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***From Words to Deeds: A Study of Collective Action by Irrigators in  
Enforcing their Commitments to Adopt Conservation Practices***

Graham R. Marshall<sup>1</sup>

Institute for Rural Futures, The University of New England,  
Armidale, Australia.

**Abstract:**

Collective action in conserving common-pool natural resources involves the problem of enforcing individuals' commitments to cooperate. Historically, many resource-conservation programs have failed to meet their expectations due to the high transaction (including political) costs of government enforcement of compliance by individuals with what they have committed themselves to. One response to this has been devolution of enforcement of this kind from governments to industry-based organisations. This has followed from a belief that firms are usually more prepared to cooperate with industry organisations because of the greater likelihood that their approach to enforcement will accord with their norms and values. This paper reports the findings from a case study that assessed the validity of this belief in a single context. The case involves a group of Australian farmers attempting to overcome their irrigation salinity and waterlogging problems by agreeing *inter alia* to grant to their jointly-owned company (supplying them with irrigation services) powers to sanction them individually if they fail to comply with a conservation strategy to which they have collectively committed themselves. The study involved qualitative analysis of in-depth interviews as well as quantitative analysis of responses from a survey of 235 farm businesses. It was found that the farmers are more prepared to accept sanctioning from their company than they would be from government. Nevertheless, their longstanding suspicion of authority generally has not been overcome overnight. There remains considerable scope for the company to reduce the transaction costs of its enforcement function by continuing to work at gaining trust from the farmers that this function is necessary and is being carried out in their best interests.

**1. Introduction**

Governments the world over are coming to recognise their limitations in addressing natural resource degradation. They can enact rules governing the use and conservation of natural resources, but all too frequently these rules lack adequate enforcement (Meinzen-Dick and Knox 2001). This is often particularly the case in agricultural contexts due to strong farmer convictions that their property rights in land should be unconstrained, "the political sentimentality of all things agrarian" (Bromley 1996 p. 19), and administrators often having considerable discretion in deciding whether and how enforcement should occur (Bradsen 1994).

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One way that governments have responded has been to devolve some rights and responsibilities for natural resources governance to the local level. This response has been justified in part by assumptions that rules devised and administered locally will be easier to enforce than those imposed by “outsiders”. It has also suited governments facing fiscal crises (Meinzen-Dick and Knox 2001). The actual record of devolution programs in improving enforcement of rules governing natural resource use has been mixed, highlighting the importance of developing a more sophisticated theoretical understanding of the link between devolution and enforcement. Such an understanding would better equip us to match designs for devolution programs to specific contexts and thus maximise their prospects for success. Comparisons of case studies of actual devolution programs will provide much of the basis for this understanding (ibid.).

This paper presents one case study of this kind. The case involves a program of devolving rights and responsibilities for aspects of natural resources governance to a irrigator-owned company. The aim is to identify factors affecting the success of the program in improving the enforcement of rules governing natural resource use in this context. Progress made in developing a theory of how devolution of natural resources governance might enhance the prospects of enforcing rules in this domain is briefly reviewed in section 2. This theory was the source of the hypotheses explored in the present research. The biophysical and policy context of the case study is considered in section 3, after which the methodology is described in section 4. This methodology involved joint application of qualitative and quantitative research techniques. The findings from the qualitative and quantitative research are presented in sections 5 and 6, respectively. Some concluding comments are offered in section 7.

## *2. Theory*

Natural resources for which degradation is an issue tend to be common-pool resources (CPRs). These are “goods that can be kept from potential users only at great cost or with difficulty but that are subtractible in consumption and can thus disappear” (McKean 2000 p. 28). Unless institutional arrangements can be devised making it affordable to control access to a CPR, they essentially remain open-access resources available to anyone. Hardin’s (1968 p. 1244) article “The Tragedy of the Commons” highlighted influentially how open-access resources are subject to collective action dilemmas – rational self interest can lead individuals to outcomes inferior to those they would reap if they cooperated with one another.

Dilemmas of this kind can be overcome by introducing systems of “selective incentives” (Olson 1965 p. 51) making individuals’ costs of access to a CPR contingent upon their compliance with institutions, otherwise known as rules. Provision of such systems typically involves a second-order collective action dilemma because of the difficulty of restricting any resulting benefits, in terms of enhanced collective action, to the individuals incurring the costs of the provision effort (i.e., precluding ‘free riding’). A key aspect of this dilemma concerns the enforcement of the institutions underpinning a system of selective incentives. As Elster (1989 pp. 40-41) observed:

Punishment almost invariably is costly to the punisher, while the benefits of punishment are diffusely distributed over the members. ... To provide it, one would need second-order selective incentives which would, however, run into a third-order free-rider problem.

Rational-choice theories of collective action have come to acknowledge the pivotal role of norms of generalised reciprocity in solving free-rider problems associated with providing punishment. For Putnam (1993 p. 172), “generalized reciprocity refers to a continuing relationship of exchange that is at any time unrequited or unbalanced, but that involves

mutual expectations that a benefit granted now should be repaid in the future”. Another word for these mutual expectations is trust. Ostrom (1998) modeled reciprocity and trust as positively reinforcing one another. This is because compliance with reciprocity norms requires trust that the compliance will eventually be reciprocated. Trust in others practising reciprocity grows when increased compliance with this norm is observed. This increase in trust raises the expected return from initiating reciprocity, thus increasing compliance with this norm. Conversely, an observed decline in reciprocity weakens trust and thereby undermines reciprocity further.

As problems of collective action become more complex (including by groups sharing these problems becoming larger), the advantages of groups organising hierarchically to solve their collective-action problems increase commensurately. Hierarchical, otherwise known as ‘third-party’, development and enforcement of institutions is typically needed in large-group problems of collective action to increase the likelihood of free riders being identified and punished so that free riding does not exceed a threshold over which trust, reciprocity and cooperation begin to unravel in a vicious circle.

This does not mean that large groups should depend entirely, or even mostly, on third parties to provide them with the institutions they require. Complex problems of collective action are often decomposable into sequences of simpler problems. The trust needed to solve some these simpler problems through reciprocity may be available already. If a base of hierarchical organisation can be established for a group’s simpler problems, the task for the group providing itself with the hierarchy it requires to resolve more difficult problems becomes easier. This way it can be possible for hierarchy to accumulate endogenously through “the incremental self-transformations that frequently are involved in the process of supplying institutions” (Ostrom 1990 p. 190).

An elaborate hierarchical system can thus arise organically as higher levels of hierarchy emerge from and ‘nest’ lower levels that managed to self-organise sooner. This model suggests that government needs to complement, rather than supplant, the self-governing capacities at simpler levels of social organisation if it is to be effective. The benefits of hierarchy in helping individuals establish trust that they will reciprocate one another’s cooperation are not costless. Aside from the resources required to establish and maintain such a system, introducing a third party creates a new challenge of establishing trust ‘vertically’. Hence the problems of individuals establishing mutual trust are lessened by hierarchy only to the extent that they trust the third party not to fail them. To the extent that this trust or legitimacy is lacking, the less will individuals judge it in their interests to comply with hierarchical interventions spontaneously on the basis of reciprocity – and the greater will be the need for costly coercion.

Trust in a hierarchy depends *inter alia* on how well its behaviour is perceived to accord with the social norms of those it is intended to serve. The more that a hierarchy’s interventions are consonant with such norms, therefore, the more can compliance with those interventions be expected to occur spontaneously by virtue of norms of reciprocity. The more that compliance occurs normatively in this way, the lower will be the overall transaction costs of gaining compliance given that “[t]he cost of social rewards to achieve conformity to norms is low because it is produced spontaneously in the course of social interaction in networks of personal interaction” (Nee 1998 p. 87). Indeed, one of the main justifications for devolving rights and responsibilities associated with hierarchical governance of natural resources towards local communities has been that this may allow for closer matching of interventions

with the norms of each community, thus reducing the need to enforce them coercively (Meinzen-Dick and Knox 2001 p. 65).

Devolution signifies transfers of property rights and corresponding responsibilities in respect of making collective choices from state property regimes to common property regimes. A common property regime “is a property-rights arrangement in which a group of resource users share rights and duties towards a resource” (McKean 2000 pp. 29-30). There is now considerable evidence that common property regimes can, given the right conditions, play an important part in efficient governance arrangements (Baland and Platteau 1996; Meinzen-Dick *et al.* 2001; Ostrom *et al.* 2002). Substantial progress has been made in systematically delineating these conditions through comparative analysis of case studies of diverse common property arrangements. One condition entails common property regimes enforcing their rules through systems of graduated sanctions (McKean 1992; Ostrom 1990). The level of punishment for rule infractions in such systems depends on the seriousness and the context of the offence.

### ***3. Study context***

The case study was concerned with a program of developing and implementing four ‘land and water management plans’ (LWMPs) for four adjoining irrigation districts located in south-eastern Australia. Significant devolution of rights and responsibilities in respect of natural resource governance occurred in this program. Indeed, the program has resulted in a company co-owned by the irrigators in these districts being devolved rights and responsibilities giving it considerable autonomy to decide how the LWMPs will be implemented.

The company is Murray Irrigation Limited (MIL). Subject to a Heads of Agreement (HoA) it co-signed in April 1996 with the New South Wales (NSW) Government, it was devolved various property rights it required to ensure that landholders in its area of operation comply with the terms of the cost-sharing agreement in respect of implementation of the LWMPs. The four districts addressed by the LWMPs are known as Berriquin, Denimein, Wakool and Cadell. The first two of these Districts coincide with the Berriquin and Denimein irrigation schemes, respectively. The third coincides with the Wakool/Tullakool irrigation scheme. The fourth comprises the Deniboota irrigation scheme as well as an adjoining area to the east (that came to be known as East Cadell). These Districts are situated in southern inland NSW in what is known as the central-Murray region. The schemes were constructed by the NSW Government during the 1930’s and 1940’s. The farm area within the schemes is 749,202 ha. The number of farm businesses within the schemes has been estimated at 1,610 (MIL 1998).

Concerns during the 1980s regarding rising watertables within the scheme areas, and consequently about increased productivity losses due to soil salinisation as well as worsened waterlogging, became increasingly prominent. Wider concerns were emerging too regarding the water-quality effects of discharging drainage – predicted to become increasingly saline as soils salinised – from the schemes into streams that flow ultimately into the Murray River. The Murray-Darling Basin Ministerial Council (MDBMC) responded to these broader concerns by promulgating a Salinity and Drainage Policy that set limits on the rights of NSW and other states in the Basin to discharge saline drainage into the Murray River system. At about the same time, the MDBMC also promulgated a Natural Resources Management Strategy signaling that government funding of salinity-mitigation programs would henceforth

be provided only if these programs involved effective collaboration between state governments and the affected communities.

These initiatives motivated landholders in the irrigation schemes, as well as the NSW Government, to reassess how they had been dealing with their problems of soil salinisation and waterlogging. The communities of each of the four districts had convened public meetings by June 1992. In each case a decision was made to develop a LWMP. Negotiations between the NSW Government and the communities of the four districts over the final content of the LWMPs, including cost-sharing arrangements, occurred during September 1995. The outcome – formalised in the HoA – was that the Government agreed to contribute \$A116 million over the first 15 years of implementing the four LWMPs, subject to the Commonwealth Government meeting half this cost and landholders in the district communities delivering annually on their cost-sharing commitments. These commitments sum to \$A382 million over 30 years. Most of this commitment is ‘in kind’, in the form of costs incurred by landholders in adopting the conservation technologies and practices specified in their LWMP.

The irrigation schemes were privatised in March 1995 as part of a national process of water-policy reform. This left the schemes as the property of MIL, a private company incorporated under the Irrigation Corporations Act, 1994. Shares in the company are fully apportioned among irrigators in proportion to their irrigation entitlements. MIL is the largest privately-owned irrigation supply and drainage company in Australia, with a bulk irrigation entitlement of 1.445 million megalitres (MIL 1999). The HoA requires that the company ensure implementation of the four LWMPs, including by honouring the community’s cost-sharing commitments, if it is to remain in business. The rights conferred legally upon the company were considered sufficient for it to enforce landholder compliance with the LWMPs. It was anticipated that this enforcement would occur through the company attaching conditions to its water-supply agreements with the individual irrigators who are its customers (Schroo 1998).

#### **4. Method**

The case study method treats cases as experiments from which insights can be generalised “to theoretical propositions and not to populations or universes” (Yin 1984 p. 21). One strategy for increasing construct validity in case studies is to use multiple sources of evidence. One way of doing so, followed here, is to use quantitative and qualitative methods of data collection and analysis together in a complementary fashion (Easterby-Smith *et al.* 1991). Quantitative methods concentrate on measuring phenomena numerically, whereas qualitative methods seek to capture the nuances of the case dynamics as well as richness of detail.

The qualitative research consisted of conducting and analysing in-depth interviews with 30 key informants in respect of the LWMP program. All interviews were conducted during 1999. The informants included landholders, MIL directors, MIL staff, community leaders, chairpersons and executive officers (past and present) of the Murray Catchment Management Committee, staff from relevant NSW Government agencies (located in the region as well as in head office), staff from the Murray-Darling Basin Commission, the Program Coordinator, a consultant with substantial involvement in the program, and a local government councillor.

The quantitative research involved estimation of multiple regression models. In order to demonstrate on-farm compliance with the LWMPs, each year MIL undertakes a face-to-face survey of land holdings within the four districts. Interviewing to obtain the quantitative data

occurred at the end of each respondent's standard MIL interview. There were 235 farm businesses in the stratified random sample, representing 14.6 per cent of the 1998 population of 1,610 farm businesses. The interview schedule for this study was comprised mainly of bipolar (e.g., strongly agree/strongly disagree) rating scales. A nine-point rating scale was used for these items (so the scale midpoint in each case is five). The ordered-probit method of multiple regression (Greene 1993) was used recognising that the dependent variables were measured by rating scales rather than interval scales. A pseudo- $R^2$  recommended by Veall and Zimmerman (1992) was used to measure goodness of fit.

## 5. *Qualitative analysis*

The qualitative analysis explored how devolution of governance rights and responsibilities to MIL had enhanced the prospects for enforcing on-farm implementation of the LWMPs. The exploration involved examining the match between the theory discussed in section 2 and the actual effects of devolution on enforcement as ascertained in the in-depth interviews. See Appendix A in Marshall (2001) for the complete set of interview transcripts.

The Heads of Agreement had the effect of devolving to MIL the responsibility for ensuring that landholders collectively satisfy the on-farm requirements of the LWMPs. It also granted the irrigator-owned company a range collective-choice property rights giving it considerable autonomy in deciding how this might be achieved. Geoff McLeod, MIL's Environmental Manager when interviewed, characterised his company's strategy of ensuring on-farm compliance as follows as one of graduated sanctions along the following lines:

Our approach has been, first, education, second, encourage by incentives, third, make them aware that there are sticks in the cupboard and, fourth, you pull the stick out and use it. ... Murray Irrigation has got the ultimate stick of being able to turn someone's water off. We seek to use that as sparingly as possible. ... But there are individuals who will always try and get around us. And anyone who does, by stealing water for example, is hit pretty hard. Their wheels are locked, and their irrigation allocations are debited.

The hope in devolving implementation responsibilities to MIL was that its co-ownership by irrigators would make them more prepared to cooperate with its policies than if it were the NSW Government, which historically they had mistrusted and resisted, still making and implementing those policy choices. The irrigators had for many years resented the Government operating the schemes unresponsively to their practical requirements. Daniel Liphuyzen, the Chairperson of the Denimein Community Implementation Group (CIG) at the time of interview and previously a member of the Community Working Group<sup>2</sup> (CWG), referred accordingly to "the entrenched bureaucratic attitude of reluctance to change". Kelvin Baxter – who was an irrigator and a Director of MIL when interviewed and earlier was the first Chairperson of this company – recalled how: "New technology just hadn't been taken up at all. The Government was still running the scheme as in 1938 when it was first built".

Consistent with these views from irrigators, Warren Martin, who was Deputy Director of the NSW Department of Water Resources (later merged into the Department of Land and Water Conservation (DLWC)) during the time that the LWMPs were developed, commented: "I think that the irrigation areas and districts were seen a bit within the Department as being Government-owned operations. There was a bit of an attitude that 'we know best'". Peter Stewart, who was Project Coordinator for the plan development phase, remarked similarly on

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<sup>2</sup> Plan development in a LWMP district was the responsibility of that district's Community Working Group. These Groups were renamed as Community Implementation Groups once the plan implementation phases began.

how “There was a culture of “them and us”. “Them” was the Government and it laid the law down. And “us” were the people who paid the water bills and did what they were told”.

The hope invested in devolving implementation responsibilities to MIL appears to have materialised in significant degree. Tony McGlynn, a senior officer in the head office of the DLWC, judged that locating responsibility for implementing the LWMPs with MIL had been “very important in getting real change on farms. You wouldn’t be able to get it out of Government”. Consistent with this view, Berriquin Farmer One<sup>3</sup> reflected “I think now, as Murray Irrigation’s shareholders, we can see that it has to take more responsibility for environmental management and that they’ve got to do something”.

It seems also that irrigators are becoming aware that MIL’s responsibility for policing implementation has put the region’s irrigation community in the position of being able to establish a positive environmental reputation for itself. Berriquin Farmer Two remarked accordingly:

It’s no longer the Government chasing us around and saying “You’re not doing the right thing”. ... If we can collectively show through Murray Irrigation that we are trying, and that we’re not going to tolerate people that do the wrong things, it must help us collectively.

In a similar vein, Mr. Baxter asked rhetorically:

Do we really want the Environment Protection Authority going up all the back lanes looking for problems? Or do we want to be responsible for finding out ourselves what’s going on up those back lanes ourselves and nipping those in the bud? ... If we don’t take our responsibilities seriously, we may well lose them. Then all the irrigators would be worse off.

Moreover, the comments received indicate considerable confidence that MIL is more successful in expediting LWMP implementation by farmers than would be the case if Government were the responsible entity. For example, Sandy Robinson from the Murray-Darling Basin Commission observed from her experience of the LWMP program that “It’s interesting that once you’ve got things down to an arrangement, communities tend to be tougher on themselves than they’ll let government be with them”. Likewise, Jamie Hearn, who had been Chairperson of the Cadell CWG, felt MIL had achieved far more in implementing the LWMPs than the Government would have if it were still responsible. The company had introduced some tough policies in support of the LWMPs which he believed would have been beyond the political will and capacity of the Government to implement effectively. He claimed that around 15-20 per cent of farmers were upset by these policies. Mr. Gerard Lahy, the Chairperson of the Wakool CIG when interviewed, made commented likewise that “It was a very difficult policy for Murray Irrigation to sell ...”.

The company cannot take for granted that the cooperation from most farmers it has enjoyed to date will continue. Ms. Robinson recalled confronting MIL’s management with this challenge by asking them “How do you not become ‘those bastards in town’ as opposed to ‘those bastards in Sydney’?” Mr. McLeod acknowledged as follows that maintaining the trust and cooperation of farmers depends on the company continuing to engage them actively in its policy-making deliberations:

The company does go out of its way to listen to what people are saying, not only to be seen doing it. ... Our Directors are democratically elected, so I guess that they are very much aware that if they ignore the views of their constituency they may not be on the Board the next time around.

Due to these democratic checks and balances, a considerable degree of flexibility has been built into MIL’s environmental policies in order to satisfy local norms of fairness. For

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<sup>3</sup> Irrigators agreed to be interviewed on the condition that they remain anonymous.

instance, Berriquin Farmer Two remarked when discussing the policy limiting average water application:

I know it's caused a bit of hardship to some of my friends. ... [But] no, I don't think they feel that they've been treated unfairly. There are ways around it. ... They've restricted people, but they've also allowed people to get around it if they do the right thing.

A further issue concerns the extent to which the status of irrigators as co-owners of MIL has made them more likely to help it meet its LWMP implementation obligations – particularly by applying to one another the kinds of peer pressure they apply in other contexts to encourage adherence to local customs or norms. According to Mr. Baxter, this status as co-owners has indeed made them:

... more likely to take action against fellow farmers than they were before. Previously it was seen as the Government's water, and it was a bit of a sport trying to rip the Government off. But when it's your own system, then they are ripping you off.

However, it seems at this relatively early stage of the implementation process that any 'first-party' sanctioning of this kind by farmers in respect of one another's adoption of LWMP measures is mostly one-to-one through casually-proffered admiration or information. For instance, Berriquin Farmer Two commented:

I don't encourage other farmers. But if someone says "You've done that. What do you reckon about that?", then I'm very happy to say "We've done these things and this worked and that hasn't worked".

He added:

I don't think you are looked upon badly [by other farmers] if you don't do the things in the LWMP, because it's understood that ... you might not be able to afford to do it. ... But if you do a good job on your farm, I think people will think "He's done a good job on his farm". So perhaps that is a social kind of encouragement to follow the LWMP on your farm.

Mr. Liphuyzen suggested that peer pressure among farmers to adopt LWMP measures would strengthen with their increasing awareness of the costs of not doing so for the environment and in terms of the reputation of the region's irrigators. Berriquin Farmer One suggested another reason why peer pressure among farmers may strengthen with time: "As more and more farmers take it up, I think greater pressure will be brought to bear on the ones that aren't doing it". This possibility is consistent with Mr. Hearn's comment that "There is lots of 'looking over the fence' to see what other farmers have done. It's like a 'domino effect'. One farmer's uptake of LWMP practices leads others to follow suit".

To the extent that peer pressure among farmers does strengthen with time, it seems likely that CIG members would find themselves with an important role in mediating this process. As Mr. Hearn remarked, they are the focus of day-to-day feedback from farmers about the LWMPs, including gossip regarding the activities of particular farmers. As Knox and Meinen-Dick (2001) have observed internationally, it is common for members of local communities to avoid the risk of endangering relationships with neighbours that first-party sanctioning may involve. As Mr. Stewart commented, "in the country ... if you alienate your neighbour you can't just go a hundred metres and find another one. That's it. You're boxed in".

## **6. *Quantitative analysis***

### *Model specification*

A third party attempting to enforce a policy by complementing first-party provision of selective incentives by members of a group will be advantaged to the extent that it is aware of this kind of provision that exists and understands its determinants. Moreover, it will be assisted in this attempt by knowledge regarding the preparedness of group members to



cooperate with its efforts as a third party, and about the determinants of that preparedness. The purpose of the quantitative modeling reported in this section was therefore, by building on the insights gleaned from the qualitative analysis, to enhance such knowledge in respect of the LWMP program.

Towards this end, three multiple regression models were estimated in relation to different aspects of selective-incentives provision applicable in this context. Two of the models are concerned with first-party provision – i.e., by farmers themselves. The objective of the first of these models was to explain variation between farmers in their likelihood of expressing disappointment to farmers they view as not meeting an acceptable standard of compliance with the LWMPs (hereafter referred to as ‘under-complying farmers’). The dependent variable for this model was called Express Disappointment. Expressing disappointment can be regarded as a preliminary level in a graduated scale of sanctions. The second model focused on explaining why farmers vary in disapproving of under-complying farmers. The dependent variable of this model was called Disapprove.

The third model is concerned with third-party provision of selective incentives. It focuses on the willingness of farmers to cooperate with MIL, as a third party, penalising under-complying farmers. This can be regarded as a higher level in a graduated scale of sanctions than farmers themselves expressing their disappointment to, and disapproving of, under-complying farmers. The dependent variable here was called Support Penalties. Except where indicated below, the three models comprise a common set of explanatory variables. In this section, the three quantitative models and the hypotheses upon which they are based are discussed and the findings from testing these models are considered. See Table 1 for the survey items by which the variables comprising the models were measured<sup>4</sup>.

Two explanatory variables were included in each model to explore how farmers’ perceptions of private and community benefits from LWMP implementation affect their preparedness to sanction, or have MIL sanction, under-complying farmers. These variables were called Private Benefit and Community Benefit, respectively. The greater a farmer’s perceived benefits from successful LWMP implementation, the stronger will the motive be to see under-complying farmers punished. Consequently, these variables were both expected to relate positively with the three dependent variables.

Farmers’ preparedness to sanction under-complying farmers, or support a hierarchy sanctioning them, was hypothesised to relate positively with their perceptions of compliance involving a free-riding dilemma shared with other farmers – i.e., to be greater the more that they believe that their own benefits from complying depend on other farmers complying. This proposition was investigated by including a variable known as Dependence on Other Farmers as an explanatory variable. The more that individuals practising reciprocity trust others caught in the same free-riding dilemma to cooperate with them, the more likely are they to act cooperatively towards them (see section 2). Therefore, the greater the loss is likely to be, and the stronger the resentment, if the others do not in fact reciprocate. We therefore expected trust in others to be related positively with a desire to see them punished if they act uncooperatively. A reverse relationship would be expected if the strategy being followed were free riding (i.e., cooperate less as others cooperate more) rather than reciprocity. The explanatory variable included to explore this issue was Trust in Other Farmers. Its coefficient in each case was anticipated only to differ from zero.

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<sup>4</sup> See Appendix B in Marshall (2001) for the full interview schedule.

Table 1: Survey items used to measure the quantitative variables

Variable	Survey item
Express Disappointment	How likely are you to express your disappointment to farmers not making reasonable attempts to follow the plan's recommendations? <sup>a</sup>
Disapprove	I will have less respect for farmers who do not make reasonable progress in following the plan. <sup>β</sup>
Support Penalties	Farmers who do not make reasonable progress in following the plan should be penalised. <sup>β</sup>
Private Benefit	How do you regard the following as threats to the long-term viability of your farm business? ... Salinisation and waterlogging if the plan is not successfully carried out. <sup>γ</sup>
Community Benefit	The long-term viability of our district's community would really be improved if everyone successfully carried out their parts of the plan. <sup>β</sup>
Dependence on Other Farmers	The benefits on our farm of following the plan depend at least partly on what other farmers do. <sup>β</sup>
Trust in Other Farmers	Most farmers are committed to following the plan. <sup>β</sup>
Trust Generally	Most people can be trusted. <sup>β</sup>
Trust in Local Autonomy	Murray Irrigation has more say over how our plan is carried out than the government does. <sup>β</sup>
Fairness for Farmers	The plan poses too much of a cost burden on farmers compared with the wider public (reverse scored). <sup>β</sup>
Civic Duty	The rights of individuals should come before the interests of their local community (reverse scored). <sup>β</sup>
Knowledge of Other Farmers' Compliance	We have a good idea of how much progress each farm in our locality has made in following the plan. <sup>β</sup>

Note: The negative and positive poles of a scale are "extremely unlikely" and "extremely likely", respectively, if the item is marked <sup>a</sup>, "very far from my view" and "very close to my view" if marked <sup>β</sup>, and "no threat at all" and "a very serious threat" if marked <sup>γ</sup>.

Fairness norms may moderate the impulse to punish under-complying farmers, particularly when it seems that lack of compliance is due to a mistake or difficult circumstances. It seems reasonable to suppose that individuals with greater trust in people generally are more likely to exercise moderation of this kind than individuals with less of this trust. The explanatory variable included in the models to test whether this is the case in the context of this study was Trust Generally. This variable was expected to be negatively related with each of the three dependent variables.

The Support Penalties model included an additional explanatory variable called Trust in Local Autonomy. This followed from MIL having been devolved the right to formally regulate compliance by individual farmers with the LWMPs. It was expected that the farmers would be more likely to support imposition of penalties on under-complying farmers the greater their trust that MIL had truly been devolved authority to decide on such matters. Trust in Local Autonomy was thus anticipated to be related positively with Support Penalties.

Farmers who believe that farmers generally have been treated fairly in the LWMP program might reasonably be expected to have a greater desire to see under-complying farmers sanctioned. The variable included to test for this effect was called Fairness for Farmers. It was expected to relate positively with the dependent variables. It was also anticipated that farmers placing greater importance on civic duty would be more likely to want to see others punished who put their own interests ahead of their responsibility to their community (i.e., compliance with their LWMP). This effect was accounted for in the models by including the explanatory variable Civic Duty, which was expected to be positively related with the three dependent variables.

The more that farmers know about one another's LWMP compliance, the more confidently can they judge what constitutes a fair standard of compliance by individual farmers at any time. The greater this confidence, the more confident might each farmer's assessment be of whether particular other farmers are under-complying. Hence, the more strongly might they

be expected to desire punishment for under-complying farmers. A positive relationship was therefore expected between farmers' degree of access to this kind of knowledge and each of the three dependent variables. These hypotheses were tested by including the explanatory variable Knowledge of Other Farmers' Compliance in each of the models. Finally, a set of three dummy variables was included in each of the models to control for possible interviewer-induced response bias. These variables were called Int\_Dum1, Int\_Dum2 and Int\_Dum3, respectively.

#### *Sample statistics*

Prior to discussing the models estimated for Express Disappointment, Disapprove and Support Penalties, a few comments on the sample statistics for these dependent variables are pertinent. The sample means for Express Disappointment (3.5, n=215) and Support Penalties (4.0, n=212) are less than their scale midpoints. Hence, farmers on average appear to remain averse to expressing disappointment to other farmers they feel are unreasonably lax in complying with their District's LWMP. It seems too that on average they remain averse to penalisation of farmers whose LWMP compliance is unreasonably poor, albeit less averse than with expressing disappointment. Despite the qualitative evidence suggesting devolution of governance of the LWMP program to MIL has potential to gradually erode such aversions, therefore, realisation of this potential cannot be taken for granted. The sample mean of 5.3 for Disapprove (n=204) exceeds the scale midpoint only marginally, indicating that the average farmer is ambivalent about whether he or she would lose respect for farmers who are lax in their LWMP compliance.

The Wilcoxon signed-rank test indicates that scores for Disapprove are significantly greater ( $p < 0.001$ , 2-tailed) than those for Express Disappointment and Support Penalties. By the same criterion, scores for Support Penalties ( $p = 0.004$ , 2-tailed) are significantly greater than those for Express Disappointment. Hence it seems that the average farmer is more comfortable with supporting third-party punishment of under-complying farmers, at least when the third party is MIL, than with expressing disappointment directly to these farmers.

#### *Results*

The models estimated for the three dependent variables, as well as the sample means for the explanatory variables, are presented in Table 2. The anticipated positive effect of Private Benefit on the three dependent variables was supported by the models for Express Disappointment and Disapprove, but not by the Support Penalties model. The positive relationship expected between Community Benefit and the dependent variables was supported in each case. Hence the preparedness of farmers to sanction other farmers informally seems to strengthen the more that they expect benefits from implementing the LWMPs to accrue to themselves and to their community. In contrast, their preparedness to support MIL as a hierarchy issuing penalties to under-complying farmers seems to strengthen with their expectations of community benefits from implementation, but not with their expectation of benefits to their own farm business.

The expected positive influence of Dependence on Other Farmers was supported by the estimated models for Disapprove and Support Penalties, but not by the model for Express Disappointment. It seems that increasing farmers' awareness of their interdependence would make them more likely to disapprove of under-complying farmers and accept MIL penalising them. However, it appears that their reluctance to express disappointment to other farmers is sufficiently entrenched that it would be unaffected by an awareness program of this kind. In addition, the hypothesised influence of Trust in Other Farmers is not supported by any of the

Table 2: Estimated models for Express Disappointment, Disapprove, and Support Penalties

Explanatory variables	No. of observations	Sample mean	Dependent variable								
			Express Disappointment			Disapprove			Support Penalties		
			Coef.	p value	Sig.	Coef.	p value	Sig.	Coef.	p value	Sig.
Private Benefit	229	5.2	0.08	0.006	***	0.06	0.048	**	0.03	0.218	
Community Benefit	213	7.7	0.09	0.095	*	0.09	0.078	*	0.09	0.087	*
Dependence on Other Farmers	213	5.1	0.03	0.187		0.06	0.027	**	0.07	0.011	**
Trust in Other Farmers	190	6.1	-0.06	0.272		0.06	0.330		-0.05	0.389	
Trust Generally	223	6.2	-0.12	0.002	***	0.02	0.307		0.00	0.457	
Trust in Local Autonomy	185	5.1	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.08	0.013	**
Fairness for Farmers	203	4.6	-0.01	0.392		-0.02	0.306		0.08	0.006	***
Civic Duty	218	6.2	0.08	0.008	***	0.02	0.230		0.14	0.000	***
Knowledge of Other Farmers' Compliance	194	4.8	0.16	0.000	***	0.21	0.000	***	0.06	0.025	**
Int_Dum1			0.33	0.086	*	0.25	0.219		0.12	0.504	
Int_Dum2			-0.37	0.117		0.08	0.747		-0.06	0.801	
Int_Dum3			0.30	0.359		0.26	0.450		0.19	0.580	
$\mu_1$			1.01			1.68			2.23		
$\mu_2$			1.39			2.10			2.63		
$\mu_3$			1.83			2.45			2.89		
$\mu_4$			1.99			2.57			3.07		
$\mu_5$			2.47			2.93			3.38		
$\mu_6$			2.70			3.28			3.69		
$\mu_7$			3.21			3.97			4.34		
$\mu_8$			3.73			4.86			4.65		
Pseudo R <sup>2</sup>			0.30			0.35			0.26		

Note: \*, \*\*, and \*\*\* indicate 0.10, 0.05 and 0.01 levels of confidence, respectively.

three estimated models. The trust farmers have in one another's LWMP compliance thus seems irrelevant to their decisions in respect of the three sanctioning options considered here.

The hypothesised negative influence of Trust Generally was supported only by the estimated model for Express Disappointment. Hence it seems that it is only in the case of expressing disappointment that farmers' impulses to sanction under-complying farmers are moderated by trust that there are valid reasons for the lack of compliance. Perhaps this is because expressing disappointment is likely to be the least anonymous of the three sanctioning options considered and therefore to be the one involving the greatest risk of souring one's relations with other farmers. Given this greater risk, it makes sense that farmers' impulses to see other farmers punished would be moderated more carefully by their beliefs more generally regarding the common decency of people.

The expected positive effect of Trust in Local Autonomy was supported by the Support Penalties model (the only model in which it was included). Hence, it appears that farmers in the LWMP program are more prepared to accept hierarchical (in this case, Murray-Irrigation-administered) penalisation of under-complying farmers the more they trust that the hierarchy is truly independent of government. This finding is consistent with the qualitative analysis in so far as it accords with observations by key informants that MIL needs to retain the trust of its irrigator co-owners if it is to regulate them more successfully than would the NSW Government. This is an important given that the mean sample score for Trust in Local Autonomy was 5.1, which lies just above the midpoint of its scale. Hence the average farmer seems ambivalent about whether MIL is truly autonomous from government in respect of its LWMP implementation role.

The anticipated positive influence of Fairness for Farmers is supported only by the Support Penalties model. This might be explained by penalisation of under-complying farmers being a harsher form of punishment than expressing disappointment to them or losing respect for them. It could be that farmers tend to view the two softer punishment options as not severe enough to warrant bringing into play considerations of fairness. Civic Duty's anticipated positive effect was supported by the models for Express Disappointment and Support Penalties, but not by the model for Disapprove. Hence it seems that farmers are more likely to express disappointment to, and accept hierarchical penalisation of, under-complying farmers the greater their conviction that civic responsibility should take precedence over private interest.

The expected positive influence of Knowledge of Other Farmers' Compliance is supported by all three models. Hence, it would seem that greater knowledge by farmers of compliance by other farmers tends to increase the confidence with which they assess under-compliance, and thus the likelihood of them wanting it punished in some way. Finally, the estimated coefficient of one of the three dummy variables (Int\_Dum1) included in the model to test for interviewer-induced response bias was found in the Express Disappointment model to differ from zero. This suggests that farmers interviewed by other farmers from within the study region indicated a stronger disposition to express disappointment to under-complying farmers than they would have otherwise.

## **6. Conclusions**

The possibility that devolution of authority for implementing the LWMPs to a common-property regime would lead farmers – as co-owners of that regime – to take a more active

role in sanctioning one another's compliance with the LWMPs implementation was first analysed qualitatively. This analysis indicated that this effect has been weak so far, with the extent of 'first-party' sanctioning of this kind limited mainly to gestures of social approval to farmers who have made progress with on-farm implementation.

Consistent with these findings, the quantitative analysis found that informal provision by farmers of selective incentives to one another in respect of expressing disappointment to under-complying farmers and disapproving of them appears to remain fairly weak in the LWMP program. This is despite the finding that farmers are significantly more likely to disapprove of under-complying farmers than they are to express disappointment to them. Nevertheless, this continuing reticence of farmers to sanction one another directly does not necessarily mean that the attempts to gain farmers' ownership of the program have failed to make them more amenable to sanctioning one another than would have been the case otherwise. In any case, the qualitative analysis indicated that informal first-party sanctioning, or peer pressure, may well strengthen over time as the urgency of meeting on-farm implementation targets increases, farmers become more aware of the need for implementation, and there are more farmers that have fulfilled their implementation responsibilities sufficiently to feel justified in expecting a greater effort from others who have made less progress.

The results from the three quantitative models are useful as a guide to the opportunities and constraints likely to arise in attempting to address this challenge within the LWMP program. On the one hand, farmers' dispositions to trust people generally (found to have a significant influence on Express Disappointment) are likely to be formed through experiences much broader than those associated with the program itself, and thus effectively to lie outside the sphere of what any reformulation of the program could realistically hope to influence. On the other hand, farmers' perceptions of the relevance of the other explanatory variables found to have statistically-significant effects would seem to lie within the realm of what adjustments to program policy and practice might reasonably hope to influence over the medium to long term.

In some cases, this might be possible through education or awareness-raising activities (e.g., in relation to the Private Benefit, Community Benefit, Dependence on Other Farmers, and Civic Duty variables). Indeed, the qualitative analysis revealed that MIL already is placing strong emphasis on increasing farmer awareness that their interests are interconnected not only with each other but also with other stakeholder groups. In other cases, a focus more on promoting feedback flows between farmers might be appropriate (e.g., in relation to the Trust in Other Farmers and the Knowledge of Other Farmers' Compliance variables). With respect to the Trust in Local Autonomy variable, the focus would appropriately be on promoting feedback flows between farmers and MIL. This would involve the company demonstrating by its ongoing decisions and actions that it is indeed more responsive to the norms, needs and knowledge of local farmers than they would expect government to be.

A final comment is warranted regarding the finding that knowledge by farmers of one another's compliance seems an important determinant of their willingness to see under-complying farmers sanctioned. The primary focus of MIL monitoring compliance by farmers until now has been to demonstrate successful implementation of the LWMPs to the NSW Government. As such, this monitoring has not necessarily been organised and reported in a way that best helps farmers gauge what a fair standard of compliance is at any stage and judge when that standard is not being met. The sample mean of 4.8 for Knowledge of Other

Farmers' Compliance variable indicates that the average farmer is only moderately aware of how other farmers are complying. Farmers' preparedness to see under-complying farmers sanctioned might therefore strengthen markedly if they could access greater information about how other farmers are complying. It could be that locality-based groups of farmers have an important role to play in achieving such an outcome in ways compatible with maintaining social cohesion.

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