

REGISTRATION OF MARINE INTERESTS IN ASIA- PACIFIC REGION

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Abstract

The oldest and most enduring registration systems were developed to manage private property rights in land. Less developed systems are used to manage interests in personal property and resources. These systems formed the background for development of registration of some marine interests. Since then, the need for sustainable land management has pushed registration programs to service public policy purposes. Registration of marine interests, by contrast, remains underdeveloped. Marine systems are examined to identify their core components in compliance and regulation. A new model capable of providing better management of marine resources through an integrated spatial and text capacity is constructed.

Keywords: registration theory, land registration, marine interests

1 INTRODUCTION

The need for better spatial identification of marine interests, restrictions and responsibilities is accepted world wide. The problems inhibiting by our endeavours to improve these spatial capacities in very summary form include: formal and differentiated legal authorizations, imprecision of spatial identification, overlapping responsibilities and a leadership vacuum. These problems form the background to this analysis of how registration might assist in the construction of marine cadastres and management of marine resources. This paper explores the theory of registration, examines three examples of separated systems now operating in marine environment and designs a dual purpose and integrated approach to marine registration, with appropriate tenure and titling systems.

2 THEORY OF REGISTRATION

2.1 Marine Cadastre Context

Designing a marine cadastre raises definition and function issues: Robertson and others [1] said that it is boundaries of maritime rights and interests. This focus is now recognized as inappropriate (even in case of land), and a more functional system is preferred to deliver to clear information about restrictions and responsibilities. Better enforcement of restrictions and responsibilities is also a deliverable demanded of any cadastre. Nichols and others [2] included “responsibilities” within the interests and property rights, and started with the concept of a marine information system. This broader definition is closer to the goal.

The working vision now is an even broader concept: “delineating, managing, administering legally definable offshore boundaries, managing the wide range of interests, identifying organisations and agencies involved, and including fisheries and aquaculture leases, etc, defining cables and pipelines, and overlaying petroleum and gas exploration opportunities and mining processes.” [3] Using this broad concept of a cadastre as a starting point, the key phrase for consideration of the place of registration is “managing the wide range of interests”. Registration at this basic level involves *naming*, that is authoritatively identifying something of significance in the cadastre so that all players recognise it. But registers can do much more than just this, and the high cost of their construction alone warrants getting as much benefit for the effort as possible.

2.2 Types of registration systems

Registers create order out of disorder in access to and allocation of resources and opportunities for creation of wealth. Registers exist for all kinds of property and resource interests. Some registers do not have a spatial component: shares in listed (large scale listings) and even unlisted (small scale and self managed systems) companies are the most familiar example. Another is the register of personal property securities used in New Zealand and other major jurisdictions in the world: personal property includes paintings, furniture and other tangibles and also property with no physical existence; for example, stock mortgages, debts and liens where a third party has otherwise no reliable means of discovering the existence of the security interest.¹ Countries without this kind of a register depend on separate listings for each kind of personal property with immense adverse implications for third parties and enforcement of securities. The parallel with marine management is obvious. Some other familiar registers have a spatial component but are not resources: cars are the best example. Even with land, registers do not record all enforceable allocations: rights of occupancy in buildings owned through company share schemes and residential leases are common examples.

¹ In Australia personal property securities reform is long overdue. The legislative framework is out of date, complex, inconsistent and incapable of providing protection for third parties. Legislation includes state legislation including Bills of Sale and Hire Purchase Acts, Warehouseman's Liens Acts, Wool Stock and Crop Liens Acts, Chattel Securities Acts and commonwealth legislation: Corporations Act 2001, Life Insurance Act 1995, Patents Act 1990, Trademarks Act 1995, Shipping Registration Act 1982 and Air Navigation Act 1902. From the legal perspective, the legal, administrative and regulatory environment for personal property securities demonstrates problems and difficulties very similar to those thrown up in the marine environment, where an estimated 600 acts impact on activities.

Among all our various registries, land registries are the most developed and the most significant socially and economically.[4] This is not to say that land collectively has more economic worth than, say, all the shares in the stock exchange listings. Merely that without stable land allocations, nothing else of social or economic value is sustainable. Land is simply where everything else happens, and access to land must be highly organised and predictable.

2.2.2 Two basic components

Normally, a land register has two components: text defining the interests and diagrams or, in advanced systems, cadastres, defining spatial identity. Together the text and map or, in developed systems, the cadastre facilitate answering of the five questions of who, what, where, when and why (policy information) about opportunities related to particular land. Modern land cadastres supporting registration are highly sophisticated, and expensive to design, build and manage. Looked at as a whole, they display three-dimensional boundaries: height, width, depth, plus (when we add the text) a fourth dimension of time (how long the interest lasts for).

Technical issues in spatial dimensions of registers are not discussed here: the assumption is that entries in any register will receive spatial definition according to appropriate national practices and standards. The convenience of maps is normally recognised very early in the process of regularization of land use and development of registers. The capacity to support spatial land identification historically follows text or descriptive capacity. For developing countries lacking technical competence, mapping and survey systems are initially unreliable, but they are improved as technical, human and institutional capacities grow. For property that

not spatially identified, such as shares, a text description provides sufficient utility for a robust register. If the resource is economically significant, such as off-shore gas and petroleum, even the poorest nation will use a register with reasonably developed spatial capacity.

2.2.3 *Basic types of registers relating to land*

All registration systems relating to land are different. They reflect their country's history, needs, literacy and professional skill levels, administrative arrangements, governance and development of markets. The local nature of these registries is apparent in the UN-ECE analysis of registration systems.[5] In the most simple analysis, land registration systems used in developed countries to manage private land can be viewed as belonging to one of three major categories.

a) **Register of land:** the title to the land is registered and transactions recorded on the titles.

The most famous example is the Torrens system, varieties of which are used in Australia, Canada, New Zealand, with similar systems in Malaysia, Thailand, England under the *Land Registration Act 2002*, Israel, and some states of the USA. The verb “register” is commonly used in this context. The most accessible version of the Torrens system was provided by Theo Ruoff [6] and his three principles: *mirror* (title mirrors all relevant interests in the land), *curtain* (the title creates a barrier or curtain ensuring that interests off the register need not be searched), and *insurance* (the state guarantees registered interests).

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- b) **Register of deeds or transactions:** each instrument is registered and taken together, the transactions evidenced in the deeds represent the title. The language of “record” is commonly used in this context because the deeds or copies of them are recorded in depositories.
- c) **Register of deeds backed up with private title insurance:** the predominant method used in USA.
- d) **Register of government land and assets:** registry practices often separate crown and government assets from privately owned land. Only in western European countries with a long history of an integrated cadastre is the treatment of these two asset types tightly merged. This best practice model is found in Germany, Switzerland, Denmark and The Netherlands. Australian jurisdictions vary; in case of government and public land, the register (combined with private land or stand alone) records leases, licences and access rights.

Land registration is not a static concept. As with most activities in land administration registration changed in response to new management styles, devolution of government activities to the private sector and available technologies. Most land registration systems are now hybrid and not pure examples of a particular type. For purposes of the marine environment, there is no need to technically differentiate between registers that *register* or *create* title or ownership (a Torrens type system), and registers that merely *record* the administrative grant that is the source of title or ownership (a deeds type system). Nor is there necessarily a compelling reason to treat all interests in the marine environment register in the same single inflexible way. Registers, these days, are capable of mix-and-match.

e) **Service Registries:** land registration analysis is evolving a new model utilizing expensive digitized text and spatial data to satisfy emerging needs for public, reliable and accessible information about land especially to assist policy makers to deliver sustainable development. This new model offers a great deal of utility and serviceability and views registration as only one of a number of core functions in a land administration system (LAS). The emerging model is therefore highly relevant to the marine environment. Sources of the model include the historically integrated and multi-purpose cadastres in Europe. These reflected in the trend in Australian Torrens systems to provide new recording fields differentiating “below the line” from “above the line” land information that determines ownership and attracts government guarantee. Below the line information could, conceivably, include any information about the land thought to be significant from the point of view of government, or the land buying and selling public.²

In addition to determining titles, service registries will deliver information in broad classifications of -

- responsibilities and restrictions relating to a parcel, and
- information needed by government, business and the public.

² There are exceptions where governments have narrowed the registry functions to service private ownership, co-relatively built up capacity in other LAS data systems and relied on information communications technologies to create links to apparently seamless access.

2.3.4 *Resource registers*

Design of resource registers tends to be much more prosaic and singular. The types of registers vary greatly; each was developed on an ad hoc basis in response to immediate needs and perceived future needs related to a particular resource. The systems typically develop where resources are valuable, rivalrous in supply and require state enforced allocation. A secondary driver is the need to create marketable rights or titles to the resource in addition to systematizing physical access to yields.

The intention of the Council of Australian Governments in 1994 to use the private market as the allocation mechanism of the country's most precious resource, water, excited review of resource titling systems and their supportive registers by Land and Water Australia. The result was a conceptual framework of resource registers identifying a trend to use the land register as a primary model, moving away from it when the titles are not market commodities or used to secure loans. **Table 1** below, is an example of an holistic analysis of resource titling in the context of developing marketable water titles.

INSERT TABLE 1

One element missing from this grid is registers of mining, gas and petroleum interests. Possibly the variety of approaches among Australian jurisdictions in off-shore and on-shore mining and exploration did not permit useful generalizations capable of informing development of a new titling and registry proposal for water. In the context of developing a theory relating to registers of marine interests, no country can afford to ignore its existing practice in handling off-shore mining and petroleum: these activities are likely to be the subject of the most

comprehensive administrative management and recording systems in the marine environment. When mining is added to the grid, the marine registries can be said to perform functions distinct from those performed by existing land registries, in that they are predominantly designed to assist regulation of activity related to a resource rather than to manage transactions.

2.4 Function of registries

2.4.1 Relationship with property regimes

The most useful analysis of registries sees them as servicing the need of governments to design, build and manage property regimes for allocation of scarce resources. Allocation is structured through using at least one of four possible property regimes:

- a) Open Access
- b) Private Property
- c) Common Property
- d) Public Property.

Registers are being extended well beyond service of land markets to protect other kinds of property including non-marketable interests. The contribution of common or communal property to food security in transitional economies and respect for minority cultures, especially of local indigenous people, create pressure on land policy makers to incorporate this land into the land cadastre, into a specialized registers (for example the Native Title Tribunal register in Australia) or, in some cases, in the standard land register.

2.4.2 *Land and resource management for markets*

Registries and their supporting spatial components, particularly well built cadastres, are necessary infrastructure for effective private property regimes.[7] Essential functions performed by registers -

- a) Separation
- b) Layering
- c) Administration
- d) Informed policy making

are shown in **Figure 1, Private Property Regime Management Functions** below.

INSERT FIGURE 1

Separation identifies the particular single interest and typically differentiates one resource opportunity from another, so each can be visualised. Separation may even establish recognition patterns that tie diverse interests together: so that the right to take water from a stream might be inexorably tied with ownership of land abutting the stream.

Layering is more sophisticated and involves two different but interrelated capacities. The first involves intensive management of interests in one resource, be it land, minerals, gas or fish. It involves comprehensive specification of all like interests in one resource (for example, mining law can allow personal prospecting within mining titles so long as activities are limited by use of hand held tools). The second is much more sophisticated and is used extensively in developed systems. This second capacity allows interests in different resources to co-exist in

one spatial area; for example, rights to fish and opportunities to explore for gas deposits. It requires identification of each opportunity in a relative relationship with the whole to both facilitate overlapping activities and minimise interference and disputes. Layering therefore permits simultaneous recognition of opportunity sets within the same space, and can apply in one particular resource and among different resources in the same area.

This capacity for layering involves thought being given to how the various potentially competing activities (gold mining, native title activities, dairy farming, water damming, glider flying, wild life preserving and so on) can all be simultaneously serviced and balanced in the same area at the same time. Those countries capable of delivering this capacity in relation to land have achieved far more than mere “passporting or identifying of private titles” that de Soto [8] associates with the success of capitalism. In fact, layering, rather than merely identifying, is the more important wealth accelerator of capitalism, though obviously it presupposes a highly organised LAS, including registration.[9]

Administration is the national function of ensuring that the allocations are carefully made, including using tenures and rights intelligently and establishing supporting registers. When well done, administration assists apparently seamless and frictionless access to land and resources.

Policy making is a constant for any nation dealing with resources. The major contribution of a registration system is the information it delivers to the door of the policy maker. A well designed register enhances capacity for regular and effective policy review. In the resource

sector, registers need to track work activities, quantities and types of products taken, means of taking, and, of course, performance of the resource taker against standards set for the industry. Compliance and enforcement capacities are directly commensurate with the level of information about a particular activity. Hence the register should record information from sources beyond the licence holder or interest owner.

2.4.3 Public or private register

There are two important aspects of this question, whether the government should run the register, and whether the register should be searchable by the public. The answers to both lie in the significance of land and resources to citizens and need for public accountability in fundamental land and resource management policies and administration. Registers of significant assets should be an activity of government. Most countries organise registries of significant assets through their public sector, with the exception of shares in listed companies. In developed democracies, the land register provides transparency in allocation of land rights, maintains high credibility and integrity, and sustains public confidence in market operations. Administrative responsibility for sound land administration is linked through ministerial coordination of the registry and other functions with the executive or cabinet, and eventually through the voting process to the electorate at large.

In return for the government's delivery of secure tenures and sound administration, owners of land and other significant resources expect their ownership to be publicly available for market and public accountability purposes. The register is typically open to the public, though it may contain "internal administrative information" unavailable for public search. Maintaining

transparency in market operations demands that ownership and sale price information be publicly available.³

2.4.4 Underlying tenure system

Land and resource management presupposes a tenure system. Only if resources are **allocated** does registration have a role. Tenure defines the arrangement between the owner of land and all other people, enforced by the state, or in case of informal tenures by an authority source. Owners receive rights in the resource according to the tenure type. Registration is simply the tracking system by which the government, owners and the public find out particular information about a legitimate and formalised resource related activity.

Compared with land tenures, resource tenures are uncomplicated, though they mirror the familiar patterns in land tenures and rights allocations. Mostly, systems require ownership of the resource to stay with the government, and access to be granted through patents, concessions, leases, licences or permits. These access systems are highly tailored to the particular resource, marketability of the title, scarcity of the resource and the terms of the arrangement. The most important decision is whether the interest in the resource is to be allocated by market or by government. Grant terms vary: a payment up-front is different from a royalty calculated on the value of extractions. Forestry licences are sometimes granted on the basis of a return per tonne. Fishing licences in domestic waters may be bid for. Spectrum licences may be auctioned with an annual fee payable for their duration.

³ Modern extensions of privacy standards to undermine transparency in land registries in Australia are contentious, particularly where they are applied to conceal non-personal information such as land prices.

3 REGISTRATION SYSTEMS OPERATING IN MARINE ENVIRONMENTS

3.1 Introduction

Developed countries use registers of marine interests to assist administration of significant marine activities (off-shore oil and gas exploration, extraction, mining, fishing, aquaculture, and so on). Most management systems demand both cadastral/spatial and naming/identification capacity. In the marine environment however both the spatial identification and text systems can be much more flexible. Indeed, marine interests may not have a geographic location at all; opportunities may be tied to simply holding a licence or being owner or operator of a licenced fishing vessel. Interests may be held in common, or in groups of owners who share a history or commercial arrangement.

Typically, each system is separately administered, ordered and legislatively or administratively authorised. Within each separate system specified opportunities are allowed to a person or organisation for specific purposes. Most of the systems manage the relationship between the owner or holder of the opportunity set and the grantor (the agency, government, or authorizing manager). Trading, subsequent to the grant, is usually a derivative and not the primary function of the registration system. It is well developed in off-shore gas and petroleum industries, but less developed in other resources.

3.2 Off-shore petroleum and gas registration

Registration associated with exploration for and extraction of gas and petroleum is highly refined. Though every system varies, the general framework is fairly standard. A federal system in which national power is limited, as in Australia, requires a dual approach to off-shore activities, with the states managing interests and activities related to resources up to the three nautical mile limit and the national government managing the area between the limit and the outer limit of the national marine jurisdiction.

Initially the mining company gets an exploration licence, and if petroleum or gas is discovered, the permit holder is able to obtain a production licence. Licences are granted subject to conditions and work requirements. Permits also require the holders of licences to provide information about samples and reports back to the issuing department. The information is subject to a program of release to the public and other competitors to improve national knowledge of resources and attract competitive mining activities.

The systems utilize a concept of gas or petroleum mining instruments (a collective noun embracing the variety of rights). Legislation must deal with petroleum pools in two licence areas because licences are granted on the basis of parcels typically defined by graticular areas artificially reflecting the five minutes of latitude by five minutes of longitude, as in case of the Australian **Petroleum (Submerged Lands) Act 1967**. By combining the blocks, areas of 50 to 80 square kilometers are granted for exploration. The Australian states use similar squares to allocate petroleum rights in the three nautical mile zone.

The legislation requires the department to keep a register of titles, authorities, licences, concessions, permits and so on. The processes relating to registration of issue and transfer of interests are standard. A transfer of the licence is typically not effective to create an interest in the resource or capacity to undertake activity until registered, though contractual rights between the parties may be enforceable among themselves meanwhile. Registration may not be available until the Minister has approved the applicant after investigating its credentials, history in the industry, performance, directors' personal reputations and so on.

Whether mining rights are property and if so what kind (for example, for stamp duty and tax purposes or if the owner's will left his wife all his "real estate" and his children his "personal property") should be legislatively defined. Law and economics use distinct approaches to determining what is property.[10] In English derived legal systems, most mining laws make their permits "personal property". The interests are not corporeal in nature because they do not confer a present entitlement to any physical part of the land: they merely allow activities on the land. They are not leaseholds as they do not give, in English law, exclusive possession.

3.3 Fisheries management

Registration in case of fisheries involves a different spatial component and system of licences using the typology in **Table 2, Taxonomy of fisheries management systems** below.

INSERT TABLE 2

“Commercial wild-catch fishing involves commercial fishing operators catching and removing fish from non-private waters, including oceans, estuaries, rivers and lakes”.^[11] Commercial use of fish stocks is consumptive and rival in supply. Only if managed are fish stocks renewable. A system of quotas tied to vessels in a particular jurisdiction is the principal means of control of the amount of catch. It is generally failing. Consistent information about deep sea fishing indicates not only that fish stocks are being depleted but that large sea mammals are being destroyed, a classic third party effect. “Globally, most known capture fisheries (wild catch) are at or near full exploitation.” ^[12] The need for management within national waters is only a small part, but an important part of the problem. Despite this negative assessment, Australia and New Zealand (where fishing history is short, relatively) enjoy advanced management regimes.^[13]

A concept of Total Allowable Catch is typically developed for a species based on an estimate (usually not scientifically informed) of the sustainable yield. The major issue is that regulation applying to one ocean area allows migratory fish stocks to be fished out when they migrate to unregulated areas. The struggle is then to prevent the tragedy of the commons.^[14]⁴ To deal with the problem, transitions from the regulated quotas to Individual Tradeable Quotas are made to move to market based regulation.

⁴ Hardin’s argument depends on the idea that unrestricted access to a commonly available good (such as common land grazing opportunities, or deep sea fish) will inevitably lead to destruction of the good since incentives for sustainable management conflict with the human opportunity for immediate gain. His arguments do not apply to communally managed agrarian land in sedentary traditional uses where social and management controls remove opportunities for individual overuse.

Unlike the graticular spatial identification associated with oil and gas exploration and extraction, spatial identification used in the fishing industry relies on a particular person or company (through its employees and agents), and/or a vessel. In some cases a geographic source of fish might be involved, say within a range of coastline, a bay, or a mileage limit. Perhaps because of the complexity of identification, governments additionally use taxes, quotas or non-transferable quotas, controls on equipment, controls over entry into the industry, sale of initial quotas, and other means of managing the resource. There were compelling arguments for tradeable fishing rights as early as 1954, though Individual Transferable Quotas (ITQ) developed much later, typically in response to industry crisis; in a most notable case after the Pacific Halibut fishing season dropped to less than one day in length. ITQs are implemented nearly always “as a desperate step to resuscitate a fishery at the brink of nonviability, rarely as a proactive step to maintain a viable but threatened fishery”.[15] Hence, resource management through quota marketing gets a bad name.

In relatively developed systems access to fishing opportunities is managed through registry systems run by each jurisdiction. Fishing quotas or licences in developed economies tend to be transferable through standard market mechanisms, recognizing the value of the catch and the cost of equipment. Management of the transfers is achieved through the registration system. It is essential for managers to recognise problems associated with divorce of ownership from management of vessel operations and to deal with the moral hazard issue where no penalties arise for over-fishing.[16]

3.4 Aquaculture arrangements

The Australian experience is typical. The aquaculture industry is the fastest growing primary industry in Australia and is managed by the States and territories. There is no standard approach. New South Wales, South Australia and Tasmania use aquaculture leases. Western Australia uses annual aquaculture licences, but has capacity to use dedicated marine aquaculture lease arrangements. Victoria and Queensland have no specific arrangements but rely on licences for use of marine areas for aquaculture purposes.[17]

Administration of these interests in Australia is subject of critical analysis in a recent report by the Productivity Commission.[18] In the summary the message is that existing regulatory structures create significant difficulties for management of aquaculture though not necessarily for users. The conflictual contexts of marine and coastal management, environmental management, land use policy, land tenure and quarantine and translocation together impede both business activities and regulatory arrangements. Diverse policies and implementation in aquaculture and fisheries legislation create an uncertain legal and regulatory environment. In many cases of actual operations, the industry needs dual access to land and water: the hybrid nature of mussel and oyster production where land access is required, for instance, provides an excellent example of the need for consistent management of both land and marine environments. There is no legal recognition for aquaculture in Australian waters beyond the three nautical mile limit,[19] presumably because there are no activities to regulate.

In the legislative vacuum, the fall-back position applies models of land related instruments, such as land planning codes, often with unhappy results.

“Apart from South Australia and Tasmania, there has been slow progress with marine aquaculture planning. The limited use of statutory marine aquaculture plans in New South Wales, Queensland and Western Australia may either constrain marine aquaculture, or result in ad hoc approvals for individual sites and resource use conflicts.”[20]

4 A ROBUST MARINE CADASTRE SUPPORTED BY INTEGRATED TEXT INFORMATION

4.1 Registration history

Testing existing marine registers against modern registration theory shows they are barely at the initial stage of development. The registers concentrate on recordation of existing narrow and sectoral rights and in some cases transactions related to them. The schemes are designed primarily for internal management purposes of the issuing agency, and in some cases, also to create and service property interests in the resource.

A multitude of separate systems is itself a problem. Separate systems inevitably involve duplication. They also create high levels of discordance, lack of access, lack of interoperability and institutional barriers to sound resource management. They also defy an operative standard for all LAS: enter data once and use it many times. Once separate systems are embedded, reorganizing them becomes almost impossible. Moreover, the model of a service register, hard learned in case of land, is not available to assist management of marine environment.

Whether examined as stand alones or collectively, the registers are not used to advance sustainability in the marine environment. The programs do not, and given the sectoral nature of their enabling legislation, they cannot –

- support an holistic approach to allocation of marine resources, or

-
- build capacity to identify and implement restrictions and responsibilities or management of externalities and third party effects.

Given needs for better marine management, a more serious deficiency is apparent. The most sophisticated task achieved by land registration associated with successful private property regimes and associated privatization of land based resources in developed countries is *layering*, the methods of simultaneously recognizing and ordering an open-ended range of activities in the same area or parcel without causing dispute or uncertainty.

This delivers a very important message to managers of the marine environment. Thus far, governments have been happy to withdraw from the obvious necessity to construct sophisticated marine registers as components of an integrated marine cadastre or spatial data infrastructure. By the time the issue is recognised, attempts to build an integrated, holistic and comprehensive approach to marine registers legally, institutionally and constitutionally (certainly in Australia) is barricaded outside collective imaginations and political capacities.

4.2 Registers of tradeable marine interests

The first decision for policy makers is whether the resource is inexorably tied with the right to take or access yields. In the case of land, abstract commodities or rights are made into property: ownership is separated from use, sometimes in very complicated arrangements. In resources, the question is whether to facilitate trading in the rights to

fish in addition to the fishing yield. For efficient trading of rights, the register is essential and should make transactions easy and transparent and avoid difficulties in initial trading period. “Transactions, when they first begin to occur in a new area, resemble complex diplomatic negotiations rather than commodity exchanges.” [21]

4.2.1 Principles of a tradable marine interests register

Basic registers manage initial grants of opportunity sets and trading in these grants. Core principles for the operation of the register (whether it be single interest or integrated) need to be established. These principles can be derived from the simplest land registry model of the Torrens system. This system is chosen because it offers the most inexpensive transfer and management system. In land, Torrens systems are expensive to establish if they are imposed on an existing land titling systems because they demand accurate information about land parcel ownership and identification, and require processes of adjudication of present titles and boundaries in cases of doubt. The systems are much easier to implement where the land is brought into the system by initial government grant, as is the situation in many marine interests.

In the modern context, if not in the original design, Torrens efficiency principles involve:

- Recording the information once and using it many times.
- Recording all the interests, patents, concessions, licences, rights, leases, and opportunities in the resource.
- Self funding the administration including insurance.

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- Compliance with hopefully international and certainly national and widely applicable standards about data collection, public search, costs charged and technical support systems.
 - Application of clear indefeasibility and certainty rules -
 - No interest in the title exists before the registration is made.
 - No interest outside the register is recognised.
 - Property interests are ranked in order of registration derived from order of lodging. Liabilities and obligations among contracting parties remain undisturbed.
 - Loss of a registered interest through administrative error, fraud or forgery, or other selected occasions is compensable

For trading to work, the titles must support security interests (that is, owners can use them as security for a capital loan to cover set up or operating expenses of resource harvesting and management). The register needs to record both security interests and trading in them to facilitate secondary credit and securitisation markets in financing sectors.

4.2.2 Spatial Identification

The standard land register and supporting cadastre are organised around the land parcel or real estate unit. The parcel can be on the ground with standard dimensions or above or below ground (strata) with three-dimensional identification.[22] While the legal boundaries are defined with certainty, implementation of the description frequently involves intrinsic spatial uncertainty.[23] A land boundary described as being as far as one can hear the cock crow from the village center is legally certain, but spatially

uncertain. Similarly the high tide mark, so often used to identify land and sea boundaries in parcel cadastres and titles is spatially uncertain. In the context of marine resources, a parcel base remains appropriate for most interests where specific spatial identification is required within the parameters of clear legal standards. Because spatial uncertainty is experienced much more than with land, research into levels of precision available continues to improve options.[24] However, at any given time, a register can work happily with the level of spatial certainty capable of being delivered by available technological systems.

Other databases, for example topographical data sets, use different core organisers of objects and features. Object based spatial identification can also be used in a marine register: for example a licence attached to a fishing boat to take a quota of a species from a marine area.

Whatever spatial identification is used, technical standards should be defined by performance criteria, not by descriptive reference to a particular technical system. This avoids the need to repair out-dated technical references and anticipates availability of alternative systems such as Galileo, the proposed satellite positioning system for the European Union, and new international standards. The performance criteria should also include interoperability, compliance with international instrumental standards from time to time, and open access. An administrative process can be available to allow instrumental updating of spatial certainty standards to accord with the most appropriate technology, given national capacity.

4.3 Marine activities management register

Most titles in the marine environment are dual in nature: they create property rights (whether real or personal) and they regulate work activity related to a specific resource. They are therefore quite different in nature from the land rights given in most leases where broad opportunity for choice of land uses is available to tenants. Leases issued by the state tend to be more prescriptive both in uses and conditions.

The marine register should be to facilitate management of activities related to the resource, rather than mere trading in marine interests. Although existing systems support a level of trading in marine licences, permits, leases and so on, the skill base for utilizing registration systems for regularizing, policing, administering activity standards is not as well developed. Likewise, the capacity to ensure that a coastline or other area is restored to appropriate condition following suspension or cessation of activities is under-developed.

Use of registers to track activities and identify compliance and failure could be much more comprehensive. Registers can service a variety of tools for regulating marine activities. Tying an activity to the holder of a licence might be appropriate in extreme cases, where marketing of the title is excluded. If title trading is permitted, conditioning of titles according to compliance with work standards, work plans and performance levels would be the principal mechanism of enforcement. Information about title holders' insurances and other risk management strategies could be maintained.

Work activities are regulated for two reasons: to prevent real estate of valuable resource use opportunities by people more interested in making speculative gains from sitting on and then trading in the title, and to ensure that work activities related to the resource are carried out in compliance with resource management principles. Work regulation is the means of avoiding the Hardin problem of the tragedy of the commons, of applying environmental controls, and of controlling the production of externalities and third party effects.

The register, within the limits of personal privacy and commercial confidentiality, must make information and performance measures available. The number of applications, rejections and approvals, discretionary and conditional approvals, processing times, trading statistics, exemptions, appeals, monitoring and enforcement activities should be available both on case by case basis and collectively in annual reporting systems.

4.4 Designing a multi function register

The marine environment is characterized by a multitude of individual management systems which cannot deliver comprehensive sustainable marine management. Compliance is undertaken by a variety of agencies: the issuing agency, a planning authority, funding agency, local governments, environment protection agencies, marine park management authorities, a general fishing inspectorate, labour protection authority and so on.[25] The picture would be no less complex for the gas, petroleum, fishing and waste discharge industries.

At this point, the marine environment clearly requires development of a master plan for instrumental management and administration of marine interests. There is a pressing need for comprehensive regularization of activity controls and standards at all key points: selecting an applicant, granting of interest, conducting operations, ceasing activities and terminating the right. The standard Australian approach of prescriptive legislative regulation is too single minded, and used at the expense of more flexible regulatory models of education, codes of practice, markets, and regulatory instruments such as environmental assurance bonds. Whatever regulatory control approach is used, registration processes are capable of improving management by principal and subordinate agencies.

In this context, systematic registration could assist identification of –

- Multiple permits required for same activity
- Disparate “titles” licences, leases, conditioned access rights, and so on
- Disparate and inappropriately technical work requirements
- Application of land based planning systems and permits
- National administrative inconsistencies
- Gaps in the legal and regulatory structure.

In the emerging information age, the design could follow the “above” and “below the line” approach in land registries, and deliver two new functions –

-
- a clearinghouse for information. and
 - a postbox for applications, directing them to the correct agency in much the same way as Victorian councils handle obtaining consents to subdivisions from referral authorities.

The register should be multi-functional and highly integrated with other essential marine administration functions, while focused on implementation of resource management systems that require performance criteria for re-grant, or information return to assist resource information.

National endeavour is required to produce best practice principles for registration and titling in the marine environment.[26] The compliance, conditioning and performance and especially the cessation requirements, need to be built into the titling system and reflected in the register to assist the multi agency enforcement.

The registers (whether one register or an integrated and holistic management of various registries) should be capable servicing and layering all marine interests. They need to reflect sound economic principles. Economics literature[27] identifies potential for market failure in many resource trading arrangements as a result of failure to deal with externalities. Third party effects arise if a resource is privatised and the market transactions fail to take account of all costs imposed on third parties: in water trading, the typical third party effects for water are down stream salination and pollution. For marine activities, they involve pollution and destruction of breeding environments. The problem

for the regulator is to allow private access to and trading in the access rights and at the same time maximize the collective outcome of privatization in terms of equity, sustainability and economic output.

The marine register should be part of a policy based national system by offering interactive opportunities to assist boarder management goals including -

Pollution, oil spills, identification of cause, cleaning up, monitoring

Shore to sea pollution, warm water, silt, nitrogen monitoring

Protecting natural features

Shipwreck and historical asset monitoring

Maintaining shipping channels

Protecting marine parks

Updating hydrographic information

Managing shipping risks, including piracy

Managing shore degradation

Protecting pipelines and cables

Monitoring weather patterns and tides.

4.5 Effective titling systems

This design assumes adequate and effective tenure and titling systems. However, the reality in most of the marine interests is that tenure and titling are poorly handled. Tenures are variable, highly specific and often unattractive market commodities, except

to knowledgeable insiders. In the commercial areas of gas and petroleum, the specification of the titles is very technical.

Possible best practice standards for effective titles are identified **Table 3** below as a means of initiating a debate.

INSERT TABLE 3.

4.6 Ancillary Issues

4.6.1 Owner identification

The conversion of registration processes to electronic systems will force registries to adopt more stringent identification practices. Even now, in a manual context, most registries demand proof of identification for people and organisations (companies, cooperative associations and other legal entities) transacting in the register. Multi-functioning of the register justifies identification requirements: verification and transaction tracking back into tax and fiscal information systems, or pension allocation systems depending on asset limits for entitlement. Another, and more convincing, reason is accuracy of the register. Other controls are available: for example, New Brunswick titles regulation requires that titles are registered in birth certificate names and vendors' solicitors produce a copy of vendors' birth certificates for the purchaser. Likewise for the purchasers' solicitors who produce copies of purchaser's birth certificates for vendors. In other systems, for example, Denmark, citizen identity numbers are used.

Australia Torrens systems remain anomalous for not requiring any identification check for registration of land or other resources: no identification check is made for initial registration or derivative registration.

4.6.2 *Compensation and insurance*

Marine management requires a separated approach to risk coverage and risk shifting: the compensation of a person who suffers loss of interest due to registration of his fishing or mining right in another through forgery is possible. But the agency running the register or the government would not be expected to compensate the owner for attenuation or diminution of supply of fish, even if this was caused by issuance of too many licences and consequent over fishing. Protection can attach to the right, but not to the volume.[28] Whether compensation is payable for withdrawal of access, for example where the area in question is converted to a marine park, is a question for government according to constitutional requirements and case-by-case analysis.

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Table 1: Titling Systems For Different Resources

| Resource | Water** | Land | Fish | Shares | Public forest | Spectrum |
|---|----------------|-----------------|-------------|-----------------|----------------------|-----------------|
| Fixed or fluid | fluid | fixed | fluid | fixed | fixed | fixed |
| Size of resource base in nature | variable | fixed | variable | variable | variable | fixed |
| Consumptive or non-consumptive use | both | non-consumptive | consumptive | non-consumptive | consumptive | non-consumptive |
| Renewable or non-renewable | renewable | na | renewable | na | renewable | na |
| Divisibility* | high | low | moderate | high | high | moderate |
| Rivalrous in supply | yes | yes | yes | yes | yes | yes |
| <i>Nature of the right (in Australia)</i> | | | | | | |
| Frequency of transactions | frequent | infrequent | infrequent | frequent | infrequent | infrequent |
| Consistency of availability | moderate | high | moderate | high | low | low |
| <i>Nature of the titling system (in Australia)</i> | | | | | | |
| Register or record system+ | record | registry | record | record | record | registry |
| Ability to register security interests | some | yes | no | yes | no | no |
| Digital or hard copy records | both | both | both | digital | both | digital |
| Fee charged for public access | yes | no | yes | no | yes | no |
| Online access | no | no | no | yes | no | yes |

* Means capable of being broken up into many smaller parts (p 71)

+ Most resources have some sort of register for administration and resource-management purposes, but the criterion here is whether the register provides the ultimate evidence of the right (as in the Torrens system).

** Water probably needs a range of approaches reflecting the particular characteristics of the source: artesian water is non renewable, flowing water has high environmental uses and collected water often involves expenditure of labour and resources by one person. Registration of extractive users is normal.

Source: ACIL Tasman and Freehills, 2004.

Table 2: Taxonomy of fisheries management systems

| Type | Characteristics |
|-------------------------------|---|
| 1 Private Ownership | Ownership rights are held by a private firm or industry. |
| 2 State ownership | |
| Sole ownership | All fishing activities dictated by government as sole owner |
| Limited entry schemes | Access and withdrawal rights restricted by the government (may involve non-transferable quota) |
| Quota | Market-based system of management. State confers on fisher an exclusive right to catch a quantity of fish |
| Individual transferable quota | Exclusive quota is made transferable via a market to other participants including potential new entrants |
| Co-management | Market system based on negotiation. This will involve the participants and the state as the custodian of the fishery |
| Concession-aire schemes | Access rights granted by the state to firms who in turn provide access for various groups in return for a fee or a right to recover costs |
| 3 Common ownership | Resource owned and managed jointly by a small group of self-governing fishers. The state would grant this group joint or common ownership. Each participant in the fishery then depends on the arrangements or rules worked out in the ownership group. |

Source: Fisheries, Western Australia 1998

Table 3: Marine Resource Titling Standards

| | |
|-------------------------------------|---|
| Property aspects | |
| Resource | Clear identification of the resource involved. |
| Property nature | Statement that the title is property and what type. |
| Proprietary extent | Definition of proprietary characteristics: exclusivity, transferability, divisibility, inheritability, and any limitations on these, particularly whether owners are required to personally undertake resource harvesting. (If they are, the interest is not proprietary in character). |
| Application process | Statement of criteria, who will make the judgment, payment, issuing authority, entitlement to apply, limits on applications (eg to existing users, or vessels of particular size) and processes of prioritization of competing applications. |
| Access | Statement of the nature of access: exclusive or shared. Statement of access limitations vis-à-vis other marine activities. |
| Use aspects | Defined opportunities to use, to consume, to “waste”. |
| Fees and royalties | Statement of the fees, royalties and payments required, and the means of increasing them from time to time. |
| Transfer | Statement of terms (if any) upon which the title can be transferred. |
| Third party property aspects | |
| Overriding claims | Statement of overriding claims – native titles, recreational fishing, prior rights (if any). |
| Security | Statement of whether the title can be mortgaged and opportunities of lender for gaining possession, selling or foreclosing, and priorities among serial lenders. |
| Title aspects | |
| Name | Lease, concession or licence; preferably a name the public understand. |
| Pro formas | Provision a pro-form “lease” in plain language in digital, Web available, and hard copy, easy print, versions preferably established by subordinate legislation. |
| Grant | Authoritative description of the grant process, particularly identifying when property exists. |
| Time period | Beginning and end dates clearly specified. |
| Renewal | Renewal arrangements specified, including whether renewal is available after expiration of the title. |
| Conditions | Statement of all the special conditions applying to the title (which may be included by reference rather than quoted in full). |
| Trading mechanisms | Guide to standard transactions: negotiated, resource banks, auction, return to government for reissue to new owner. |
| Trading information | Provision for trades and prices to be publicly available. |
| Equity constraints on transfer | Limits on transfers, limits on ITQ transfers across vessel size (Colby 2000, 649) |
| Depletion of resource | Retirement policy if resource is depleted (fish, oil, gas) or if management considerations require moratorium or suspension of access, including opportunities to claim compensation (if any). |
| Forfeiture | Statement of situations in which forfeiture is available. |
| Termination | Situations in which title is ended other than forfeiture. |
| Link use with resource | Program for linking opportunities to use with available supply, methods of assuring public good supply. |

| | |
|----------------------------|--|
| Bond or security | Statement of bond, security or guarantee given to ensure compliance. |
| Compliance aspects | |
| Work plan/activity | Clear statement of the activity required. |
| Reports | Specification of nature of information returns including form and timing. |
| Insurances | Statement of insurances required, and information to be provided. |
| Cessation of title | Statement of condition of site on relinquishment and forfeiture of bond or security. |
| Enforcers | Identification of the agencies and officers able to enforce. |
| Entry of enforcers | Identification of opportunities for officers to access site. |
| Enforcement officer powers | Inspection of site, books and records, taking statements, and so on. |
| Enforcement incentives | Fines, penalties, reduction of next year's permit, revocation. |

Figure 1: Private Property Regime Management Functions

1 Separating

Differentiating and identifying every commodity or permitted activity, using accurate text and spatial definitions

2 Layering

Simultaneously recognising various commodities and activities within the titled areas in context of all other activities and commodities

3 Administering

Appropriate and holistic administration of all resources

4 Choosing appropriate policies

FOOTNOTES