

Property Rights to Water

Effects on Agricultural Productivity and the Environment

by Alan Moran

Summary

Irrigation is a vital part of farming in Australia. Irrigated farming in Australia's main irrigated area, the Murray–Darling, contributes over one-seventh of agricultural output.

Successful agriculture depends on farmers having firm, individually controlled and tradable title to farm assets that are of value. Water is clearly such an asset in many areas.

If rights are taken away without compensation, major incentives that power the economy's well-being are undermined. Hence the constitutional requirements on the Commonwealth Government to take private property only on payment of 'just terms'.

In recent times, considerably greater emphasis has been placed on environmental aspects of water use. The crucible of these debates is the Murray–Darling catchment area.

Evidence that the Murray–Darling system is under stress as a result of excessive agricultural use is patchy. The leading indicator is salinity, the extent of which is often greatly magnified in the public eye. Salinity in the Murray–Darling basin appears to have improved over the past two decades.

Measures to combat a threat which turns out to be unfounded or greatly exaggerated can be very costly, especially if those measures involve disturbing productive activity with all the physical and human capital this involves. Clearly, governments should anchor their policies on solid evidence. In this respect, only recently has a programme commenced to establish the factual basis that is necessary for taking decisions to markedly modify the policy approach to the rivers.

Should it be determined that water needs to be retrieved for environmental flows, the options largely involve taking it from existing productive uses. This means costs to society. These costs are best faced overtly rather than hidden through a series of regulatory 'takings'. Explicit purchases of water recompense owners (thereby avoiding damage to the sanctity of property rights). They also force governments and the community in general to undertake a closer scrutiny of alternatives and to seek out the most effective ways of managing environmental flows.

WATER IN AUSTRALIA

Australia is often depicted as the flattest and driest of the continents. Average rainfall is low by world standards and is highly variable. These features made the continent rather less hospitable to high levels of population than the Americas, Asia, Africa and Europe. European settlement has brought a vast increase in population levels, but with only 20 million people, Australia remains, after Antarctica, the least populated continent. Our low population has meant that, in spite of the low rainfall, per capita receipt and use of water in Australia is high by world standards.

Water has always been a defining issue in the continent's prosperity. And in recent decades, irrigation has grown rapidly. Even so, the proportion of Australia that is irrigated, at 2 per cent of the land, represents a share that is amongst the lowest within OECD countries. Only Canada and the rainiest countries, New Zealand and the UK, have lower shares; that of the US is 11 per cent and in Japan it reaches 60 per cent. While Australia's irrigated area doubled in the 30 years to 1993, similar or larger increases were seen in many other countries, including Canada, Denmark, France, Mexico, the Netherlands, New Zealand and Turkey.¹

Australian water rights developed under very different circumstances to those common-law approaches which framed rights in Europe. This was perhaps inevitable given the scarcity of water in Australia compared with an overabundance of water that shaped the legal approach in Europe. Even so, over a century of agreements between States and between users within each catchment area have established well-understood rights to the water resources available in Australia.

Where water rights are less than clear, or are made ambiguous as a result of government prevarication, damaging economic consequences follow. These involve a much reduced incentive to augment the value of the water and of farmland which uses it, as well as reduced incentives to conserve it.

Modern agriculture is only 200 years old in Australia and though in the first 100 years agricultural productivity was increased to equal that of anywhere in the world, gains continue to be made—output has doubled over the past 50 years, a growth that could not have taken place without the rapid expansion of irrigation. Irrigation in the Murray–Darling agricultural province, Australia's most important irrigated area, contributes \$5 billion to the \$35 billion of Australia's agricultural output, with a further

Table 1: Irrigated Area by Culture, 1996/97

State	Dairy (\$m)	Livestock (\$m)	Crops (\$m)	Vegetables (\$m)	Grapes (\$m)	Fruit (\$m)	Sugar (\$m)	Cotton (\$m)	Rice (\$m)
AUS	1,259	148	1,133	1,119	1,027	613	1,128	310	517
ACT	0	0	0	0	0	0	0	-	0
NSW	232	107	415	142	199	133	845	-	1
NT	0	0	4	4	9	4	0	-	0
QLD	109	9	254	303	229	12	283	-	513
SA	88	3	92	136	179	254	0	-	0
TAS	67	1	29	124	40	3	0	-	0
VIC	722	23	268	289	298	183	0	-	0
WA	40	5	72	120	73	25	0	-	3

Notes:

1. Dairy: Based on the value of milk products
 2. Livestock: Includes all stock products, except milk
 3. Crops: Includes all other crops, but is mainly cereals
 4. Cotton: The value of cotton lint, including cotton seed
 5. Sugar: The value of sugar cane for crushing
- Source: The National Land and Water Resources Audit.
[<http://www.nlwra.gov.au>]

Note: The column for cotton in this chart apparently fails to allocate production across the states, but the total for Australia is believed to be correct.

contribution of \$5 billion from non-irrigated agriculture in the region. Comprising over a million square kilometres, the Murray–Darling is 14 per cent of Australia’s land mass.

Overall, irrigated agriculture is conducted on a little over two million hectares. This is just 0.44 per cent of agricultural holdings but produces 29 per cent of the value of agricultural output.² Table 1 illustrates the value of irrigated product by State.

THE IMPORTANCE OF CLEAR INDIVIDUAL RIGHTS OVER PROPERTY

Incentives stemming from rights to property

Individuals will seek to make intensive use of free (unpriced) inputs whilst economizing on inputs for which they have to pay. This is part of a pattern of conserving usage of the most valuable inputs that has led to efficient use of resources and therefore prosperity.

Where the free input has a value, however, society will not be making the best use of its endowments. If property is unowned, it will allow each individual to maximize his own value with little regard to the ongoing value of the resource. Failure of an individual to take the value for himself will simply mean that others will do so. This will frustrate the smooth operations of the ‘invisible hand’—the uncoordinated process by which people, in the main pursuing their individual interests, are able to discover needs for goods and apply their knowledge and capabilities to satisfying these needs through markets.

If property resources are owned in common, individuals are unable to make exclusive gains and their losses are also shared by others. This, in turn, means that the resources are inefficiently managed. The situation is even worse if valuable resources are open to all. The medieval European commons were, however, never open access (nor in all likelihood were the areas controlled by individual aboriginal clans in Australia). In Europe, common ownership placed strict limits, called *stinting*, on the use of the common resource. Individuals might be able to graze one

cow on the common property but not more. This prevented the ‘tragedy of the commons’ under which the commons were over-used and became degraded.

Nonetheless, the management of a commons required considerably more administration and negotiation than is the case with single ownership. ‘Progressive’ farmers needed to run the gauntlet of consultation with traditional co-owners in order to change approaches and they could not readily separate their own activities. These transaction costs tended to prevent innovation and impeded the re-allocation of resources into more remunerative activities.

Common pool resources, such as the Soviet Kolkhozes, are even less productive than commons, which entail some implicit, if imperfect, ownership of inputs alongside individual ownership of outputs. The Soviet Kolkhoz farms were so inefficient that some 50 per cent of agricultural produce was supplied from individual peasant plots, even though these comprised only 10 per cent of the agriculturally worked area.

Aside from land, clearer definition of property rights has unlocked wealth potential in a great many areas of differing economic activity. In these other activities, property rights have been shown to be potent sources both for saving resources and for making a resource more productive and sustainable. Examples range from fishing,³ through forestry and mining and into more modern issues concerning ownership of parts of the electromagnetic spectrum.⁴

All this goes to illustrate that if an asset’s ownership is vested, the owner will attempt to maximize its present value. The owner will do so taking into account future alternative uses, deciding how much effort and output to allocate for present consumption and how much for the future. By ensuring that others are excluded, a landowner can determine whether the property merits conservation or modification; whether it warrants spending resources to improve its fertility, accessibility, aesthetic qualities, etc.

Property rights: owners’ obligations

Ownership not only brings rights to the income stream and other benefits that the property

entails, but it also brings obligations on the part of the owner. Since the nineteenth century case of *Rylands v. Fletcher*,⁵ a property owner is obliged to compensate injured parties where the operations of that property are the cause of such injuries.

This ensures that property owners have an incentive to avoid operations that are unduly risky to others. The owner trades off the aggregate risk that he personally bears and that which his actions pass on to others against the prospective reward he personally obtains.

This allocation of obligations to the owners allows a better informed risk/reward choice because the owner is likely to be better informed about his property's features and has every reason to scrutinize possible adverse impacts.

Trading of property

An indispensable key to efficiency is the clear allocation of property rights underpinned by the rule of law. The ability to trade that property right is the second leg of the promotion of efficiency. Trading allows a buyer to search for opportunities in the assets of a property owner and to purchase that property to take advantage of the improved opportunities. At the same time, the original owner is adequately compensated and has every opportunity to ensure that his property is well cared for, not only in the interests of the income stream it brings, but also so that opportunities for others to offer to purchase it might arise.

Generally, placing a minimum of impediments on the ability of sellers and buyers to trade will ensure the best use of resources. Placing a levy on a sale, for example, will deter trades where the intended owner has only a small advantage over the incumbent.

USES OF WATER AND PROPERTY RIGHTS

Water Uses

Water usage can be classified into several categories:

1. Drinking and sanitation water
2. Industrial production

3. Irrigation
4. Recreation
5. Power
6. Environmental

Individuals will have preferred usages covering all of these features as well as preferences within the features (for example, different claims on the electricity generation characteristics by differently located parties). Some means of assessing the weight of every claimant's values and the strength of their claims is necessary if the asset is to be optimally used.

Most of the uses of water involve choices or compromises—drinking water versus irrigation versus industrial and so on. Some, however, involve complementarities, particularly certain recreational uses, such as water sports that are facilitated by storage and consistent availability.

In many cases, water will perform sequential functions—the same water can be used and re-used for irrigation, used for industrial cooling and finish as drinking water. Water with different, sometimes competing, productive uses will be optimally used as long as two conditions, addressed in the previous section, are in place. The first of these is that its ownership is clearly specified and the owners' obligations to other users (or claims from other beneficiaries) are well understood. This is a fully specified system of property rights. The second condition requires each property right to be tradable, to enable acquisition by those who value it most, thereby maximizing its value.

How Property Rights are Created

The normal economics analysis of property uses the formulation first presented by Coase.⁶ Stripped of its complexity, this 'Coase Theorem' is sometimes described as demonstrating that the allocation of rights to property is unimportant in determining its uses, so long as the rights are defined, secure and tradable. The theorem also notes, however, that the rights need not be defined if the costs of doing so exceed the benefits (for example, if enforcing the rights is too costly). Coase established that the uses of property will gravitate to the most valuable applications, irrespective of the original ownership, as long as the owners are able to

trade—the original owner will sell to one who can extract better value and receive compensation; alternatively, the original owner will be the one with the most valuable uses and that owner will obtain all the value.

Indifference to the original allocation of rights can, however, have harmful consequences if it leads owners to undervalue the property. If confidence in the exclusivity an owner has over the property right is lost, or was never present, the asset will be used less productively; for example, owners will milk them for their current use value rather than trade off present value for a future value that is less certain. At the extreme this constitutes the stereotype of the ‘Tragedy of the Commons’ whereby each user is indifferent to future uses and therefore contributes to its destruction. Property law was gradually developed to prevent this abuse of assets and the most successful economies are those where property rights are most forcefully protected. This includes full compensation to property owners if the state decides that their rights must be taken or modified to enable the property to be used for a more general community benefit.

The rights specification, and therefore property ownership, can rarely commence with a clean sheet of paper. People acquire individual rights to property initially through a variety of routes. One of these is seizure of something that was originally of little value until it was acquired and improved. Another is ‘first come, first served’. Squatters assume rights in these ways. Sometimes rights are acquired through discovery, as is the case with mineral rights. However the rights are acquired, the relative inviolability of property rights provides the incentive for them to be improved and for their owners and others to search out ways in which the assets they represent can be used to provide increased value or other benefits.

It is important to recognize that property rights are more than titles conferred by governments. Though having a title to an asset or future income stream is one important form and feature of property rights, the rights themselves are broader than this. They are rights that have been generally agreed to by all involved parties. Government will normally need to endorse the rights if they are to be fully

protected, but they are not a ‘gift’ of government.

This is critical in establishing the conditions under which rights might be taken away. Governments cannot legitimately take away rights on the basis that they never expressly accepted that they had been assigned (or seized) in the first place. If they do so, they will subject the rights’ claimants to sovereign risk and thereby reduce the value of the rights.

It is not necessary for government to formally recognize such rights for them to be present. Rights become real once they have been accepted as such and government *de jure* recognition often comes long after the fact. There are a great many quasi-property rights that are as valuable as rights which have been formally recognized. Taxi plate licenses are good examples and Sheehan cites a number of cases where permits and licences have been held to be property.⁷ Having allocated these ‘rights’ to individuals, governments cannot simply eliminate them without compensation—should they do so, their actions will cause deep-seated damage to the incentive system on which society’s prosperity is founded.

It is idle, indeed harmful, to revisit their original allocation to try to make changes on the basis of whether or not they should have been recognized or allocated in the first place. Property rights are the rights that are generally accepted in the community, not just those that the government has so ordained. Threats to disturb those rights will bring repercussions that are deleterious to general income levels as a result of owners adopting wealth preservation and short-term business strategies, rather than maximizing the value of the property, secure in their ongoing title.

Applying Property Rights to Water

Australian Issues

Water rights in Australia had to be developed without clear markers from regimes that had emerged in Europe, especially under the common law.

First, the common law of England was developed on the basis that water was over-

abundant, not scarce, and Australian colonies largely abandoned riparian rights well before federation.

Once water is recognized as scarce, land-owners will seek to ensure it does not leave their land. NSW and Victoria have placed limits (a strict 10 per cent in NSW) on reserving water run-off from property as the owner's entitlement; Queensland has not yet enacted an equivalent to this. Such adaptations of the common law are essential, however, if the downstream users are not to be expropriated.

Second, a 'prior rights' doctrine applied in the UK waterways. This gives priority to the first user of the rights. Hence the rights of fishermen downstream of mills were more powerful than those of the mills, with the result that the latter had to ensure their discharges did not adversely affect fisheries. Rights of upstream river polluters were considered to have been granted, if, after 20 years, there had been no objections.⁸

Prior rights doctrines were linked to *use* of the asset and if it was not used, it would be forfeited. Hence, environmentalists are likely to be suspicious of it even if the prior rights had not been fully appropriated. As *use* is a common law interpretation, however, it would be likely to be adapted to contemporary interpretations of use, including environmental use.

Establishing prior rights in Australia would be very difficult.⁹ Even so, there has been over a century of agreements regarding the allocation of water rights between jurisdictions and to the main irrigation provinces. In the case of the Murray, the 'Cap' on water abstractions agreed between the various jurisdictions in 1995 largely validated agreements made early in the 20th century and before. Disturbing these agreements other than in the light of climate changes (which would in any case only mean a pro rata change in quantities) would greatly undermine the trust in the sanctity of property rights. Increased allocations for certain parties or for certain uses (including environmental flows) would need to be purchased at market prices.

Third, there are issues of compensation. Australian States do not have obligations to compensate for takings and the Commonwealth does not have to do so for partial takings. In the

UK, these obligations are much more powerful—even the National Trust must compensate for the cost that listing imposes on an owner, whereas in Australia the owner bears the cost.

Expropriation, or the fear of it, brings risk-averse actions that will diminish output. Indeed, it was the restraint that governments placed on their own actions in seizing property that led to nations adopting such approaches to achieve greater prosperity. Others progressively emulated these more successful nations or collapsed into backwardness. It might be argued that the issue of requiring compensation for a government property seizure was so settled at the time the Australian constitution was written that a 'takings' clause was unnecessary. This aside, with or without formal constitutional obligations, governments that impose sovereign risk on property owners threaten to seriously reduce their nations' wealth.

Fourth, when does an annual lease become a perpetual property right? Squatters' rights are established under the common law. At what stage do they cut in? How do we translate a right for a quantity in a system limited by natural supply?

While all these issues often need clarification, after over a century of settled agriculture, such clarification is only required at the margin.

The Damaging Effects of Poorly Defined and Insecure Water Rights

Even without a total emasculation of individual rights (for example, when title to the property depends on continuing governmental assent), lack of certainty brings lower incomes and diminished asset protection. When meteorologist Professor Robert Balling was studying desertification in the south-west of North America, he was struck by the markedly different flora north and south of the Rio Grande. On the US side, the land was used for farming, the soil was fertile, and there was considerable flora coverage. Just a few miles further south, the area was semi-desert and the soil windblown.

Balling discovered that this was due to the different land titles covering the two areas. In the US, land ownership was highly protected. Water availability was secure on the US side

and available only annually on the Mexican side.¹⁰

Similar, though less dramatic, comparisons can be made in Australia. Water rights on the Victorian side of the Murray were, in the past, regarded as more secure than those on the NSW side. Though management changes may have made these differences less important, there is a perception among many irrigators that security and the ability to ensure certain availability is lower in NSW. This may have contributed to the situation where farmers on the Victorian side plant perennials while those in NSW tend to focus on annual crops, especially rice.

While in both cases the rights, in principle, belong to the State Governments, those on the Victorian side were said to be perpetual rights, while those in NSW have been subject to the possibility of government resumption. NSW ownership rights have been clarified to some degree over the past year or so and owners are now to be compensated if their allocation is reduced in the course of a ten-year period from 2003.

While such clarity may be preferable to the prospect of 'expropriation' without compensation within a ten-year contract period, the NSW arrangements are not a satisfactory basis for operating businesses where decisions are required which have a lengthy gestation period. It may, of course, turn out that the Victorian rights are no more secure than those of NSW,¹¹ but irrigator perceptions are that the rights in Victoria are perpetual.

In addition, NSW water has been more thoroughly allocated or, in the eyes of many, over-allocated.¹² Victoria gives rights holders considerable certainty that adequate water will be available, even in drought years. At least until recently, the annual NSW allocation was uncertain until well into the year, and individual irrigators had no ability to bank water for future years.

There are claims that Victoria's more robust property rights in the form of water licences mean that the State Government has lost 'capability' to manage when compared with NSW. Whether or not Victoria's title rights are more secure, the flip side of this is the increased risk and associated lower value of production

where property rights are attenuated. Governments that attenuate rights by giving themselves increased capacity to direct production or to take individuals' properties will need to accept lower levels of income and output.

In December 2002, CoAG sought a report from the 'Chief Executive Officers' Group on Water' on Water Access Entitlements.¹³ The Chief Executives Group are the government-appointed managers of State water resources. The CEOs recognized that 'Uncertainty for water users is likely to affect investment in irrigated agriculture' (para 30) but sought only that there be adequate breathing space between reviews. It also appeared to favour a rigorous review of needs for water before access entitlements are initiated. It is unfortunate if this is meant to suggest that we could abandon existing allocations and start anew; such an approach would offer future property owners no confidence that the same procedure would not apply again.

There are gains to be made by governments applying to water the same principles of inviolability of property rights that have been the cornerstone of the wealth that capitalism has been instrumental in creating. Primitive societies, and those societies that could not offer certainty that individuals' property tenures could be protected, failed to prosper. Those societies where individuals' property rights were fully protected not only prospered themselves, but their prosperity spilled over into higher incomes for others in the community (and a higher capacity to pay taxes).

Perhaps with these factors in mind, water property rights have formed a major feature of national competition policy. The Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) has argued that water entitlements be clearly specified in terms of:

1. rights and conditions of ownership tenure;
2. share of natural resource being allocated (including probability of occurrence);
3. details of agreed standards of any commercial services to be delivered;
4. constraints to and rules on transferability; and
5. constraints to resource use or access.¹⁴

ARMCANZ also suggested that an effective

market requires rights that are:

6. limited in extent or availability;
7. well specified and understood by the market;
8. exclusive so that benefits and costs associated with the rights are attributed to the right holders;
9. enforceable and enforced by appropriate legal systems; and
10. transferable and divisible within defined limitations.¹⁵

In recent years, however, statements by governments and others have raised doubts about the perpetual nature of individual irrigators' rights to water.¹⁶ Accordingly, governments should confirm the *de facto* rights that irrigators are generally recognized as holding, in the interests of restoring greater confidence among producers and the consequent incentives to adopt the best long-term and short-term perspectives.

ENVIRONMENTAL SERVICES

The Increasing Value of Environmental Services

Setting aside a cluster of services under the heading of environmental use would have puzzled almost everyone 100 years ago. And earlier than that, men such as Prime Minister Gladstone cut down trees for their recreational pleasure, an activity that many would now regard as sacrilege. Environmental uses, once considered valueless have progressively been re-evaluated. This is partly as a result of a perception of increased scarcity of such goods and partly because environmental uses assume higher values the greater the wealth of a society.¹⁷

It is also important to recognize that environmental values comprise several forms:

- those that impinge upon the ability of others to produce goods and services which make use of those assets—in other words, destructive use;
- those producing goods and services that make use of the assets but do not change them or use them in any destructive way; and
- those that involve no use except that which goes with their existence.

Water conservation contains all three elements.

The Natural Environment

Almost by definition, the environment is something that is regarded as part of nature's endowment. Yet the contemporary evocativeness of environmental values that is driving much of the agenda on water are far different from some pristine reality. The environmental improvement that most people wish to see does not actually correspond to the raw natural state that prevailed before modern, or indeed any, human settlement.

Nowhere is this more graphically demonstrated than in river flows. Many people would like to experience a synthetic environment of rugged but scenically beautiful and passable country and river areas.

The truth is that the natural state of the Australian environment reflects the continent's vast climatic variability and generally flat landscape. Rather than neat rivers confined to their banks, the natural state of the most important waterway, the Murray–Darling, is one of alternating floods that might cover up to a quarter of Victoria and a river system reduced to a few ponds with nothing flowing.

In these terms, modern agriculture and other development has facilitated a superior set of environmental amenities as valued by people in general. Rivers are controlled by dams and embankments largely in the interests of having their water made available for productive use. But in addition to offering these benefits, river management also allows more consistent flows with positive spin-offs for such recreational activities as boating and fishing, as well as providing a more pleasing 'natural' environment in the eyes of most people.

Maximizing the Combined Value of Productive and Environmental Uses

Agriculture, even primitive agriculture, brings immense changes to the landscape but, as with urban development, people have views of what is, and is not, aesthetically pleasing. In this respect, it may be of little consequence that society wishes to 'restore' an environment that never existed in the first place.

At issue is how much compromise is required between property owners' use and other preferences and how to achieve those goals. As already argued, it is important for general prosperity that property should, as far as possible, be in individual hands and that rights should be protected and not taken without compensation.

This suggests that any modification of established uses (those that have a form of property rights) would need to be bought. Existing owners would require compensation (or, conceivably, new rights might be created by new expenditure in water-saving technologies). This should lead naturally to a process under which the various changes to usage patterns are valued, as well as to a means by which those changes can be best brought about most cost-effectively.

A fundamental question is: how much is the community prepared to set aside to buy property rights (or attributes of those rights) for purposes that the current owners would not otherwise undertake? Following this, and perhaps influencing it, is how to arrange the different constellation of new, preferred uses more efficiently. A more efficient use of the resources allows fewer resources to be taken from productive activities (or more of the non-productive uses to be undertaken). Arranging for some form of trading of rights is a key means of ensuring the environmental uses are made at the expense of the least fruitful productive uses.

Offering compensation, as well as preventing the adverse repercussions that are concomitant with erosion of owner security, ensure a rigorous assessment by government of the worth of taking productive resources for environmental benefits. In the absence of compensation, the temptation is always to seize assets with the assumption (which might be correct in the short term) that this will result in little damage.

Application of compensation also encourages government to seek out solutions that provide compromises, where this allows a combination of environmental services and on-going (if reduced) productive uses.

Irrigation, Environmental Benefits and Salinity

The Types of Issues

Issues stemming from irrigation comprise two types: those impacting on the sort of common environment people want ('pure' environmental goods) and those impacting on private uses. The former includes issues such as preventing loss of species, ensuring that certain sorts of species flourish and avoiding unattractive growths such as blue-green algae where this results from nutrient build-up.

The second is economic impacts on different users. Pollution or salinisation downstream caused by upstream users is most commonly the issue in Australia. Elsewhere, upstream users have grievances—for example, where downstream uses may obstruct navigation or migratory fish.

'Pure' Environmental Goods

With respect to the 'pure' environmental goods in the first category, the recent Victorian election brought to a head the bubbling discontent about the once feted diversion of the Snowy River. This brings into relief the issue of valuing water for direct conservation, and for use values due to the alleged benefits the Snowy waters bring through flushing of fishing grounds.

If 21 per cent of the Snowy waters were to be redirected away from the current hydro system, this could be interpreted as reducing the capital value of the system by that share of its supposed value (that is, \$400 million or more).¹⁸ Part and parcel with this would be an increase in the prices paid by all electricity customers and a reduction in the security of supply for electricity. In addition, since all the water is allocated, the present irrigator, industrial and urban beneficiaries would seek compensation. It is doubtful that the new beneficiaries would contemplate paying anything like the sums necessary.

The matter of biodiversity is an issue for public policy only because some people take the view that the value to mankind of biodiversity is not being adequately considered in individuals' decisions. Such inadequate consideration is common to many situations where it is not possible for those who pay for things, and

thereby make sacrifices, to obtain for themselves all the value from the payment. As a result, we have ‘free-rider’ problems—people will try to shuffle off to someone else the payment for things that they truly value. And inadequate sums will be spent.

The magnitude of this problem is frequently overstated by those who favour increased governmental control. Unless these matters are addressed dispassionately, we are likely to have decisions of policy taken without reference to alternative values. Placing values on things that are interconnected and isolated, necessities and luxuries, apples and oranges, is the crucible of economic analysis. This is not the heartless, clinical task that some claim it to be. It is merely a recognition that we can’t have everything we want and we have to have a means of choosing.

The real values people place on things and the real sacrifices they are prepared to make for them should be the ultimate arbiters of what choices should be made. These valuations emerge only when things are owned by an individual or firm and can be sold to others who value them more highly.

Private ownership is not always a possible approach.¹⁹ Yet, as people are placing greater values on nature, even if this imitates or romanticizes its true state, the conservation values of goods such as wilderness should be increasing relative to other goods.

That said, it is very difficult to construct the synthetic valuations of preservation on which public provision must rest. In order to do this, economists, especially those with a weather eye on entrepreneurial opportunities, have introduced a new product line to their catalogue. Resting on market research principles, this is known as contingent valuation. Contingent valuation seeks to establish a value equal to the market value on difficult-to-trade natural phenomena. Many of its findings have, however, offered implausibly high or inconsistent valuations.²⁰

Nonetheless, some means of capping the expense must be arrived at. In this respect, contingent valuation could prove rather more useful if applied to establishing the aggregate value that people would prefer to have spent on

their behalf on environmental services. Contingent valuation could be used as guidance to establish a total budget. In addition, it could offer some principles on which this can be divided between the different services that comprise common environmental assets.

Impacts on Other Parties

It is resolution of conflicts caused by impacts of the actions of one party on others that is at the heart of legal systems. Concerns about increased pollution are endemic with irrigated agriculture the world over. While issues of industrial pollution, closure of river mouths and loss of fish are among the issues that are factors in these debates, Australian debates are dominated by salinity.

SALINITY AND ITS EFFECTS

Taking stock of salinity

In Australia, salinity is a major concern as a result of the high natural occurrence of salt in the soil and the ability of this to become more concentrated where water flows are reduced or where flows are diverted over them. A reduced water flow over land with naturally occurring salt will inevitably mean greater salinity because there is a diminished flushing of the soil.

Increased salinity, especially in the tidal areas of a river, also results from increased sea incursions.

Increased salinity has an impact on ‘pure’ environmental services, since it is likely to affect all flora and fauna. The main issue, however, is one of conflict of interest between productive users—that is, the complaint of ‘damaged goods’ by downstream users against those upstream.

The Australian focus is the Murray–Darling. The Basin Salinity Strategy 2001–2015 has estimated that increased salinity brings costs of \$294 million per annum to the basin.

Yet data on the salinity of the Murray–Darling is at best ambiguous. Salinity levels upstream of Merbein are lower than they were in the early 1980s and are only seriously above these levels as the river approaches its mouth at

the Goolwa Barrage. This is due to engineering work, particularly in diverting highly saline water into evaporation pans.

Although the present concerns upstream of Morgan are therefore largely incipient rather than actual, if salinity build-up were to occur, this would be likely to move upstream.

The Basin Salinity Management Strategy argues that the progress over the past decade will 'be cancelled within 20-50 years, and median salinity levels would exceed the Australian Drinking Water Guidelines for good water quality within 50-100 years.' The cause of this is said to be rising groundwater tables due to land use changes across the Basin.

It is also pointed out that little water now reaches the sea at Goolwa and that a sand bar often closes the river off. To which it might be said, 'Why should any water reach the sea?' What is the comparative value to society of a closed bar versus the foregone returns of water by households, irrigators and industry? The flows from the Murray system are clearly not material in the quantities in the world's oceans and nutrients will end up in the oceans in any case, even if in the form of sewage. The only case for such flows is if they are necessary for

migrating fish or navigation.

The issue of salinity needs to be placed in perspective. Australia-wide, the ABS 2002 Land Management and Salinity Survey²¹ indicates that two million hectares of agricultural land were reported by farmers as showing signs of salinity. Of these, 7 per cent were in irrigated areas; over 70 per cent was in Western Australia. About 0.2 per cent of farmland was unusable due to salinisation (and this rose to as high as 0.5 per cent in some irrigated areas of the Murray–Darling). Table 2 (on the following page) provides details.

Reports addressing the salinity issue

A series of reports over recent years has fuelled considerable alarm over the future productivity of Australian agriculture in general and the Murray–Darling area in particular. These reports have cast doubt on the ability of irrigated areas to maintain their present environmental diversity and productivities.

A report published by the ACF and NFF²² calls for an additional \$3.7 billion of government spending annually and a total \$6.5 billion to combat environmental distress and consequent economic loss.

In all, the report sought an additional \$60 billion 'capital investment' over the following decade with subsequent annual payments of \$0.5 billion.

The report claims that, currently, degradation costs at least \$2 billion each year, and is increasing at an accelerating rate. It estimates that the investment expenditure it advocates has the potential to generate a 6.5 per cent annual return, for the next 100 years. The bulk of the

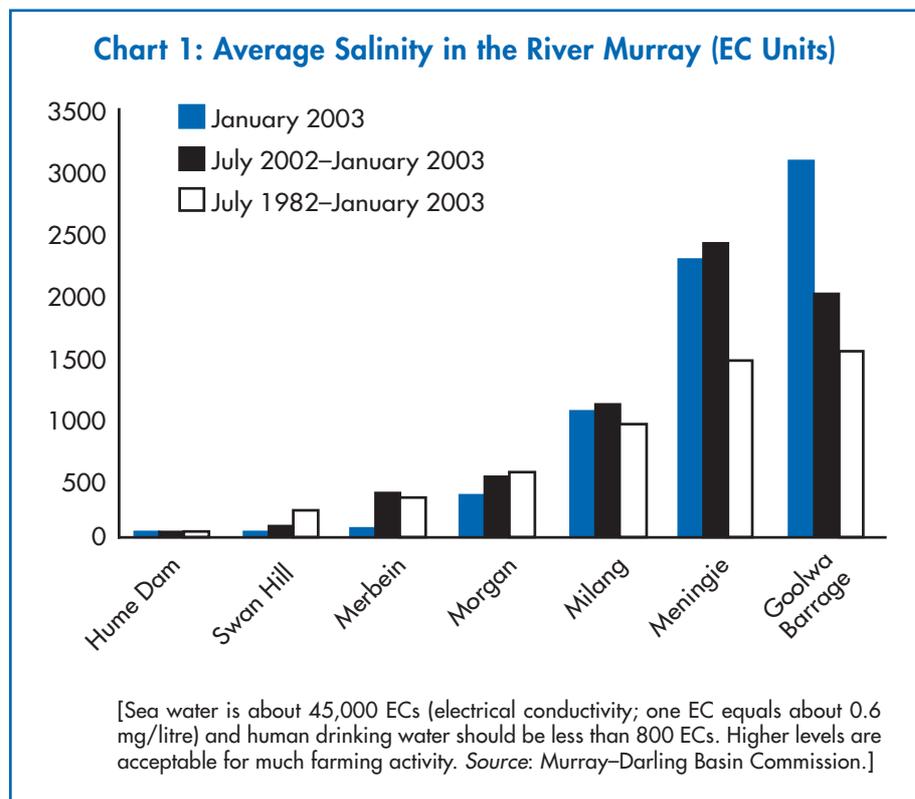


Table 2: Land Showing Signs of Salinity, Summary by State

State	Farms with land showing signs of salinity number	Proportion of total farms in State (a) %	Land showing signs of salinity '000 ha	Proportion of total farm area in State (b) %	Salinised land unable to be used for production '000 ha	Proportion of land showing signs of salinity (c) %	Proportion of total farm area in State (d) %
NSW/ACT	3108	7.4	124	0.2	44	35.6	0.1
Vic.	4834	13.7	139	1.1	60	43.5	0.5
Qld	993	3.4	107	0.1	40	37.4	-
SA	3328	21.6	*350	0.6	105	30.1	0.2
WA	6918	51.3	1241	1.1	567	45.7	0.5
Tas.	390	9.1	6	0.3	2	27.2	0.1
NT	8	2.0	2	-	2	97.3	-
Total Australia	19579	13.9	1969	0.4	821	41.7	0.2

(a) Farms with land showing signs of salinity as a proportion of total farms in the State/Territory/Australia. Source for the denominator is data from the ABS 2001 Agricultural Census.

(b) Land showing signs of salinity as a proportion of total farm land in the State/Territory/Australia. Source for the denominator is data from the ABS 2001 Agricultural Census.

(c) Salinised land unable to be used for production as a proportion of land showing signs of salinity.

(d) Salinised land unable to be used for production as a proportion of total farm land in the State/Territory/Australia. Source for the denominator is data from the ABS 2001 Agricultural Census.

* Subject to sampling variability between 25-50%

benefits are in forestry and the report envisages a 20-fold growth in that industry.

The proposed expansion of forestry is non-credible as it would use up more land on the continent than exists.²³ The report itself, however, has little relevance to the issues, as its estimates of salinity costs are clearly excessive and the benefits of its proposals, even if forthcoming, would not justify the colossal expenditure levels it envisages.

A more modest claim, \$16 billion over 10 years with \$3.6 billion of this coming from government, was made by the 'Business Leaders Roundtable'.²⁴ The report said, 'These business leaders recognize that problems like salinity, habitat loss, soil degradation, loss of biodiversity and river degradation and pollution are clear warning signs that landscapes are not being used or managed sustainably.' As with other reports, this one accepts uncritically the notion that the Australian continent is becoming severely degraded and seeks government action without a proper accounting for the cost/benefit trade-off. Some of the self-styled 'business leaders'

would clearly appreciate the 20 per cent government subsidy to investment that their report envisages.

In *Blueprint for a living continent*, the Wentworth Group, largely comprising government and World Wildlife Fund (WWF) activists, echoes these demands for funding and clarifies some of the rationales for the expenditure, while pointing to specific expenditure directions.

The Wentworth Group sees us heading towards a precipice. It claims that:

- 'two thirds of landholders report that their property values will decline by up to 25% over the next three to five years'
- 'dryland salinity is rising and 'could affect' 22 per cent of cultivated land, and that the sustainability of our agriculture is under threat.'

The report is laced with evocative phrases such as:

- 'Salt destroying our rivers and land like a cancer.'
- 'Many of our native plants and animals are heading for extinction.'
- 'About 50,000 km of streams have been

degraded by sand deposition and sediments are moving off hill slopes much faster than soil is formed.'

- 'We are taking more resources out of our continent than its natural systems can replenish.'
- None of these statements, like many other assertions in the report, stands up to scrutiny.
1. Salinity is a locally occurring issue and, as shown in Table 2, it is not as great an issue as is sometimes portrayed in the media. In many cases, it reflects a natural state of affairs. In this respect, when in 1829 the explorer Charles Sturt first saw what is now called the Darling River, his early excitement was soon doused when he realized that its salt level made it undrinkable (he named it the Salt River).²⁵
 2. In Australia, since European settlement, about 10 per cent of mammals and two per cent of bird species have become extinct, with a similar percentage listed as endangered. This is a major loss. But Australia is unique in its remoteness over the period until European settlement. And, it must be remembered that the loss of species largely occurred at a time when species were not greatly valued.
 3. There is no evidence for stream degradation on the scale presented by the Wentworth Group and, as with the suggested degradation caused by salinity, it is inconsistent with the observed levels of productivity increase.
 4. Similarly, we are not taking more resources out of the continent than natural systems can replenish. Indeed, the claim often levelled against farming in most developed countries is that the application of fertilizers is excessive and residues are having a deleterious effect. This is a reflection of the discredited 'Club of Rome' notion that the world is running out of resources, a notion that has been fully deflated by the ongoing increases in output of agricultural produce.²⁶

Even though the clamour for action to restore environmental flows is based on exaggerated claims, water does present an example of classical 'externalities' issues evident in many situations where the ownership of goods is not tightly defined and where one person's use can impact adversely on those of others.

All this said, the disputes over salinisation are largely disputes between commercial parties.

Full specification of rights and obligations will allow these to be resolved, as long as the impacts are measurable, their causes identifiable and the various rights and obligations are known and stable.

Of course, the whole matter of allowing markets to resolve issues is further complicated by the non-point source of a salinity problem. But where there is value in actions that can be taken to prevent damage or enhance value, means of measuring these are typically found. In this respect, technology to measure salt in water and to trace increases to particular locations is readily available.

But if the problem is as great as some claim, we need other solutions which might well include market-type pricing within a regulated framework of reduced water availability. But we also may need to live with salt levels that were higher than in previous eras. Technology, including biotechnology, may provide some solutions in this respect.

Application of Private Ownership and Markets to these Issues

In England, where riparian rights prevail, common law has largely resolved these conflicts (which concern industrial pollutants versus fishable water rather than salinity caused by upstream agricultural practices). With regard to Australia's rights and obligations, governmental seizure of water rights has occluded some of the power of markets to settle the issues. Water trading was forbidden until relatively recently and there are still some residual impediments to it. This reflects the incomplete nature of government allocation of rights and the fact that rights having been granted in a *de facto* manner as leases, rather than *de jure* vested ownership.

The arguably vulnerable nature of many of the water rights may also have deterred many parties from trading. Trading is a solution where a rights holder can be compensated for transferring his rights to others who place a greater worth on them. In the ten years to 2000–01, around 6 per cent of the total Victorian entitlement had been permanently traded and temporary transfers are running at 3–8 per cent

of the total per year.²⁷ These trades, however, are between different irrigators (and there are even constraints on the degree to which water can be transferred out of an irrigation district).

Some means of allowing trades between irrigators and ‘non-use’ users is also required. Private trades of this nature are common in the US, where the Nature Conservancy is a leading land holder and where philanthropic individuals have bought natural assets to ensure preservation of their biodiversity.²⁸ Such private-sector activity is far preferable to government allocation, though as previously discussed, the ‘free rider’ problems may bring about less than optimal ‘environmental’ reservations. Establishing a possible role for government funding would be a preferable approach to seizure of water rights without compensation and it might also be cheaper than government setting up engineering solutions to ‘save’ water.

With respect to the latter, a consultancy set up by the Murray–Darling Basin Commission²⁹ has found negligible savings available at a cost of \$1000 per megalitre (the approximate price of permanent water trades). The full valuation of water encourages the search for technological means of, in effect, creating more water through savings. The scope for this is limited as demonstrated by the ACIL Tasman report—there are few ‘free lunches’ available once all property is allocated, because the owners will normally search out the available gains themselves.

This is illustrated by the following data summary:

Case Study: Goulburn–Murray Water*	
	%
Delivered water	76.5
Wheel inaccuracies	5.0
Unmetered supplies (S&D)	1.5
Leaks through outlets	2.0
Leaks through channels	1.7
Channel outfalls (escape flows)	12.1
Channel seepage	0.6
Evaporation	1.3

* Results from 3-year NPIRD-funded pilot study on systems losses (GMW3)

In that study, the water available for other uses (aside from that which might be regarded as having been inappropriately taken or charged for) amounts to seepage and evaporation. This is 5.6 per cent in the area studied, not all of which could be saved in any event. It is thought that greater potential exists in some areas where seepage is particularly prevalent, such as the Mallee in Victoria, but other areas have even less potential (Murray Irrigation estimates evaporation and seepage losses at only two per cent.) Also, there are considerable numbers of ways that water can be conserved on farms, including new application techniques and more water-efficient crops/varieties.

Developments in southern Australia over recent decades have conspired to make irrigation water far more valuable. These include:

1. the fact that cost-effective water resources are largely exhausted and a cap on new diversions is in place;
2. an increase in the cultivation of higher valued crops; and
3. drier than median conditions over the past decade.

These have been exacerbated by:

4. an over-allocation of water rights, especially in NSW, that led to an activation of ‘sleeper’ and ‘dozer’ rights. The activation of these rights has meant they are more heavily utilized; and
5. the increased scarcity leading to measures that more carefully husband the water. While some of these prevent evaporation loss and have therefore brought a net increase in effective availability, others have reduced availability; these include a more careful watering resulting in reduced run-off and re-use.

Differences in Trading and Property Rights

Victoria has a system of market-based trading rights. There are limitations (for example, no more than two per cent of permanent rights can be sold out of a district in any one year) but trading has been vigorous. It has tended to be from areas of high salinity such as Pyramid-Boort and Torrumbarry. Most of the water bought has been for higher value dairying and horticulture.

Victorian holders of water rights consider these to be highly secure and perpetual rights. The report to CoAG of the Water CEO's Group describes the Victorian rights as 'renewable unless good reason not to' and that 'Rights may be permanently cut if a "water shortage" develops'. It may be that the Victorian Government will develop an approach that renders the rights of that State's water licensees less secure than they had thought. (See endnote 11).

NSW also has a system of market-based trading, however the rights appear to be far less certain. Although there is an obligation on the government to compensate for availability cuts made within the next ten years, there is no certainty offered beyond then. And the ten-year 'vesting' is further devalued in so far as, with every passing year, security diminishes by a year.

NSW and Victoria operate their allocation systems differently. Victorian high security water represents most of the water that irrigators use and is firmly available in a given year because it is notionally 'banked' from the previous year. Even in a drought year like 2002–03, said to be the worst drought in 50 years, Victorian licence holders received 130 per cent of their allocation. Some water, typically 30 per cent, is available to the water holders in Victoria as 'sales' water.

NSW allocates its water on the basis of what is available in the current year. The allocation is, on average, 83 per cent of licence levels, and in a drought year it falls considerably—allocations in 2002–03 were only 10 per cent of licence levels, in addition to an average 10 per cent carryover from the previous year. The less conservative manner in which NSW operates its licences means that it typically obtains a greater share of the water, notionally shared 50/50 between the two States, because once Victoria has filled its quota for the succeeding year, water is notionally 'spilled' to become available for NSW irrigators. (See endnote 12).

NSW irrigators can now buy up to 50 per cent of the following year's water and by purchasing additional licences could achieve levels of security comparable with those available to Victorian irrigators. These developments are, however, quite recent.

The different policy approaches in NSW and

Victoria have doubtless been partly responsible for a different production profile in the two States. In NSW, the traditionally lower levels of certainty about a given year's water allocation has led to irrigated agriculture being dominated by annual plantings, especially rice, a crop that can take advantage of water becoming available at short notice. In Victoria and South Australia, irrigated agriculture is much more focused on perennials which require a high degree of certainty in water supply.

All this is complicated by the sleeper rights and the more recent environmental claims. In some NSW catchments, such as the Lachlan, the over-allocation meant that only about 45 per cent of the licensed water was typically used. Once the 'Cap' was set, the 'sleeper' (unused) and 'dozer' (occasionally used) rights became valuable. The allocation in these areas was set at average usage, hence those farmers that previously used all their licence rights had to find another 55 per cent, while farmers not using their rights received a windfall.

Allocating the Use of Water Through Pricing

Property rights create valuations and prices that bring about the best allocation of resources. Prices condense all manner of private information on values into a single item. As was discussed earlier (see the discussion on pages 7–8 above), the system requires three things:

- first, that the resource be scarce, and for much of mankind's history water was not scarce, at least in a great many locations and at many times, and would therefore command no price;
- second, the right has to be definable, measurable and hence able to be policed; and
- third, the water has to be tradable. If, like indigenous land rights, the commodity is required to be used by the owners or not used at all, its value is drastically reduced and the signals the market might offer are severely attenuated.

Where, as in most urban situations, the unit price of water is based on property values rather than its actual usage, there is too little incentive to frugal usage. But for urban households, water pricing is really about ensuring an adequate cost recovery for the distribution and waste water

disposal systems rather than putting a price on virgin water.

Urban water use may be quite price-responsive. Beattie and Foster found that demand declined by between 3.75 per cent and 12.63 per cent following a 10 per cent price increase.³⁰ The scarcity value of water itself, however, is not a large component of the final cost to the urban householder—probably only 10 per cent. This means that a price that was more cost reflective of the value of the water *per se* would have little effect on the consumption pattern. In other words, while there are good reasons to bring a better alignment of costs and prices in urban water use, there would be little conservation of the water itself as a result.

In the case of agricultural water use, however, which comprises some 80 per cent of water usage, the virgin water/total water cost differential is much closer. Although the costs of dams and irrigation channels were originally heavily subsidized, this is largely irrelevant. Bygones are bygones—especially since their expansion and maintenance is now funded by users.

Water values are likely to increase—and this would be accentuated by water being taken or bought for environmental purposes. This will probably bring about a shift in usage, especially

because there are vast differences in the gross value of agricultural output per unit of irrigation water used. Gross returns from a megalitre of water in 1996–97 ranged from over \$16,000 for vegetables, fruit and vines in Tasmania and NT to around \$100 for pasture in NSW. Table 3 illustrates this.

Recreational Use

Superimposed on other valued uses are those of recreation. This paper addresses these only in passing. They are, nonetheless, considerable

Although on the Murray–Darling some recreational uses, for example fishing, are said to have been reduced as a result of other uses of the river, this is heavily contested by those who claim a more consistent flow (resulting from storages) means a greater fish population. (Adding further complications are the effects of introduced ‘pest’ species such as the European carp and other exotic species, such as trout, to which most people attach great value.)

Other recreational uses, such as boating and water sports, have been unambiguously improved as a by-product of irrigation. The effect on these uses of taking irrigation waters for increased environmental flows would need to be assessed.

Table 3: Gross Value per ML Water Used (1996/97) (Production Efficiency)

State	Vegetables (\$/ML)	Sugar (a) (\$/ML)	Fruit (\$/ML)	Grape Vines (\$/ML)	Pastures (b) (\$/ML)	Cotton (\$/ML)	Rice (\$/ML)
AUS	1,762	418	1,459	945	160	613	189
ACT	0	0	0	0	0	0	-
NSW	732	2,801	713	549	100	596	-
NT	16,949	0	2,431	3,322	0	0	-
QLD	2,480	436	2,524	2,954	163	669	-
SA	2,084	0	1,562	1,478	142	0	-
TAS	3,014	0	18,067	16,304	975	0	-
VIC	2,688	0	1,728	840	210	0	-
WA	1,148	50	1,778	2,250	112	0	-

Notes:

(a) Sugarcane for crushing

(b) Includes livestock, grains (except rice) and other agriculture

Source: The National Land and Water Resources Audit [<http://www.nlwra.gov.au>]

LOOKING AT SOLUTIONS TO OVER-USE AND ENVIRONMENTAL DEBITS

Taxation

Some suggestions for addressing salinity have included taxes on fertilizer, an approach apparently used in Denmark. Aside from the fact that this is an extremely blunt instrument that takes no account of the degree to which run-off affects different river systems and the diverse degree to which run-off occurs farm-by-farm, there is the vexed issue of farmer lobby power to overcome. Taxing fertilizer is taxing an input and would (rightly) be vigorously contested.

Economic instruments offer other ways of addressing the problem. In principle, it would be possible to measure use of water and run-off from each property and apply charges or tradable pollution rights to encourage reduced run-off or reduced salt contamination.

In other cases, some pricing of water could be put in place for recreational uses, including fishing and boating. Offering salt bonds for tree planting might also be a fruitful approach. But it is doubtful that the sums needed to satisfy some environmentalists could be raised by these sorts of means. Moreover, it would not be appropriate to raise money to combat salinity from boating or (probably) fishing, since these outputs of the water are not related to its salinity.

Application to Use Values

Water rights usually have accompanied title to land. Water in a system that was fully allocated therefore needed to be acquired alongside the land to which it was attached. Moreover, the quantity and security of supply over the water rights were frequently unclear.

Separating water entitlements from land titles allows much greater flexibility. Water can be bought to meet particular needs, for example seasonal requirements or as supplements where there are drought conditions. The price in such circumstances is likely to be high. Trade takes place, however, where sellers value the loss or deterioration of their own crop less than the money a buyer is prepared to pay to ensure the

survival of his crop. Permanent trades can also be made so that there is adequate insurance for a long-term farming investment.

According to the National Competition Council, in Victorian irrigation areas, between 1 to 4 per cent of water rights are traded permanently every year, and up to 17 per cent are traded on a temporary basis.

Water rights vesting and the ability to trade those rights can be readily demonstrated to stimulate more efficient water use. The subsequently revealed value following such measures drives considerable changes in water use. John Dainton, Chairman of the Goulburn Broken Catchment Management Authority has provided information that, over the past ten years, 80 per cent of farms in the region have moved to re-use their water.³¹ Such re-use in response to price signals is vastly different from re-use mandated by government in pursuit of a belief that water should be treasured.

Ironically, the increased efficiency of use may also have two adverse side-effects. First, as already mentioned, it will lead to less water re-entering the catchment and diminish downstream availability. Secondly, it will increase the concentration of salt and other pollutants in the water that is returned to the system.

This said, trading and hence appropriately pricing water will have beneficial effects by deterring its over-use and the consequent washing out of salts from the soil that brings salinity problems. Not only do farmers have incentives to economize on water use, but the greater value attached to the water encourages conservation in channels, for example by taking measures to reduce evaporation.

Solutions

1. First, there is a need to confirm the property rights. The *de facto* rights inherent in the licenses need to be converted into *de jure* rights now that doubt has been placed on their protection from seizure. Without this, the water will not be applied to its best long-term uses as licence holders seek risk-averse usages that do not lock in investments. This may give rise to issues of statutory compensation rights. In the Australian context, the respective policy and financial roles

and capacities of the Commonwealth and State Governments need to be explored.

2. The water right should be fully detachable from property and be able to be used in whatever way the holder wishes, subject to any environmental damage this might impose on others. This requires greater exploration of the means of purchasing and securing environmental flows both by governments and private parties. It also means determining the different environmental priorities and resolving any conflicts between them.
3. Water rights holders selling from one region to another may impose additional costs on the remaining rights holders in the selling region. This is not uncommon in industries where particular firms are relocating away from an area. Unless some prior arrangement has been made, the remaining rights holders would no more have to be compensated than would firms which left a specialized manufacturing were obliged to compensate those remaining.
4. There is a need also to define the right so as not to reduce the quality of water for other users. This entails requiring farming practices that do not bring greater salinisation than some standard. At its most basic, this requires setbacks from river systems to avoid salt infusion or, where infusion occurs, engineering rectification on the part of the individual causing the damage.
5. Existing rights need to be specified for the different levels of security to facilitate trading in the inferior rights.

Changes to rights may come about as a result of long-term climate change (such as has occurred in eastern NSW where the past 50 years have been wetter than the previous 50).

Other changes may be brought about as a result of policy changes. These must entail full recompense for the property right where it is taken by a government agency. If the Commonwealth were to seize these rights without offering adequate compensation, the rights holders would be protected by Section 51 (xxxix) of the Constitution. This requires that if the (Commonwealth) Government acquires property from any State or person, it does so on just terms which have been defined by the High Court as 'full and adequate compensation' where

the acquisition is a compulsory taking. Section 51 (xxxix) as interpreted by the courts does not bind State governments and, indeed, governments in Queensland and NSW have seized property without compensation.³² Some means of placing restraints on State Government seizure needs to be devised.

Concluding Comments

Allocating specific individual ownership rights to water and allowing its trade is a well-founded means of maximizing the use value. It would also be likely to have the beneficial side-effects of reducing salinity and farm-based pollutants caused by intensive use. We should grab such opportunities.

Above all, strong property rights allow the best long term and short term trade-offs in the use of property and encourage appropriate levels of investment. Property rights to water complement land ownership in facilitating the most productive usage. This efficient stewardship of resources brings community- and economy-wide benefits. Governments in the Australian federal system, however, have sometimes chosen to overlook the means of achieving these available gains. This is partly because of the fiscal structure of Commonwealth–State relationships, under which the major share of government revenues from a better performing economy accrue to the Commonwealth as a result of its income-tax collecting prerogative.

Accordingly, State Governments might be inclined to place an unduly high priority on the pursuit of other goals—equal income distributions, environmental outcomes, etc.—at the expense of improved income levels. One means of addressing this distortion has already been employed in the CoAG context. This involves the Commonwealth providing additional funding to the States contingent on their offering appropriate undertakings to undertake reforms. The detailed means of implementing such measures for water would need some consideration.

ENDNOTES

- 1 *The Price of Water: Trends in OECD Countries*, OECD, 1999.
- 2 Derived from the National Land and Water Audit http://audit.ea.gov.au/ANRA/atlas_home.cfm
- 3 See Michael De Alessi *Fishing for Solutions*, Institute of Economic Affairs, London 1998; and Donald R. Leal 'Community-Run Fisheries: Preventing the Tragedy of the Commons', in *Taking Ownership: Property Rights and Fishery Management on the Atlantic Coast*, Ed. Brian Lee Crowley.
- 4 See James V. DeLong *Broadband Dreams: The Tech Community Has a Vision*, Cato, 15 January, 2002; Thomas W. Hazlett *Spectrum Markets: The Clock Is Ticking*, ZDNet on 26 March, 2001; and A. De Vany, *Property Rights in the Electromagnetic Spectrum*, California Irvine—School of Social Sciences, 1997.
- 5 Actually a case that involved water escaping from a property owner's dam and flooding a neighbour's mill. The dam owner was found liable for damages.
- 6 Coase, R., 'The Problem of Social Cost', *Journal of Law and Economics*, 3 (1960) 1-44.
- 7 These include *Dovey v. The Minister for Primary Industries* (1993) 119ALR108; *Western Mining Corporation v. Commonwealth* (1994) 121 ALR661; *Newcrest Mining (WA) Ltd v. Commonwealth* (1997) 147ALR4. See 'Defining and valuing water property rights', by John Sheehan, Address to Cairns Forum on Property Rights, April 2003, Australian Property Institute, NSW.
- 8 Bate, Roger, 'Water Pollution Prevention: a Nuisance Approach', *Economic Affairs*, 14 (3), 13-14, 1994.
- 9 The common law (of England), on which these rights were based, was not developed with a view to valuing irrigation, the issue of water being one of removing a surfeit and the consequential impact on those downstream. A basic tenet was to ensure the downstream user had water that was substantially unaltered in terms of quantity, quality and flow rate.
- 10 See <http://www.azstarnet.com/clips/chewland.htm>
- 11 Victorian private licence rights are stated as being for 15-year terms and renewable unless there is good reason not to, and rights in water districts are stated to be indefinite but subject to change in the event of a change in aggregate levels of Cap or if a 'water shortage' takes place. More recently, a Ministerial Statement by Mr Thwaites, the Victorian Minister has said it is '...beneficial to have rights that are firm, as in Victoria, ... (but) rights must be able to be gradually adjusted in the light of environmental needs.' See [http://www.nre.vic.gov.au/web/root/domino/cm_da/nrenlwm.nsf/frameset/NRE+Land+and+Water?OpenDocument&\[/4A25676D0024CB20/BCVIEW/5D0CF905D92A8DB1CA256D01008249EC?OPENDOCUMENT\]](http://www.nre.vic.gov.au/web/root/domino/cm_da/nrenlwm.nsf/frameset/NRE+Land+and+Water?OpenDocument&[/4A25676D0024CB20/BCVIEW/5D0CF905D92A8DB1CA256D01008249EC?OPENDOCUMENT]) (p. 7).
- 12 Allocations and management in NSW are conducted on an annual basis rather than using the Victorian procedure by which water is implicitly banked from the previous year. This actually brings a higher share to NSW at the expense of reliability, although in principle the Murray is shared 50/50. The higher NSW share is amplified by Victoria's conservative management bringing water to notionally 'spill' into the NSW share in many years, leaving the latter with greater availability.
- 13 Report to the Council of Australian Governments, Chief Executive Officers' Group on Water, April 2003.
- 14 ARMCANZ (1995) *Water Allocations and Entitlements: A National Framework for the Implementation of Property Rights in Water*, Task Force on CoAG Water Reform Occasional Paper No.1 (Canberra: Standing Committee on Agriculture and Resource Management) (October), 8.
- 15 ARMCANZ, 4.
- 16 As well as previous referenced statements by the Victorian and NSW Governments, the Water CEOs Group, which was charged by the CoAG Ministerial Council to prepare a report *Water Property Rights*, argues that, '... in every State the "right to use and control" water has for over a century been clearly vested in the Crown. States then allocate the rights to use water to individuals. There is no *constitutional* right in any State to compensation for withdrawal of a resource allocation.' (para 28)
- 17 Environmental services are technically referred to as being within a class of goods and services known

- as preferred goods. These tend to be valued more highly the richer a society is.
- 18 The actual loss of value would be less than the *pro rata* 21 per cent if the release is at the discretion of the hydro facility, since the facility would choose release times when the water was valued least.
 - 19 In Coasian terms (see endnote 6), the benefits are exceeded by the costs of assigning the property rights to individuals and the subsequent transaction costs in arranging for the individual owners to take decisions on the property uses.
 - 20 For example, a contingent valuation study of Kakadu placed a value on 'clapped out buffalo country' higher than land in Manhattan. See Moran, A., *Valuing the Kakadu Conservation Zone—a critique of the Resource Assessment Commission's contingent valuation study*, Tasman Institute, Melbourne 1991.
 - 21 <http://www.abs.gov.au/Ausstats/abs%40.nsf/b0462a212839e1e5ca256820000fe0de/e3c62b38c2b153aeca256c8b0081eb9b!OpenDocument>
 - 22 *National Investment in Rural Landscapes*, NFF and ACF, May 2000.
 - 23 Before European settlement, about 14 per cent of Australia was forested. It is presently about 7 per cent and it is very difficult to see it physically possible to reach more than the previous 14 per cent, even if the loss of agricultural and urban land were to be acceptable.
 - 24 Allen Consulting Group (2001) *Repairing the Country: Leveraging Private Investment* (sponsored by Australian Conservation Foundation, Southcorp, ABN AMRO, Berri, CSIRO, Elders and Macquarie Bank).
 - 25 See Murray–Darling Basin Commission http://www.mdbc.gov.au/education/encyclopedia/water_and_land_salinity.htm
 - 26 Of course, in a parody of the sandwich-board man declaring 'the end of the world is nigh', doomsayers respond to this by constantly putting back the date of the impending catastrophic depletion of resources. The Club of Rome's forecasts of resource depletion were published in 1975, but there is a long history of such 'wake-up calls', including one from Theodore Roosevelt in 1908.
 - 27 See *The Value of Water*, DNRE, Victoria, December 2001.
 - 28 See *Free Market Environmentalism*, Terry L. Anderson and Donald R. Leal, Pacific Institute for Public Policy, Boulder Col., 1991.
 - 29 *Scope for Water Use Efficiency Savings as a Source of Water to meet increased Environmental Flows*, ACIL Tasman, March 2003
 - 30 Beattie B.R. and Foster H.S., 'Can prices Tame the Inflationary Tiger?', *Journal of American Water Works Association*, 72 (August 1980): 441–445. Cited in Anderson T.L. and Snyder A., *Water Markets*, Cato Institute, 1997.
 - 31 Address to Earthwatch's Shearwater Conference, Victoria, 30 June 2000.
 - 32 This reflects the English common law, which represents the centuries-long development of this understanding and the vast improvement in those countries' economies which adopted the secure property rights approach. (See Epstein R., *Principles for a Free Society*, Perseus Books, Reading Mass., 1998). See also Bethell, Tom, *The Noblest Triumph*, St Martin's Press, New York, 1998.

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Dr Alan Moran is among Australia's best-known economists working in the area of regulation. One focus of his work has been the network industries. In addition to water, these include energy, on which he has written extensively and serves on the National Electricity Code regulator's Panel. Dr Moran has been prominent in promoting reduced regulation and competition reforms both from within the IPA and as a government official. In this respect he was the inaugural Director of the Commonwealth's Office of Regulation. He has authored several books and published numerous articles on regulatory matters.