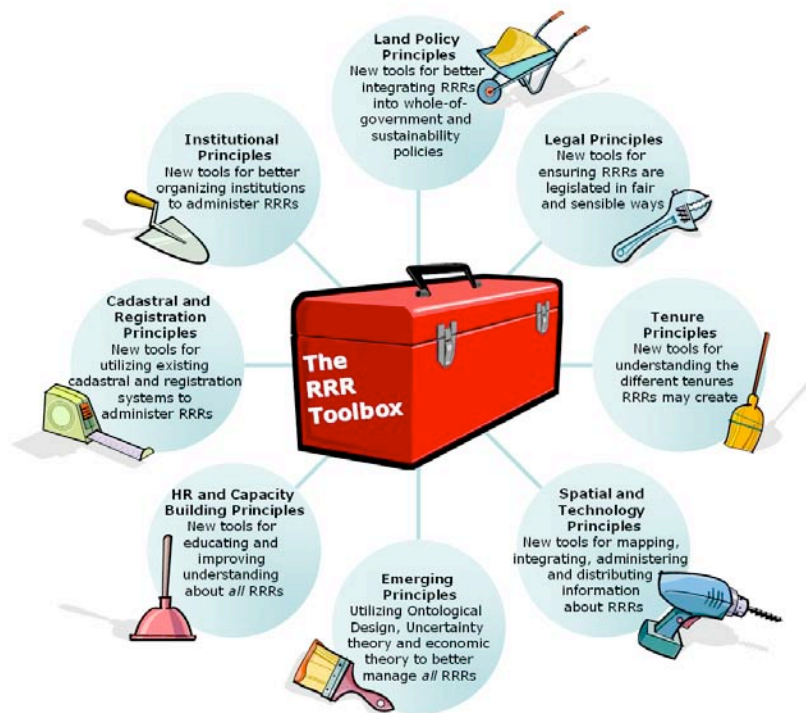


Figure 8.1 The RRR Toolbox – a framework for holistically managing the majority of land interests

The model assumes the previous content of all components still exists. However, each component has a number of new principles to assist the management of all rights, restrictions and responsibilities. Each component is now considered in detail.

LAND POLICY PRINCIPLES

Land policies underpin all other land administration activities. As discussed by Williamson (2001) they drive legislative reform which in turn results in institutional and administrative reform. In relation to this research the following questions regarding land policy needed to be answered. How many disparate reasons have driven the creation of land policies? How should land policies be designed and, implemented to improve the management of rights, restrictions and responsibilities? These questions were answered in the previous chapter. Table 8.1 organizes these findings into a set of coherent principles.

Table 8.1: Land policy component - sustainability and integration are essential

Principles, tools and explanations
<p>An <u>overarching vision</u> for land and its relation to people is required</p> <p>Societies must define this vision. It should be amenable to change and be compatible with general government initiatives. The overarching vision leads to the creation of a set of first principles or 'points of truth' which apply unless good articulated reason overrides. Example: "Government land interests should be treated the same as private land interests".</p>
<p><u>Sustainable development</u> objectives will continue to drive land policy creation</p> <p>Land policy creation has been driven by six disparate forces: environmental conservation, social equity, economic growth and savings, public order and safety, industry management and tenure organization. An integrated understanding of these forces is required. Collectively they are seen as sustainable development. Individually these drivers have led to the creation of many disparate, ad hoc and unorganized land policies and land interests. Having holistic land policies based around sustainability will result in more efficient legislative design and administration. By identifying sustainability as the policy driver, development a comprehensive model for reorganizing our treatment of restrictions and responsibilities relating to land can begin.</p>
<p>Land policy frameworks must recognize that <u>land is more than parcels</u></p> <p>Williamson's original tool suggests a land policy framework <i>could</i> recognize the growing complexity of rights, restrictions and responsibilities relating to land and the consequent demands on land administration infrastructures. This inclusively is now non-negotiable. The activities of government and society require a holistic approach to land interests.</p>
<p>Land policies must reflect the <u>whole-of-government nature</u> of land administration</p> <p>This research found that 56% (average of all jurisdictions) of government legislation relates to land. This means a large portion of government agencies collect, provide or use land and spatial information. Land policies must promote government collaboration. For example, eGovernment and sustainability policies should inform the process of land policy development. Land management is a mainstream part of government and cannot be viewed separately from other government activities.</p>
<p><u>Local level empowerment</u> in land policy design is essential</p> <p>Globalization is driving the resurgence of local government, as is the principle of subsidiarity (placing management responsibility as near as possible to the problem – that is at the lowest hierarchical level) that drives much of European Union organization. While central governments will still set policy frameworks, local governance will provide the leadership, the networks, the knowledge and the commitment. Local governments need to be given an active role in land policy creation and implementation. There is a need to motivate local communities.</p>
<p><u>Integration</u> of land policies across and <u>between levels of government</u> is critical</p> <p>Environmental issues do not respect administrative boundaries. Land policies must be developed through coordination of different levels of government. Collaboration and cooperation must be embedded into land policy implementations.</p>
<p>Land policies must include appropriate <u>incentive schemes</u></p> <p>When designing land policies the right mix of economic, social and moral incentives for citizens</p>

needs to be determined. Examples include market based interests (MBIs), compensation arrangements, land care agreements, rewards schemes or penalties.

EXAMPLE: AUSTRALIA'S UNORGANISED LAND POLICIES

The Australian experience illustrates the need for organized and coordinated policies when dealing with interests over land. At the national level, Australia lacks an overarching land policy. The constitution makes no mention of land, except to require just compensation for its taking by government. No Australian state has an overarching land policy. This lack of policy organization is one contributor to the creation of masses of legislation to counter environmental problems. A framework of land policies based around the principles of sustainable development would improve this situation. The policy framework could be organized through national, state and local collaboration. Land policies with a whole-of-government approach would go some way to decreasing the amount of administrative overlap between national and state levels and within the state level.

LEGAL PRINCIPLES

Legislative principles relate to the design of statutory rules and regulations. Williamson's (2001) original toolbox did not include legal principles; these were added in later versions. The central idea is that creation of new legislation must be driven solely by sound land policies. Other recommendations include minimizing the amount of legislation, integrating land administration legislation through the national code and the use of sunset clauses. In relation to this research the following questions regarding legal issues needed to be answered. How many legal land interests are there? Are they emerging at an increasing rate? How long do they apply for? Do any not exist where they ought to? What principles should guide the creation of legal rights, restrictions and responsibilities over land? How do we make the rules acceptable to the community and impact on human behaviors? The questions were answered in the previous two chapters; Table 8.2 collates the findings and introduces them as principles and tools.

Table 8.2: The legal component – keep it simple

Principles, tools and explanations
<p><u>Minimization of the amount of legislation and regulation</u></p> <p>Legislation sprawl is a real phenomenon that needs to be curbed. Regulatory overlap and complexities will reach a tipping point. The affects of this tipping point are already being felt (see case studies). Legislation needs to be a last option, not first. Concentrate on using other strategies (e.g. technology) to simplify the administration of existing laws, rather than create more.</p>
<p><u>Organized policy driven legislative drafting over ad hoc legislative drafting</u></p> <p>Lack of overarching and organized land polices has resulted in disparate laws being created. Overarching policies should be used to inform the development of all land related legislation.</p>
<p><u>Government accountability must be embedded into legislation</u></p> <p>Governments creating land interests via legislation must make information about the interests publicly available. Government agencies who implement schemes of responsibilities and restrictions by applying decisions to land and collecting information about land which they refuse to make available should be treated with suspicion. If information cannot be tested, its reliability is in question; moreover, the activities of the agency are not within appropriate standards for a democracy. Lack of public information has been a major problem for private owners; legislating publication requirements will improve the situation. If information is created by decisions of an agency, it is the agency’s risk to make it available. Note: In the case of private interests the right holder should have to make information about the restriction transparent.</p>
<p><u>Spatial extent, duration and people impacted must be defined in legislation</u></p> <p>These three attributes of land interests have been poorly defined in legislation in the past. The ability of governments to organize and integrate land information will be greatly improved if these attributes are defined in a uniform fashion.</p>
<p><u>Use sunset clauses on all legislation creating land interests</u></p> <p>Lack of foresight by governments has resulted in land interests remaining applicable long after they were intended. By ensuring all legislation has a review date or sunset clause these occurrences can be mitigated. Existing legislation lacking sunset clauses needs to be corrected.</p>
<p><u>Legislation should be drafted in a ‘performance based’ style</u></p> <p>Statues that are written in formalistic proscriptive or descriptive styles are long and detailed. They demand more administration and often become out dated when new technologies emerge. Performance based legislation reduces complexity in administration and is more flexible in the long term.</p>

Trouble cases must not be used to develop reactionary legislation

Legislation drafted in response to a widely publicized problem often creates more problems than it resolves. Creation of land legislation must be driven solely by sound land policies.

Education over legislation

Many examples found where there was no interests controlling an activity at a few of the case studies. In most of these cases legislation wasn't needed – just information or education would have helped.

EXAMPLE: THE NETHERLAND'S ACCOUNTABILITY LEGISLATION

The Netherlands are already actively implementing a number of these principles. As discussed in Chapter 3, Dutch parliament passed laws requiring government agencies to publish land interest information. Unlike privately held land interests that gain greater protection if recorded in a public register, public bodies have very little incentive to register their interests in a public record. This is because legislation often confers overriding powers on public agencies and secures their interests against all or most competitors. The new legislation provides an incentive for government bodies to publish their land information where one did not previously exist.

EXAMPLE: MORELAND CITY COUNCIL AND THE IMPORTANCE OF GOOD LEGISLATIVE DESIGN

Poor land policy design results in poor legislative design and consequently poor administration. As mentioned in Chapter 6, Moreland City Council is a local government municipality located in the northern suburbs of Melbourne, Australia. The old suburb of Brunswick lies within the municipality and includes old derelict buildings which are no longer in use and in a state of disrepair. Developers often sit on these properties, 'land-bank' them and wait for an opportunity to redevelop or sell them during economic up-turns.

For the purposes of public safety, a by-law exists (Private Land Local Legislation, Moreland, Section 9.1) which states that all buildings on privately held land must be safe and secure at all times; otherwise fines can be applied to individual

parcels/properties. Property owners who have been served with these fines often ignore them. While they still pay their local service rates, they do not respond to safety enforcement notices, most probably because it is cheaper to ignore them. An enforcement problem exists with this law and the initial policy objective of community and environmental safety is clearly not being met. Better designed legislation would enable the authority to clear the offending parcels at the expense of the owner. Increase of the payable rates for owner's that do not clean up their properties is also a possibility. Regardless of the chosen solution, well designed and enforceable legislation is essential to changing human behaviour.

TENURE PRINCIPLES (+ THE PROPERTY OBJECT)

If individuals have tenure over land, they have the right to undertake certain activities on that land. The number and sort of activities that can be undertaken are determined by the type of tenure held. Williamson's (2001) tenure principles suggested that within any jurisdiction a wide range of tenures may exist, each potentially requiring a different administrative response. This is true, especially with respect to new land interests that involve new tenures over land. In relation to this research the following questions regarding tenure needed to be answered. How many different types of tenure are there? Who do the new interests benefit? Who do they disadvantage? How can we describe and classify rights, restrictions and responsibilities in a holistic way? These questions were answered in the previous chapters. Table 8.3 collates the overarching ideas into principles and tools.

Table 8.3: The land tenure component – flexible approaches are required

Principles, tools and explanations
<p><u>Absolute Ownership is dead: long live layered public and private interests</u></p> <p>Every time a government or private party creates a new interest over land, no matter how insignificant it might seem, a new tenure is also created. The concept of absolute ownership is no longer a reality: most land is subject to multiple tenures. The extent to which land can be encumbered with multiple interests needs careful consideration: new tenures can weaken private ownership, a foundation pillar of modern economies. If the new interests are not well managed these institutions could fail.</p>
<p><u>The Property Object: a new tool for organizing and understanding land interests</u></p> <p>There are tens, if not hundreds, of different tenures available for use. Existing tenure models used to describe how people and land relate are historically simplistic. They do not capture the multitude of new rights, restrictions and responsibilities that now exist on land. Consequently they can only provide limited guidance as to how the interests should be administered. A new flexible model for</p>

understanding and assessing tenures is required. A comprehensive and flexible categorization model, the property object, is justified and presented in the section below.

The property object model can be used to create categories for organizing land interests. For example:

1. *Private or Tradable*: interests that involve private parties and may be tradable between private parties e.g. land parcels, water, carbon credits and timber licences.
2. *Government Management*: interests that allow government agents to use, restrict use, or transform the land.
3. *Government Access*: interests that allow governments to enter land.

Flexible tenure models require flexible administration

Different types of land interests require different administrative responses. Inclusion in a government secured registry is not necessary for all land interests.

EXPLANATION: THE PROPERTY OBJECT MODEL

The second principle in Table 8.3 mentioned the requirement for the property object model. The concept was developed using ontological design theory. This concept is now introduced, justified and explained. A recurring theme throughout the thesis has been that every property interest is different in nature and, depending on the perspective taken different classification schemes are equally valid. The fields of law and economics offer different approaches to understanding property interests and identify the features important in their respective disciplines. From the viewpoint of land administration, the focus is on the information needed to perform the land and resource related tasks of government, business and citizens. Here, the five attributes in (Figure 8.2) are considered most important.

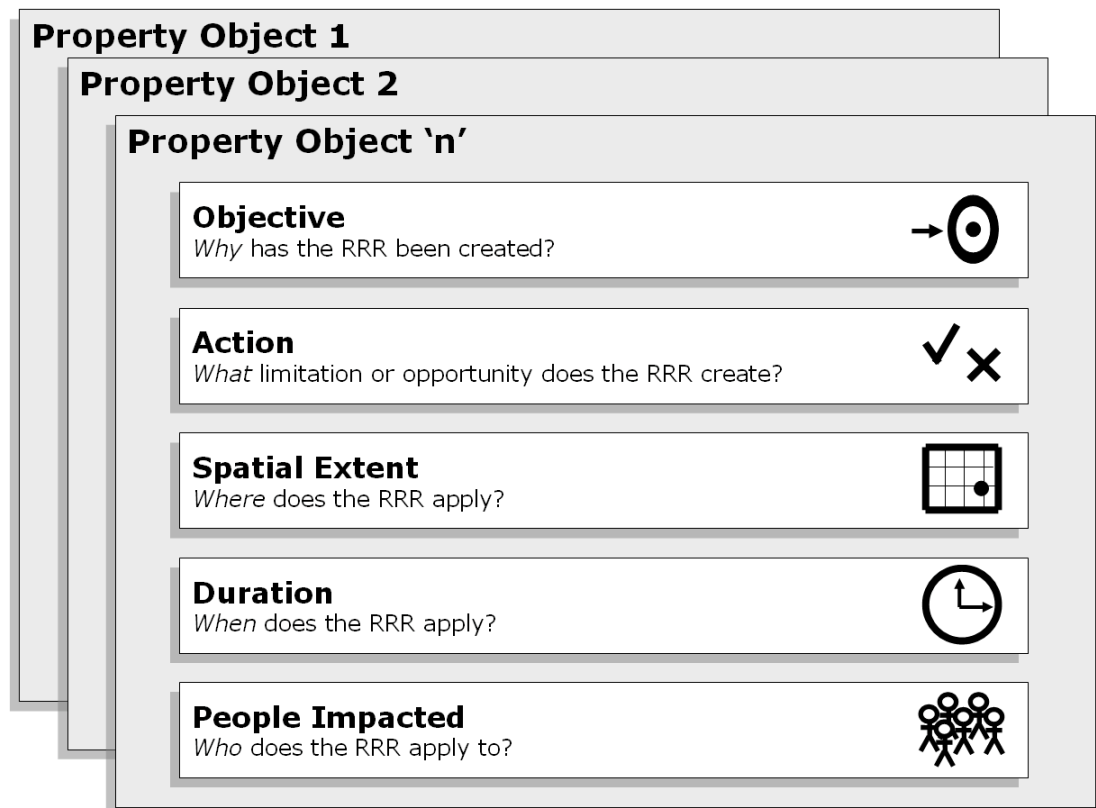


Figure 8.2: The Property Object – each object has five key attributes

The property object is defined as an advanced descriptive framework of the key attributes that make up an individual property interest. The property object permits a holistic treatment of property interests, from ownership down to simple access

powers, and also allows for meaningful contrast between different interests. The framework conveys the essential information needed by governments and citizens about land and resources to deliver sustainable development objectives. It does not force any interest into a simple box such as ‘public’ or ‘private’. Rather, it is flexible and recognizes that many property objects are very different in nature.

Government policy and legislation makers can use the tool to compare and classify property interests regardless of what legal system they are created in. Existing property theories such as those espoused by Hohfeld (Cole and Grossman, 2002) or Cohen (1954), on their own, cannot comprehend the hundreds of new restrictions that are placed on land. This model sits above the jurisdiction’s legal and administrative systems and their major property concepts, be they common or civil, Vietnam’s land use right, Indonesia’s Hak Milik, Malaysia’s qualified title or an Eigendom of the Netherlands. The precise but flexible analytical framework is capable of applying to most current property interests whilst identifying their specific characteristics.

The five attributes determine what information must be recorded and made available when a property interest is created. They provide an understanding of the nature of, and differences between, specific property interests. Considered together, the attributes help determine what type of administrative approach would be most appropriate for each interest (there are many options in terms of registration systems, allocation methods, removal methodologies, use of ICT, mapping methods and enforcement tools).

THE OBJECTIVE ATTRIBUTE

The objective attribute describes the reasons for enacting the property object in legislation or contract. Different objectives may prompt the creation of particular interests. Government policy drivers and personal objectives will change over time.

Table 8.4 outlines the common objectives behind property interests, in no particular order.

Table 8.4: Objectives behind the creation of property objects

Options	Description	Examples
Environmental conservation	RRRs created with the intention of conserving, protecting and regenerating the flora and fauna of the natural environment.	<ul style="list-style-type: none"> • Crop growing restrictions • Tree clearing restrictions • Carbon trading rights • Post-mining rehabilitation responsibilities
Social conservation and equity	RRRs created with the intention of protecting cultural landmarks and ensuring fair access to land, natural resources and housing	<ul style="list-style-type: none"> • Public housing rights • Native title land rights • Heritage restrictions • Archaeological preservation restrictions
Economic growth and savings	RRRs created with the intention of using land and natural resources for the generation of wealth at individual and wider community levels.	<ul style="list-style-type: none"> • Land ownership and transfer rights • Land tax responsibilities • Unbundling of rights to land and natural resources
Tenure organization and legal procedure requirements	RRRs that manage the creation, variation and removal of the different public and private tenures that exist over land, natural resources and the built environment.	<ul style="list-style-type: none"> • Compulsory acquisition rights of land • Residential and retail landlord and tenant rights and responsibilities • Property trust rights and restrictions
Industry management	RRRs that manage the land and non-land based activities of different industries.	<ul style="list-style-type: none"> • Gambling outlet and liquor retail restrictions • Utility operator restrictions and responsibilities • Medical, surveying, architectural practicing restrictions etc.
Public safety and order	RRRs that control public behaviours on land and promote safety within the community.	<ul style="list-style-type: none"> • Road safety restrictions • Liquor and tobacco consumption restrictions • Nuclear activity restrictions • Nudity areas restrictions • Terrorist activity restrictions • Building fabric and utility supply standards

Property interests with similar objectives often need to be managed together in a portfolio arrangement. Lack of integrated management can prompt confusion and cause information voids for citizens and government agencies. For example, under Victoria’s Water Act 1989, property owners with bulk water entitlements were able to transfer the rights to other parties. Farmers could effectively retire their farms from production for the greater good of environmental sustainability. Problems arose because many struggling farmers with failing farms chose to sell their water rights to other parties. Many of these same farmers also had mortgages, another form of property interest, over their properties. The land and water titles were managed independently. If the land was about to be repossessed on default, the bank could not prevent separate sale of the water right by the farmer. Consequently

banks and new land owners lost the value of water previously associated with their asset. The administrative regimes were inadequate and needed more integration.

THE ACTION ATTRIBUTE

The action attribute refers to the particular activities that the property object allows, with regard to land and natural resources. There have been many attempts to categorize all the possible actions. As discussed earlier, most definitions of ownership rely on three qualities; the ability to exclude others, the ability to receive income or benefits; and the ability to sell or alienate the interest. In this way ownership can be seen as comprising a 'bundle' of individual opportunities. Authors disagree on the exact number of individual actions; however, all definitions include the three listed above as a minimum. Schlager and Ostrom (1992) provide perhaps the most comprehensive framework for differentiating between the available actions of different property interests (Table 8.5). The options available are listed in order from the least authority of 'access', to the greatest authority of 'alienation', which usually equates to ownership. New government created property interests are usually at the lower end of the scale and grant access or management controls to statutory authorities. The level of interest created plays a key role in determining the most effective system for titling and registration. For example, higher forms of authority, such as alienation or withdrawal rights, are generally of greater economic value and therefore usually demand more extensive forms of administration and management.

Table 8.5: Actions regulated by property objects

Options	Description	Examples
Access	The ability to enter a defined physical area and enjoy non-subtractive benefits.	<ul style="list-style-type: none"> Authorized officers entering lands for purposes of inspection and works e.g. surveyors, police officers, tax inspectors etc. Entry by citizens onto public parklands
Management	Transformation (changing the resource): The ability to transform the resource by making improvements.	<ul style="list-style-type: none"> Limitation on excavating areas of land found to have cultural importance Requirement of mining lease holders to rehabilitate the excavated area on cessation of mining
	Usage (merely undertaking an activity on the resource): The ability to regulate use patterns that occur on the resource. Includes the ability to shift risk.	<ul style="list-style-type: none"> Gaming licenses allowing the operation of gaming machines on the premises Building regulations that dictate standards for the construction of dwellings
Withdrawal (or value extraction)	The ability to obtain resource units or products from the resource.	<ul style="list-style-type: none"> Licenses allowing harvesting of fish from waterways Water irrigation entitlements Timber harvesting agreements
Exclusion	The ability to determine who will have access rights and withdrawal rights, and how those rights may be transferred.	<ul style="list-style-type: none"> Non transferable licence for a particular fishery A five year site lease for a retailer
Alienation	The ability to sell, lease or mortgage Management and Exclusion rights.	<ul style="list-style-type: none"> Ownership of property by private citizen, government or community Ability to transfer and sell fishery licence to another party

Adapted from Schlager and Ostrom 1992

THE SPATIAL EXTENT ATTRIBUTE

The spatial extent refers to the geographic area over which the interest applies. All property objects have a spatial extent. Indeed any legislation can be considered to have a spatial extent: it applies within a jurisdiction's geographic area. However, in this thesis, legislation only contains a property object if a section(s) of the document explicitly or implicitly creates an interest over land. Property objects can be divided into parcel and non-parcel typologies (Table 8.6). A parcel is the smallest unit of land ownership and the basic building block of the cadastre. Most property interests are parcel based, however, interests that are non-parcel in nature are being increasingly used (Figure 8.3). This trend reflects the shift from land parcel focus to regional management which incorporates environmental features. In Australia, the creation of water catchment authorities is an example. In general, interests which are patchwork and dynamic tend to require more administration than specific or blanket interests.

Table 8.6: The spatial extent of property objects

Options	Description	Examples	
Parcel	Specific	RRRs that apply to a specific parcel or small number of parcels located within a small geographic area.	<ul style="list-style-type: none"> Melbourne Cricket Ground Land Act Ararat Land Act Footscray Land Act Australian Grand Prix Act
	Patchwork	RRRs that may/may not apply to a given parcel <i>or</i> RRRs applied to every parcel within a jurisdiction applied differently in each case	<ul style="list-style-type: none"> Heritage restriction Vegetation clearing restriction Aboriginal sacred site protected area Land tax restriction
	Blanket	RRRs that apply to all parcels uniformly across the whole jurisdiction.	<ul style="list-style-type: none"> Compulsory acquisition power over any parcel Provisions relating to the construction of fences between properties
Non-parcel	Point/Object	RRRs that apply to non-real property or specific points rather than a parcel.	<ul style="list-style-type: none"> Aboriginal relic and sacred site protection schemes
	Network	RRRs that apply to infrastructure networks rather than the parcels they overlay.	<ul style="list-style-type: none"> Road management restrictions and controls Electrical and gas pipeline restrictions
	Polygon	RRRs that apply to natural boundaries or administrative boundaries other than ownership parcels.	<ul style="list-style-type: none"> Water catchments areas Livestock disease control areas Mining leases and licensed areas Marine waterway management provisions
	Dynamic	RRRs that apply to different areas over time.	<ul style="list-style-type: none"> Fisheries defined by position of stocks Water right regimes Wildlife protection areas defined by location of animals rather than set boundary zones

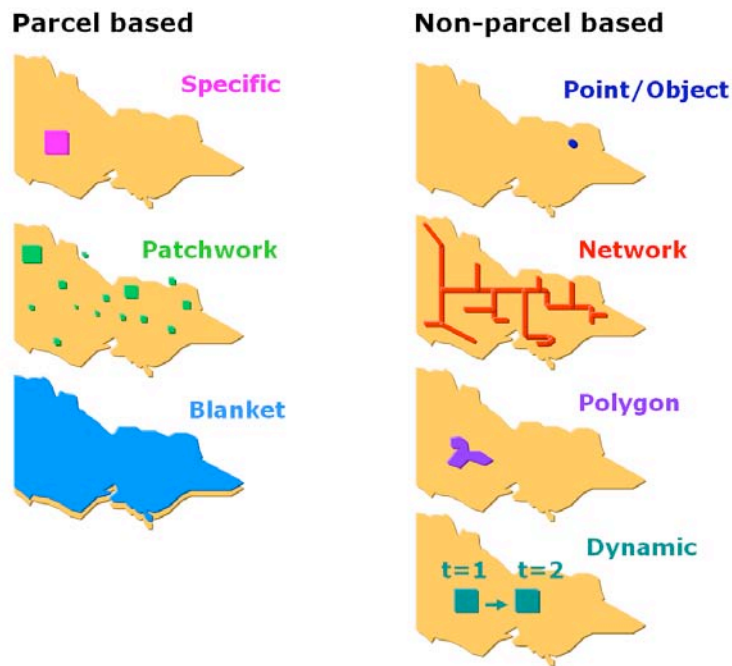


Figure 8.3: The possible spatial extents of a property object

Whatever definition of area is adopted, spatial extent is a vital attribute. In the past, the spatial extent has not always been well understood or defined by law makers. We have failed to link maps and legislation together. Some laws have made use of latitude and longitude to define spatial extent; however, clarifying the boundaries of a protected area for citizens is difficult without physical markings or access to modern spatial technologies. Determination of boundaries of marine reserves that lie kilometres out from the coastline is a good example.

Today, the Global Positioning System (GPS) provides for the definition and location of spatial extent more quickly, cheaply and more accurately (if suitable methods are used) than earlier on-ground survey methods. Chapter 4 revealed that other new spatial technologies, such as next generation Geographic Information Systems (GIS), spatially enabled databases and newly defined web mapping services, allow information to be organized using geographic coordinates: different datasets can be grouped according to location. This allows property interests to be viewed together and diminishes the need to attach every interest to a parcel.

THE DURATION ATTRIBUTE

Duration refers to the period of time over which the property object applies (Table 8.7, Figure 8.4). Legislation traditionally does not define duration, with the effect that many interests remain applicable long after they can be justified. For example, during WWII in metropolitan Melbourne, rent controls were placed on dwellings to keep housing affordable. Instances of this property interest remain even fifty years after the declaration of peace, keeping rent well below market levels (*Residential Tenancies Act 1997* (Vic), Section 14). Other interests remain on the public record despite being unnecessary. Orders registered on a title for breach of human habitation and planning standards (*Planning and Environment Act 1987* (Vic), Section 173) are sometimes not removed when the property is remedied. In general, ad hoc and repeat interests tend to have more administrative support than those that only apply over a short period or indefinitely.

Table 8.7: The duration of property objects

Options	Description	Examples
Once/ short term/ set period	RRRs that are applied only once usually for a specific purpose.	<ul style="list-style-type: none"> • Transfer of public utility assets to private companies
Repeat	RRRs that apply for a specific period at the same time every year or cycle.	<ul style="list-style-type: none"> • Certain types of fishery licenses • Seasonal duck hunting permits • Land tax and utility service bills
Ad-hoc	RRRs that can begin and end at any time desired by the participating parties.	<ul style="list-style-type: none"> • Land management agreements between private citizens and government • Residential and retail leases • Restrictive covenants on private titles
Indefinite	RRRs established without a sunset clause.	<ul style="list-style-type: none"> • Rent controlled housing • Terrorism and anti nuclear activity restrictions

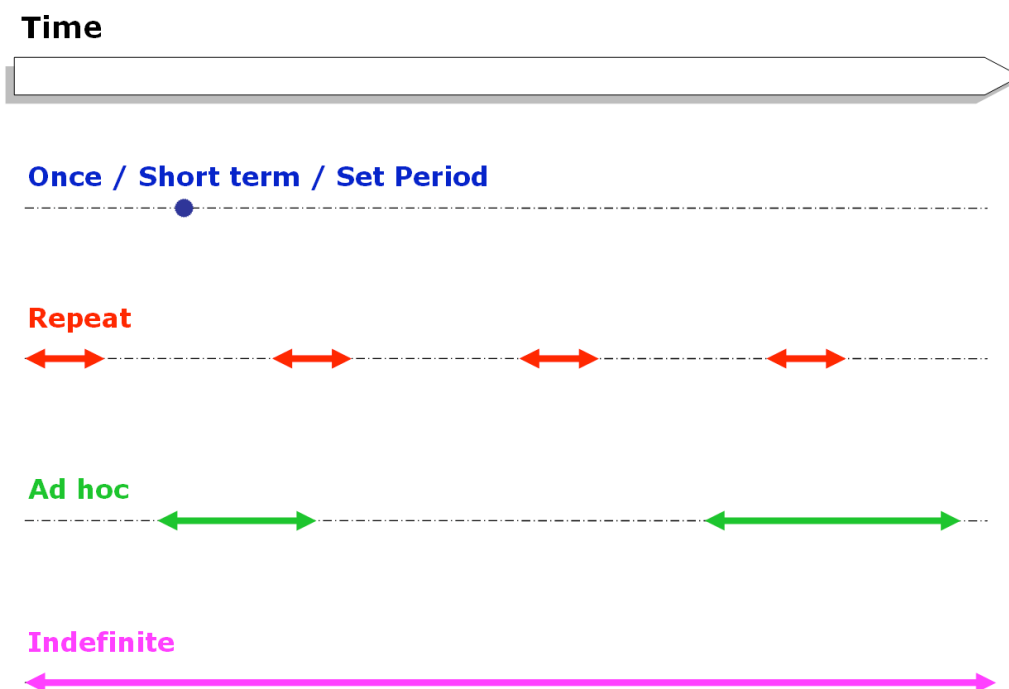


Figure 8.4: The possible durations of a property object

THE PEOPLE IMPACTED ATTRIBUTE

The people impacted attribute denotes the group of people affected by the property interest. As property interests are primarily about regulating human behaviour with respect to land, knowing who an interest applies to is important. In the past

governments tended to only consider and record the people who benefit from the interest. This is not enough: a property right only exists when the community, in the form of a government, supports and protects the exclusive use and enjoyment of that entitlement. This means that each interest involves two parties; one benefiting from the interest and the other bound by it (Figure 8.5).

The dual or bifurcated nature of property interests is further supported by the influential 'system of jural relations' constructed by Wesley Newcomb Hohfeld in the first half of the twentieth century (Cole and Grossman, 2002). Hohfeld's jural relations suggest that in order to establish a right, liberty, power or immunity one must be able to identify respectively the corresponding duty, restriction, liability or disability that someone else possesses. What is important here is not the difference between rights, powers and immunities (the property object makes no distinction between these terms and permits holistic discussion of all property interests), but the fact that a dual impact on two parties must be identifiable for the right to exist.

Consider the two parties involved in each of the following interests. For a basic land right like freehold, the owner has the benefit while the others in the community are compelled to respect his/her access decisions. For a restriction on clearing vegetation from private land the community benefits while the actions of the owner are limited. If, in turn, a ruling allowing for the owner to be compensated is established, then another interest has been created; the owner benefits and the community is bound and must recompense the owner.

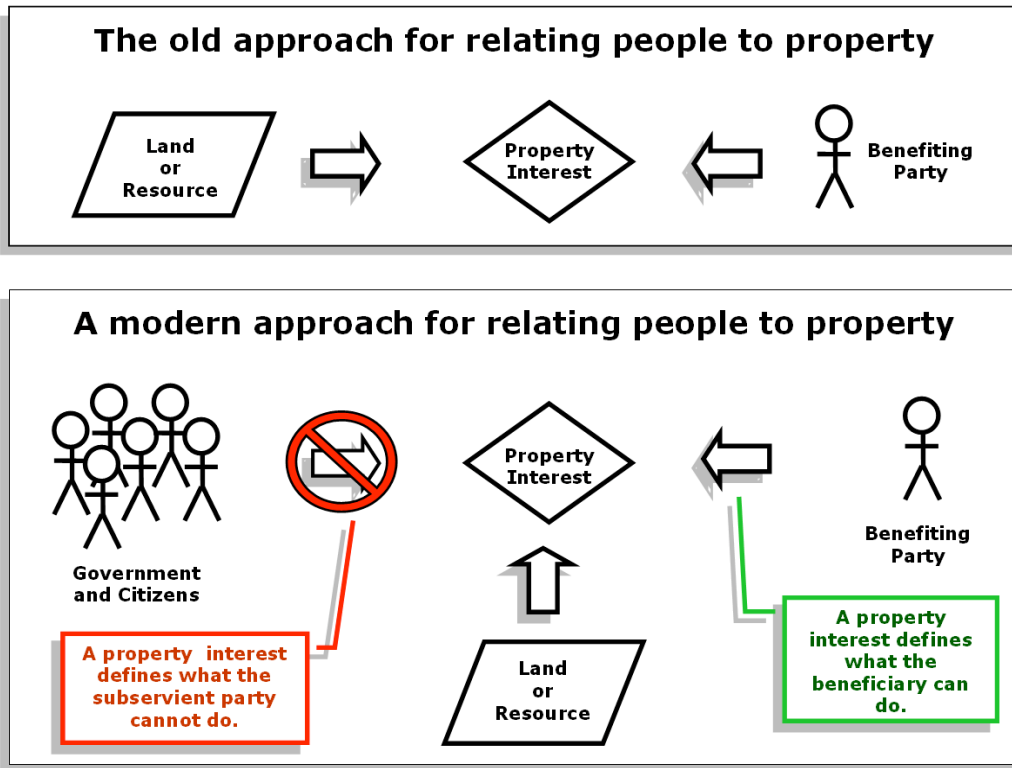


Figure 8.5: The dual nature of a property object – each has a beneficiary and a subservient party

Tenure theory allows us to identify the broad typologies for classifying either of the two different parties (Table 8.8) - private, public, common and open space. Property interests can exist between two parties in the same tenure typology: for example, private easements may be created between two private adjoining land owners. Government departments may require identified statutory authorities to maintain land and roads.

Table 8.8: The types of people impacted by property objects

Options	Description	Examples
Private	RRRs that apply to privately owned property and other subclasses of private property such as leased land, mortgaged land and land held in trusts.	<ul style="list-style-type: none"> • Taxation of private land by the government. • Compulsory acquisition rights by government. • Land conservation agreements between the government and private land holders • Private easements affecting two adjacent land parcels
Public/Government	RRRs that apply to public lands including land held by statutory authorities, government departments, local councils and other non-private bodies.	<ul style="list-style-type: none"> • Creation of national parks for the benefit of community • Restrictions applying to alpine resorts and regions • Coastal water restrictions and management plans
Communal	RRRs that apply only to communal lands if they exist and are formalized.	<ul style="list-style-type: none"> • Native title land restrictions on sale • Native title restrictions on use and management
All	RRRs that apply to all tenures and inhabitants	<ul style="list-style-type: none"> • Acquisition power over any parcel of land by the government • Provisions relating to the construction of fences between properties • Mining leases
Open space/other jurisdiction	RRRs that apply to unclaimed land, open space or another jurisdiction. By definition no RRRs can be readily enforced in these areas.	<ul style="list-style-type: none"> • N/A

Legislation in Victoria broadly defines the interested parties, but often fails to identify an individual who might be affected. For example, a government decision to collect taxes on land held in trust or to charge a capital gains tax will have problematic and uneven application where no information base has identified the relevant transactions and parcels.

In summary, the Property Object model offers a new flexible, comprehensive method for describing land tenures. The object is generic enough to apply to all land interests, old and new, and can be easily modeled by computers. Land administrators can use the model to create categories relevant to their jurisdiction or the administrative tasks they wish to undertake.

CADASTRAL AND REGISTRATION PRINCIPLES

Williamson (2001) lists many cadastral tools and concepts. In relation to this research the following questions relating to cadastre and registration systems required answering. How many of these new interests are mapped and registered appropriately? What is the role of existing cadastral mapping and registration systems in the management of rights, restrictions and responsibilities? Table 8.9 provides the answers to these questions and number of additional tools for managing new lands interests.

Table 8.9: The cadastral and registration component – selective application is important

Principles, tools and explanations
<p><u>Cadastral and registration systems should have wider utility</u></p> <p>The role of the registration and mapping components of cadastral systems in the management of new rights, restrictions and responsibilities has been unclear. Cadastral maps have had some limited application, registration systems even less. However, the potential of these systems is now recognized. Cadastral maps can be used in almost all government activities, registries can be used in the management of any transferable interest with a spatial extent. It should be noted that some cadastral systems are better equipped than others to manage with the new land interests.</p>
<p><u>Cadastral and registration systems should manage only some interests</u></p> <p>The temptation to use cadastral and registration systems to manage all land interests needs to be resisted. These systems were designed primarily to manage taxation or land transfer. The benefits these systems offer in terms of certainty are outweighed by the overwhelming legal complexities and administrative quirks they are encumbered with. To fully re-engineer the systems would create large amounts of uncertainty and the cost would outweigh the benefits. Instead, these systems should focus on managing those which they always have: those which convey extensive powers over land, are tradable, require government securitization, and are generally private in nature. Interests not requiring the security of a guaranteed register do not need to be included in traditional land registers (e.g. government access rights).</p>
<p><u>Cadastral and registration systems should be part of a broader suite of authoritative registers</u></p> <p>Effective administration of land related activities requires knowledge of the actions, places, people, and times involved. Without any of these pieces of information (e.g. people identification), processes are open to fraud. Additionally, our ability to manage and understand how different activities interrelate is non-existent. This phenomenon does not just relate to land activities, it relates to the majority of government activities (e.g. health management, emergency response). Land registers need to be part of a large suite of authoritative registers organized and secured by government.</p>

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Many interests do not require any form of mapping or registration

The cadastral concept demands that ownership interests be mapped spatially. Analysis shows that this may not always be necessary for some land interests. For example, hundreds of interests relate to government agents accessing land: these do not necessarily require spatial identification. These interests tend to require minimal administration and should be recorded by the responsible government agency.

Non-parcel interests are on the rise, but, parcels still dominate

Governments are increasingly creating land interests that are non parcel in nature. These interests may be spatially defined as polygons, networks or points. Cadastres must be capable of integrating with these new layers of spatial interests.

Coordinated cadastral maps with high accuracy levels are essential

If we wish to use the cadastre to support sustainable development then coordination of cadastres is required. Coordinates allow for layering of interests in computers. This is important because many environment conservation interests are non-parcel in nature. If we cannot integrate natural resource data with built environment data then integrated management cannot be achieved.

Virtual boundaries and eEnforcement rather than physical monuments

Cadastral parcels are demarcated in the physical world using survey pegs or other monuments. The advent of cheap GPS and sensor networks available to citizens and governments reduces the need for new non-parcel land interests to rely on monumentation. Additionally, sensor networks can be used for on-going enforcement of environmental conservation, rather than yearly or bi-yearly inspections.

EXAMPLE: MAPPING LAND INTERESTS IN DIFFERENT WAYS

An example of the need to map and record interests in different ways can be found in Victoria. Recently a number of marine sanctuaries were created along Victoria's coastal waters. These interests create management, withdrawal and access controls on vessels and people passing through affected areas. The interests are not physically demarcated and GPS navigation systems must be used to assess boundary locations. The interests are spatially mapped and managed by Parks Victoria, the responsible government agency, in accordance with the above principles.

EXAMPLE: NOT EVERYTHING BELONGS IN THE REGISTRY

The Australian State of Victoria provides a good illustration of the value of these principles. Some land administration literature suggested the use of Torrens or Deeds style registries to administer all land interests (Kaufmann and Stuedler, 1998). In Victoria this would mean placing the administration of 620 Acts that create land interests under the partial control of the registry. Clearly this would be unworkable and create massive information management issues. The question is then: which property interests ought to be managed within the registry and which ought not?

The central role of Torrens and deeds registries is to administer private ownership rights. They are useful tools for managing specific kinds of interests, particularly private interests that need to be secured by government (Zevenbergen, 2002). Their core function is to deal with large numbers of interests that are marketable, dynamic, easily defined spatially and held by private owners. In Australia a number of interests with these characteristics are beginning to appear through the unbundling of natural resources from land parcels such as water rights and carbon emission rights (Williamson et al, 2005). If a condition is placed on the registry that only private or tradable interests are registered, fewer than 100 of the 620 Acts would involve the registry, an administratively feasible goal (Figure 8.6).

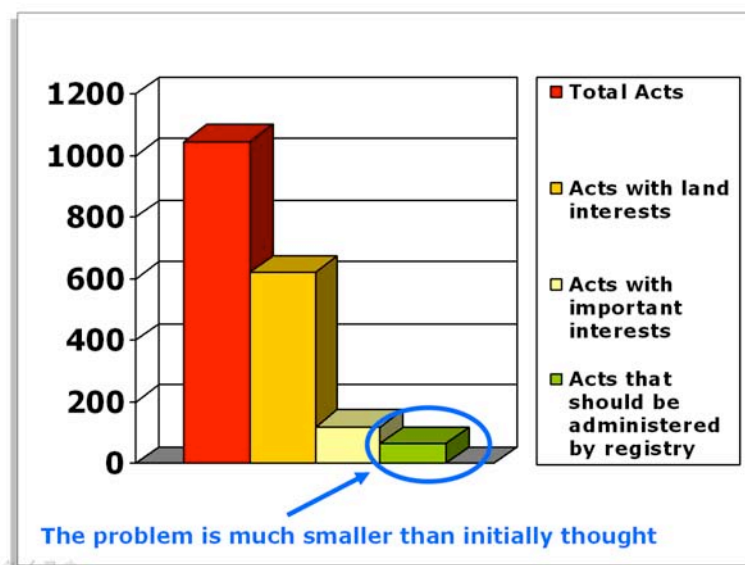


Figure 8.6: Identifying the most important property interests in the State of Victoria, Australia

The remaining Acts involve government held interests such as access rights for agents of the state (e.g. cadastral surveyors, tax officials). These are usually non-marketable, non-transferable and less dynamic interests that do not require as extensive or as secure administration. A cadastral surveyor's right to enter private land is a good example; the guarantee and security of the land registry are simply not required. Why is this case? It is because they do not generate as much information and generally create fewer disputes. That is, they are either highly specific or extremely broad, have less value/power attached to them, and are therefore generally of less interest to citizens. This criterion identifies 500 of the 620 of the Victorian Acts as not requiring government registration or security. For the remainder integration with registry information could be achieved using new technological solutions.

INSTITUTIONAL PRINCIPLES

Williamson's (2001) original institutional principles dealt with defining government structures such as ministerial responsibilities, departmental configurations and decentralization. The principles also included private sector relationships and the operation of professional organizations. In relation to this research the following questions relating to institutions required answering. How many institutions are actually involved managing land interests? How should institutions be structured? How should agencies managing the different rights, restrictions and responsibilities be organized? With respect to managing new land interests the principles in Table 8.10 answers the questions.

Table 8.10: The institutional component – shared responsibilities with centralized leadership

Principles, tools and explanations
<p><u>Leadership: a single information coordination body is required</u></p> <p>The studies revealed that tens, if not hundreds, of government agencies were involved in the management of land interests. However, an overarching leadership body was absent. A single coordination body should be responsible for driving and organising the integration of government and industry land information sets. Powers of this body need to be legislated otherwise integration may only occur on a case by case basis. Importantly, the agency that takes on this role needs to have a whole-of-government focus, at the same time as having a whole-of-land-department approach.</p>
<p><u>Structure: government remains decentralized but collaboration is essential</u></p> <p>Existing institutional structures need to be used intelligently. Administration of land interests is spread across countless government departments and agencies. Many restrictions are governed by well established administrative arrangements. It is too costly and impractical to move all land interest information into a single agency. Existing government structures should remain: technology can assist integration of information. Collaborative partnerships are necessary.</p>
<p><u>Custodianship: control of information remains decentralized with government agencies</u></p> <p>Ownership of land information should remain with the primarily responsible government agencies. These organizations have the most intimate understanding of the information they collect. Universal distribution and information sharing agreements are required.</p>
<p><u>Processes: government should be organized around land activities not institutions</u></p> <p>The days of government organizing institutions based on their own administrative needs are over: participants are now a key concern. Organization and integration of interests should be based around the core land processes undertaken by citizens (e.g. buying and owning a house, dairy production).</p>

EXAMPLE: WESTERN AUSTRALIA'S WALIS SUPPORTS COLLABORATION

An illustration of well designed institutions can be found in the state of Western Australia. The state is a front runner in land information management. Contributing to this success was an integrated management plan in the central government department, and a long established collaboration path through WALIS, Western Australia's Land Information System, a 25 year old network of government, industry and community bodies. WALIS set up foundations for co-ordination of the State's geographic information, and facilitated policies and standards that contributed to the effective management of vast information sets. This history helped facilitate a holistic approach to land management in the state. It saw the Department of Land Administration into transform into a Department of Land

Information. These changes led to the development of SLIP and subsequent integration of government and industry land information sets.

EXAMPLE: ORGANIZING INTERESTS BASED ON ACTIVITIES (NOT INSTITUTIONS)

There is no need to manage all interests through a single agency. In most cases only the information need be integrated. This can be achieved using the spatial data infrastructure concept (Williamson et al, 2003). However, property objects with similar attributes are ideally administered by a single organization with integrated processes. The example in section 3.1 dealing with the management water and land ownership interests provides a good illustration. The attributes of land and water ownership interests are similar, and therefore an ideal administrative regime would manage the two resource and other similar ownership interests together in a portfolio arrangement (Figure 8.7).

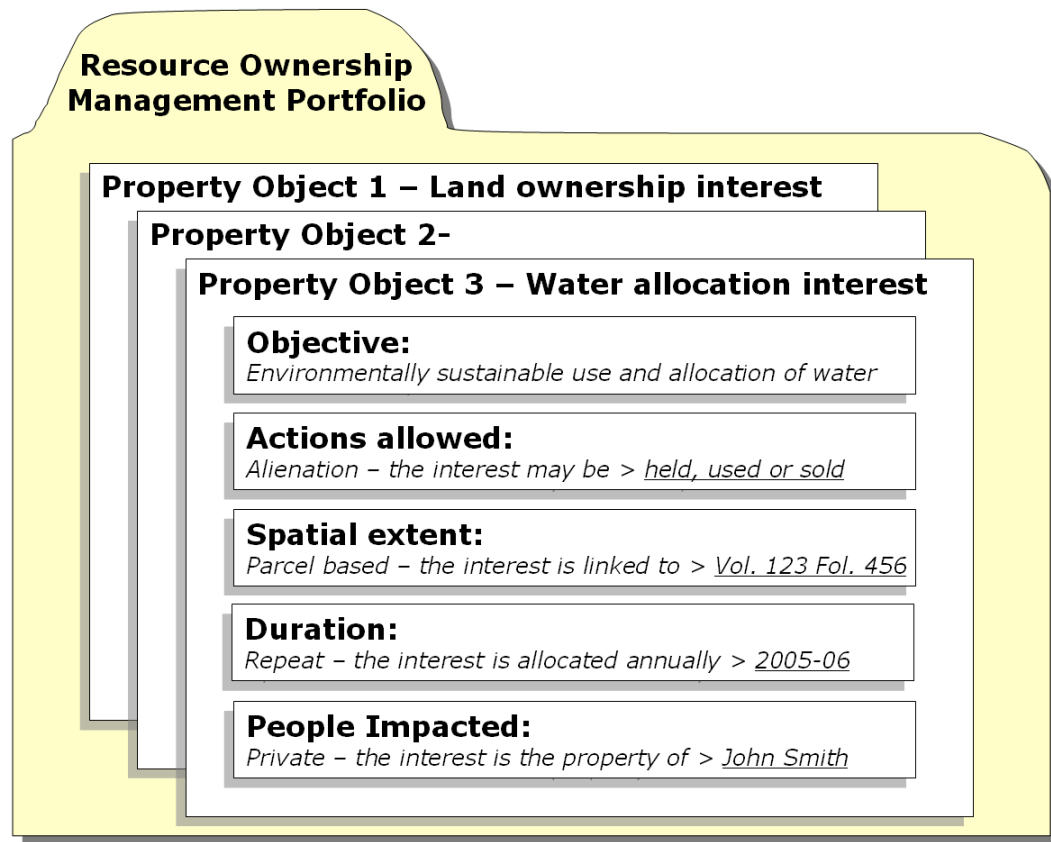


Figure 8.7: Similar property objects should be managed together in a portfolio arrangement

EXAMPLE: CHOOSING THE METHOD TO ORGANIZE INSTITUTIONS

The current management of land interests is disparate: separate interests managed through isolated, silo departments. For the purposes of discussion, this is called the horizontal approach (Figure 8.8). A government department has agencies devoted to a particular a land interest (e.g. water entitlements, land ownership rights). These agencies are divided into processing sections which deal with the policy, legal, permitting and licensing and appeals processes.

This method has disadvantages. There are no uniform controls or principles guiding the creation of land interests. The result is administrative overload and an inability to coherently integrate the management of land and natural resources; we do not have a holistic view. This leads to poor policy creation and decision making. It also results in poor or complicated customer access to land information and permit/license/appeals services.

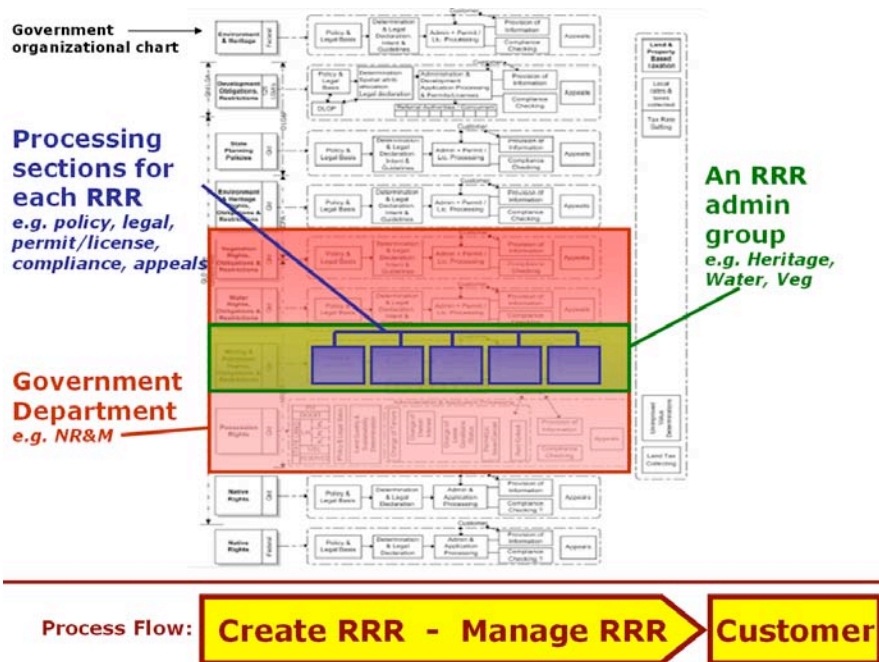


Figure 8.8: The horizontal approach

Lyons, Cottrell and Davies (2002) suggest another approach. For the purposes of discussion this is called functional approach. They suggest that rather than organize institutions by a particular interest (e.g. forest rights), they should be organized via the functions of policy, licensing, compliance and appeals processes (Figure 8.9).

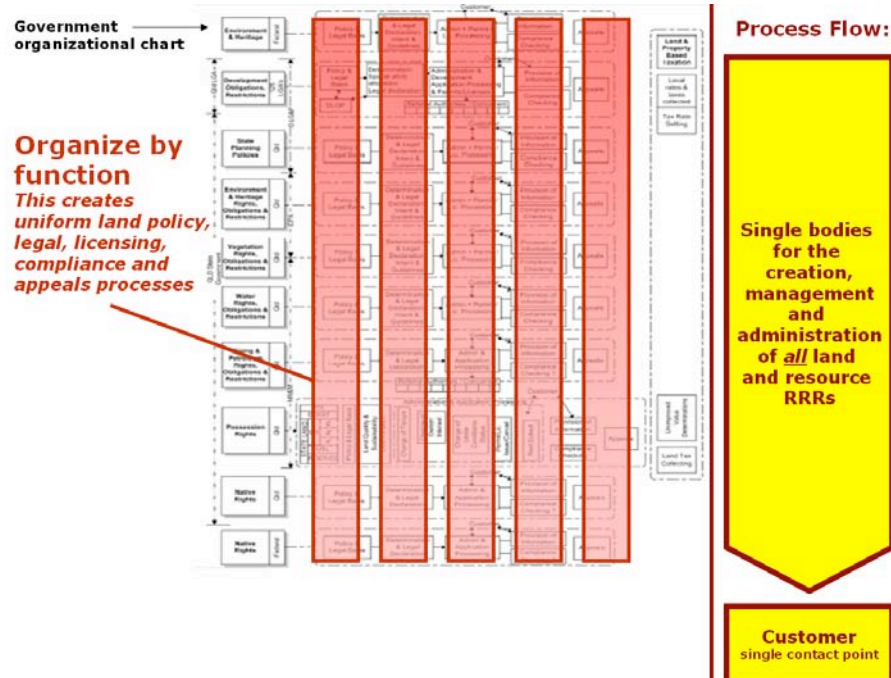


Figure 8.9: The vertical approach

The method has advantages. It promotes a holistic approach to land interest creation and management. It promotes a centralized single shop front for the customer. However, it also has disadvantages. It is too costly to implement in terms of time and money. It requires complete re-organization of government institutions and systems. It is also too rigid: as has been shown all land interests are different in nature and not all need to be managed in the same way. Finally, the approach does not take advantage of the cheaper opportunities offered by ICT and risks jeopardizing the integrity of the registry.

The research in this thesis has identified a third approach. For the purposes of discussion this approach is called the collaborative approach. Firstly, it is recommended that government structures be left alone. Secondly, it suggests that the creation of any new interests be based upon the set of first principles developed as part of the overarching land policy (see land policy principles). This will result in uniform design of interests and will additionally mean that the definition of spatial extent can be mandated. These interests can be administered by the appropriate agency, however, SDI can be used to integrate the information and deliver it to customers in a uniform way (Figure 8.10).

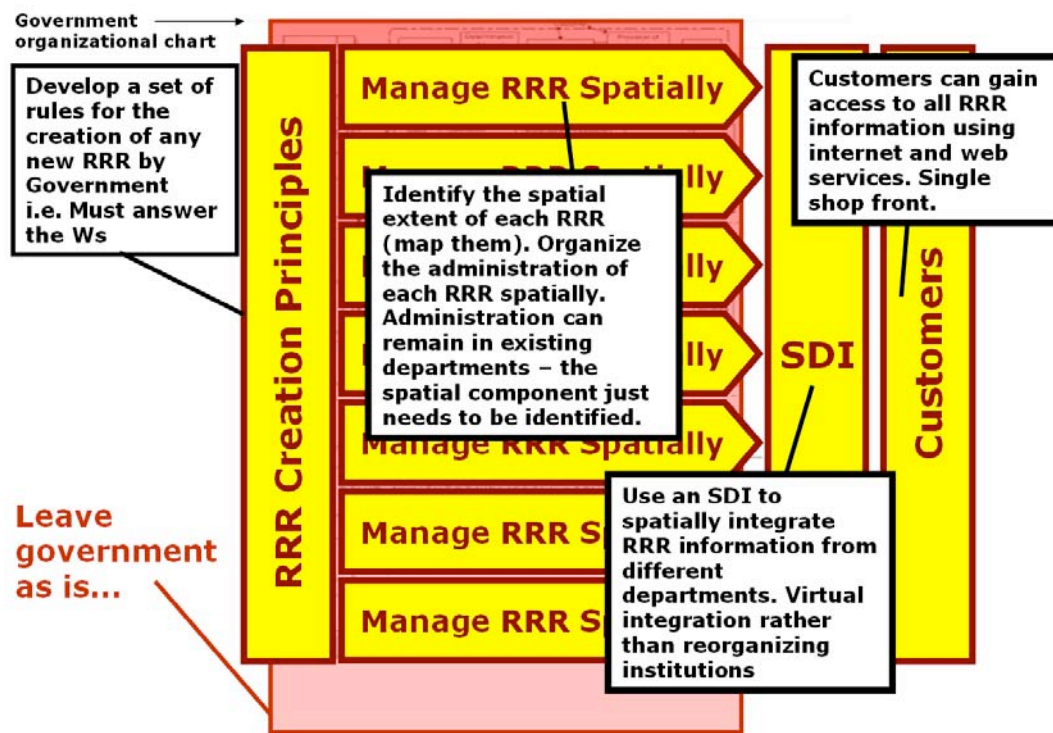


Figure 8.10: The collaborative approach

This approach has advantages. It is a holistic approach: creation principles allow for uniform policy and legal frameworks. It is cost effective: it does not require reorganization of government. It only requires integration of information using SDI. It is scalable: it can incorporate new interests as they emerge and allows for integration of different levels of government. The SDI component allows for a holistic view of land and resource information. It also provides for a single virtual

shop front for customers, whilst allowing for specialization of management. The approach does have some disadvantages. It requires creation of principles that need to be defined, adhered to and possibly legislated. It also requires investment into inter-governmental SDIs and also requires all customers to be spatially and ICT capable.

SPATIAL AND ICT PRINCIPLES

While recognizing the importance of spatial technologies and ICT, Williamson (2001) also warned that focusing solely on technology often results in project failure. In relation to this research a number of issues demanded consideration: What different spatial extents do land interests have? How many of the interests are managed using modern SDI and information technology principles? How can these tools be incorporated into a framework for managing rights, restrictions and responsibilities? Recognizing Williamson's (2001) initial principles and taking into account the findings of the two studies, Table 8.11 introduces a number of new spatial and ICT tools.

Table 8.11: The spatial and ICT component – enabling new solutions

Principles, tools and explanations
<p><u>Acquisition: lack of datasets and lack of integration</u></p> <p>All land interests have a spatial extent. The studies showed that a large majority of interests had no formal mapping or spatial identification. Those that had been mapped were often not integrated with other key datasets e.g. cadastre, roads. Those interests that require spatial enablement need identification. Better programs for integrating spatial datasets using SDI concepts are required.</p>
<p><u>Information: spatial extents, duration and people impacted must be recorded</u></p> <p>Location, time and place attributes should be defined and recorded in uniform fashion by government agencies. This will enable better ordering, integration and searching of core land interest information. In Australia's case this would be through PSMA.</p>
<p><u>Source: identify best available information</u></p> <p>In some cases multiple agencies and organizations hold information relating to an interest. The most authoritative source of information relating to a source needs to be identified and indicated in some way.</p>

Access: land interest information and transactions should be online and affordable

Limited land transactions are available to citizens online. Many transactions are still paper based: only printable forms are provided online. Governments should strive to include the processes of creation, alteration and removal online. Generic standards should apply to information types. The most important information should be provided for cost of provision using web services and guaranteed. Any damage suffered because of incorrect information should be recoverable. Less generically important information should be provided for cost of collection and provision.

Continued next page

Infrastructure: SDI overcomes the need to reorganize government

SDI removes the need to reengineer governments. Standard infrastructure platforms enable the integration of government information.

Interface: web services need to be designed around land activities not datasets

Existing government web sites tend to allow citizens to view different land datasets, however, sites should be designed around core activities and transactions.

Standards: uniform spatial identifiers, units and access need to be developed

In the past different agencies used different spatial identifiers. For example, addressing is still unreasonably complex in Victoria. In urban areas when numbers increase, odd numbers are on your left and even numbers are on your right. When even numbers are on your left, numbers are decreasing. In case of rural addressing, the number multiplied by 10 indicates the distance in metres from the start of the road. Integration and efficiency demands that uniform units and identifiers be adopted.

EXAMPLE: ENABLING ADVANCED SEARCHING TOOLS FOR LAND INTEREST INFORMATION

As mentioned previously, concern for sustainability has lead to the creation of many new property interests. Finding out where certain interests apply, to whom they apply, when they apply, why they exist and how they can be changed is of significant interest to citizens. Until now, our systems for delivering this information have been poor. New technology available for managing the spatial dimension can easily combine these disparate datasets and make them understandable to the intended audience. Without spatial technologies, datasets will remain disparate and so will management. The citizen's responsibility to understand and adhere to these laws will remain next to impossible. New spatial data infrastructure initiatives offer the opportunity to use a common IT

infrastructure across government to integrate datasets virtually using the spatial attribute; a web client can be used by citizens to access this database of property information. The state government of Western Australia's whole-of-government Shared Land Information Platform (SLIP), and web service known as Register of Interests (ROI), provides an example of this type of arrangement. The key benefits of this system are cost reduction and economies of scale. New sustainable land management applications, functionality and datasets can be developed and integrated into the underlying infrastructure for a comparatively small additional cost.

In Victoria, this architecture would result in information generated under 620 Acts and countless other datasets being integrated and made available to the public over the internet with the utility of visualization. This would reduce the search time required when looking for property information, but would leave the problem of determining which interests are important for a particular citizen or activity. Western Australia's ROI prototype conducts searches using parcel identifiers and classifies interests using common business activities, such as property development and emergency management. The property object concept can advance these search typologies even further.

If the attribute values were to be recorded in a uniform fashion, advanced searches could be conducted using a range of different user inputs. Figure 8.11 provides an example. This would allow citizens to search based on the information they had access to, be it people information, location information, activities of interest or individual Acts. The search result would produce a list of interests that are deemed relevant to the customized search. The more attribute fields that are filled in, the more specific the returned information. The search may also reduce the need to classify interests, as citizens could filter their searches for particular occasions. An overall classification of importance as discussed earlier could be included. This type of searching can only be enabled if all the attribute information for each

property interest is geo-coded and also recorded by the custodian agency in a common way.

Property Interest Search

Act Title

Objective **Action Regulated**

Spatial Coverage **Duration**

Person Benefiting **Person Restricted**

Overall Importance

Figure 8.11: Using the property object allows for more advanced property information searching

HR DEVELOPMENT AND CAPACITY BUILDING

PRINCIPLES

Human resource and capacity building principles have only recently permeated the discipline of land administration (Chapter 4). To ensure the long term sustainability of any land administrative reform ongoing education of people in both public and private sectors and citizens must be implemented at individual, institutional and societal levels. The institutional element of capacity building was covered in earlier components of the toolbox (i.e. cadastral and registration principles, and institutional principles) and therefore this component concentrates on individual and societal capacity building. In relation to this research the following questions needed answering: How many property rights, restrictions and responsibilities impact on individual properties (and the individual people who use that land)? How can capacity building tools (e.g. social learning) be incorporated into a framework

for managing rights, restrictions and responsibilities? These questions were answered in the previous chapters. Table 8.12 synthesizes the findings into a set of new principles.

Table 8.12: The HR and capacity building component – spatially skilled societies are essential

Principles, tools and explanations
<p><u>Individual properties are heavily burdened</u> Every property considered in the study was burdened by a different, yet extensive, range of land interests. Consequently people with an interest in the land were confronted with legislative complexities and information voids. Better tools designed around citizen information needs are required.</p>
<p><u>Spatially enabled societies do not require spatial technology aware citizens</u> Spatial technologies will be ubiquitous. Basic spatial functions will be embedded into most information systems. Citizens do not need to be expert users of spatial information technologies, people’s innate map consciousness mean they already know how to use basic web mapping services.</p>
<p><u>Expectations must change: social learning and information provision over regulation</u> The need for copious amounts of regulation can be decreased by making use of social education and information provision. For example, if a property developer knows which land is contaminated there is no need to draft a law penalizing people for building on contaminated land, it simply would not happen.</p> <p>Removing uncertainty removes the need for legislation. Additionally, it is imperative the change the way people think about land. The current “home is castle” idea is inappropriate in a systems view of the world. This could be done by providing basic information to citizens, in plain language, summarizing the main aspects of land law and explaining to land owners their rights and obligations, available free of charge. Additionally the statement should also make clear the Governments role to adjust land uses to deliver public good outcomes (safety, permanency of buildings, limit salinity, save water, preserve soils, enhance vegetation cover, preserve flora and fauna, manage risks of slipping, flooding, incendiary and shifting land, control special areas such as mountain ridges, coastal zones). These are all result of sustainability decisions and built on the understanding that limitations on what people can do are inbuilt.</p> <p>In contrast to legislating new rights, restrictions and responsibilities these tools offer new ways to modify people’s behaviour towards land. It turns the concept of restrictions on its head and projects them as tools for servicing goals and sharing the responsibilities.</p>
<p><u>Basic land/ sustainability/ spatial education, embedded in service provision, across governments and community</u> Government departments are experts in understanding the land interests they administer, however, use and understanding of basic spatial technologies is very limited. Basic skill upgrading in areas of land interests, sustainability and spatial information should be undertaken across government agencies.</p>

EMERGING TOOLS

Outside land administration a swath of tools from other disciplines can be applied to the management of land. In relation to this research the following questions required answering: How can these new tools be incorporated into a framework for managing rights, restrictions and responsibilities? Table 8.13 relates how these tools have been applied and may be applied to land interest management in the future.

Table 8.13: The emerging tools

Principles, tools and explanations
<p><u>Ontological design</u> The original land administration toolbox did not reveal how land interests, apart from ownership, should be understood or organized. The theories of ontological design were used to develop the property object discussed in the new tenure component. The theory has further utility: it will be used to develop classifications of interests relevant to each jurisdiction's administrative system.</p>
<p><u>Spatial and information technologies</u> The original land administration toolbox did not reveal the full extent to which spatial and information technologies could be applied to land interest management. Spatial and information technologies were highlighted in the SDI and spatial technology component; however, the spatial attribute underpins many of the other components. Discussion suggested how the spatial attribute: could be used to remove the need to reorganize institutions; was required to be defined in legislation; was an essential part of the property object concept; enabled cadastral maps to underpin the integration of land interests; and could be used in land policy analysis creation. Spatial information technologies will continue to have a very close relationship to all land interest management systems and their development.</p>
<p><u>Social Learning</u> The original land administration toolbox focused high-level policy and legislative drafting to drive behavioural change. However, the new HR development and capacity building component revealed how social learning at the ground-level can also be a very cost effective tool for changing human behaviour. It minimizes the need for legislation and the institutions which accompany them.</p>
<p><u>Uncertainty theory</u> The original land administration toolbox grew out of the discipline of land surveying: a field built upon high levels of certainty in measurement and record management. This thesis has revealed how some land interests do not warrant the expenses involved in achieving such high levels of certainty: the new cadastral and registration component encapsulates this point. Additionally, some interests are amorphous: they will not fit into defined categories of administration. They will need to be dealt with on a case by case basis. Layered interests upon land mean that risk is a reality attached to any other land interest. This risk needs to be understood and managed by citizens just like any other risk associated with other societal activities.</p>

Funding principles and other economic tools

The original land administration toolbox did not fully consider the mechanisms for funding administration of land interests. This thesis assessed the possible options in Chapter 4. The research showed that many interests available are being provided for free, however, these interests could be considered administratively simple. A large number of interests were provided for a fee, these tended to be the higher demand interests (e.g. title search). While it would be beneficial for information services to be free, it is possible that markets will emerge in the provision of interests land information. Damages caused by errors in information will most likely be covered by the provider. Markets will also continue to be used to service sustainability objectives: market based interests (e.g. carbon trading) are already in use and will continue to increase in number.

CONCLUSIONS

There is no immediate solution for overcoming the problematic management of property rights, restrictions and responsibilities: the underlying issues are wide reaching and require a number of initiatives and approaches in order to be properly addressed. Important environmental and economic problems will not be overcome if the current approach of ad-hoc legislative design and disparate administration systems continues.

To this end, this chapter organized a number of concepts and findings from the studies undertaken into a coherent framework called The RRR Toolbox. The framework built upon the work of Williamson (2001) and provides a comprehensive model for reorganizing the treatment of restrictions and responsibilities relating to land. Together, the eight components provide a guiding framework for governments attempting to achieve integrated management of land interests. The components are diverse and deal with all elements associated with land administration: land policy design, legislative drafting and tenure creation, but, also the more technical elements of cadastral and registration processes, institutional structure, spatial and information infrastructures, and finally capacity building. Importantly the emerging tools of ontological design, social learning, uncertainty theory and funding principles are incorporated into the framework. Because two different approaches were used to generate the framework, it is robust, tested and self justifying.

Having introduced the framework, the next chapter returns to the research design to close the loop on the scientific method. It revisits the earlier thesis chapters, research questions, and hypothesis used to generate them to determine the success and limitations of the overarching research used to generate the RRR toolbox. It also looks forward and discusses the future directions and research required in the area of property rights, restrictions and responsibility management.

CHAPTER 9

CONCLUSIONS AND FUTURE DIRECTIONS

This chapter returns to the research design to close the loop on the scientific method. It revisits the earlier chapters and synthesizes the key research findings. The chapter aims to determine the success and limitations of the research design used to generate the RRR toolbox and Property Object concept. It also looks to the future and discusses the potential research opportunities in the area of property rights, restrictions and responsibility management.

CLOSING THE LOOP

On the 18th of October 1999, forty international experts on land administration met in Bathurst, Australia. They aimed to understand and articulate the important and growing relationship between land administration and the sustainable development of human societies. Their debates, discussions and lamentations resulted in The Bathurst Declaration on Land Administration for Sustainable Development (UNFIG, 1999): twenty recommendations aimed at assisting countries to reform their land administration arrangements.

This thesis aspired to continue the challenge set by the Bathurst Declaration. Specifically, it explored an essential component of the vision: it aimed to develop a framework for understanding and organizing the management of property rights, restrictions and responsibilities in a way that enabled the achievement of sustainable development objectives by citizens and governments. To this end, the thesis followed the roadmap outlined in Figure 9.1.

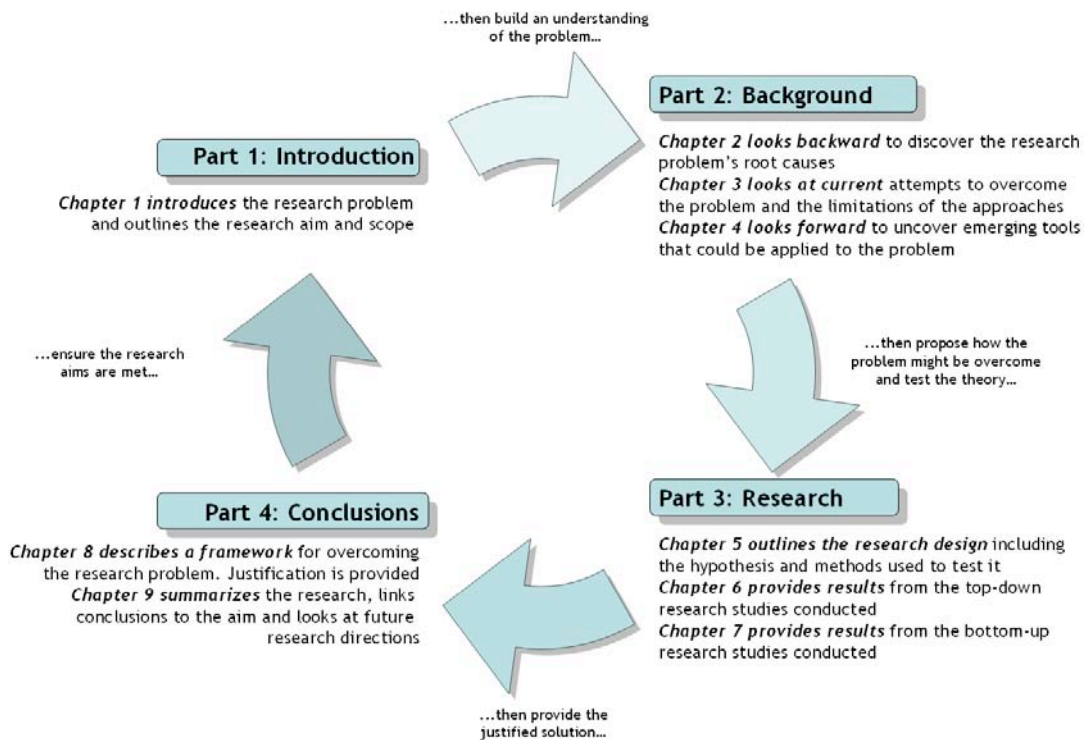


Figure 9.1: The research roadmap

SUMMARY OF 'INTRODUCTION' SECTION

The overarching research problem was defined as:

“Property rights, restrictions and responsibilities over land are designed and administered in a disparate, ad hoc and disorganized fashion. This makes achieving sustainable development difficult, if not impossible. How should we organize the management of these property rights, restrictions and responsibilities in a way that enables citizens and governments to meet their sustainable development objectives?”

The overarching aim of the research was therefore:

“To develop a framework for organizing the management of property rights, restrictions and responsibilities in a way that enables the achievement of sustainable development objectives by citizens and governments.”

SUMMARY OF 'BACKGROUND' SECTION

In order to understand how the problem had emerged three disciplinary perspectives were studied. The three perspectives of tenure, legal objectives and policy objectives all illustrated how the rise in land interests occurred. A diverse range of economic, social and environmental drivers all contributed to the influx. Each perspective demonstrated the inability of existing theories to describe and manage the many interests over land: tenure models and conceptualizations of property were not coping. Such theories were described as outdated and requiring re-evaluation and redesign. A new framework needed to consider and incorporate these findings.

An examination of land interests from the perspective of cadastral systems and the institutions which administer them was then undertaken. The complexities of these systems and how they have struggled with the emergence of new land rights, restrictions and responsibilities were discussed. It was discovered that traditional land administration tools had been bypassed in the design and management of new land interests. However, these systems and institutions were re-emerging to tackle

the problem. Attempts to overcome the problem were studied, however, it was concluded that more work was required to determine what role these systems and institutions should play. In particular, there was a need to develop new systems for organizing, understanding and managing land interests holistically.

It was then proposed that in order to develop a new framework for understanding and managing the majority of land interests, new theories and concepts from outside the discipline needed to be explored. An analysis of five areas relatively new to land administration was undertaken. Ontological design could be used to create new conceptual understandings of land interests: this would result in better organization and administration of interests. Capacity building, specifically the concept of social learning, offers a new way of looking at policy design and motivating changes to human behaviour in relation to land. It also mitigates the need to create large bodies of legislation. Information and spatial technologies provide the practical tools for better collecting, integrating and monitoring of information at reduced costs. Uncertainty is a part of any measurable system. Incorporating concepts of uncertainty into land administration systems will result in more appropriate and realistic designs for information provision. In relation to funding models, a range of methods are available. The ability of systems that manage land interests to be self sufficient will be an important factor in the success of this system. It was concluded that each of these emerging theories could significantly impact the design of a new framework to manage all rights, restrictions and responsibilities over land.

SUMMARY OF 'RESEARCH' SECTION

The contextual understanding gained in the 'Background' section was used to develop and justify a robust research design. The scientific method was used to guide the design process. The first stages involved developing the research problem and hypothesis, using the background research. It was determined that no 'silver bullet' existed to solve the problem. Instead, a holistic framework dealing with

many elements related to land administration was required, much like the land administration toolbox (Williamson, 2001). The hypothesis was articulated as:

Expanding the land administration toolbox with new tools and principles will enable better management of property rights, restrictions and responsibilities and consequently assist the achievement of sustainable development objectives by citizens and government.

The research hypothesis led to the creation of a number of research questions, all of which needed to be answered in order to test the hypothesis. A mixed methodology involving both qualitative and quantitative studies was required to answer the questions. Additionally, top-down (government) and bottom-up (parcel) perspectives were also used. Together, the results from these equally weighted case studies could be used to answer the research questions, test the appropriateness of the hypothesis, and to generate components of an updated land administration toolbox, one capable of managing all interests in land.

The top-down case studies provided a detailed insight into the creation, organization and management of land interests within Australia's three levels of government. The sheer size of the legislative sprawl (Federal – 514, State – 620, Local – 7) and the administrative effort required to manage it was exposed at all levels of government. Lack of organization and coordination prevailed. However, amongst the tangle of bureaucracy, pockets of very well managed, automated and spatially integrated land interests were uncovered. Additionally, the underutilized potential of the cadastre and existing registry to manage 'some' interests was identified. The quantitative and qualitative results obtained, directly related to the research questions underpinning this research and provided substantial input into management framework proposed.

The bottom-up case studies provided a detailed insight into the effect of old and new land interests on individual parcels. The impact of their creation, modification and removal was assessed. The lack of integration between policy, legal and administrative systems was experienced first hand. The historical complexities of

existing cadastral and registration systems and their deficiencies also became clear. Additionally, the applicability of interests to different places, people, times and activities also became apparent. The results obtained directly related to the questions underpinning this research and provided substantial input into the management framework proposed.

SUMMARY OF 'CONCLUSION' SECTION: KEY FINDINGS AND CONTRIBUTIONS TO KNOWLEDGE

The new framework for articulating the management of the majority of property interests was articulated by bringing the key findings together from the top-down and bottom-up studies. The two different perspectives acted as a check or test of the results obtained and hence the final framework was considered robust and justified (Figure 9.2).

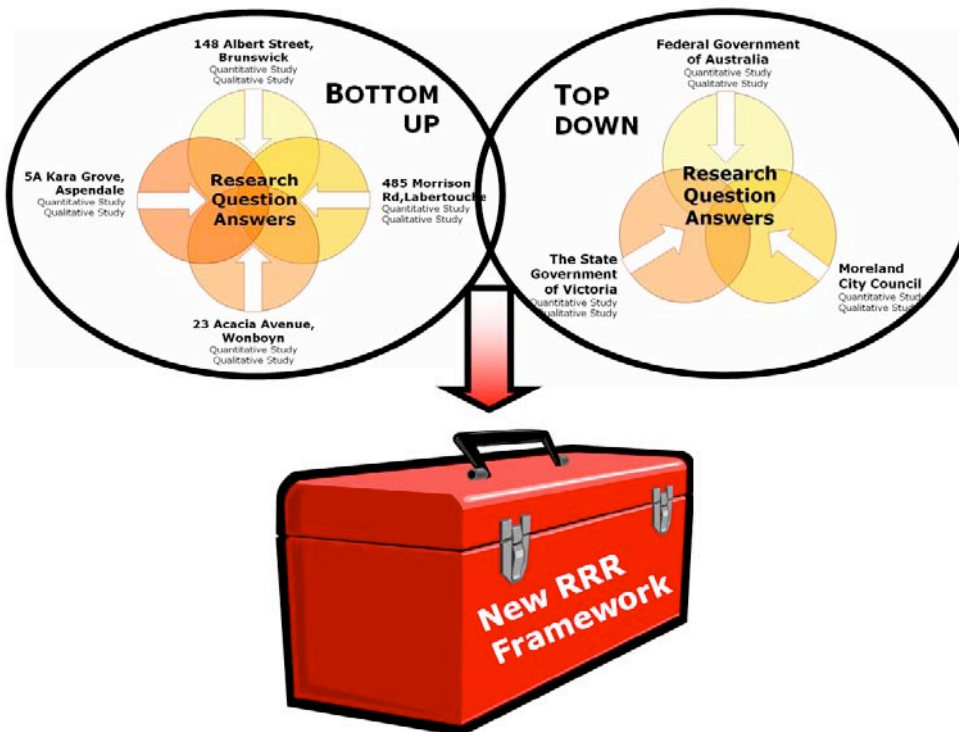


Figure 9.2: Developing results into the practical RRR toolbox

Conceptual diagrams best describe the two most important components of the model. First, Figure 9.3 shows ‘The RRR Toolbox’. If a jurisdiction wishes to coherently manage all its land rights, restrictions and responsibilities then each of the eight components needs to be addressed and acted upon. The framework built upon the work of Williamson (2001) and provides a comprehensive model for reorganizing the treatment of restrictions and responsibilities relating to land. The components are diverse and deal with all elements associated with land administration: land policy design, legislative drafting and tenure creation, but, also the more technical elements of cadastral and registration processes, institutional structure, spatial and information infrastructures and finally capacity building. Importantly the emerging tools of ontological design, social learning, uncertainty theory and funding principles are incorporated into the framework. There is no quick fix or single solution for overcoming the problematic management of property rights, restrictions and responsibilities: the underlying issues are wide reaching and require a number of initiatives and approaches in order to be properly addressed. Important environmental and economic problems will not be overcome if the current approach of ad-hoc legislative design and disparate administration systems continues.

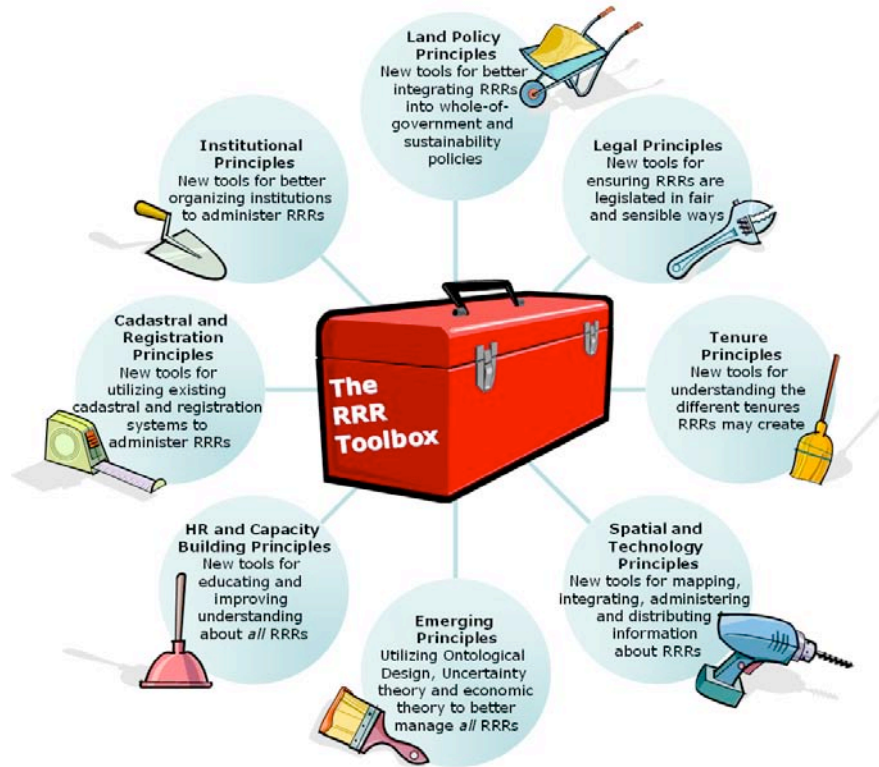


Figure 9.3: The RRR Toolbox

Second, Figure 9.4 illustrates the ‘Property Object’. The concept was developed using ontological design theory. A recurring theme throughout the thesis has been that every property interest is different in nature and, depending on the perspective taken; different classification schemes are equally valid. From the viewpoint of land administration, the focus is on the information needed to perform the land and resource related tasks of government, business and citizens. Here, the five attributes in Figure 9.4 are considered most important. The property object is defined as an advanced descriptive framework of the key attributes that make up an individual property interest. The property object permits a holistic treatment of the majority of property interests, from ownership down to simple access powers, and also allows for meaningful contrast between different interests. The framework conveys the essential information needed by governments and citizens about land and resources to deliver sustainable development objectives. It does not force any interest into a simple box such as ‘public’ or ‘private’. Rather, it is flexible and recognizes that many property objects are very different in nature. The five attributes determine

what information must be recorded and made available when a property interest is created. They provide an understanding of the nature of, and differences between, specific property interests.

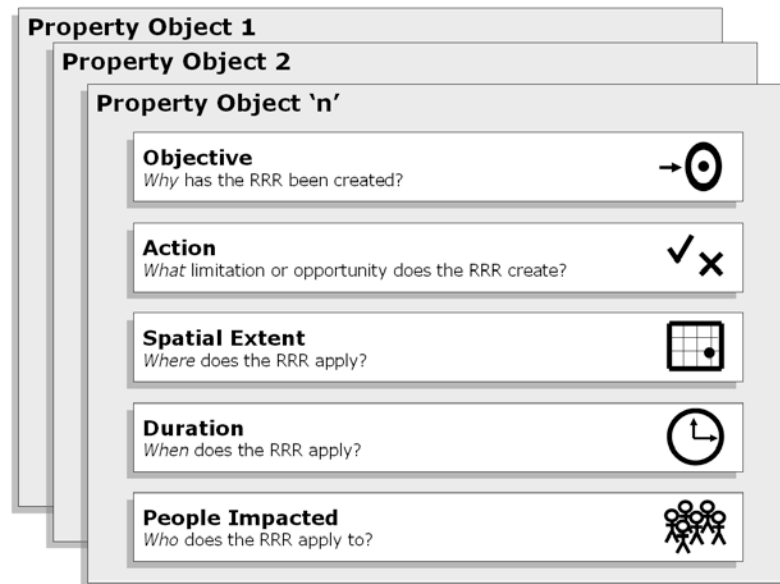


Figure 9.4: The Property Object

In relation to ‘closing the loop’ on this research, two key question remain. First, was the overarching aim of the research, “to develop a framework for organizing the management of property rights, restrictions and responsibilities in a way that enables the achievement of sustainable development objectives by citizens and governments,” achieved? Together, the ‘RRR Toolbox’ and ‘Property Object’ deliver on the aim in a new and innovative manner. They add to previous models designed to improve the management of land interests for the purposes of sustainable development, but, they go further. The concepts are based on in-depth empirical studies of the legislative and administration systems and also consider on-ground issues: this has not been done before. Importantly the concepts are simple to understand. Government policy and legislation makers can use the tools to design, compare, classify and manage most property interests regardless of what legal system they are created in. The analytical frameworks are capable of applying to most property interests, but, provide specific tools of thought for individual cases. They help determine what type of administrative approach would be most

appropriate for each interest. It should be noted that the achievement of sustainable development through use of the toolbox is only implied at this stage. Not until the tools are widely used and appropriate metrics developed can this part of the aim be truly delivered.

Second: was the hypothesis, “Expanding the land administration toolbox with new tools and principles will enable better management of property rights, restrictions and responsibilities and consequently assist the achievement of sustainable development objectives by citizens and government” substantially not disproved? The results of the top-down and bottom-up case studies reveal this to be the case. The components and principles developed are based on the successful parts of existing property interest management regimes. Additionally, where administrative problems were identified, these too were articulated as principles. Therefore, each principle is tested and successfully in use in at least one jurisdiction. Together the principles or ‘expanded toolbox’ will help to deliver sustainability objectives. Any country that manages to enact all components of the model would place itself in a very strong position to deliver land information for the purposes of sustainable decision making to all arms of government and citizens. However, again it should be noted that the achievement of sustainable development through use of the toolbox is only implied: only once the tools are widely used and metrics have developed can the hypothesis be further substantiated. Finally, this thesis does not claim to solve the problem: more work on each of the components identified is needed. This thesis concludes by looking towards future research directions for property rights, restrictions and responsibility management.

FUTURE DIRECTIONS

This thesis builds upon all the work which has emerged since and prior to the Bathurst Declaration in 1999. In turn this work also needs to be built upon: no single research activity is capable of understanding or solving all problems relating to property interest management. Indeed, this research has served to create many

new questions. Future areas of research might consider the following areas and questions:

This thesis concentrated on all interests related to an individual parcel rather than the specific land information required by different industries. What is the land information and service needs of from different industry sectors (e.g. dairy farming / oyster farming, development sector, insurance sector)?

While some discussion and research into the funding of administration systems was covered in this thesis, more depth is required. How should information management and provision of different types of interests be funded?

The Property Object provides a tool for classifying interests; however, different classification will be necessary for different jurisdictions. What does an example classification scheme look like?

A range of new spatial tools were identified in this research. All could be applied to the management of land interests, however, within this research no prototypes were developed. What might a prototype look like? How would it function?

As the tenth anniversary of the Bathurst Declaration approaches it is clear that the underlying principles are finally being embraced by societies. Researchers and governments alike continue to strive to achieve the vision. Understandings have deepened and new tools and strategies have emerged. However, despite this concerted action, the problems of climate change, entrenched poverty and environmental degradation are still large. This fact only increases the urgency of implementing strategies and tools such as those outlined in this thesis.

All people are impacted by property rights, restrictions and responsibilities: positive and negative, formal and informal, local and global. Therefore, all people have a shared interest in ensuring that all land is managed sustainably. To ensure a sustainable future, all individuals, institutions and societies must understand and manage appropriately their rights, restrictions and responsibilities in relation to land.

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(Note: This list only refers to those statutes cited in the text. A full list of legislation used in the research case studies is provided in Appendix 1)

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APPENDIX 1

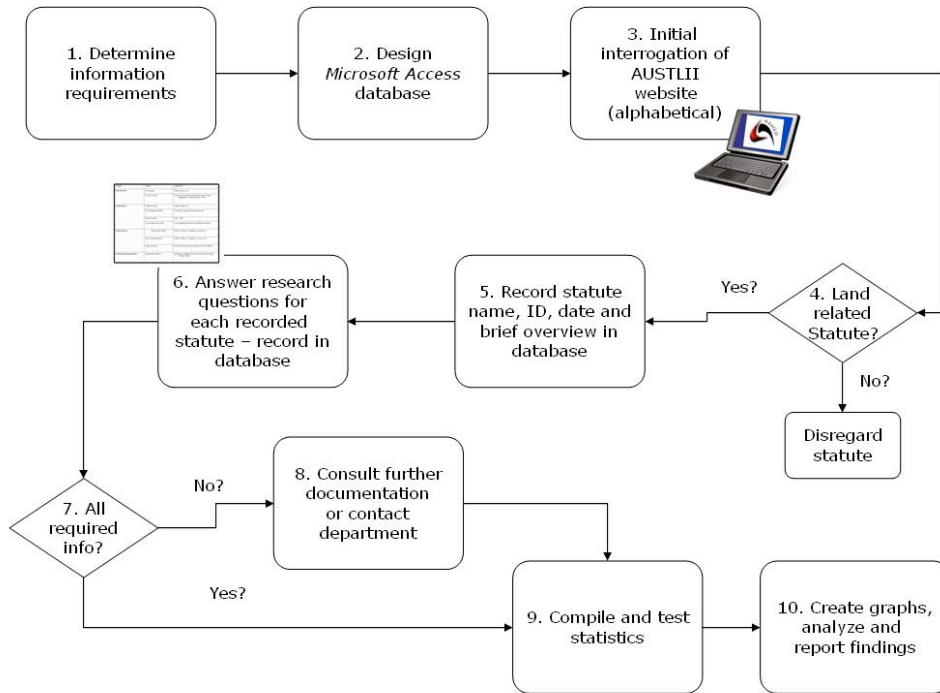
TOP-DOWN STUDY DESIGN AND RESULTS

This thesis has an accompanying website. Visit the site to download and view the database design files, data collected and imagery obtained for all the top-down studies:

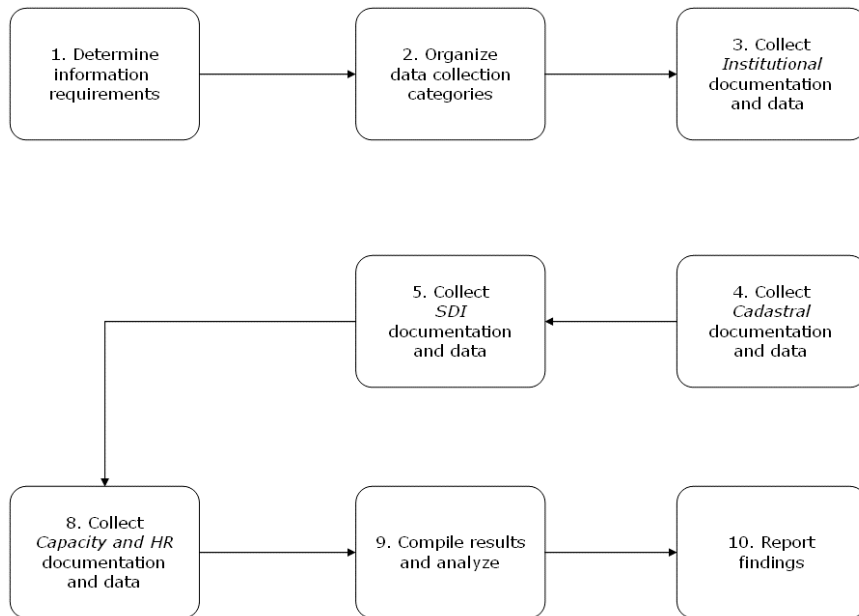
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FEDERAL – AUSTRALIAN GOVERNMENT

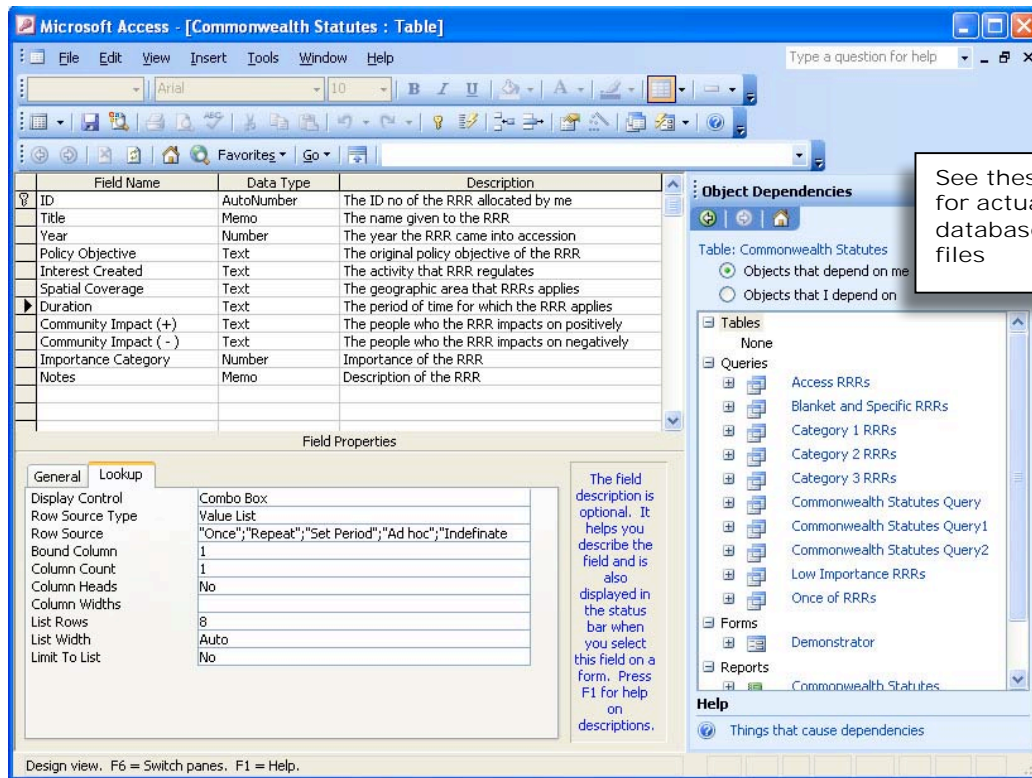
QUANTITATIVE STUDY FLOWCHART



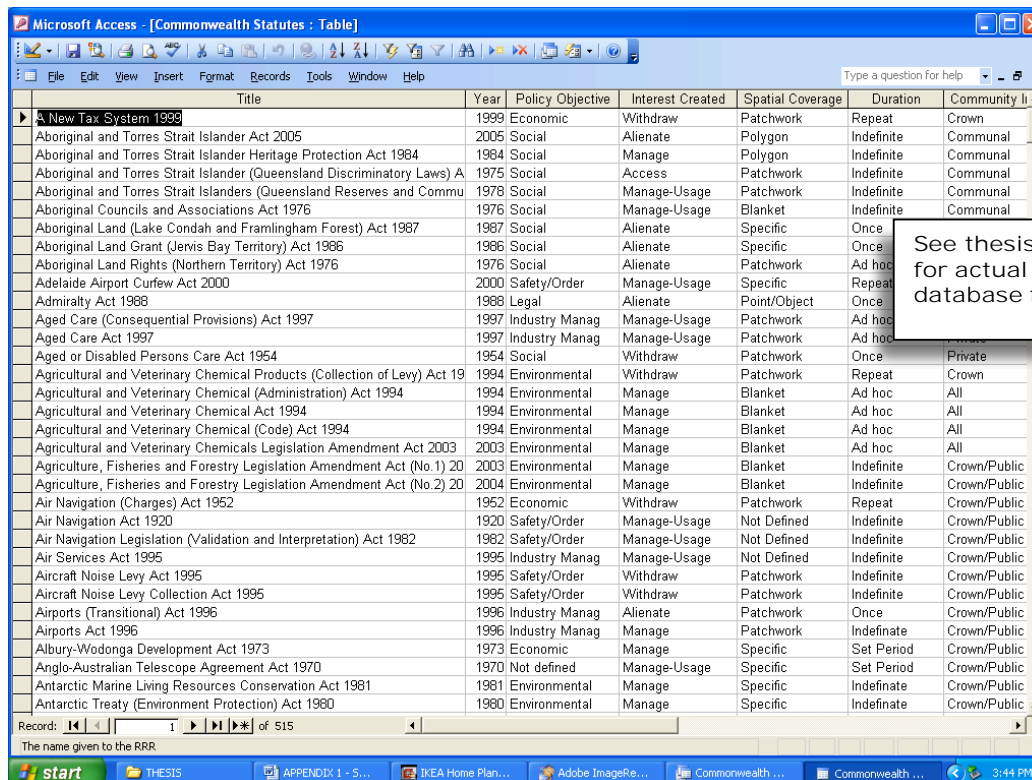
QUALITATIVE STUDY FLOWCHART



DATABASE DESIGN



DATA COLLECTED



LIST OF STATUTES

A New Tax System 1999
Aboriginal and Torres Strait Islander Act 2005
Aboriginal and Torres Strait Islander Heritage Protection Act 1984
Aboriginal and Torres Strait Islander (Queensland Discriminatory Laws) Act 1975
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Aboriginal Councils and Associations Act 1976
Aboriginal Land (Lake Condah and Framlingham Forest) Act 1987
Aboriginal Land Grant (Jervis Bay Territory) Act 1986
Aboriginal Land Rights (Northern Territory) Act 1976
Adelaide Airport Curfew Act 2000
Admiralty Act 1988
Aged Care (Consequential Provisions) Act 1997
Aged Care Act 1997
Aged or Disabled Persons Care Act 1954
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Antarctic Treaty (Environment Protection) Act 1980
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Australian Antarctic Territory Acceptance Act 1933
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Australian Capital Territory (Self-Government) Act 1988
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Australian Capital Territory Tax (Vehicle Registration) Act 1981
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Australian Energy Market Act 2004
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Australian Land Transport Development Act 1988

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Australian National Univeristy Act 1991
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Australian Radiation Protection and Nuclear Safety (Licence Charges) Act 1998
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Australian Workplace Safety Standards Act 2005
Aviation Transport Security (Consequential Amendments and Transitional Provisions) Act 2004
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Bankruptcy Act 1966
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Bounty (Bed Sheeting) Act 1977
Bounty (Books) Act 1986
Bounty (Citric Acid) Act 1991
Bountry (Computers) Act 1984
Bounty (Fuel Ethanol) Act 1994
Bounty (Machine Tools and Robots) Act 1985
Bounty (Photographic Film) Act 1989
Bounty (Printed Fabrics) Act 1981
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Chemical Weapons (Prohibition) Act 1994
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Employment Services Act 1994
Environment Protection (Alligator Rivers Region) Act 1978
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Land Commissions (Financial Assistance) Act 1973
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Lands Acquisition Act 1989
Lighthouses Act 1911
Liquefied Petroleum Gas (Grants) Act 1980
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Local Government (Financial Assistance) Act 1995
Marine Insurance Act 1909
Marine Navigation (Regulatory Functions) Levy Act 1991
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National Rail Corporation Agreement Act 1992
National Railway Network (Financial Assistance) Act 1979
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Nothern Territory (Commonwealth Lands) Act 1980
Nothern Territory (Lessees' Loan Guarantee) Act 1954
Nothern Territory (Self-Government) Act 1978
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Nothern Territory Grant (Electricity) Act 1989
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Nursing Home Charge (Imposition) act 1994
Nursing Homes Assistance Act 1974
Occupational Health and Safety (Commonwealth Employment) Act 1991
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Offshore Minerals (Exploration Licence Fees) Act 1981
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Offshore Petroleum (Safety Levies) Act 2003
Overseas Missions (Privileges and Immunities) act 1995
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Papua New Guinea Loan Guarantee Act 1973
Papua New Guinea Loans Gurantee Act 1973
Papua New Guinea Loans Gurantee Act 1974
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Passenger Movement Charge Act 1978
Passenger Movement Charge Collection Act 1978
Petermann Aboriginal Land Trust (Boundaries) Act 1985
Petroleum (Submerged Lands) (Registration Fees) Act 1967
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Petroleum (Submerged Lands) Act 1967
Petroleum (Submerged Lands) Fees Act 1994
Petroleum (Submerged Lands) Legislation Amendment Act 2001
Petroleum (Timor Sea Treaty) (Consequential Amendments) Act 2003
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Petroleum Resource Rent Tax (Interest on Underpayments) Act 1987
Petroleum Resource Rent Tax Act 1987
Petroleum Resource Rent Tax Assessment Act 1987
Petroleum Retail Marketing Francise Act 1980
Petroleum Retail Marketing Sites Act 1980
Petroleum Revenue Act 1985
Pig Industry (Transitional Provisions) Act 1986
Pig Industry Act 2001
Pipeline Authority Act 1973

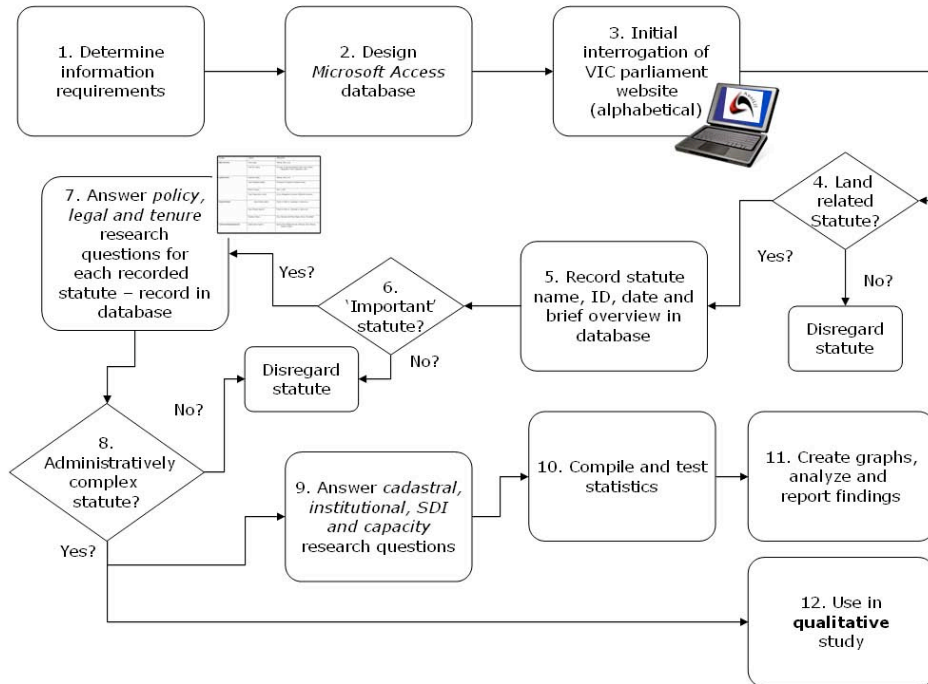
Plant Breeder's Rights Act 1994
Port Statistics Act 2001
Postal and Telecommunications Commissions (Transitional Provisions) Act 1975
Primary Industries Levies and Charges Collection Act 1991
Primary Industries (Customs) Charges Act 1999
Primary Industries (Excise) Levies Act 1999
Primary Industries Levies and Charges (Consequential Amendments) Act 1999
Primary Industry Councils Act 1991
Product Stewardship (Oil) Act 2000
Prohibition of Human Cloning Act 2002
Protection of Movable Cultural Heritage Act 1986
Protection of the Sea (Civil Liability) Act 1981
Protection of the Sea (Imposition of Contributions to Oil Pollution Compensation Fund - Customs) Act 1993
Protection of the Sea (Imposition of Contributions to Oil Pollution Compensation Fund - Excise) Act 1993
Protection of the Sea (Imposition of Contributions to Oil Pollution Compensation Fund - General) Act 1993
Protection of the Sea (Oil Pollution Compensation Fund) Act 1993
Protection of the Sea (Powers of Intervention) Act 1981
Protection of the Sea (Prevention of Pollution from Ships) Act 1983
Protection of the Sea (Shipping Levy Collection Act) Act 1981
Protection of the Sea (Shipping Levy) Act 1981
Public Order (Protection of Persons and Property) Act 1971
Public Works Committee Act 1969
Quarantine (Validation of Fees) Act 1985
Quarantine Act 1908
Quarantine Amendment (Health) Act 2003
Queensland Flood Relief Act 1974
Queensland Grant (Prosperpine Flood Migration) Act 1976
Queensland Grant (Special Assistance) Act 1980
Queensland Grant (Special Assistance) Act 1981
Radio Licence Fees Act 1964
Radiocommunications (Receiver Licence Tax) Act 1983
Radiocommunications (Spectrum Licence Tax) Act 1997
Radiocommunications (Transitional Provisions and Consequential Amendments) Act 1992
Radiocommunications (Transmitter Licence Tax) Act 1983
Radiocommunications Act 1992
Radiocommunications Taxes Collections Act 1983
Railway Agreement (Western Australia) Act 1961
Railways Standardization (New South Wales and Victoria) Agreement Act 1958
Regional Forest Agreements Act 2002
Renewable Energy (Electricity) (Charge) Act 2000
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Retirement Assistance for Farmers Scheme Extension Act 2000
Road Transport Charges (Australian Capital Territory) Act 1993
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Road Transport Reform (Vehicles and Traffic) Act 1993
Roads to Recovery Act 2000
Royal Australian Air Force Veterans' Residences Act 1953
Rural Adjustment Act 1992
Schools Assistance (Learning Together - Achievement through Choice and Opportunity) Act 2004
Sea Installations Act 1987
Seas and Submerged Lands Act 1973
Security Treaty (Australia, New Zealand and The United States of America) Act 1952
Sewerage Agreements Act 1973
Sewerage Agreements Act 1974
Shipping Registration Act 1981
Ships (Capital Grants) Act 1987
Snowy-Hydro Corporatisation (Consequential Amendments) Act 1997
Snowy Hydro Corporatisation Act 1997
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Snowy Mountains Engineering Corporation Limited Sale Act 1993
Softwood Forestry Agreements Act 1967

Softwood Forestry Agreements Act 1972
Softwood Forestry Agreements Act 1976
Softwood Forestry Agreements Act 1978
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Space Activities Act 1998
Spirits Act 1906
State Grant (Special Assistance to South Australia) Act 1960
States (Works and Housing) Assistance Act 1982
States (Works and Housing) Assistance Act 1983
States (Works and Housing) Assistance Act 1984
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States and Northern Territory Grants (Rural Adjustment) Act 1979
States and Northern Territory Grants (Rural Adjustment) Act 1985
States Grants (Advanced Education) Act 1976
States Grants (Beef Industry) Act 1975
States Grants (Home Care) Act 1969
States Grants (Housing) Act 1971
States Grants (Paramedical Services) Act 1969
States Grants (Primary and Seoncdary Education Assistance) Act 2000
States Grants (Rural Adjustment) Act 1976
States Grants (Rural Adjustment) Act 1988
States Grants (Rural Reconstruction) Act 1971
States Grants (Rural Reconstruction) Act 1973
States Grants (Science Laboratories) Act 1971
States Grants (Technical Training Fees Re-Imbursement) Act 1974
States Grants (War Service Land Settlement) Act 1952
States Grants (Water Resources Measurement) Act 1970
Statutory Fishing Rights Charge Act 1991
Stevedoring Industry Levy Collection Act 1977
Stevedoring Levy (Collection) Act 1998
Stevedoring Levy (Imposition) Act 1998
Submarine Cables and Pipelines Protection Act 1963
Supported Acommodation Assistance Act 1985
Supported Acommodation Assistance Act 1989
Supported Acommodation Assistance Act 1994
Surveillance Devices Act 2004
Sydney Airport Curfew Act 1995
Sydney Airport Demand Management Act 1997
Sydney Harbour Federation Trust Act 2001
Tasmania Agreement (Hydro-Electric Power Development) Act 1968
Tasmania Agreement (Launceston Prescision Tool Annexe) Act 1980
Tasmanian Native Forestry Agreement Act 1979
Tasmanian Native Forestry Agreement Act 1980
Taxation (Interest on Non-Resident Trust Distribution) Act 1990
Taxation Laws Amendment (Landcare and Water Facility Tax Offset) Act 1998
Telecommunications (Interception) Act 1979
Telecommunications (Interception) and Listening Device Amendment Act 1997
Telecommunications (Transitional Provisions and Consequential Amendments) Act 1997
Telecommunications Act 1997
Telecommunications Legislation Amendment Act 1997
Television Broadcasting Services (Digital Conversion) Act 1998
Television Licence Fees Act 1964
Timor Gap Treaty (Transitional Arrangements) Act 2000
Tobacco Advertising Prohibition Act 1992
Tobacco Charge Act (No. 1) 1955
Tobacco Charge Act (No. 2) 1955
Tobacco Charge Act (No. 3) 1955
Torres Strait Fisheries Act 1984
Trade Practices Act 1974
Transport Safety Investigation Act 2003
United States Naval Communications Station (Civilian Employees) Act 1968
United States Naval Communications Station (Civilian Employees) Act 1988

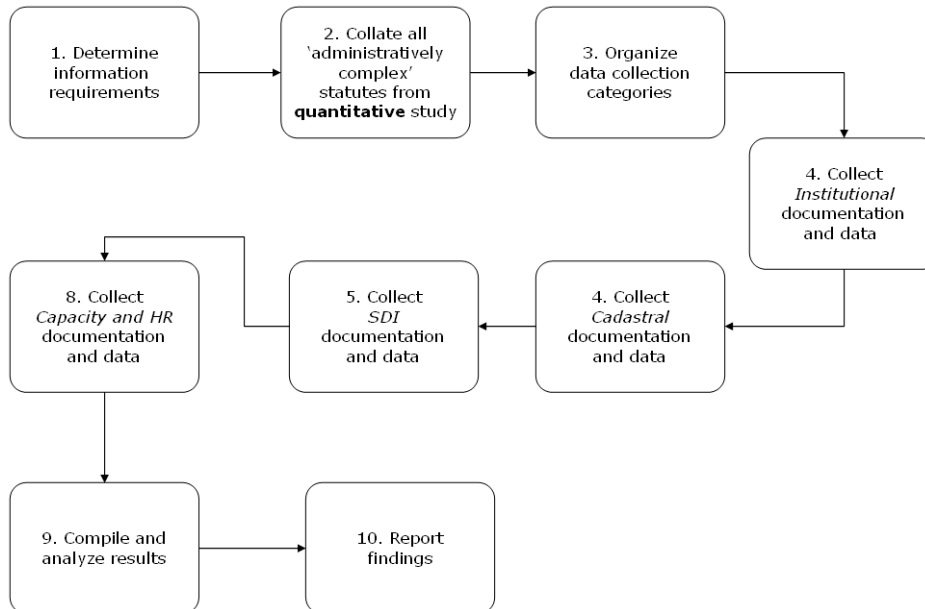
United States Naval Communications Station Agreement 1963
United States Naval Communications Station Agreement 1975
Urban and Regional Development (Financial Assistance) Act 1974
Weapons of Mass Destructions (Prevention of Proliferation) Act 1994
Western Australia (Northern Development) Agreement Act 1963
Western Australia (South-West Region Water Supplies) Agreement Act 1965
Western Australia (Agreement Ord River Irrigation) Act 1968
Western Australia (Agreement Ord River Irrigation) Act 1980
Western Australia Grant (Northern Development) Act 1958
Wet Tropics of Queensland World Heritage Area Conservation Act 1994
Telecommunications (Carrier Licence Charges) Act 1997
Telecommunications (Carrier Licence Charges) Amendment Act 1997
Telecommunications (Consumer Protection and Service Standards) Act 1999

STATE – VICTORIAN GOVERNMENT

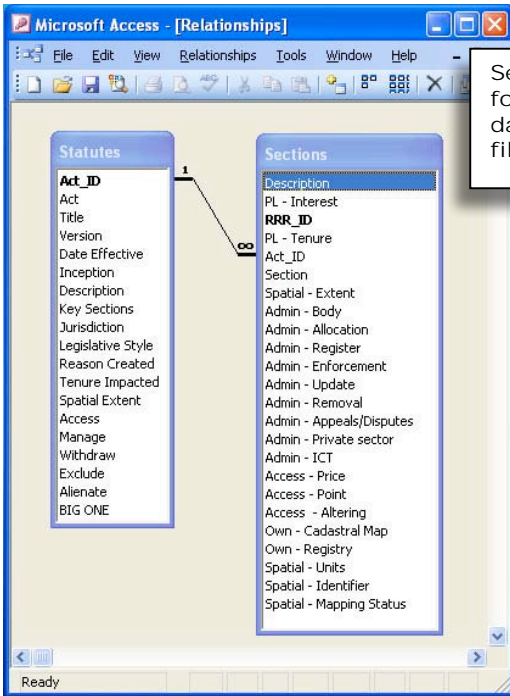
QUANTITATIVE STUDY FLOWCHART



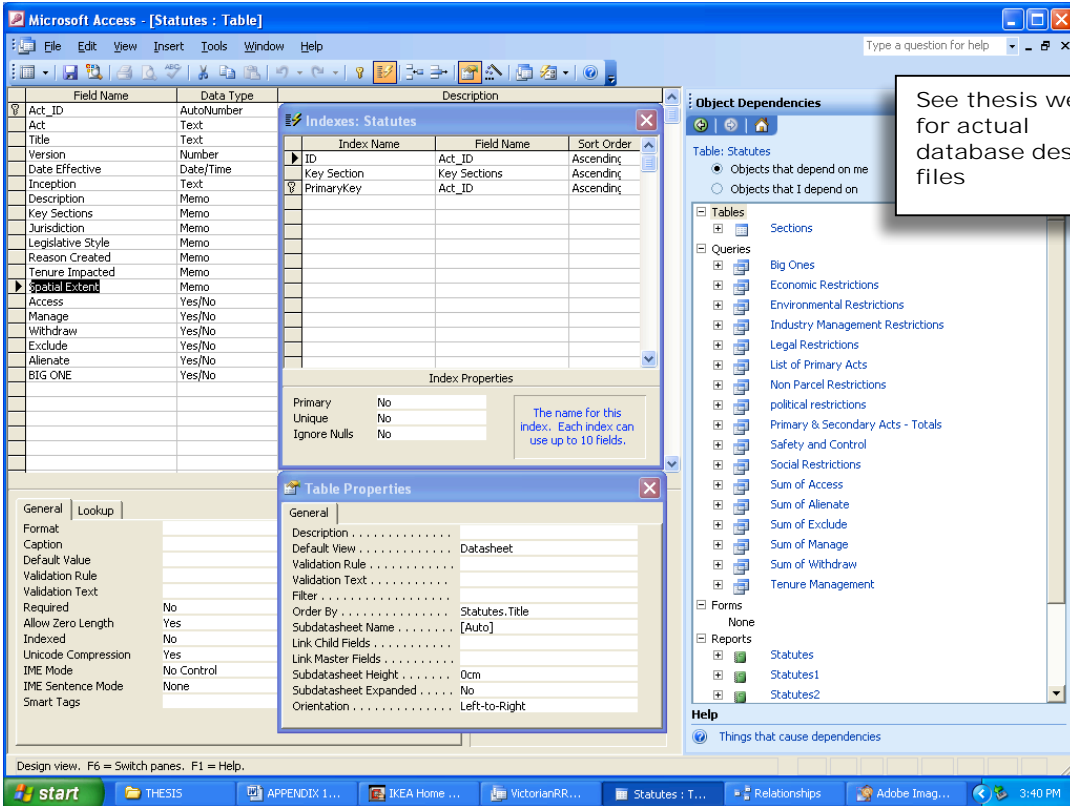
QUALITATIVE STUDY FLOWCHART



DATABASE DESIGN



See this website for actual database design files



See thesis website for actual database design files

DATA COLLECTED

Title	Act	Version	Date Effective	Inception	Description
Administration and Probate Act 1958	6191/1958	101	26/04/2005	1900 (Prior)	Consolidates the Law relating to the Administration of Wills.
Agricultural and Veterinary Chemicals (Control of Use) Act 1992	46/1992	35	1/07/2005	1992	Impose controls in relation to the manufacture use, application and stock foods. Protect against financial loss and contaminat
Description					
Management: Contamination - Notice of limited use can be applied by gov, records must	Management	Private	50-51	Patchwork (sml)	Chemical St
Management: Spraying - A person must not use an unregistered chemical product unles	Management	Private	6	Blanket	Chemical St
Management: A person must not manufacture, sell or use agricultural chemicals without	Management	Private	24-32	Patchwork (sml)	Chemical St
Management: Spraying - ACCA, Agricultural Chemical Control Area, Gov can order spray	Management	Private	38-39	Non Parcel	Chemical St
Management: Spraying - Must ensure spray does not drift	Management	Private	40-41	Blanket	
Management: Spraying - Pilots must have licence to spray and must keep records	Management	Private	42-43	Blanket	
Management: Contamination - contaminated stock order -Gov may regulate the identifica	Management	Private	48-49	Patchwork	
Management: Contamination - contaminated produce notice - An authorised officer may,	Management	Private	52	Patchwork	
Access: General - authoised offices may enter property and test lands and produce	Access	Private	53-67	Blanket	
Agricultural and Veterinary Chemicals (Victoria) Act 1994	73/1992	21	5/04/2005	1994	Applies laws of the Commonwealth relating to Agricultural and Veterinary Chemicals in Victoria.
Alpine Resorts (Management) Act 1997	89/1987	32	25/01/2001	1997	Creates Alpine Council and Management for each resort. Enab electricity generation.
Alpine Resorts Act 1983	9974/1983	21	5/04/2005	1983	Establishes Alpine Resorts Commission. Enabled the conversi Alpine Resorts which the commission then manages.
Archaeological and Aboriginal Relics Preservation Act 1972	8273/1972	51	5/04/2005	1972	Sets up Committee/Registry for Relics Protection. Powers for (tenure, Aboriginal Affairs Victoria
Description					
Access: inspector can enter	Access	All	12	Patchwork (lrg)	Aboriginal Af
Management: declare areas	Management	All	15	Patchwork (lrg)	Aboriginal Af
Management: declare temp areas	Management	All	16	Patchwork (lrg)	Aboriginal Af
Exclude: crown removes access to area	Exclude	All	17	Patchwork (lrg)	Aboriginal Af
Alienate: crown can acquire	Alienate	All	18	Patchwork (lrg)	Aboriginal Af
Withdraw: crown acquires relics	Withdraw	All	20	Patchwork (lrg)	Aboriginal Af
Management: limit on excavation	Management	All	22	Patchwork (lrg)	Aboriginal Af
Alienate: crown purchase land for relics	Alienate	All	26	Patchwork (lrg)	Aboriginal Af

See thesis website for actual database files

LIST OF STATUTES

Administration and Probate Act 1958
Agricultural and Veterinary Chemicals (Control of Use) Act 1992
Agricultural and Veterinary Chemicals (Victoria) Act 1994
Alpine Resorts (Management) Act 1997
Alpine Resorts Act 1983
Archaeological and Aboriginal Relics Preservation Act 1972
Biological Control Act 1986
Building Act 1993
Catchment and Land Protection Act 1994
Cemeteries and Crematoria Act 2003
Coastal Management Act 1995
Conservation, Forests and Lands Act 1987
Constitutional Powers (Coastal Waters) Act 1980
Control of Genetically Modified Crops Act 2004
Co-operative Housing Societies Act 1958
Co-operatives Act 1996
Crown Land (Reserves) Act 1978
Cultural and Recreational Lands Act 1963
Domestic (Feral and Nuisance) Animals Act 1994
Domestic Building Contracts Act 1995
Electricity Safety Act 1998
Environmental Effects Act 1978
Environmental Protection Act 1970
Extractive Industries Development Act 1995
Farm Water Supplies Advances Act 1944

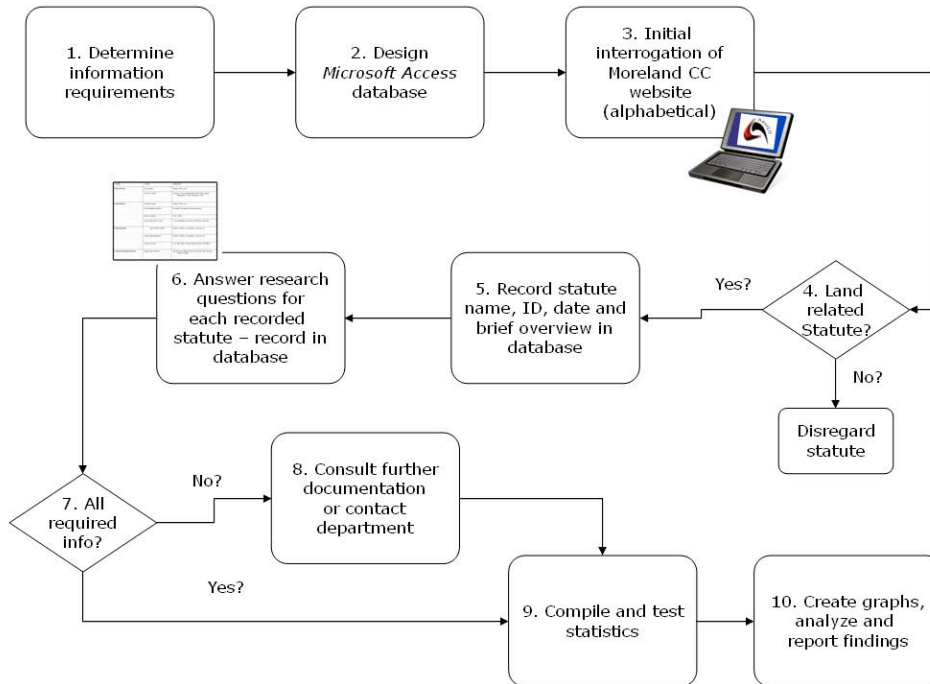
Farm Water Supplies and Drainage Advances Act 1946
Fences Act 1968
Fisheries Act 1995
Flora and Fauna Guarantee Act 1988
Forestry Rights Act 1996
Forests Act 1958
Gambling Regulation Act 2003
Gas and Fuel Corporation (Heatane Gas) Act 1993
Gas Industry (Residual Provisions) Act 1994
Gas Industry Act 2001
Gas Pipelines Access (Victoria) Act 1998
Gas Safety Act 1997
Gene Technology Act 2001
Geographic Place Names Act 1998
Geothermal Energy Resources Act 2005
Grain Handling and Storage Act 1995
Groundwater (Border Agreement) Act 1985
Health (Fluoridation) Act 1973
Heritage Act 1995
Heritage Rivers Act 1992
House Contracts Guarantee Act 1987
Housing Act 1983
Instruments Act 1958
Land (Surf Life Saving Association) Act 1967
Land Acquisition and Compensation Act 1986
Land Act 1958
Land Tax Act 1958
Land Titles Validation Act 1994
Landlord and Tenant Act 1958
Lands (Charitable Trusts) Act 1951
Lands (Charitable Trusts) Act 1952
Libraries Act 1988
Liquor Control Reform Act 1998
Livestock Disease Control Act 1994
Local Government Act 1989
Major Events (Crowd Management) Act 2003
Marine Act 1988
Mineral Resources and Development Act 1990
Mines Act 1958
Murray-Darling Basin Act 1993
National Electricity (Victoria) Act 2005
National Environment Protection Council (Victoria) Act 1995
National Parks Act 1975
Nuclear Activities (Prohibitions) Act 1983
Nudity (Prescribed Areas) Act 1983
Petroleum (Submerged Lands) Act 1982
Petroleum Act 1998
Petroleum Products Subsidy Act 1965
Petroleum Retail Selling Sites Act 1981
Pipelines Act 1967
Planning and Environment (Planning Schemes) Act 1996
Planning and Environment Act 1987
Plant Health and Plant Products Act 1995
Pollution of Waters by Oil and Noxious Substances Act 1986
Port Services Act 1995
Project Development and Construction Management Act 1994
Property Law Act 1958
Prostitution Control Act 1994
Racing Act 1958
Radiation Act 2005
Rail Corporations Act 1996
Rain-Making Control Act 1967
Reconstructed Companies Act 1893

Reference Areas Act 1978
Religious Successory and Charitable Trusts Act 1958
Residential Tenancies Act 1997
Retail Leases Act 2003
Retirement Villages Act 1986
Road Management Act 2004
Road Safety Act 1986
Road Transport (Dangerous Goods) Act 1995
Rural Finance Act 1988
Safety on Public Land Act 2004
Sale of Land Act 1962
Settled Land Act 1958
Shop Trading Reform Act 1996
Subdivision Act 1988
Surveillance Devices Act 1999
Surveying Act 2004
Sustainable Forests (Timber) Act 2004
Tobacco Act 1987
Transfer of Land Act 1958
Trustee Act 1958
Trustee Companies Act 1984
Unlawful Assemblies and Processions Act 1958
Victorian Civil and Administrative Tribunal Act 1998
Victorian Plantations Corporations Act 1993
Victorian Urban Development Authority Act 2003
War Veteran's Homes Trust Act 1958
Warehousemen's Liens Act 1958
Water Act 1989
Water Efficiency Labelling and Standards Act 2005
Water Industry Act 1994
Wildlife Act 1975
Zoological Parks and Gardens Act 1995

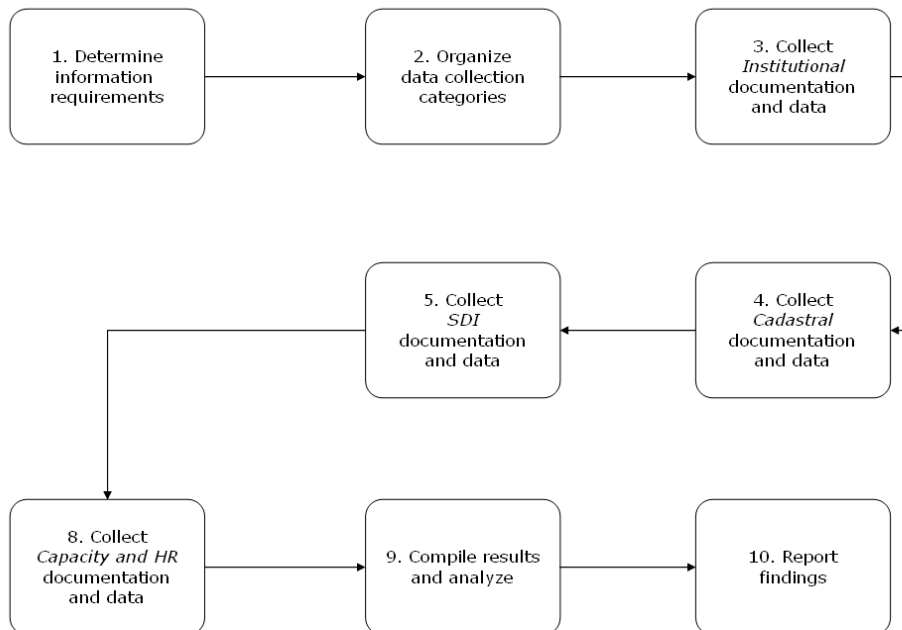
Note: the list only includes the 120 quantitatively and qualitatively analyzed. The remaining 500 were not digitally recorded. Photocopies are available from the author.

LOCAL – MORELAND CITY COUNCIL

QUANTITATIVE STUDY FLOWCHART



QUALITATIVE STUDY FLOWCHART



DATABASE DESIGN

Microsoft Access - [Moreland RRRs : Table]

Field Name	Data Type
ID	AutoNumber
Act Name	Text
Jurisdiction	Text
Objective	Text
Activity	Text
Spatial	Text
Duration	Text
People +	Text
People -	Text
Description	Memo
Importance	Text

Index Name	Field Name	Sort Order
Primary Key	ID	Ascending

Index Properties

Primary: Yes
 Unique: Yes
 Ignore Nulls: No

The name for this index. Each index can use up to 10 fields.

Field Properties

General | Lookup

Field Size: Long Integer
 New Values: Increment
 Format: [blank]
 Caption: [blank]
 Indexed: Yes (No Duplicates)
 Smart Tags: [blank]

Table Properties

General

Description: [blank]
 Default View: Datasheet
 Validation Rule: [blank]
 Validation Text: [blank]
 Filter: [blank]
 Order By: [blank]
 Subdatasheet Name: [Auto]
 Link Child Fields: [blank]
 Link Master Fields: [blank]
 Subdatasheet Height: 0cm
 Subdatasheet Expanded: No
 Orientation: Left-to-Rig

Object Dependencies

Table: Moreland RRRs

- Objects that depend on this object: [blank]
- Objects that this object depends on: [blank]

Tables: Moreland RRRs

- Category 1 RRRs
- Category 2 RRRs

Queries: [blank]

Forms: None

Reports: None

Help: Things that cause dependencies

F6 = Switch panes. F1 = Help.

Microsoft Access - [Relationships]

Moreland ...

- ID
- Act Name
- Jurisdiction
- Objective
- Activity
- Spatial
- Duration
- People +
- People -
- Description

Moreland Sections

- Section ID
- Section
- Description
- Objective
- Interest
- Spatial
- Duration
- People +
- People -
- ID

Relationship: 1 to ∞

Ready

DATA COLLECTED

See this website for actual database files

Act Name	Jurisdiction	Objective	Activity	Spatial			
+ Animals Local Legislation	Local	Order	Manage	Blanket /Parcel			
+ Private Land Local Legislation	Local	Environment /Order	Manage	Blanket / Parcel			
+ Public Places Local Legislation	Local	Order	Manage	Blanket / Polygon /Point			
+ Specified Parking Infringements Local Legislation	Local	Economic / Order	Withdraw / Manage	Patchwork			
+ Litter Act 1987	State	Environment	Manage	Blanket			
- Domestic (Feral and Nuisance) Animals Act 1994	State	Order	Manage	Patchwork/ Blanket			
Section	Description	Objective	Interest	Spatial	Duration	People +	People -
24	Dogs must not be at large	Safety/Order	Manage	Blanket	Indefinite	Public	Private
25	Cats must not be at large	Safety/Order	Manage	Blanket	Indefinite	Public	Private
10	Dogs and cats over the age of 6 months to be registered	Safety/Order	Manage	Parcel	Ad hoc	Public	Private
26	Means of restraint can be specified in public area	Safety/Order	Manage	Blanket	Indefinite	Public	Private
28	No setting dogs on others	Safety/Order	Manage	Blanket	Indefinite	Public	Private
29	Owners guilty if dogs attack	Safety/Order	Manage	Blanket	Indefinit	Public	Private
*							
+ Road Safety Act 1986 / Road Rules Vic 1999, 2000	State	Order	Manage	Blanket / Patchwork			Indefinite
+ Local Government Act 1989	State	Order	Manage	Blanket			Indefinite
+ Planning and Environment Act 1987	State/Loc	Environment / Social/ Order	Manage	Patchwork			Set Period / Pr
+ Planning and Environment (Planning Schemes) Act	State/Loc	Environment / Social / Order	Manage	Patchwork			Indefinite
- Moreland Planning Scheme	Local/Sta	Environment / Social / Order	Manage	Patchwork/Blanket/Polygon/Specific			Set Period / Pr
Section	Description	Objective	Interest	Spatial	Duration	People +	People -
12	Statewide policy for metro development- guides compactness, growth, region	Environment / Manage		Blanket	Indefinite	Public	All
14	Statewide policy for settlement- ensures a sufficient supply of land is availabl	Social / Environ	Alienate	Blanket	Indefinite	Public	All
15	Statewide policy for environment and heritage- assists the protection and, wh	Environment	Manage	Polygon	Indefinite	Public	All
16	Statewide policy for housing- rules for single dwellings, medium density, rura	Social / Environ	Manage	Patchwo	Indefinite	Public	All
17	Statewide policy for economic development- rules for activity centres, busine	Economic	Manage	Polygon/	Indefinite	Public	Private
18	Statewide policy for infrastructure- declared highway, railways, tramways, pu	Environment / Manage		Network	Indefinite	Private	All
19	Statewide policy for particular use and development- subdivision, gaming, de	Environment / Manage		Patchwo	Indefinite	Public	Private
22	Local policies for- discretionary use with residential areas (e.g. medical cent	Environment / Manage		Specific	Set period	Public	Private
32	Local residential zone 1 and mixed use zone - acceptable uses, permits and	Social / Econ	Manage	Patchwo	Indefinite	Public	Private
33	Local industrial zone 1 and 3 - acceptable uses, permits and prohibited uses	Economic / S	Manage	Patchwo	Indefinite	Public	Private
34	Local business zone 1, 2, 3, 4, 5 - acceptable uses, permits and prohibited u	Economic / S	Manage	Patchwo	Indefinite	Public	Private
36	Local public land zone - acceptable uses, permits and prohibited uses for rec	Environment / Manage		Patchwo	Indefinite	Public	Private
37	Local special purpose zone - acceptable uses, permits and prohibited uses f	Environment / Manage		Patchwo	Indefinite	Public	Private

LIST OF STATUTES

Animals Local Legislation
Private Land Local Legislation
Public Places Local Legislation
Specified Parking Infringements Local Legislation
Litter Act 1987
Domestic (Feral and Nuisance) Animals Act 1994
Road Safety Act 1986 / Road Rules Vic 1999, 2000
Local Government Act 1989
Planning and Environment Act 1987
Planning and Environment (Planning Schemes) Act 19
Moreland Planning Scheme

APPENDIX 2

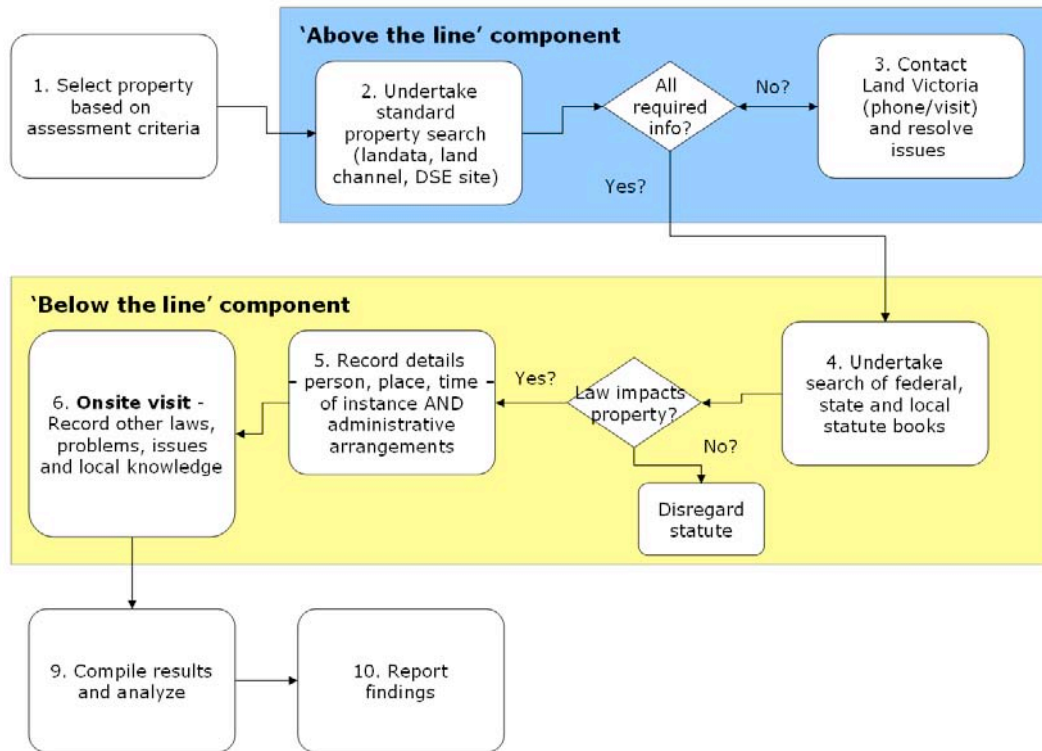
BOTTOM-UP STUDY DESIGN AND RESULTS

This thesis has an accompanying website. Visit the site to download and view the more imagery from the bottom-up studies:

http://www.geom.unimelb.edu.au/research/SDI_research/RRR/

148 ALBERT STREET, BRUNSWICK

STUDY FLOWCHART



LIST OF STATUTES

FEDERAL

Anti-Terrorism Act (No. 2) 2005
Anti-Terrorism Act 2004
Building Industry Act 1985
Census and Statistics Act 1905
Crimes Act 1914
Crimes Amendment (Forensic Procedures) Act 1998
Environment Protection and Biodiversity Conservation Act 1999
Explosives Act 1961
Income Tax Assessment Act 1997
Lands Acquisition Act 1989
Protection of Movable Cultural Heritage Act 1986
Radiocommunications Act 1992
Research Involving Human Embryos Act 2002
Spirits Act 1906
Surveillance Devices Act 2004
Telecommunications (Interception) Act 1979
Telecommunications (Interception) and Listening Device Amendment Act 1997

STATE

Administration and Probate Act 1958
Building Act 1993

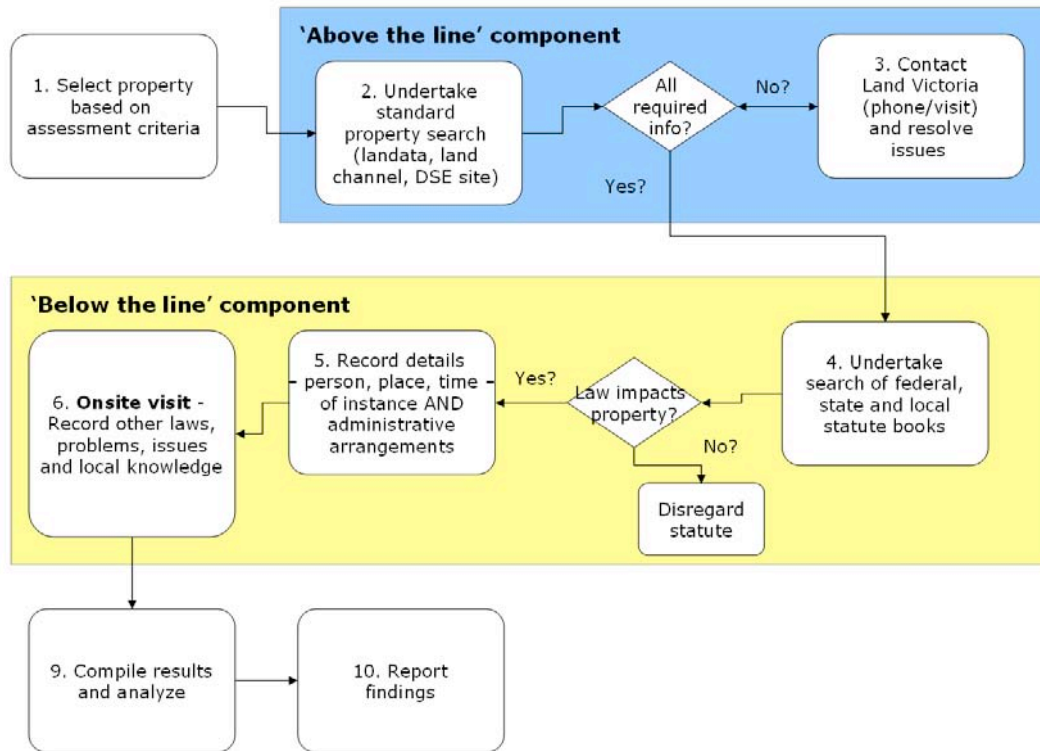
Domestic (Feral and Nuisance) Animals Act 1994
Electricity Safety Act 1998
Environmental Effects Act 1978
Environmental Protection Act 1970
Fences Act 1968
Flora and Fauna Guarantee Act 1988
Gambling Regulation Act 2003
Gas Safety Act 1997
Geographic Place Names Act 1998
Instruments Act 1958
Land Acquisition and Compensation Act 1986
Land Act 1958
Land Tax Act 1958
Landlord and Tenant Act 1958
Liquor Control Reform Act 1998
Planning and Environment (Planning Schemes) Act 1996
Planning and Environment Act 1987
Property Law Act 1958
Prostitution Control Act 1994
Road Management Act 2004
Sale of Land Act 1962
Subdivision Act 1988
Surveillance Devices Act 1999
Surveying Act 2004
Transfer of Land Act 1958
Water Act 1989

LOCAL – MORELAND CITY COUNCIL

Animals Local Legislation
Private Land Local Legislation
Public Places Local Legislation
Specified Parking Infringements Local Legislation
Litter Act 1987
Domestic (Feral and Nuisance) Animals Act 1994
Road Safety Act 1986 / Road Rules Vic 1999, 2000
Local Government Act 1989
Planning and Environment Act 1987
Planning and Environment (Planning Schemes) Act 19
Moreland Planning Scheme

5A KARA GROVE, ASPENDALE

STUDY FLOWCHART



LIST OF STATUTES

FEDERAL

Anti-Terrorism Act (No. 2) 2005
Anti-Terrorism Act 2004
Building Industry Act 1985
Census and Statistics Act 1905
Crimes Act 1914
Crimes Amendment (Forensic Procedures) Act 1998
Environment Protection and Biodiversity Conservation Act 1999
Explosives Act 1961
Income Tax Assessment Act 1997
Lands Acquisition Act 1989
Protection of Movable Cultural Heritage Act 1986
Radiocommunications Act 1992
Research Involving Human Embryos Act 2002
Spirits Act 1906
Surveillance Devices Act 2004
Telecommunications (Interception) Act 1979
Telecommunications (Interception) and Listening Device Amendment Act 1997

STATE (FROM THE 120 STUDIED)

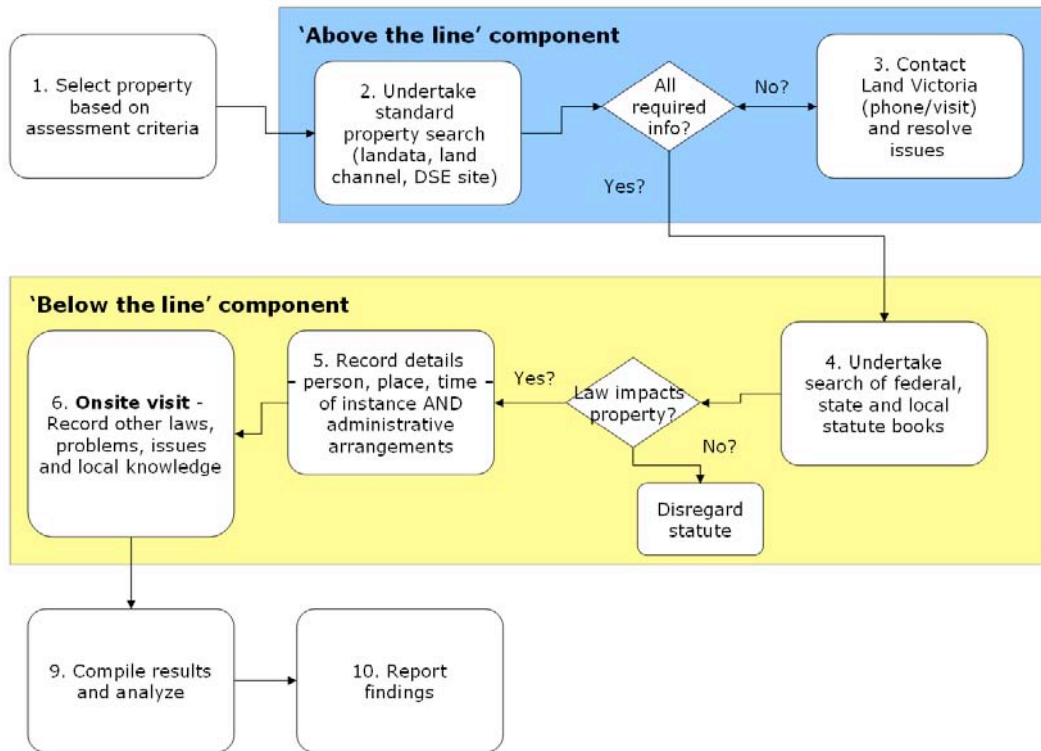
Administration and Probate Act 1958
Building Act 1993
Coastal Management Act 1995
Domestic (Feral and Nuisance) Animals Act 1994
Electricity Safety Act 1998
Environmental Effects Act 1978
Environmental Protection Act 1970
Fences Act 1968
Flora and Fauna Guarantee Act 1988
Gambling Regulation Act 2003
Gas Safety Act 1997
Geographic Place Names Act 1998
Instruments Act 1958
Land Acquisition and Compensation Act 1986
Land Act 1958
Land Tax Act 1958
Landlord and Tenant Act 1958
Liquor Control Reform Act 1998
Planning and Environment (Planning Schemes) Act 1996
Planning and Environment Act 1987
Property Law Act 1958
Prostitution Control Act 1994
Road Management Act 2004
Sale of Land Act 1962
Subdivision Act 1988
Surveillance Devices Act 1999
Surveying Act 2004
Transfer of Land Act 1958
Water Act 1989

LOCAL – KINGSTON CITY COUNCIL

Local Law #1: Public Health
Local Law #2: Roads & Traffic
Local Law #3: Management of Council Property
Local Law #4: Foreshore Reserves
Local Law #5: Environment & Amenities
Local Law #6: Birds, Animals, Poultry, Rodents & Bees
Kingston Planning Scheme

485 MORRISON ROAD, LABERTOUCHE

STUDY FLOWCHART



LIST OF STATUTES

FEDERAL

Agricultural and Veterinary Chemical Products (Collection of Levy) Act 1994
Agricultural and Veterinary Chemical (Administration) Act 1994
Agricultural and Veterinary Chemical Act 1994
Agricultural and Veterinary Chemical (Code) Act 1994
Agricultural and Veterinary Chemicals Legislation Amendment Act 2003
Anti-Terrorism Act (No. 2) 2005
Anti-Terrorism Act 2004
Building Industry Act 1985
Census and Statistics Act 1905
Crimes Act 1914
Crimes Amendment (Forensic Procedures) Act 1998
Crimes Amendment (Forensic Procedures) Act 2001
Dairy Adjustment Act 1974
Dairy Adjustment Levy (Customs) Act 2000
Dairy Adjustment Levy (Excise) Act 2000
Dairy Adjustment Levy (General) Act 2000
Diary Industry Adjustment Act 2000
Diary Industry Legislation Adjustment Act 2002
Dairy Industry Service Reform Act 2003
Dairy Produce Act 1986
Environment Protection and Biodiversity Conservation Act 1999
Explosives Act 1961

Income Tax Assessment Act 1997
Lands Acquisition Act 1989
Meat Inspection Act 1983
Meat Inspection Arrangements Act 1964
Protection of Movable Cultural Heritage Act 1986
Radiocommunications Act 1992
Research Involving Human Embryos Act 2002
Spirits Act 1906
Surveillance Devices Act 2004
Taxation Laws Amendment (Landcare and Water Facility Tax Offset) Act 1998
Telecommunications (Interception) Act 1979
Telecommunications (Interception) and Listening Device Amendment Act 1997

STATE (FROM THE 120 STUDIED)

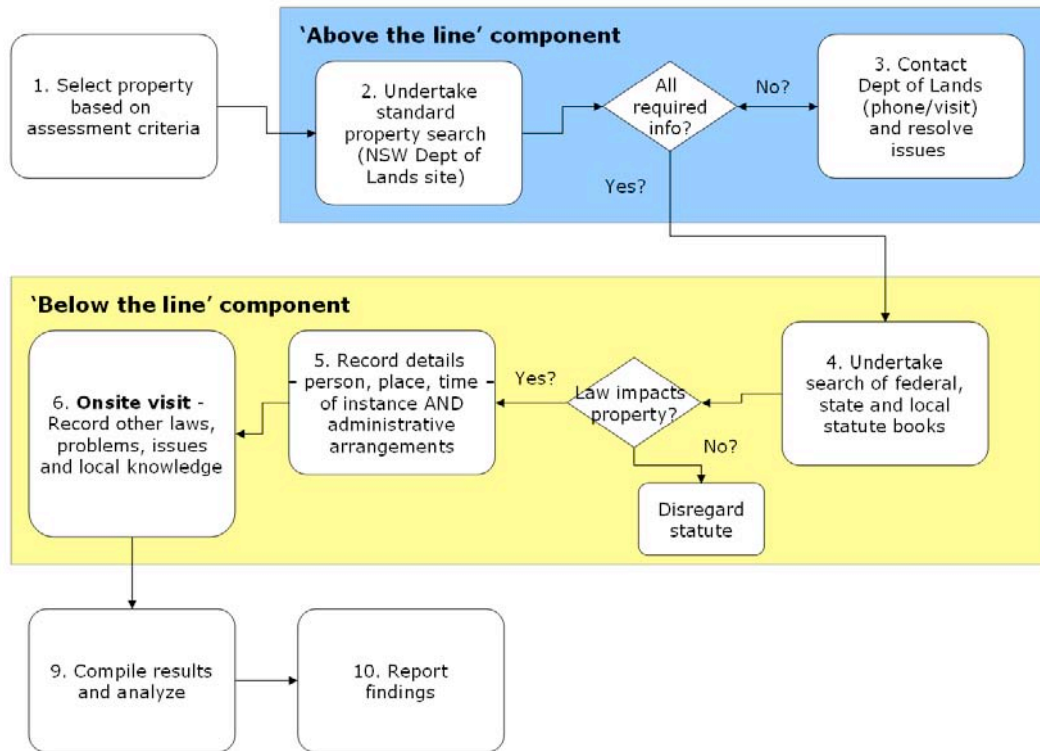
Livestock Disease Control Act 1994
Gambling Regulation Act 2003
Administration and Probate Act 1958
Agricultural and Veterinary Chemicals (Control of Use) Act 1992
Agricultural and Veterinary Chemicals (Victoria) Act 1994
Coastal Management Act 1995
Conservation, Forests and Lands Act 1987
Crown Land (Reserves) Act 1978
The Dairy Act 2000
Domestic (Feral and Nuisance) Animals Act 1994
Electricity Safety Act 1998
Environmental Effects Act 1978
Environmental Protection Act 1970
Fences Act 1968
Flora and Fauna Guarantee Act 1988
Gas Safety Act 1997
Geographic Place Names Act 1998
Instruments Act 1958
Land Acquisition and Compensation Act 1986
Land Act 1958
Land Tax Act 1958
Landlord and Tenant Act 1958
Liquor Control Reform Act 1998
Planning and Environment Act 1987
Planning and Environment (Planning Schemes) Act 1996
Property Law Act 1958
Prostitution Control Act 1994
Road Management Act 2004
Sale of Land Act 1962
Subdivision Act 1988
Surveillance Devices Act 1999
Surveying Act 2004
Transfer of Land Act 1958
Water Act 1989
Water Industry Act 1994
Wildlife Act 1975
Biological Control Act 1986
Building Act 1993

LOCAL – BAW BAW SHIRE COUNCIL

Community Local Law 1999
Baw Baw Planning Scheme

23 ACACIA AVENUE, WONBOYN

STUDY FLOWCHART



LIST OF STATUTES (that applied on the date of study)

FEDERAL

Anti-Terrorism Act (No. 2) 2005
Anti-Terrorism Act 2004
Building Industry Act 1985
Census and Statistics Act 1905
Crimes Act 1914
Crimes Amendment (Forensic Procedures) Act 1998
Crimes Amendment (Forensic Procedures) Act 2001
Environment Protection and Biodiversity Conservation Act 1999
Explosives Act 1961
Income Tax Assessment Act 1997
Lands Acquisition Act 1989
Meat Inspection Act 1983
Meat Inspection Arrangments Act 1964
Protection of Movable Cultural Heritage Act 1986
Radiocommunications Act 1992
Research Involving Human Embryos Act 2002
Spirits Act 1906
Surveillance Devices Act 2004
Telecommunications (Interception) Act 1979
Telecommunications (Interception) and Listening Device Amendment Act 1997

STATE (FROM THE 120 STUDIED) – NEW SOUTH WALES

Aboriginal Land Rights Act 1983
Access to Neighbouring Land Act 2000
Animals Act 1977
Application of Law (Coastal Sea) Act 1980
Biological Control Act 1985
Catchment Management Authorities Act 2003
Companion Animals Act 1998
Constitutional Powers (Coastal Waters) Act 1979
Conveyancing and Law of Property (Supplemental) Act 1901
Conveyancing and Law of Property Act 1898
Crown Lands (Continued Tenures) Act 1989
Crown Lands (Validation of Revocations) Act 1983
Crown Lands 1989
Dividing Fences Act 1991
Electricity (Consumer Safety) Act 2004
Electricity Safety Act 1945
Electricity Supply Act 1995
Encroachment of Buildings Act 1922
Environment Planning and Assessment Act 1979
Environment Planning and Assessment Amendment Act 2006
Exotic Diseases of Animals Act 1991
Fisheries Act 1935
Fisheries Management Act 1994
Fisheries Management Amendment Act 2006
Forestry Act 1916
Forestry and National Park Estate Act 1998
Forestry Revocation and Nature Conservation Act 1996
Geographical Names Act 1966
Heritage Act 1977
Holiday Parks (Long-term Casual Occupation) Act 2002
Home Building Act 1989
Home Building Amendment Act 2004
Home Building Legislation Amendment Act 2001
Inclosed Lands Protection Act 1901
Land Acquisition (Just Terms Compensation) Act 1991
Land Tax Act 1956
Land Tax Management Act 1956
Land Tax Management Amendment (Tax Threshold) Act 2006
Local Government (Areas) Act 1948
Local Government Act 1993
Local Government Amendment (Stormwater) Act 2005
Local Government and Environmental Planning and Assessment Amendment (Transfer of Functions) Act 2001
Local Government Areas Amalgamation Act 1980
Local Government Associations Incorporation Act 1974
Marine Pilotage Licensing Act 1971
Marine Pollution Act 1987
Marine Safety Act 1998
National Park Estate (Reservations) Act 2002 (Sch 5)
National Park Estate (Reservations) Act 2002 (Sch 5)
National Parks and Wildlife Act 1974
National Parks and Wildlife Amendment Act 2001
Native Title (New South Wales) Act 1994
Native Vegetation Act 2003
Navigation Act 1901
Protection of the Environment Administration Act 1991
Protection of the Environment Operations Act 1997
Protection of the Environment Operations Amendment Act 2005
Real Property Act 1900
Roads Act 1993
Rural Fires Act 1997
Stamp Duties Act 1920
State Water Corporation Act 2004

Surveying Act 2002
Threatened Species Conservation Act 1995
Threatened Species Legislation Amendment Act 2004
Valuation of Land Act 1916
Waste Avoidance and Resource Recovery Act 2001
Water Act 1912
Water Management Act 2000
Wilderness Act 1987

LOCAL

N/A
(Note: A wide range of strategic plans and policy documents guide decision making and spending in Bega Valley Council. Additionally, Wonboyn has an active Rate Payers Association which involves itself heavily in most decisions affecting public land, common areas and private property.

APPENDIX 3

PAPERS RESULTING FROM THIS RESEARCH

(In chronological order)

Bennett, R., Wallace, J., Williamson, I.P., (2007), A framework for mapping and managing land interests, *Survey Review*, ****in press****.

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