



CSIRO LAND and WATER

## Robust Separation

A search for a generic framework to  
simplify registration and trading  
of interests in natural resources



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## Dedication

This report is dedicated to five people.

- Sir Robert Torrens and Ulrich Hubbe; and
- Lord Sherbrook, Robert Lowe and Lord Bramwell.

The first two of these people developed the Torrens Title Property Title registration system that dramatically simplified and improved dealings in land around the world. It was based on a system used in the nineteenth century to register ships in Germany. The Torrens Title Act was passed by the South Australian Parliament in 1857.

The second three of these people developed the idea of a limited liability share company. The Companies Act was passed by the British Parliament in 1862. The practical bottom line solution was simple - add "Limited" to the end of a Company name.

Both ideas established new legal concepts and precedents. Both radically changed the grounds for dispute and dramatically reduced transaction costs. Both are built upon foundation concepts that have stood the test of time.

This report begins the search for a new non-controversial way to define and trade interests in water and other natural resources.

## EXECUTIVE SUMMARY

This report is about the search for an economically efficient and equitable system of defining, allocating, and managing use of natural resources that proves to be robust. Robust in the sense that the fundamental principles and foundations upon which it is based remains unchanged over time.

We focus on the notion of “interests” in natural resources, and obligations associated with use.

We search for a generic robust approach to the definition of interests, rights and use obligations that sits comfortably within an economically efficient trading system. Pricing and charging issues and the question of how to convert from existing systems to the proposed one are left for subsequent reports.

Comments and engagement in discussions with us is invited.

### 1.1 COAG

Two key elements of the COAG reform process are: first, a commitment to separate interests in land from interests in water; and second, to improve pricing arrangements. We leave water-pricing considerations, including the effects of inconsistent pricing arrangements on trade, to other reports. Nevertheless, it needs to be recognised that inconsistent pricing arrangements, inconsistent use conditions and inconsistent approaches to enforcement distort trade and discourage economically efficient resource use.<sup>1</sup>

While the separation of interests in water from interests in land has facilitated the emergence of new markets for water resources, a major debate has been generated about water allocation, river flows, water trading, the environment and compensation. We note also that the existing plethora of water allocation systems have been derived piecemeal over time and have not been built for trading - in effect, trading has been “bolted on”.

As a general rule separation enables resources to be used in a more economically efficient manner. The separation of water from land is the first step and to varying degrees is being achieved. We pursue the second step - specification of interests in water into a system that should prove robust and stand the test of time.

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<sup>1</sup> See, for example, Brennan & Scoccimaro (1999); DNRE (2001); Eigenraam and Stoneham (1998); NCC(2002); Shadwick (2002); Young *et al.* (2000) and Young & Hatton MacDonald (2001).

## 1.2 A robust system

A robust system would need to facilitate:

- Resolution of resource allocation between consumptive use and the environment, among consumptive users, and of issues related to distribution and use;
- Secure, economically efficient and low cost trading and administration;
- Assignment of risks making it clear where responsibility lies, under what circumstances compensation is due, and specifying the processes for obtaining redress;
- Management of externalities associated with use - the interests of third parties, future generations and the environment - with minimum controversy.

A robust system also must pass the conventional tests of efficiency and fairness in a changing world. For this to occur, the system must be built on a solid conceptual foundation.

In the search for insights as to how to do build a robust system, we have cast our net wide.

## 1.3 The search

- From the limited liability share company structure we have - interests expressed in proportional terms (shares), the use of accounting systems to determine how much "profit" is available for use by others and, also, the notion of managing dividends separately from shares.
- From the Torrens Title system comes - guaranteed recording of all interests on a register, formal settlement procedures, and irreversibility of market transactions.
- From the banking and finance system we get - internet debit and credit accounting systems, exchange rates and associated formal transaction mechanisms.
- From other sources, we identify - the definition of risks and responsibilities, and the definition of conditions and obligations to third parties.

Over time, robust systems are characterised by the use of separate instruments for each distinguishable component.

## 1.4 Separation

From this search, we observe that separation of the interests into their component parts facilitates the development of more economically efficient management and accounting systems. This provides for adjustment of part of the system without having to deal with the whole system, and reduces transaction costs.

Risk management is more economically efficient when each type of risk is defined and assigned separately.

## 1.5 Definitions of the interest

For each dimension of a tradeable resource allocation system that needs to be managed, we propose separation. Essentially, an interest in any common pool resource, like a quantity of water, can be considered as having three key components:

- **The entitlement** - the long-term interest (share) in a varying stream of periodic allocations;
- **Allocations** - a unit of opportunity (usually a volume) as distributed periodically; and
- **The use licence** - permission to use allocations with pre-specified use conditions and obligations to third parties.

In a separated system, each component can be managed independently without consideration of what is happening to the other component. Entitlements define equity among those with interests in the resource, allocations define the periodic quantity that may be extracted from the common pool or sold, and the use licence defines the site-specific conditions pertaining to use including limits on the degree to which users, by choice of practice, are allowed to change the environment.

In areas or systems where use may cause adverse impacts like salinity, the use licence should be expressed in a manner that enables a separate entitlement/allocation system to be set up to manage that issue. Similarly, the entitlement should be drafted in a manner that enables channel congestion to be devolved to a separate entitlement/allocation system.

The system we summarise applies, with minor variation, to all water resource systems - regulated and unregulated, surface and ground. Although not explained in this report, we suspect that it is applicable to many other common pool resources.

## 1.6 The entitlement

The most valuable component is the entitlement - the long-term interest in a stream of allocations that occur from time to time.

Entitlements are granted by government. They define the degree of access to the resource that can be expected over time and the nature of changes, if any, that can be expected.

In defining the entitlement, five considerations are important:

- What priority, if any, is given to entitlement holders when the available resource is distributed and how reliable or variable access is likely to be;
- The nature of the periodic allocations to be expected;
- The extent of the area and resource over which risks associated with the entitlement are pooled;
- How allocative risks are distributed between entitlement holders and the government; and
- The effects of land use changes on future allocations.

Essentially, if both priority and risk are managed at the entitlement level, then trading of allocations can be relatively unconstrained and exposed to market forces. Provided, of course, that externalities resulting from the use of the resource are managed via a separate use licence.

Attention needs to be given to the size of the common pool. Within the pool there is little opportunity for arbitrage. Entitlement conversion from one part of the system to another requires an exchange rate to be set. At every exchange point opportunity for arbitrage is created. In short, the greater the extent of spatial coverage, the less the opportunity for exchange rate speculation and market manipulation by those who have access to privileged information.

### *Priority and Reliability*

Classically, States have developed high and general security systems. The entitlement embodied in each licence is defined by reference to a volume and statement about the probability that that volume will be delivered. Implicit in the licence is an unstated assumption that all people who hold the same type of licence will receive identical opportunities per unit of volume. Whenever there is more than one entitlement class, typically allocations are made in order of priority or preference. Consequently, we conclude that the entitlement should be formally described as a share.

Priority relates to the reliability of the allocation stream over time. Often discussions focus on the number of years in a hundred that periodic allocations will exceed the specified quantity. Using the share approach, this would be handled by issuing different classes of entitlement shares. If only one class of share is issued, then the level of individual risk can be managed through investment or trading.

### *Allocations*

An allocation is a unit of opportunity that is known to exist in the common pool. Consistent with trading rules and charges, the unit may be traded. It may also be used but only in a way consistent with the conditions and third party obligations on a use licence. When used or at the end of the period, the unit of allocation is extinguished.

Under some systems, a considerable proportion of an unused allocation can be carried forward. In other systems, storage without substantial loss is impossible. Careful consideration of the incentives associated with the carry forward versus partial or total extinguishment issue is necessary.

At the start of each period, once the quantity per entitlement to be allocated has been determined, whether derived from high or general security entitlements, trading can take place by volume alone.

Allocations should be managed like bank accounts with debits, credits and balances. By separating trading issues from use issues, trading costs can be kept low.

Allocation trades are permanent in the sense that, once completed, they can not be undone. Multiple trades, including trade back to the original source, are possible.

### *Return flows*

Although periodic allocations vary over time, an important question is that of whether the interest to be traded is expressed in "gross" (volume pumped) or "net" (volume consumed). The difference between gross and net reflects the effects that water-use efficiency has on the volume of water returned to the system for use by others. This issue is controversial in Australia but well accepted in the United States. If a person pumps 1,000 ML at 50% water use efficiency, 500 ML returns back to the system for use by others. If the pathway is through groundwater the effect can be delayed. Ultimately, if this 1,000 ML is sold to a highly efficient system (say 90%), an extra 400 ML is removed from the system. One irrigator gains at the expense of all others.

Two approaches are possible, either the sum of gross entitlements should never be allowed to exceed the cap or, alternatively, only

that which has been consumed may be traded. Real gains from trade occur only when there is improvement in net use. If trading in gross entitlements is allowed, in a fully allocated system where technical water use efficiency is low, the system will inevitably become over allocated as irrigators improve efficiency. This situation can be addressed by across-the board proportional reductions in periodic allocations per share or defining and managing the interest and allocations as "net". On the other hand, there are systems where "gross" is close to "net", with little or no return flow.

When cost or technology limitations, prevent direct measurement of net use either an attempt should be made to deem the extent of net use or entitlements should specifically make it clear that as net use increases gross allocations will be cut on a one for one basis.

A reduction in return flows can also cause an increase in river salinity (dilution effect). As indicated earlier, for a robust solution to the allocation problem, it is necessary also to manage salinity and other water quality issues separately from the management of volume.

### *Assigning Risk*

If fully specified, the risk of change in entitlements and allocations needs to be partitioned between the holders and the government.

Summarised below in tabular format is a framework for risk assignment. The table suggests a way to partition risks into those met by entitlement holders, those where compensation claims can be made, and those unspecified. Compensation would be payable only when risk turns to reality and only in circumstances that might, in retrospect, be reasonably described as failure by the administrative agency to exercise adequate duty of care or diligence in managing the interests of all parties. Compensation or structural assistance could be payable also in cases when there is a sudden and dramatic change in policy direction. We recognise, however, that opinions vary on the need and case for compensation. Our point is that, for efficient outcomes, it is necessary to specify the position taken in a transparent manner.

## Assignment of Risk

Financial risk of change met entirely by entitlement holder <i>(Adaptive Risk)</i>	Compensation claim may be made against administering agency <i>(Duty of care in managing the interests of all parties )</i>	Financial risk incompletely specified or shared <i>(Uncertainty)</i>
<p>Natural variations in periodic allocations (eg. seasonal fluctuations)</p> <p>Change in mean annual rainfall (eg. effect of climate change)</p> <p>Revised estimate of the capacity of the resource that are the result of an adaptive process (eg. improved scientific knowledge - adaptive management, proper process, relatively small changes over time)</p> <p>Land-use change<sup>a)</sup> (eg . pastures replaced by forestry)</p>	<p>Administrative error associated with a transaction. An adjustment judged by the courts to be capricious.</p> <p>Issuance of new entitlements once the system is known to be fully allocated.</p> <p>Rapid and unexpected administrative change resulting in a sudden and significant reduction in the value of share entitlements<sup>b)</sup>.</p>	<p>Catastrophes such as the failure of a dam.</p>

a) For significant land-use changes, it is possible to require that any negative impacts of land-use change be offset via the purchase and surrender of an entitlement equivalent to the size of the expected impact. Similarly, it is possible to allow issuance of entitlement shares when land-use change results in a positive contribution.

b) For example, resulting from initial over-commitment and failure to allocate in a precautionary manner.

### 1.7 Registration and trading

The Torrens Title experience clearly shows that by defining legal ownership through a register and guaranteeing its integrity, the risks of fraud and the cost of negotiating a trade are considerably lower. Registration of third-party interests (mortgages) lowers the cost of credit significantly. Licensing of brokers and development of formal settlement procedures lowers transaction costs.

Clear trading rules including exchange rates should be established. Once executed, a trade is complete.

There should be separate registers for entitlements and accounts for allocations.

State of the art accounting systems can be used to record transactions. Electronic trading should be possible for allocations.

### 1.8 The use licence

The holding of entitlements (shares) or even the holding of a distributed allocation of themselves provides no permission to use the resource. While either of these components are fully

tradeable, to use an allocated resource, a third component is required. This we have labelled earlier - the use licence.

Typically, a use licence would state conditions of use and obligations to third parties. The total volume of water that may be applied would be stated as an upper limit. For example, a licence may authorise flood irrigation over say, 350 hectares at a specific location.

### *Conditions of use*

These arise with specific use of an allocation and should reflect the requirements of a statutory management plan. They may include pumping limits and drainage disposal requirements, possibly certain restrictions on practice, and reporting requirements.

### *Third-party obligations*

Third-party impacts arise from resource use not the action of holding an entitlement or allocation. The bottom-line statement of obligations should indicate the maximum degree of impact on others that is allowable. For example, it may reserve the right to pollute to the state and indicate that the user may be obliged to rectify damages imposed on others and or the environment.

Management planning processes could be used to signal when and to what extent obligations may be allowed to accumulate. To this end, management plans need to be statutory instruments that have standing in law. Third party obligations would also be consistent with any district or regional salinity management strategy, and may possibly be met wholly or partly through the use of market based instruments (eg. salinity credits).

## **1.9 Legislation**

A related issue is the need for legislation to implement a separated right system. Legislation facilitates and encourages consistency in approach. In some states, existing arrangements and reforms underway mean that few amendments would be necessary to move to the proposed system. In other States significant changes are necessary.

## **1.10 Implementation issues**

There are a number of important implementation issues that require addressing. The most topical of these is the issue of how to define the environment's interest so that its effect on the interests of consumptive users is fully understood and accepted.

The environment's interest can be defined as being either

- prior to those of consumptive users; or
- equivalent and, hence, defined so that trade between environment and consumptive use is possible.

Under the "*prior*" model, all risk of change in the expected stream of allocations due to alteration in community environmental values is born by entitlement holders. Under the "*equivalent*" model, risk is shifted to society and change, if not executed via a market transaction, would be compensable. Entitlement values will be higher under the equivalent model than under the prior model. Careful, examination of these two alternative models and variants of them is necessary. If the environment's interest is managed under the "*equivalent*" model, very careful consideration has to be given to the way periodic allocations would be managed and accounted for. Conceptually, it is possible to make a base allocation to the environment under prior rules and then manage the residual under the equivalent model.

Other critical implementation issues to be explored include centre around questions about

**Definition, Planning and Management** and, in particular:

- Identifying the most appropriate spatial extent of each entitlement - a Basin, a catchment, a valley or a reach - with close consideration of the arbitrage and risk-sharing opportunities different arrangements set up;
- Determining the pros and cons of having a single entitlement versus one where there are two, three or more classes of shares;
- Determining how the separated system can be linked seamlessly to licences for overland flows, farm dams and unregulated streams;
- Determining the most appropriate planning and management structure.

**Trading and dealing** and, in particular:

- Determining what charging and pricing arrangements should apply;
- Establishing a bank-like trading system for allocations;
- Determining the extent to which inter-dependent entitlements can be exchanged for one another - surface water for groundwater;
- Determining how to manage simply the return flow or "gross" versus "net" issue;

- Determining the nature of periodic allocations, time until extinguishment and ways to define return flows;
- Determining whether or not allocations should be managed at the same or a different scale to entitlements.

Use licence specification and, in particular:

- Determining how to specify third-party obligations and organising them so that they can be separated from the use licence and, issues like salinity and channel flow capacity, managed in an independent trading environment.
- Determining what needs to be included in a use licence and what is best left in a management plan and how the two should interact;
- Determining how use licence conditions can be reviewed and the best processes used to change them.

Conversion

- Determining what principles and processes should be used in the conversion to a separated system;
- Determining how to convert the licences in any specific area to the new separated system.

### 1.11 Concluding comment

While some may disagree, we consider all the above, including the question of how to define and manage environmental flows as second order issues that need to be considered after a robust foundation is in place. Consequently, we perceive that the next steps involve careful exploration and consideration of the separated system proposed in this report followed by a series of reports on each of the issues listed above: Options for definition of the environment's interest; integrated planning and management of the resource; trading and registration arrangements; use licence specification; and conversion principles and processes.

Finally, as stated at the start of this report, we seek a robust way to define interests in water and other natural resources. To this end, we seek comments and feedback. Comments should be sent to [Mike.Young@csiro.au](mailto:Mike.Young@csiro.au) or [Jim.McColl@csiro.au](mailto:Jim.McColl@csiro.au). We can be contacted by phone on 08-8303.8665.

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The ideas contained in this report have resulted from the opportunity to meet with many of Australia's leading natural resource managers and work closely with them on a number of issues in water, fishery, forest, pastoral and rangeland management over a long period of time. In particular, we would like to thank and acknowledge those all those people who are passionate about water rights, the use of water and the function it plays in the delivery of economic, social and environmental benefits. In recent years several people have had a major influence on our thinking. In particular and in alphabetical order we would like to thank those who have significantly influenced our thinking in the last two years: Rod Banyard, Steve Beare, Don Blackmore, Julie Cann, Sandy Clark, Des Cleary, Jeff Connor, John Crosby, Peter Cosier, Megan Dyson, Geoff Edwards, John Fargher, Campbell Fitzpatrick, Paul Frederick, Jan Greig, John Hamparsum, Darla Hatton MacDonald, John Hill, Peter Hoey, Hugo Hopton, Phil Kalaitzis, Matt Kendall, Scott Keyworth, Russell King, John Langford, David Lewis, John Marlow, John Marsden, Jim McDonald, Wayne Meyer, Stephen Mills, Colin Mues, Blair Nancarrow, Vanessa O'Keefe, Jenny Petersen, Mike Smith, Claus Schonfeldt, Gerrit Schrale, Randy Stringer, Geoff Syme, and Ian Wills.

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Finally, we have gained considerably from comprehensive reviews by Dave Anthony, Sandy Clark, Sam Drummond, Geoff Edwards, Paul Frederick, Imogen Fullagar, David Lewis, Neil Byron, Claus Schonfeldt and Ian Wills.

# ROBUST SEPARATION: A SEARCH FOR A GENERIC FRAMEWORK TO SIMPLIFY REGISTRATION AND TRADING OF INTERESTS IN NATURAL RESOURCES

*'Don't slavishly follow precedent. New precedents are waiting to be born.'*

Sir William Payne, 1959.

## 1 Introduction

This report is about the search for an economically efficient and equitable definition and trading of property rights. We focus on the notion of “interests” in natural resources and “obligations” associated with the use of natural resources.

Because the same words have different meanings in different states<sup>2</sup> and that we suspect that we are looking for new legal concepts, we intentionally avoid using terms in common parlance.

Although our search is for a generic system applicable to all natural resources,<sup>3</sup> we focus on water resources. We consider that the most appropriate way to define interests in water and obligations associated with the use of water is still controversial. The prime reason for this is that the existing plethora of water allocation systems have been derived piece-meal over time and have not been built for trading - in effect, trading has been “bolted on”. Also, most systems were established in a development era when the aim was to get the resource used. As a result, it is often not clear that the total quantity of the resource available is limited. Every time one person takes more, some-one else gets less.

The plethora of systems complicates trading, management and communication. Opening up opportunities for arbitrage and confusion, exchange rates are used to convert from one system to another; and salinity obligations associated with a licence vary from State to State. Expectations about the amount of water that is likely to accrue to a licence also vary. In Victoria, for example, a high security licence holder can expect to receive access to sales water while in NSW there is no such expectation. The ongoing right is called an entitlement in New South Wales but a licensed allocation in South Australia.<sup>4</sup> The period for which a licence is

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<sup>2</sup> See Carmicheal, A. and Cummins, T. (No date)

<sup>3</sup> Strictly, all common-pool resources - a sub-set of common property.

<sup>4</sup> Carmichael and Cummins (no date).

issued also varies from State to State and even region to region. Definitions of reliability and rules pertaining to transferability are also inconsistent with one another. There is also an array of restrictions on trading both within and among States.<sup>5</sup>

## 2 Background

In 1994, the Council of Australian Governments (COAG) collectively committed the governments of Australia to a water reform process. Two key elements of the COAG reform process are: first, a commitment to separate interests in land from interests in water; and second, to improve pricing arrangements (see Figure 1). We leave water-pricing considerations, including the effects of inconsistent pricing arrangements on trade, to other reports. Nevertheless, it needs to be recognised that inconsistent pricing arrangements, inconsistent use conditions and inconsistent approaches to enforcement distort trade and discourage economically efficient resource use.<sup>6</sup>

Separation of interests in land from interests in water has facilitated the emergence of new markets for water resources. In many areas, resources are now “capped” and pursuing new opportunities depends on trade. However, significant impediments to trade have also been revealed. National Competition Council assessments and an emerging body of research has identified significant economic gains in those areas where trading has occurred.<sup>7</sup> On the other hand, there have also been undesirable environmental impacts resulting from trading in water. A major national debate has been generated about water allocation, river flows, water trading, the environment and compensation.

Left for others to work out was the question of how best to specify interests and the associated obligations. This report takes up that challenge and addresses critical concepts and principles associated with an economically efficient and equitable definition and trading of rights and obligations to use water.

Rather than seeking to resolve these current issues within the existing framework, we search for the building blocks of a world leading system that could be put in place and allows current and possible future issues to be progressively resolved. We encourage

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<sup>5</sup> Hassall and Associates in Association with Musgrave (2002).

<sup>6</sup> See, for example, Brennan & Scoccimaro (1999); Eigenraam and Stoneham (1998); NCC(2002); Young *et al.* (2000) and Young & Hatton MacDonald (2001).

<sup>7</sup> See Bjornlund (1999) and, also, Bjornlund and McKay (2000).

debate about concepts, ideas or building blocks that we have missed.

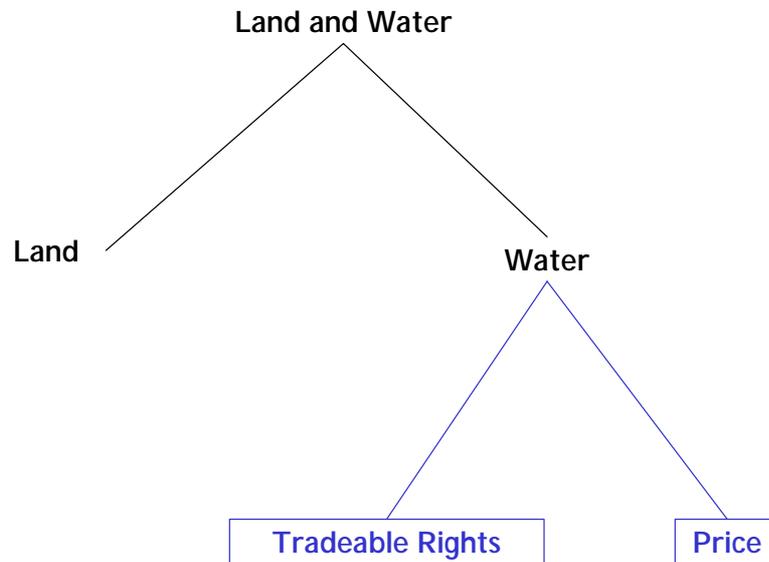


Figure 1 The COAG vision - legally separate interests in water from interests in land, specify them fully and price them appropriately.

### 3 Vision

The vision we hold is a belief that there exists a way to define interests in natural resources that will stand the test of time and, eventually, make the specification of interests in water non-controversial.

This paper searches for a generic approach to the definition of interests, rights, and obligations and use conditions and which sits comfortably within an economically efficient trading system. Such systems emerge only when their conceptual building blocks are robust. To be adopted widely and to stand the test of time they need to be robust both from current perspectives and also those likely to emerge in the future. The concept of robustness is similar to the National Competition Council proposition that the Australian water reform process should produce outcomes that are “durable.”<sup>8</sup>

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<sup>8</sup> See Shadwick (2002)

## 4 Critical Concepts and Principles

### 4.1 Conceptual Foundations

From a “rights” perspective, the critical concept that COAG introduced was that of separation. As a general rule, separation enables resources to be used in a more economically efficient manner but the devil is in the detail. Separation of “water property rights from land title” was a first step. The focus of this paper is on the second step - separation into a form that proves to be robust and non-controversial in the years to come.

The question that COAG left unresolved was the issue of how to define “water property rights” once they have been separated from land titles (See Box 1). Property rights are often described as a bundle of sticks with each stick representing a separate attribute. In a mature resource-limited environment, such as that characterised by a “capped” water resource, the way these attributes are assembled changes the way problems can be managed, the level of transaction costs and the understanding of risk.

Current debates suggest that a robust system, among other things, would need to facilitate:

The permanent resolution of allocation issues;

The periodic distribution of allocations in a way that enables them to be used and traded at minimal cost;

The definition of risks in a way that makes it clear where responsibility lies, under what circumstances compensation is due, and the processes for obtaining it;

The management of externalities associated with use and consumption - the interests of third parties and future generations - with a minimum of controversy;

Economically efficient and low cost trading and administration.

Box 1

### The 1994 COAG decision

“In relation to water allocations or entitlements;-

“(a) the State Government members or the Council, would implement comprehensive systems of water allocations or entitlements backed by the separation of water property rights from land title and clear specification of entitlements in terms of ownership, volume, reliability, transferability and, if applicable, quality,”

Source: COAG Communiqué, 1994.

For a robust system, we need a generic framework that will serve the test of time. Like a building that is designed to last for centuries, the conceptual foundations - the building blocks must be well organised. As noted earlier, most of the current systems have had trading, environmental management and other systems bolted - on. None were designed from first principles to operate in an environment where systems had been developed to their biophysical limit and improvement could come only via adjustment and/or trade.

Theory would suggest that a robust system must pass the conventional tests of efficiency and fairness in a changing environment. Such a system will need to have solid conceptual foundations. In the search for insights as to how to do this, we have cast our net wide.

## 4.2 Searching for the building blocks

Fundamental clues leading to the identification of building blocks for the foundation we put forward come primarily from the limited liability company and share trading system, from the Torrens Title system, and from the banking system.

### 4.2.1 *Limited Liability Share Companies*

The full extent and nature of risks associated with dealing with these legal entities and the way that collective interests are to be partitioned is well established and understood. Decision-making protocols are also defined. Opportunities are defined in terms of a share of net profits (periodic allocation - dividends).

The limited liability share company system tells us that:

One should trade only the “net” opportunity and never use the interest system to trade gross opportunities.

In an environment where future allocations are uncertain, interests should be expressed in proportional and not absolute terms. That is, interests should be defined so that arguments about fairness among those who hold a direct interest are resolved for once and for all time.

Transaction costs are significantly lower if periodic allocations (dividends) are managed totally separately from trading in shares. Shares define interests in the receipt of future allocations, not allocations made in the recent past.

Share company-like protocols offer an economically efficient and equitable way to respecify and/or separate collective interests via well-understood merger, acquisition and sub-division processes. Essentially, the mathematical rule is that one's proportional interest, after adjusting for risk, should not change.

#### *4.2.2 The Torrens-Title system*

The Torrens-Title system revolutionised the means by which ownership was defined by drawing upon a ship-registration system developed in Germany. Instead of producing a deed or contract to define ownership, one has to go to a register. Essentially, the vision underpinning the Torrens Title system is that interests in property should be defined on a register not by distributed pieces of paper. This simple insight dramatically reduces the opportunity for fraud and misrepresentation of the true nature of an interest. You can get a certified copy of what is recorded on the register but in any dispute, by law, the register is deemed to be correct.<sup>9</sup> Under such a system, the residual risk of misrepresentation of an interest is so low that governments are prepared to guarantee its integrity.

The Torrens-Title system tells us that:

- Full specification of interests is best achieved via guaranteed registration of all interests, including those of mortgagees, on a register rather than licences.
- For any transaction, formal settlement procedures are necessary to maintain system credibility.
- Transactions, once made, should be irreversible. No transaction should be completed until all third party interests have been cleared and arrangements put in place for all new interests to be registered fully as the transaction is executed.

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<sup>9</sup> The copy of the signed original act is at <http://www.foundingdocs.gov.au/places/sa/sa8.htm>.

- Permission to use an area of land for a specific purpose is most economically efficiently defined via processes that largely are independent of the definition of interests in that opportunity. That is permission is granted to the people whose interests are recorded on the title, their heirs and their successors.

#### *4.2.3 The Banking System and Monetary System*

Over centuries the banking sector and governments have developed a remarkably uniform system for recording interests in quantities of money and the trading of them. Essentially, there is a single generic system.

In contrast to share and land title systems, pieces of money are never owned. One's name is never attached to a coin or a note. Instead, a pool of money is managed by setting up accounts that define a person's interest in the pool. Interest is defined without having to label each bit. The result is a system with very low transaction costs.

Formal exchange rates and mechanisms are used to convert from one currency to another. A debit and credit system is used to record interests in the pool as they change by the second.

The banking and global financial system tells us that:

- Internet accessible debit and credit accounting systems offer the state of the art in managing individual accounts.
- For transactions of relatively low value, costs can be lowered by not bothering to facilitate tracking of all the previous owners of a bundle of money.
- While a single system has its advantages, if the essential elements of the system are similar, then relatively simple and low cost exchange systems can be developed.
- Exchange rates can and need to adjust as information changes.
- Double entry recording of transactions reduces the likelihood of errors.

#### *4.2.4 The Literature*

Generic literature on the design of tradeable property right systems is limited. There are, however, a number of additional principles and concepts that are critical. One of these, the

Tinbergen Principle<sup>10</sup> states that to attain a given number of independent targets there must be at least an equal number of instruments. This principle, and the research underpinning it, gives us insight into the importance of separation and the most appropriate way to do it. In particular, issues associated with equity among aspiring users need to be managed separately from issues associated with management of the pool at any point in time and issues associated with use. Interestingly, the emergence of the Tinbergen Principle as a concept central to the development of economics, led the Nobel Prize Committee to award the first Nobel Prize in economics to Jan Tinbergen and Ragnar Frisch in 1969. Both were recognised for their contributions to the development of dynamic modelling.

## 5 Building the Foundation

### 5.1 Separation

As indicated earlier, COAG has recommended that interests in water be separated from interests in land. Across Australia, transaction costs - both in political and administrative terms - are still high. Risks to water users, community, government and the environment tend to be high, especially when these risks are incompletely specified.

Current practice has tended to combine well-defined components with poorly defined components. This has frustrated progress. Every time a problem emerges the entire system is reviewed rather than simply that component where the problem arises.

We believe the answer lies in further separation of interests in natural resources (property right) into its component parts.

Separation of the interest into its component parts facilitates development of more economically efficient management and accounting systems. It facilitates adjustment of part of the system without having to review the whole system. This reduces transaction costs. Moreover, risk management is more efficient when each type of risk is managed separately.

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<sup>10</sup> The Tinbergen Principle is concerned with the possibility that there might be a robust way to efficiently manage conflicting issues in a dynamic environment. Tinbergen identified the necessary conditions for a robust solution. It is necessary to carefully examine the proposed set of instruments to determine whether or not the combination of instruments chosen will produce a solution that will stand the test of time (see Tinbergen 1950).

## 5.1 The critical components

Typically, a single licence is allocated to a water user and managed via a host of complex procedures. Even within a catchment, it is not uncommon to find many different types of licence alongside each other. However defined, each licence appears to contain three generic components:

- A long-term interest in a stream of periodic allocations;
- The stream of periodic allocations, which following assessment of resource availability, have been distributed or made available for use and/or trade;
- Permission to “use” the resource at a specific location subject to use conditions and obligations typically associated with the management of externalities.<sup>11</sup>

In the following sections, we provide more information on each of these components. As a general rule and building on the clues summarised earlier (see section 3.2):

- The interest in the stream of periodic allocations is best defined as a proportional share of the “net” opportunity in the same manner that companies define equity ownership;
- Periodic distributions of allocations are similar to a stream of dividends and are best managed using transparent double accounting systems like those used by banks; and
- Obligations and conditions pertaining to use are best managed in a system that resembles the current licence system but written more like development approvals.

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<sup>11</sup> Sometimes conditions pertaining to use and obligations to third parties are best separated.

## 5.2 Definitions of the interest

As with a company and in a trading environment, shares and dividends can be managed at least cost if they are defined separately.

For each dimension of a tradeable resource allocation system that needs to be managed, we propose a Separated System. Essentially, an interest in any common pool resource, like a quantity of water, can be considered as having three key components:

- **The entitlement** - the long-term interest (share) in a varying stream of periodic allocations;
- **Allocations** - a unit of opportunity (usually a volume) as distributed periodically; and
- **The use licence** - permission to use allocations with pre-specified use conditions and obligations to third parties.

In a separated system, each component can be managed independently without consideration of what is happening to the other component. Entitlements define equity among those with interests in the resource, allocations define the periodic quantity that may be extracted from the common pool or sold, and the use licence defines the site-specific conditions pertaining to use including limits on the degree to which users, through their actions are allowed to change the environment.

In areas or systems where use may cause adverse impacts like salinity, the use licence should be expressed in a manner that enables a separate entitlement/allocation system to be set up to manage that issue. Similarly, the entitlement should be drafted in a manner that enables channel congestion to be devolved to a separate entitlement/allocation system.

The system we summarise applies, with minor variation, to all water resource systems - regulated and unregulated, surface and ground. Although not explained in this report, we suspect that it is applicable to many other common pool resources.

Collectively, these three elements of the component determine the value of each unit and opportunities for trade in the interest.

### ***5.2.1 Defining the entitlement***

The most valuable component is the entitlement - the interest in a stream of allocations that occur from time to time.

Entitlements are granted by government. They define the degree of access that can be expected over time and the nature of changes, if any, that can be expected.

In defining the entitlement, five considerations are important:

- What priority, if any, is given to entitlement holders when the available resource is distributed and how reliable or variable access is likely to be;
- The nature of the periodic allocations to be expected;
- The extent of the area and resource over which risks associated with the entitlement are pooled; and
- How allocative risks are distributed between entitlement holders and the government; and
- The effects of land use changes on future allocations.

Essentially, if both priority and risk are managed at the entitlement level, then trading of allocations can be relatively unconstrained and exposed to market forces. Provided, of course, that externalities resulting from the use of the resource are managed via a separate use licence.

Attention needs to be given to the size of the common pool. Within the pool there is little opportunity for arbitrage. Entitlement conversion from one part of the system to another requires an exchange rate to be set. At every exchange point opportunity for arbitrage is created.<sup>12</sup> In fact, if this observation is taken to its logical conclusion then

### ***5.2.2 Priority among entitlement holders***

In the system proposed, the framework offered is similar to that used by companies to manage shares. In a trading environment administrative costs tend to be lower if shares and dividends are managed separately. Whenever a decision is made to make a distribution, a dividend is paid to current shareholders on a pro-rata basis. Thereafter, no attempt is made to trace where the dividend goes or where it is used. That is a separate exercise. The

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<sup>12</sup> If this observation is taken to its logical conclusion then there is a case for at least considering issuing Basin-wide entitlements and asking holders to specify which reach they would like their allocation issued for.

share structure is used to define equity in distribution - not to manage the resource base.

Management of priority is determined in companies through the issuance of classes of shares. For most pool resources, distributions can be expected to vary through time and resource users can expect to have differing needs for access to the allocations. As a general rule, some people will seek and value priority in allocation more than others. Classically, in irrigation it is those with permanent plantings that seek greater priority in allocation so that they can reduce the risk that they will not receive an allocation from the pool.

Many Australian systems separate interests by defining one group as having much higher priority than another. High security and general security is the term used in New South Wales. In some parts of the USA, volumes are allocated a priority according to date of issue. The first issued volume always get their full allocation, the last rarely get water.

Theoretically, if trading costs are very low, then there is little economic advantage in having more than one class of interest. In a low trading cost environment, firms can tailor reliability by holding as much of an interest as they wish and selling surplus allocations as and when appropriate. If trading costs are high, then there is a strong case for defining the interest by reliability class so that firms can tailor allocations to needs without having to trade to achieve an economically efficient result.<sup>13</sup> As a general rule, the lower trading costs are the simpler the system can be. In a very low cost trading system, the economic case for more than one class of share is minimal and market mechanisms can be used to manage water supply risk. In systems where there is more than one class of share, it is likely that in some situations allocations to the second class of share are likely to be minimal.

The main advantages of the share language are well-understood conventions, and transparency in communication. The word share makes it clear that the allocation may change. In particular, the system requires administrators to announce the size of the allocation per share to be distributed and from what date that allocation will be made available for use. It is necessary, also, to announce when the period over which the allocation may be used and what will happen if it is not used. Under some systems, a considerable proportion of an unused allocation can be carried forward. In other systems, storage without substantial loss is impossible. Careful consideration of the incentives associated with

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<sup>13</sup> That is, the more a government sets up barriers to trade, the more classes of reliability and means to access water it needs to offer. In a perfect market where transaction costs are trivial, efficient resource use can be achieved with the unit interest defined in a single manner.

the carry forward versus partial or total extinguishment issue is necessary.

We leave consideration to the most appropriate spatial unit over which interests are defined as an issue to be addressed in implementation. These considerations do, however, increase the case for using a share like structure.

### *5.2.3 Definition of the unit of allocation*

In corporate systems, shares define an interest in the net result of company performance. The parallel approach for natural resources, like water, is that the share should be in the quantity of water consumed. Interestingly, most water interests in the United States of America are defined in these terms. The literature and experience there suggests that only the volume that is consumed should be tradeable and that, as a result of improvements in water-use efficiency, irrigators should be allowed only to retain real increases in the volume of water consumed.<sup>14</sup>

Critically and as summarised in Box 2, if this principle of only allowing people to trade the volume to water that is consumed is violated then improvements in water use efficiency will cause any fully allocated system to become over-allocated and any over-allocated system to become even more over-allocated. Under the scenario set out in Box 2, 100,000 ML of permanent water trades results in 40,000 ML increase in the total volume of water that is consumed. In the past, Australian irrigators have been allowed to keep and use these savings and, as a result, the quantity of water used in capped systems continues to increase.

For systems where technical water use efficiency is not high,<sup>15</sup> essentially, there are two robust approaches to this “return flow” problem.

1. Either, any interest in a stream of periodic allocations should be defined as a “net” interest reflecting the quantity consumed not the volume pumped. Returns via surface drainage and through groundwater need to be accounted

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<sup>14</sup> See Hartman and Seastone (1965) for a thorough discussion of the importance of ensuring that trade does not result in the transfer of return flows that are already being used by some-one else. For Australian information on the scale of this issue see MacDonald & Heaney (2002) and Heaney and Beare (2002).

<sup>15</sup> Drip irrigation systems tend to be relatively efficient but most other types of irrigation return significant proportions of water to the river via drainage and groundwater processes. That which returns via groundwater can involve considerable time lags. Local soil conditions, the nature of aquifer arrangements and distance to the river also influence the extent of the time lags involved.

for. Where this is not possible, the proportion of an allocation that is “deemed” to be used should be documented.

2. Or, as water use efficiency increases there is an across the board reduction in the quantity of water per unit entitlement periodically allocated.

As indicated earlier, for a robust solution to the allocation problem, it is necessary also to manage salinity and other water quality issues separately from the management of volume. That is, if for example, a return flow causes an increase in river salinity or dryland salinity, that issue needs to be managed using a separate policy instrument. Later in this report, it is recommended that use licences be used to manage impacts like these on third parties and, when and or where the problem becomes significant, the problem be managed using a separate entitlement/allocation structure.

## Box 2

### The consequences of defining an interest in gross rather than net terms

Consider 50 farms that each have an allocation of 2,000 ML. The total allocation is 100,000 ML.

Assume also that these farms are irrigating at 50% Water Use Efficiency. That is, they pump 2,000 ML but 1,000 ML of this returns to the River via surface drainage and groundwater recharge. As a result, these 50 farms use only 50,000 ML.

Suppose that each of these farms decide to sell all their interest to people who plan to use it to grow grapes under drip irrigation using technology that achieves 90% water use efficiency. As a result, consumptive use changes from 50,000 ML to 90,000 ML.

After the system returns to equilibrium, as a result of the trade all irrigators in the system lose access to 40,000 ML that would previously have been shared among them. Gradually, a system that was fully allocated becomes both over-allocated and over-used.<sup>16</sup>

#### 5.2.4 Full specification of risk

COAG and others have repeatedly emphasised the need for the full specification. One of the main issues is the risk that expected distribution of future allocations may change. If fully specified, then the risk of change in entitlements and allocations needs to be partitioned between the interest holders and the government. The mechanisms used to partition this risk should resemble a two-sided contract where the government is required legally to pay compensation for those matters for which it accepts responsibility.<sup>17</sup>

Typically company share systems make it clear that the risk of changes in value resulting from “natural” variation, underlying

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<sup>16</sup> MacDonald & Heaney (2002) estimated that if water use efficiency in the Murrumbidgee system is increased by 10% and all the savings are retained by irrigators then the mean flow rate at Morgan in South Australia declines by 0.5%. However, if all the savings are returned to the River, the mean flow rate at Morgan increases by 2%.

<sup>17</sup> The dearth of legal precedent in the area of water law in Australia suggests that very few water licences are fully specified. Essentially, most are one-sided contracts. Licensee obligations are fully specified but those of the government incompletely specified.

changes in technology etc. are risks that the holder of the share bears fully. Action can, however, be taken whenever a proportional interest is suddenly and significantly eroded and/or an administrative error is made. As a general guideline, we conclude that the use of share terminology communicates a much better sense of the unit of entitlement and what is compensable than a volumetric specification.<sup>18</sup>

Arbitrary decisions purely taken as a result of political pressure and imposed on the system may alter the balance between consumptive use and the environment, and/or between different consumptive users. On the other hand, over time, political and adaptive administrative processes may properly reflect changes in community values.

While it is not possible to fully specify the exact quantity of water that will be available in a varying environment, it is possible to fully specify risk. The essential proposition is that in an environment where climates change, technology improves and knowledge of the system is likely to improve, greater equity and investment security may be achieved through a focus on the specification of risk rather than a formal share to the environment.

A suggested framework for the assignment of risk is presented as Table 1. In essence, we suggest that compensation would be payable only when risk turns to reality and only in circumstances that might, in retrospect, be reasonably described as failure by the administrative agency to exercise adequate duty of care or diligence in managing the interests of all parties. It seems reasonable to expect a government to be able to manage and plan the transition from development of a resource to sustained use. In particular, it seems reasonable to signal the extent of the change and not drift into situations that result, for example, in gross over-allocation or a need for a sudden precipitous change.

One example of the risks associated with allocating quotas in anything other than a proportional basis can be found in New Zealand fisheries. In the 1980s, fishing licences were defined as absolute tonnage quotas and some new ones sold by Treasury. Subsequently, it became clear that some over allocation existed and that some quotas would have to be cut. As a result, the Government decided to convert all fisheries from *absolute tonnage quotas* to *proportional share quotas* and, by way of compensation, reduce the resource rent for a number of years in significantly

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<sup>18</sup> One way of progressing conversion from a volumetric system to a share entitlement system would be for agencies to begin by simultaneously labelling licences in both terms. A 3,000 ML high security licence, for example, might also be defined as representing 300,000 shares in the quantity of water periodically defined as being available for distribution to those people who hold high security shares. Related implementation issues are the questions of the spatial extent of the rights that are shared and the number of classes of share issued.

affected fisheries. In Australia, compensation may not be payable for reduction of a water allocation. When considering the issue of whether or not compensation was payable when a fishing entitlements were reduced by the Australian Fisheries Management Authority, it was found that even though fishing units were found to be a form of property, a proportional reduction of in these units in the fishery was not considered to be an “acquisition” under the meaning of Section 51 (xxxii) of the Australian Constitution.<sup>19</sup>

Risk is related to the political and institutional environment in which the property right system operates.

For some issues, the risks are associated with administrative process. For others, the risks are associated with changes in community values and investments. The essential question is one of how risk specification effects resource management decisions.

As a general guideline, risks associated with changes in the natural functioning of an ecosystem are most effectively managed if made a full cost to business (adaptive management). Similarly, if government bears the full costs of arbitrary decisions and is required to compensate for them, they will have a strong incentive to avoid making them.

Administrative decisions taken by the organization/s responsible for managing the system ideally would flow from improved knowledge and understanding of the system, and after due process.

These may include:

- varying periodic allocations to take into account seasonal variation;
- changing the relative shares between consumptive users and the environment (generally will be a reduction in consumptive use) as a result of improved knowledge about the capacity of the resource and after due process; and
- changing the trading rules for water including modifying exchange rates to minimize arbitrage, or changing the way in which market-based instruments (MBIs) are used.

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<sup>19</sup> Federal Court of Australia. Minister of Primary Industry and Energy and Australian Fisheries Management Authority v's Davey et al., 1993.

Table 1

Assignment of Risk

Financial risk of change met entirely by entitlement holder <i>(Adaptive Risk)</i>	Compensation claim may be made against administering agency <i>(Duty of care in managing the interests of all parties)</i>	Financial risk incompletely specified or shared <i>(Uncertainty)</i>
<p>Natural variations in periodic allocations (eg. seasonal fluctuations)</p> <p>Change in mean annual rainfall (eg. effect of climate change)</p> <p>Revised estimate of the capacity of the resource that are the result of an adaptive process (eg. improved scientific knowledge - adaptive management, proper process, relatively small changes over time)</p> <p>Land-use change<sup>a)</sup> (eg. pastures replaced by forestry)</p>	<p>Administrative error associated with a transaction. An adjustment judged by the courts to be capricious.</p> <p>Issuance of new entitlements once the system is known to be fully allocated.</p> <p>Rapid and unexpected administrative change resulting in a sudden and significant reduction in the value of share entitlements<sup>b)</sup>.</p>	<p>Catastrophes such as the failure of a dam.</p>

a) For significant land-use changes, it is possible to require that any negative impacts of land-use change be offset via the purchase and surrender of an entitlement equivalent to the size of the expected impact. Similarly, it is possible to allow issuance of entitlement shares when land-use change results in a positive contribution.

b) For example, resulting from initial over-commitment and failure to allocate in a precautionary manner.

### 5.3 Registration of the interest

The Natural Resource Management Council (2002) has recommended that "Registers of water entitlements like those for land and shares should be open and inspectable."

Before interests in water were separated from interests in land, interests in water could only be mortgaged by registering a mortgage on a land title. At this time, virtually all land titles in Australia were registered under a Torrens-Title like system, sometimes called a "new" system title. From the perspective of some lending institutions, separation of interests in water from interests in land has resulted in the transfer of their registered interest from a "new" system to an "old" system.<sup>20</sup> The main feature of the Torrens system is that all interests are defined by reference to a register rather than a paper trail of contracts, etc. Certificates of titles rather than actual titles are issued. As a

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<sup>20</sup> See Natural Resource Management Council (2002) prepared by Marsden Jacob Associates. The statement is not strictly correct as the licences could always be cancelled.

result, a very high degree of protection is achieved. So high, in fact, that governments can set up procedures enabling the register and all details on it to be guaranteed. This dramatically lowers the cost of borrowing money and significantly simplifies administrative procedures associated with a transaction.

As a general rule, the asset value of a unit interest in a stream of periodic allocations is much more valuable than an interest in a specific allocation volume. As a result, different registration arrangements are appropriate. Torrens Title experience highlights the merits of defining interests in a guaranteed register rather than by issuing licences and several states are in the process of doing this. If this is not done, there is considerable risk of fraud. Under the Torrens Title system, a certificate of title is issued as an authorised copy of that recorded on the register. Applied to water entitlements, all entitlements and any change to one or more of these could be transacted only by changing the details recorded on the register.

### ***5.3.1 Mortgages and interests of other third parties***

A register rather than a conventional licence approach also makes it possible for banks and other financiers to register a financial interest in an entitlement and prevent sale until that interest is cleared. Effectively, it would be possible to register a mortgage over an entitlement. A mortgage has two characteristics. First, in the case of default on a loan and following due process, it gives the mortgagee a preferential right to sell the asset and use the proceeds to recover moneys owing. This dramatically reduces the risk of lending money and, hence, the interest rate at which money is loaned. Moreover, by separating entitlements from use licences and allocations, issues associated with default can be managed separately from those associated with use.

Under such a system, it would be possible for a water supply company to register an interest in a volume of water or a water share holding that would provide protection from becoming exposed financially to the "stranded" assets problem. This problem is thought to be likely to arise when the holders of an irrigation licence sell their entitlements or allocations to others and, hence, are no longer willing to pay for the cost of maintaining irrigation infrastructure. Mortgageability would make it possible for a water supply company to recover the cost of its investment if the supply structure is not used.

### ***5.3.2 Trading***

The question then arises of how changes should be made to the register and trades executed. Global experience with the Torrens Title System and transactions involving significant amounts of money suggest that brokers should be licensed and that formal settlement procedures are necessary.

In summary and as a general guideline, unit interests in the periodic distribution of allocations (entitlements) should be recorded on a register that is guaranteed and facilitates the registration of third party interests. Formal settlement procedures should be used to execute changes to the register.

#### 5.4 Periodically distributed allocations

An interest in a periodically distributed allocation derives from a share or its equivalent. However, the nature of the asset and its value is quite different from the share. In particular, and if priority is managed via the entitlement, there is no need to duplicate management of allocation priority at the distribution stage.<sup>21</sup> A distributed allocation is a right to either trade the resource or be subject to compliance with use conditions and obligations.

Once “used” or at the end of the period, the allocation is extinguished. For most water resources, the allocation is progressively extinguished as it is pumped. For most fishing resources under quota management, the allocation is progressively extinguished as catch is landed.

Reflecting the history of the development of licensing and allocation systems, the practices commonly used to manage assets of this form are rarely used. Typically, the entitlement is to trade or use part of a common pool resource. In the case of water, it may be an entitlement to pump a specific volume and/or sell that opportunity to someone else. In the case of fish, it is an entitlement (quota) to harvest and sell a weight of fish.

As illustrated in Figure 2 and Figure 3, the state of the art for accounting for the status of such systems has been developed by the banking sector. These systems define ownership via a set of accounts that debit and credit trades and record draw down of the pool. No attempt is made to define ownership of each coin or note in the system. Subject to well-known conditions, account holders are guaranteed the opportunity to withdraw from the common pool as and when they like. A water account could be made accessible over the internet with trades possible either by writing a cheque or by electronic transfer.

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<sup>21</sup> If there is a need to assign priority in the delivery system then we consider it more efficient to allocate and distribute channel capacity separately.

Figure 2

Hypothetical Water Account

Account Name: Aussie Irrigation				
Statement No: 24				
Date		Debit	Credit	Balance
1/7/01	Balance bought forward			400
1/9/01	Periodic allocation 1000 shares translates to 2000 ML of water that may be consumed		2000	2400
12/10/01	Transfer from XYZ Pty Ltd Cheque No. 1234 5678		500	2900
3/11/01	Use from 1/9/01 to 1/11/01 (Pumped 1000 ML and deemed to have used 50%)	500		2400
3/11/01	Transfer from AB&CD Smith Electronic RN 9876543		300	2700
30/4/02	Use from 2/11/01 to 30/4/02 (Pumped 1320 ML and deemed to have used 50%)	660		2040
30/5/02	Unused water not available for carry forward to 2002/03 season	420		1620

Water

Date \_\_\_\_\_

Pay \_\_\_\_\_ ML

The sum of \_\_\_\_\_ ML of 2002/03 Water

Water Trading Australia

Signature \_\_\_\_\_

807512 085 249:0223 7851

Figure 3

A water cheque that could be used to trade water

#### *5.4.1 Use obligations of periodic allocations*

Importantly, in the system advocated above, the issuance of a share (entitlement) and even the holding of a distributed allocation would provide no permission to use a resource. Either of the first two components would, however, be fully tradeable.

### 5.5 The Use Licence

To use an allocated resource, a third component is required. This we have earlier labelled the use licence. Typically, a use licence would set out the conditions of use and the nature of obligations to third parties.

#### *Conditions of Use*

These conditions arise with specific use of the periodic allocation and should reflect requirements provided for in a statutory water management plan. They should be attached to a use licence and may include pumping and drainage disposal requirements, possibly restrictions on practice, and reporting requirements. Details are likely to be subject to periodic change and review as new technology and relative costs change. Often they are likely to be quite site specific and relate to more generic arrangement set out in a management plan for the area in question.

The licence, however, would set out the degree of use permitted in much the same way as an approval is given to construct a house. For example, a use licence may grant permission to flood irrigate a maximum of 350 hectares on a specified area of land. Under such an arrangement it would be possible for a person to decide to operate as an irrigator without holding any entitlement and, simply, buy water as and when it is needed.

#### *Third-Party Obligations*

Third-party impacts arise from resource use not the action of holding an entitlement or allocation. The bottom-line statement of obligations should indicate the maximum degree of impact on others that is allowable. For example, it may reserve the right to pollute to the State and indicate that the user may be obliged to rectify damages imposed on others and or the environment.

Management planning processes could be used to signal when and to what extent obligations may be allowed to accumulate. To this end, management plans need to be statutory instruments that have standing in law. They would also be consistent with any district or regional salinity management strategy, and may possibly be met wholly or partly through the use of market based instruments (eg. salinity credits).

Progressive advancement of standards associated with the maximum degree of impact on others should be anticipated. Two approaches are possible either a fixed and automatic trigger can be placed in a licence or, alternatively, the licence may authorise actions that impose costs on others until a management plan dictates that a formal impact management strategy must be put in place.<sup>22</sup>

## 5.6 Legislation

A related issue is the need for legislation to implement a separated right system. Legislation facilitates and encourages consistency in approach. In some states, existing arrangements and reforms underway mean that few amendments would be necessary to move to the proposed system. In other States significant changes are necessary.

## 6 Comparison of system with fundamental characteristics

Any discussion of existing or proposed property rights generally involves the specification of a set of essential characteristics defining the property right against which the existing or proposed property rights is tested.

Scott (1999) provided the following list of fundamental characteristics in relation to individual transferable quotas in rights-based fisheries management that has been adapted and used in papers about water rights by the Productivity Commission, Sheenan, and the National Farmers Federation.<sup>23</sup> Scott's original list of fundamental characteristics can be summarised as follows:

**Duration** - the period for which the interest is defined

**Flexibility** - the extent to which the interest can be modified or altered without consent.

**Exclusivity** - the degree to which the interest holder receives all the benefits from exercise of the allocated opportunity

**Quality of title** - the extent of "security," protection from fraud, opportunity to use as collateral, etc

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<sup>22</sup> In law, effectively this is the difference between a defeasible interest and a conditional interest.

<sup>23</sup> See Aretino, *et al.* (2001), Sheenan (2002), NFF (2002), & Scott (1999).

**Transferability** - the extent of freedom to trade (level of constraints)

**Divisibility** - whether or not the interest can be subdivided into parts and each part held separately.

The Productivity Commission list is as follows:

**Universality** - all resources are privately owned and all entitlements (rights over how they can be used) are completely specified.

**Exclusivity** - all benefits and costs that result from owning and using the resource only accrue to the owner, either directly or indirectly by sale to others

**Transferability** - all property rights are transferable from one owner to another in a voluntary exchange.

**Enforceability** - property rights are secure from involuntary seizure and encroachment

The Productivity Commission in reducing the list to four appears to have included quality of title, duration, and divisibility in universality. Enforceability seems to encompass flexibility, but has other elements of protection against encroachment or seizure.

The Separated System proposed addresses each of these characteristics as follows:

**Universality** - The share entitlement is long-term, non-extinguishable and would remain even if no allocations are made for a number of years. Allocations, when made, are provided for a specified period and are extinguished at the end of that period. The use licence includes conditions of use and obligations to third parties.

**Flexibility** - The share entitlement provides for a pro-rata share of a variable resource. Allocations are in proportion to the number of shares held. Use licence conditions can be varied via a management plan. Permission to use water is similar in style to a development approval. Risks assigned and responsibility specified. For those risks assigned to the government, compensation is payable and process for redress identified.

**Exclusivity** - the holder has exclusive access to the benefits of the use of the resource either directly or indirectly by sale to others. The Use licence does not guarantee the right to harm others. The system is designed to allow the creation of shares and allocations for salinity emissions, channel capacity, etc.

**Quality of Title** - Interests are defined on a register in a Torren's Title-like manner. Mortgages can be registered. It

is impossible to transfer the interest without first clearing all registered interests. Allocations are managed via a bank-like accounting system. Formal settlement procedures are used. Brokers are licensed.

**Transferability** - both share entitlements and periodic allocations are fully tradeable. Exchange rates are pre-specified. No trade can be "undone." Internet based trading of allocations is possible. Cheque-like transactions are possible.

**Divisibility** - Periodic allocations can be sold in whole or in part down to the smallest unit of allocation in the register. A single share can be sold.

## 7 Implementation issues

There are a number of important implementation issues that require addressing. The most topical of these is the issue of how to define the environment's interest so that its effect on the interests of consumptive users is fully understood and accepted.

The environment's interest can be defined as being either

- prior to those of consumptive users; or
- equivalent and, hence, defined so that trade between environment and consumptive use is possible.

Under the *prior model*, all risk of change in the expected stream of allocations due to alteration in environmental values is born by entitlement holders. Under the *equivalent model*, risk is shifted to society and change, if not executed via a market transaction, would be compensable. In this latter case, for example, 1,000 shares may be allocated to irrigators, urban and industrial water users and 500 shares to the environment. The environmental managers would then need to decide if, when and how they would enter into the market for allocations and the market for entitlements.

There are significant political, economic, social and environmental risks associated with the equivalent model that might, without careful analysis prove catastrophic. Entitlement values will be higher under the equivalent model than under the prior model. Careful, examination of these two alternative models and variants of them is necessary. If the environment's interest is managed under the "equivalent" model, very careful consideration has to be given to the way periodic allocations would be managed and accounted for.

Consideration also needs to be given to the vexatious issue of what charges should apply and the question of whether or not some of the increase in the value should be clawed back. Indeed, if the

equivalent model is chosen then, arguably, there is a strong case for collecting some economic rent to ensure that sufficient money is available to cover the cost of increasing an environmental allocation if this proves necessary.<sup>24</sup>

Conceptually, it is possible to make a base allocation to the environment under prior rules and then manage the residual under the equivalent model. Careful consideration needs to also be given to accountability issues and the most appropriate governance structures for the management of any environment allocation, especially if trade between environment and irrigation is contemplated.

Other critical implementation issues to be explored include questions about

**Definition, Planning and Management and, in particular:**

- Identifying the most appropriate spatial extent of each entitlement - a Basin, a catchment, a valley or a reach - with close consideration of the arbitrage and risk-sharing opportunities different arrangements set up;
- Determining the pros and cons of having a single entitlement versus one where there are two, three or more classes of shares;
- Determining how the separated system can be linked seamlessly to overland flows, farm dams and unregulated streams;
- Determining how to adjust existing over-allocation of water resources, and how to allocate water resources that are not fully subscribed; and
- Determining the most appropriate planning and management structure to ensure that use remains sustainable.

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<sup>24</sup> The simplest and most economically way of doing this that we are aware of is to require each entitlement holder to surrender a proportion of their entitlement each year and then put this amount up for auction. Known as a "return-to-the-community," if the aim is to charge a 1% on the gross value of the entitlement, then 1% needs to be surrendered and sold. Similarly, if the aim is to collect 2% of the economic rent then 2% needs to be sold. The main advantage for this method, which is used in some forestry and some fishing systems, is its simplicity and the fact that the industry is forced to self-assess value. The mechanism also significantly deepens the market for the resource and makes values very transparent (Young 1999; Young and McCay 1995).

Trading and dealing and, in particular,

- Determining what charging and pricing arrangements should apply;
- Establishing a bank-like trading system for allocations;
- Determining how to manage simply the return flow or “gross” versus “net” issue;
- Determining the extent to which inter-dependent entitlements can be exchanged for one another - surface water for groundwater;
- Determining the periodic allocations and time until extinguishment; and
- Determining whether or not allocations should be managed at the same or a different scale to entitlements.

Use licence specification and, in particular,

- Determining how to specify third-party obligations and organising them so that they can be separated from the use licence and, issues like salinity and channel flow capacity, managed in an independent trading environment.
- Determining what needs to be included in a use licence and what is best left in a management plan and how the two should interact; and
- Determining how use licence conditions can be reviewed and the best processes used to change them.

Conversion

- Determining what principles and processes should be used to convert from each of the many systems that are currently in place to the proposed separated system; and
- Determining how to convert the licences in any specific area to the new separated system.

## 8 Concluding comment

While some may disagree, we consider all the above, including the question of how to define and manage environmental flows as second order issues that need to be considered after a robust foundation is in place. Consequently, we perceive that the next steps involve careful exploration and consideration of the separated system proposed in this report followed by a series of reports on each of the issues listed above: Options for definition of the environment’s interest; integrated planning and management

of the resource; trading and registration arrangements; use licence specification; and conversion principles.

Finally, as stated at the start of this report, we seek a robust way to define interests in water and other natural resources. To this end, we seek comments and feedback. Comments should be sent to [Mike.Young@csiro.au](mailto:Mike.Young@csiro.au) or [Jim.McColl@csiro.au](mailto:Jim.McColl@csiro.au). We can be contacted by phone on 08-8303.8665.

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