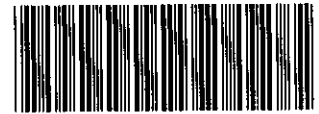


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Water Reform and Co-operation

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Abstract

This paper examines the potential impact of water reforms on agricultural water users and the consequences of the privatisation of government water irrigation assets. Within this context, the role of co-operation and the use of the co-operative organisational structure is documented and explored. From a public policy perspective, the importance of co-operation and co-operative structures can be viewed as a response to market failure. The established and proposed water markets and associated property rights, have elements of common property resources, externalities and high transaction costs. The recognition of market failure and its consequences questions the standard economic efficiency arguments for an unregulated water market, and heightens the role of co-operation.

Introduction

This paper examines the impact of water reforms on agricultural water users in NSW with a view to analysing the possibilities for greater co-operation and use of co-operative structures in water markets. The rural water reforms implemented by the NSW Government are complex. They are complicated by on-going policy changes, the development of water catchment plans, the call for compensation payments to existing water users and the difficulties of separating water and land property rights.

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An important aspect of the reform process relates to the privatisation of NSW irrigation assets. During the mid- to late-1990s the NSW Government transferred its six irrigation schemes and irrigation assets in the Murray and Murrumbidgee areas at nil cost to locally owned public companies (eg, Murray and Murrumbidgee irrigation). A major issue for these organisations has been how they structure their organisations to provide for future asset replacement, upgrades and investment, especially to provide for future water savings.

The paper serves to raise the debate surrounding the impact of the NSW reforms on agricultural production, in particular irrigation and large water user needs. It also provides commentary on the mix of competing policy objectives in NSW (eg, privatisation of government assets, micro-economic objectives and Council of Australian Governments (COAG) compensation issues), as well as the economic and environmental sustainability issues surrounding the reforms.

The rest of the paper is organised as follows. The next section sets the scene by summarising water usage and irrigation practices in NSW agriculture. We then present the policy background to NSW water reforms, looking at the COAG reforms and the NSW Water Management Act. An examination of the potential impact of the water reforms on existing physical and administrative structures and water users is then conducted. This is followed by the documentation of co-operation between water users in the water reform process. Finally, we examine possibilities and motivations for the emergence of greater co-operation and the increased use of the co-operative structure in water markets.

Water Usage and Agriculture

The ABS (2000) reports that the agricultural sector is the largest net user of water (totalling 15,502 GL in 1996-97) and accounted for 70 percent of net water use in Australia. Of this amount, pasture, livestock, grains and other agriculture accounted for some 57 percent of total agricultural water consumption. Significant water users in this sector are the cotton, sugar and rice industries. Agricultural activities depend heavily on both mains supplied (54 percent of water used) and self-extracted water resources (46 percent), (ABS 2000).

The ABS (2002) also estimates that irrigated production accounted for approximately 26 percent (\$28,156 million) of the total gross value of production from agriculture in 1996-97. The total value of irrigated agricultural production in NSW's major irrigated valleys is \$1.8 billion (NSW Irrigators Council 2002) and while it uses just 1.5 percent of agricultural land in NSW, it accounts for nearly 35 percent of production. Irrigation water usage increased by 76 percent between 1985 and 1996/97 (Jonas Ball et al. 2001). In 1999-2000, 2.4 million hectares of land were irrigated with NSW accounting for 40 percent of this area.

ABARE (1998) estimates that in 1996-97, there were at least 5,244 irrigators in NSW irrigating for a variety of agricultural purposes, including cotton, rice, pastures, wheat and other crops. The average value of irrigation plant capital was some \$23,264 and the mean total for irrigation volumes were 1,323 megalitres and mean total area of crops irrigated was 109 hectares, ABARE (1998). The most intensively irrigated crops are rice, cotton and grapes with 97 percent, 96 percent and 81 percent, respectively, of their growing areas recorded as being irrigated, (ABS 2001).

The method of irrigation used influences the efficiency of water use (ie, water applied which does not evaporate) and the value of the harvested crop. Nevertheless, the statistics show the prevalence of water inefficient irrigation techniques because furrow or flood irrigation methods are used for nearly 70 percent of all irrigated land in Australia and 85 percent of irrigation in NSW as reported by the ABS (2001).

The major problem of concern to policy makers apart from inefficient water usage, has been rising saline ground water as a result of irrigation. Of particular concern is the problem of dry land salinity in the Murray-Darling Basin (MDB) brought about by extensive farming and changes in land cover. It is predicted that by 2100, many rivers in the MDB will have salinity levels exceeding the World Health Organisation minimum acceptable standards for drinking water, (MDBC 1999).

Policy Background to the NSW Government's Rural Water Reforms

The water reform agenda undertaken by the NSW Government owes much to the national initiatives and strategies established by the COAG in 1994 to

encourage sustainable water management policies and prioritise the environment over production, economic and social objectives¹. NSW reforms that have impacted on NSW farmers and irrigators have been the privatisation of government irrigation schemes in the MDB along the Murrumbidgee and Murray rivers and the introduction of the Water Management Act 2000.

COAG Reforms

The 1994 COAG Agreement included a commitment by all Governments to a package of measures to address the economic, environmental and social implications of future water reforms. These reforms included a move to full cost recovery in pricing water, the clarification of property rights to water, the trading arrangements, institutional reforms to separate service delivery and regulatory functions and better public consultation processes.

The 'carrot' in the reforms was significant financial incentives for States and Territories to implement these water and other National Competition Policy (NCP) reforms, such as the development of a competitive electricity market. Satisfactory progress against the NCP reforms entitles individual states and territories to a per capita share of around \$16 billion in transfers from the Commonwealth.

As part of the COAG reforms, in 1997 the Murray-Darling Basin Council introduced the 'Cap' to cease permanently extra water diversions from the river systems, (Quiggin 2001). More recently debate has focused upon reducing total water diversions for irrigation in an effort to increase environmental flows. A suggested policy setting is to provide an additional 1500 gigalitres per year for environmental flows for the Murray River, (Young & McColl 2003).

In part, the COAG process seeks to impose market-based solutions to water-related environmental problems. The 'Wentworth' group and its proposed 'robust separation' framework for the trading and registering of water property

¹ The driving force behind COAG reforms appears to be a mixture of micro-economic reform and sustainable development ideals – which often sit uncomfortably with each other. Economic principles have been applied to private government assets, to limit water use because of scarcity, and to trade water with similar legal property rights as land. The mixture of these principles and paradigms has been confusing. They can be contrasted further with common pool resources and public good characteristics of water discussed in later sections of the paper.

rights is a fundamental part of the market-based solution approach, (Young & McColl 2003). The proposed framework is argued to be dynamically efficient, have low administrative costs and is robust to changes in institutional settings. A difficulty with the development of a trading rights system is the treatment 'sleeper' statutory rights, that is, historical water rights attached to land but never employed, (Quiggin 2001, pp. 85-88). If these rights are enacted then even without issuing new licences water diversions will increase.

NSW Reforms

One of the first national competition reform initiatives of the NSW government was the institutional separation of its water delivery and regulatory functions from the Department of Land and Water Conservation. The rationale underlying these reforms was the improved accountability, productivity and efficiency of separate water delivery and regulatory functions.

In the late 1990s, NSW also privatised six former government irrigation schemes located in the southern part of the Murray Darling Basin under the following NCP rationale that led to 'constituents being given a greater degree of responsibility in the management of irrigation areas (Clause 6g)' (NCC 1999). In June 2001, the NCC concluded that all NSW irrigation areas are now privately operated and controlled by farmers and irrigators and that the NSW Government had met its requirements under the NCP.

The culmination of the NSW Government's water reform program was the introduction of the Water Management Act ('the Act') in December 2000. This has revolutionised the way water is managed in NSW because it is based on the concept of ecological sustainable development that will not threaten the ability of future generations to meet their needs and gives the Government the ability to prioritise the environment above all other economic, social and community goals (NSW DLWC 2002). The purpose of the Act is to provide for the protection, conservation and ecological sustainable development of water, (NSW DLWC 2002).

The Act foreshadows the separation of current water licences into water access licences (with a share of the resource component and an extraction component) and water use licences which are specific to an area of land. This separation of water access entitlements from title to land is a major component of the COAG agreement and a key step in facilitating water trading. Existing

water licences have been converted to volumetric licences so that all water licences in NSW are more standardised.

Impact of Reforms on the NSW Irrigation Industry

In NSW farmers and irrigators have been vociferous in their criticism of the NSW Water Management Act, including its introduction, planning processes, consultations and impact on NSW agricultural production. The major problems with the NSW reforms, according to the irrigators and farmers, appear to be prioritising the environment to the detriment of production, employment and regional development.

Farmers also believe that the process of consultation through the water catchment committees has been flawed. Farmers make up only a few of the committee members, some members are not from the local community and members have had to often commit to plans that do not result in their best or future production interests.

Production Losses

The NSW Irrigators' Council together with Cotton Australia and the Ricegrowers Association (NSW Irrigators Council 2002) estimate the following impacts as a result of the NSW water reforms on the major irrigation valleys with Draft Water Sharing Plans (Murrumbidgee, Namoi, Gwydir, Lachlan, Macquarie and Murray): total potential megalitres lost to irrigation, 752,994 megalitres; total lost gross agricultural production value as \$347.6 million; an estimated 4,519 jobs lost, with 2,086 of these in the agricultural sector; the cotton industry which is valued at some \$572.9 million is projected to lose some \$208 million and the rice industry valued at some \$292 million is estimated to lose \$14 million. The NSW Farmers' Association have released similar figures and estimate that the water reforms will cost 4,300 jobs and a loss of farm production of \$324 million, (NSW Farmers' Association 2002).

The NSW Government commissioned an independent study to measure the impact of the reforms and water sharing plans for NSW (ACIL Consulting 2002). This research estimated that the impact of the reforms on production and employment would be lower than that anticipated by the irrigation industry. Despite the doubts about the veracity of both irrigators and

independent research methods, the conclusions of both are that the reforms impact negatively in terms of jobs and production losses.

Privatisation

One can argue that so far there has been very little benefit or new opportunities for co-operatives, irrigation corporations, and farmers as a result of the implementation of the new water operating environment arising from the privatisation of NSW's irrigation assets. The privatised irrigation assets were acquired at nil cost by public companies that will need to raise capital from the general public to fund future investment, infrastructure and the ageing assets. These problems may cause them in the future to lose customers and/or members who may be able to source water from other areas through temporary or permanent transfers in water licences. This may leave them with what has been called 'stranded assets', that is high cost irrigation assets that have no marketable value, (Goesch 2001).

It is unclear whether the irrigation companies as public companies will be able to raise future capital needed to replace, upgrade and invest in high cost, new plant and equipment from the general public or their local communities. As well, there may be current or annual tax liabilities that prevent them as public companies from attempting to save or invest for future unknown, but large-scale (billions of dollars) capital works and improvements. Such high cost and large-scale capital works may be beyond the abilities of local community or public fund raisings, and not seen as conducive to current community and public irrigation and water needs.

Co-operation and Co-operatives in the NSW Water Reform Process

There may be some benefits to be considered from pooling or working co-operatively in the new water environment. To this end some NSW irrigators have worked co-operatively to achieve common goals. The Department of Land and Water Conservation estimates that there are about 700 authorised joint water supply licences or arrangements operating throughout NSW.

As a result of the privatisation of irrigation assets in NSW only one co-operative has been established, namely Coleambally Irrigation Co-operative Limited (CICL). It represents 375 shareholders and 437 farms. It has

established a separate entity known as Coleambally Irrigation Mutual Co-operative Limited for the purpose of investing asset funds for future replacement of the irrigation infrastructure. The two entities operate with separate boards and via service agreements, the operating entity undertakes services for the mutual entity. This structure enables the creation of a non-trading entity responsible for the investment of funds and infrastructure replacement and is separate from the operating entity responsible for day-to-day operations.

In addition to the two-tiered Coleambally Irrigation Co-operative, seven other agricultural water related co-operatives exist in New South Wales. The size of these co-operatives is relatively small ranging from 14 to 67 members. The purpose of these co-operatives varies, but mainly relates to providing water to members, (NSW DFT 2002).

Increasing Co-operation and Co-operative Opportunities in Water Markets

This section discusses the prospect of increasing co-operation and the use of the co-operative form for water markets from two different perspectives. First, the benefits which may potentially accrue to individual irrigators from the use of the co-operative form will be outlined. Second, the role of co-operation from a public policy perspective will be examined. Here the concept of market failure and its consequences for the water market are discussed.

Benefits of a Co-operative Structure

Co-operatives do operate successfully in Australia. In 2000, approximately 5 percent of the top 500 private companies in Australia were co-operatives, the Dairy Farmers Group being the largest co-operative and listed as the eighth largest private company in Australia, (Wickremarachchi & Passey 2003). The largest co-operatives produce agricultural commodities such as: milk, cheese, rice, cotton and sugar. The total turnover of NSW primary producer co-operatives for 1999/2000 was approximately \$3.6 billion and this turnover increased by more than 110 percent over the 1990s decade (Wickremarachchi & Passey 2003). This turnover success contrasts with a 5 percent reduction in the number of NSW primary producer co-operatives during the 1990s, suggesting some rationalisation in the agricultural co-operative sector.

The arguments for forming a co-operative for servicing agriculturally based activities are well developed and potentially offer opportunities for the use of the co-operative structure for irrigators. Krivokapic-Skoko (2002) provides a good overview of the empirical evidence on reasons for forming a co-operative. Potential benefits can be labelled under two broad categories: 1) return strategies and 2) risk management strategies (see for example, Peterson & Anderson 1996).

For irrigators, compared to operating in isolation or working with a corporation, the following specific possible benefits from forming a co-operative may exist. In terms of return strategies, as the water market develops over time, potentially large traders may emerge who may gain significant market power in water trading. The ability of large traders to manipulate market outcomes can be countervailed through the formation of a co-operative which may yield greater bargaining power in the market place than might any individual small irrigator. In terms of improving cost efficiencies, lower agency costs may exist with a co-operative structure compared to a corporation. Co-operatives generally have lower pay structures for senior management than corporations. In contrast to shareholders in corporations, co-operative members have additional information about the managerial processes in their organisations. This reduces managerial monitoring costs and possibly reduces losses from inept major managerial decisions.²

In terms of risk management strategies for water trading, a co-operative structure has the potential to pursue a 'savings bank' strategy. The co-operative can use generated surpluses to act as a buffer against water market fluctuations. Retained co-operative surpluses can rise in times of low prices and fall in terms of high prices, to maintain relatively constant water prices for members, shielding them from market fluctuations. Relatedly, a co-operative is more likely than a corporation, to maintain-the-market for an individual irrigator who faces hardship. That is, because co-operatives often seek to maximise member returns they are also more likely to consider the effects on a member's farm assets of abandoning an irrigator facing unique difficulties.

Market Failure

The broad environmental economics framework surveyed in Quiggin (2001) provides the basis for examining the role of co-operation in water markets.

² For empirical evidence on cost efficiency savings see Peterson and Anderson (1996) and the references cited therein.

Quiggin (2001) provides a useful summary of a series of eclectic alternative analytical frameworks for assessing environmental policy for the Murray-Darling river system. In part, these frameworks address the consequences of market failure. Relatedly, a common motivation for establishing or maintaining a co-operative organisational structure is to overcome problems related to market failure, (Cook 1995). This recognition motivates the need to outline the role co-operation may play in water markets through an examination of frameworks relating to: 1) common property resources, 2) externalities and 3) transaction costs and incomplete information.

Common Property Resources

A common property resource (CPR) is an asset used either in production or consumption which is not owned by one individual. It could be argued that the river systems are collectively owned by society and used in various ways by its members. It is well known (Ostrom 1990) that unrestricted access to a common pool resource results in over-use and exploitation of the resource and hence unregulated markets fail.

In many countries (for example, Spain, Japan and Switzerland) and for many centuries, the use of a common pool resource has been sustained by collective local appropriators through self-designed management and monitoring systems (Ostrom & Gardner 1993). This empirical observation is consistent with the theoretical result that in terms of maximising total group net-returns to users, a co-operative solution to using a common pool resource is superior to a non-co-operative solution. That is, prisoner dilemma game theoretic notions can be employed to illustrate the superiority of a joint maximisation co-operative solution, to the appropriation of a CPR, over the individual maximisation Nash non-co-operative solution, (McCarthy, Sadoulet & de Janvry 2001). The introduction of costs of negotiation, supervision and enforcement within the co-operative, alters the level of extraction but still predicts the superiority of the co-operative solution (see Seabright 1993; McCarthy, Sadoulet & de Janvry 2001).

An important issue motivated by the CPR literature is the consequence of the free-rider provision of maintaining infrastructure for water distribution. As Freeman (1990) suggests, if all but one irrigator maintains and improves water channels and pipes, then the irrigator who does not participate in infrastructure maintenance stands to benefit at no cost. If all irrigators individually behave in this way then infrastructure is not maintained and becomes depleted.

Effectively the absence of co-operation leads to water distribution inefficiency. The current depreciated state of irrigation infrastructure in Australia makes this an issue of significant importance (Brennan and Scoccimarro 1999).

Externalities

It is well known that the existence of externalities in the production or consumption of a resource results in a difference between the privately and socially optimal usage level (see Gravelle & Rees 1992, ch. 18). In water markets at least two types of externalities have been identified, salinity and improvements in irrigation efficiency. In terms of salinity, return water flows from upstream irrigators have a major influence on the salinity level of water used by downstream users (Heaney & Beare 2001). Effectively, an upstream irrigator imposes a negative externality on a downstream user by contributing to the salt level of the river. On the other hand, if upstream users improve irrigation efficiency then this imposes a positive externality on downstream users (see Heaney, Beare & Bell 2001). Improvements in irrigation efficiency implies that individual users use less water, and if water is not hoarded for other purposes, results in increased water flows for other users and the environment and also reduces the amount of saline groundwater seeping into the water system.

Traditionally economists have advocated the use of two alternative responses for dealing with externalities: internalising the externality through negotiated property rights (Coase 1960) and the introduction of taxes or subsidies (Pigou 1924), see Gravelle and Rees (1992, ch. 18). The Coasian solution is only feasible if property rights are well defined and transaction costs are low, see Eyal and Hochman (1996). Moreover, even if property rights are well defined, unequal political power results in a sub-optimal outcome, (Eyal & Hochman 1996). We will cite literature below which points to significant problems with defining property rights for water and high levels of transaction costs. This recognition questions the efficacy of negotiated property rights for water trading.

The research of Heaney and Beare (2001) and Heaney, Beare and Bell (2001), suggests that the effects of salinity and improvements in water efficiency are non-exclusive, highly site specific and variable in nature. As a consequence it is not feasible to internalise these externalities through instruments such as salinity credits. Heaney and Beare (2001) suggest that a set of taxes and

subsidies on water trade may be necessary to handle these externalities and to facilitate the investment needed to improve irrigation efficiency.

As an alternative and consistent with the CPR literature, a co-operative solution may be another response to addressing these externalities. Co-operation through the pooling of financial, capital and human resources may make feasible the use and procurement of improved water distribution processes. In isolation there is little financial incentive for an individual irrigator to improve irrigation practices. The establishment of a group of irrigators who collectively purchase improved piping and distribution systems may result in outcomes consistent with less water usage and improved salinity levels. An irrigator is likely to gain more from, and commit resources to, improving irrigation efficiency if other irrigators also pursue similar strategies (Freeman 1990). Effectively, the costs and benefits of externalities may be shared by collective groups of irrigators to achieve a more collectively desirable outcome.

Transaction Costs and Incomplete Information

In designing and operationalising an institutional structure for water trading, issues relating to transaction costs are important. Transaction costs are costs needed to efficiently carry out exchanges between market participants. Challen (2002) argues that the best institutional structure to support property rights is that which minimises these transaction costs. A co-operative structure for irrigators may be one option which reduces these transaction costs. By definition, if co-operatives are formed then fewer market transactions need take place and therefore lower market transaction costs occur. On the other hand, the costs associated with distribution and enforcement within the co-operative must be recognised.

Some of the issues which determine the size of transaction costs for the water market include, the uncertainty of property rights and the information requirements needed to facilitate efficient water trading. In general, water property rights in Australia represent an entitlement to take a proportional share of available water within a defined security class, (MacDonald & Young 2001). The absolute entitlement is variable given changing rainfall patterns and therefore the actual uptake of water is uncertain. Moreover, policy settings are changing constantly, further adding to the uncertainty of rights. The consequences of ill-defined rights can be significant for the efficient operation of the market. Beare and Bell (1998) point to ill-defined rights leading to weak

incentives for irrigators to pursue water saving technologies and investments. Crase, O'Reilly and Dollery (2000) cite ill-defined property rights as a serious impediment to a vibrant water market for permanent entitlements. The lack of an active trading market for permanent entitlements is likely to be accompanied by under-investment in highly valued agricultural endeavours.

To help alleviate these detrimental consequences of ill-defined property rights (ie, the lack of incentives to invest in infrastructure and water saving technologies), a co-operative structure might be advocated. As previously argued, the likelihood of gaining increasing levels of investment in water infrastructure is higher with a co-operative structure than with a structure of individual irrigators. The pooling of various resources and the potential resulting benefits from economies of scale, make it more likely for irrigators to undertake investment in water saving technologies.

The specific consequences of the externalities associated with salinity and improvements in irrigation efficiency are difficult to measure. The effects depend on the time of season, long-term rainfall intensity and are site specific, (Beare & Bell 1998). The costs of acquiring this information to facilitate the operation of a successful trading market are substantial (see Bell 2002). For example, even though a downstream user may have some notion about the salinity impact of their water use, they would have very little information about the quite different salinity impact of water used by an upstream user. Given the recognition of externalities, Bell makes the case that this lack of information about the magnitudes of these external effects will mean that a free atomistic competitive market in water entitlements will not be optimal. An institutional structure which improves the information flow about these externalities is needed to produce a more socially desirable outcome.

Bell's (2002) simulations show that reducing the number of traders improves the information flow and results in more socially desirable outcomes by better recognising the costs and benefits of externalities. The formation of co-operatives reduces the number of market participants and, hence, enables the market process to better capture the salinity effects of water use. Effectively, a co-operative structure representing many individual water users will better be able to harness information about different salinity and water efficiency aspects of use and distribution. Exchanges between and within co-operatives will better capture the full benefits of trade.

Conclusions

While the prioritising of the environment and the emphasis on sustainable development embodied in the NSW water reforms is important given NSW water, groundwater and salinity usage patterns and problems, the reform process will create many production and investment casualties. There is a clear need for the NSW Government to better manage the reform process, including guarantees for critical production uses and delivering compensation to those farmers who are facing production and investment uncertainties.

There may be extra benefits from the NSW water reforms if the policy environment investigates more co-operative forms of encouraging farmers and irrigators to work together to invest in water saving technology and infrastructure. From this public policy perspective, the importance of co-operation and co-operative structures can be viewed as a response to market failure. The established and proposed water markets and associated property rights, have elements of common property resources, externalities and high transaction costs. These characteristics question the standard economic efficiency arguments for an unregulated water market, and heighten the role of co-operation.

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