Introduction: Groundwater as a ‘Magic Pudding’

“You’ll enjoy this Puddin’,” said Bill, handing him a large slice. “This is a very rare Puddin’”...the penguin leaned across to Bunyip Bluegum and said a low voice, “It’s a Magic Puddin’.”

“Observe the rules, Bill,” said Sam hurriedly... “To Jeredelum with the rules”, shouted Bill...”

Bunyip Bluegum: “To have one’s noblest feelings outraged by reposing a too great trust in unworthy people, is to end by regarding all humanity with an equal suspicion” (Lindsay 1918, 21, 48, 98).

The metaphor of ‘The Magic Pudding’ is from Australian Norman Lindsay’s 1918 story about a pudding that never ran out and the ‘rules’ and strategies that were devised to protect the pudding from thieves. The Magic Pudding is analogous to the situation in the Lockyer valley, 100 km west of Brisbane in Queensland, Australia. Until recently groundwater was widely considered a secure source for horticulture irrigation in the Valley, however water resources have been increasingly stressed as a result of high extraction of water by users, minimal regulation of take, and little replenishment of the aquifer due to drought. For more than 20 years farmers have been treating groundwater resources like the everflowing magic pudding. Lindsay’s pudding is ‘treacherous’ – like groundwater resources, it is unpredictable. High levels of groundwater extraction in upstream areas have reduced both surface water flow and groundwater recharge in downstream areas. Because of high surface water and groundwater interconnectivity in the alluvial aquifers, baseflow to the creeks has reduced over the past 30 years with groundwater levels falling below the creek bed (NRM 2005) resulting in no visible surface flow for most of the year. Decreasing availability of water has had a substantial economic impact on horticultural irrigators in this farming community.

Like many folk stories about limitless wishes, there is a hidden trap or punishment for being too greedy: the magical gift must not be abused. As Bunyip Bluegum warns, there are broader social consequences if the rules are abused by a few and trust is no more. Historically, government regulation of water use in the Central Lockyer only has led to substantial local discontent. Supplementation of reserves through centralised irrigation infrastructure works (storages and pipelines) in the Central and Lower Lockyer has proven ineffective resulting in little community trust in any future government-derived solution.

In the Lockyer an opportunity to address the situation arose in 2005 in the form of the Queensland government’s Moreton Water Resource Planning (MWRP) process, which included the Lockyer.
Landholders had been making ad-hoc adjustments in their practices for some time, but did not consider managing water cooperatively on a catchment (i.e. watershed) basis until they suffered the effects of a drought and encountered the “threat” of additional regulation by government. The leadership required and the rules devised to protect the pudding required cooperation among the pudding owners. Likewise irrigators understood that appropriate rules, cooperation and trust would be needed to minimise threats to economic viability and community well-being in the Lockyer. In response to these threats the Lockyer Water Users Forum (LWUF – a coalition of 17 sub-catchment irrigator groups) proposed a collaborative approach – co-management – to aim for water sustainability through the MWRP process.

The effectiveness of this approach required a broad understanding of the values underpinning economic viability and community well-being.

Identifying Values through Photovoice Research

This article reports on research over the period 2005-2007 about diverse values about sustainability within the community and the culture of independence that Lockyer irrigators needed to confront in order to resolve conflicts and respond effectively to water reforms. Conflict often relates to deep human needs and values (Tillett 1991). Understanding values thus improves the likelihood of stakeholders having their views reflected in potential solutions and finding a mutually satisfactory outcome (Hassan 2001; Ross et al. 2002). Qualitative research methods enable discovery of rules that are considered legitimate by those involved (Trottier 2001). A regime that brings local communities into management and decision making would reduce disparities and achieve better outcomes for all.

In 2005, 33 stakeholders (irrigators, landcare/catchment management, and government) involved in Lockyer water issues participated in photovoice interviews; in which photos taken by participants were used to elicit values and interests about water. The interview analysis revealed the differences in values and interests of various stakeholders that needed to be taken into account to negotiate an agreement acceptable to two major players, the LWUF and Queensland government. Strong values about sustainable water use and fairness were evident:

- Irrigator views about how to achieve the goal
of sustainable water use ranged from limiting extraction of water within the bounds of the aquifer to adopting more efficient methods of water use. Government and catchment-care participants on the other hand, indicated that sustainable water use also included returning environmental flows to the creek to increase surface water flows over time.

- Upper catchment irrigators were less positive about water being allocated for the public good or for the benefit of downstream users. Strong fairness values were exhibited by those irrigators most negatively affected by existing inequitable regulations and lack of water (i.e. those downstream; distributional fairness). However all participants indicated community should be involved in decision-making (i.e. procedural fairness).

In addition, different styles of decision-making were evident between irrigators and government participants. There was a strong need for independence and self-sufficiency among irrigators yet their business was highly integrated with family, community, and the land. Sense of community, sense of place and land stewardship values were important. Government decision-making was more collaborative within and between agencies but agency officers were more detached from the outcomes of their water management decisions – they did not need to live with them on a daily basis and their income, family, homes and community were not directly affected.

Lack of information about water planning and data about aquifer behaviour was considered critical. LWUF needed to understand implications of the MWRP and how they could influence it. The lack of hard data about the behaviour of the aquifer and interconnectivity with surface water caused disagreements among irrigators and with government on how groundwater should best be managed. All parties recognised that better information was needed on the relationship between extraction and aquifer levels.

LWUF proposed a system of ‘self-management’ later renamed ‘co-management’ as a way of engaging irrigators in managing the resource collaboratively with government. Key progress in consolidating irrigators’ views occurred at an LWUF workshop in April 2006, at which the photos taken by irrigators were shared in small groups and agreement was sought around topics such as sustainable water management and self-management. A major outcome of the workshop was the agreement among irrigators on an objective of self-management: ‘Water users manage a just balance between effective and efficient use of the water resource for the community and environmental benefit’ (Baldwin 2006). This objective captured irrigators’ fairness, environmental, economic and social sustainability (triple bottom line) values. This was an important milestone that recognised the diversity of opinions within the group about environmental constraints and regulation, as well as the need to present a common voice when negotiating with government on the MWRP.

Rules that Acknowledge Values
When private benefit is considered in isolation to the extent that it ignores impacts on others or the environment, the term ‘self-interest’ is often used. Hardin’s (1968) ‘tragedy of the commons’ concluded that, in relation to common-pool resources such as water, individual self-interest would prevail over cooperation unless constrained by some means. Groundwater is an example of a common-pool resource where there is ‘low excludability of users’ (beneficiaries are difficult to exclude) and ‘high subtractability of benefits’ (i.e. if used by one, then it is difficult for others to use) (Sarker et al. in press). In such ‘social dilemmas’ each person may act selfishly to maximise his or her own personal gain, but if all members operate in this way then eventually outcomes for all are reduced and everyone is disadvantaged. High levels of use can lead to degradation of the whole system and destruction of the resource (Van Vugt and Samuelson 1999). There is however substantial evidence that government, the community, and an awareness of impacts play a role in moderating the predominance of individual self-interest. In fact, more than 30 factors have been identified as affecting successful management of commons in the collective interest (Agrawal 2003).

Ostrom (1992, 2005) argued that with a set of ‘rules’ and the support of governments, stakeholders can rise above their individual needs. Syme et al. (1999) found that the community sees a need for ‘rules or guidelines’ developed by stakeholders with government responsible for enforcing rules, in order to handle self-interest. A recent attitudinal survey of Southeast Queensland water use confirmed a high level of support (70%) for community management within government guidelines and a low level of trust of either self-regulation or regulation solely by government (Baldwin 2007). Accordingly, while there is a need

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For more than 20 years farmers have been treating groundwater resources like the overflowing magic pudding.
for community involvement, governments need to be responsible for policy, monitoring and enforcing rules made by the community to protect everyone’s interests. Just as government plays a role in moderating self-interest, community values also have an effect. Natural resource management is a social dilemma of conflict between the short-term self-interest of users and the long-term collective interest of the user community. Shared knowledge and values are integral to concepts of community. Self-interest can be tempered by pro-social motivations such as fairness and efficiency when making water-allocation decisions (Syme et al. 1999). Such concepts are relatively complex. People can, at the same time, believe in equal opportunity for accessing water yet support rewards for those who have already invested in developing the resource. Solutions are related to the right mix of fairness ingredients (Syme et al. 1999), or in consensus-building terms, the right ‘package’ (Susskind and Cruikshank 2006). An alternative community-based model can foster self-restraint among users provided they feel attached to their community (Van Vugt 2002) and there is a sense of reciprocity (Marshall 2004). Managing a connective resource such as water should be through local, collective and inclusive methods that support sense of belonging, rather than distant alienating centralised institutions (Strang 2004).

Syme et al. (1999) also argued that people will modify personal demands if they believe there is adequate knowledge about their environment, and if they understand that management practices will alleviate the problem. Where there is high uncertainty, people tend to overestimate the robustness of the environment and not restrict their activities. Thus integrated mechanisms to ‘distribute’ credible data are vital for users to participate meaningfully in the process.

Water management decisions might also be motivated by basic human needs for independence and ‘control over one’s life’ (Fisher et al. 1991). The norm of self-sufficiency ‘implies that people should take care of themselves’ (Heuwstone et al. 2008). While there is a legitimate private economic benefit from water in making a living from the land, self-interest can predominate when faced with possible negative impacts from reduction of water use. Self-interest can be moderated by an overarching government framework, an ethic and understanding of environmental sustainability, sense of community, independence from excessive regulation, and involvement of the community in developing the rules. Thus the onus is on parties to the Lockyer co-management concept to embrace appropriate and agreed management rules.

### Rules for the Lockyer Valley Magic Pudding

As a result of negotiations with LWUF, the Queensland government agreed to ‘investigate user-administered approaches to groundwater management’ which might lead to a ‘self-management rules framework with an underlying base level of regulatory management’ (Syme et al. 1999). The MWRP released in July 2006 identified the next phase of water planning, the Resource Operation Plan (ROP), as the vehicle for incorporating negotiated rules on co-management. Largely this was a win-win solution. Because of insufficient data on water use in the Lockyer for making detailed decisions about ROP allocations, co-management was attractive to the Department of Natural Resources and Water (NRW). It would allow for adaptive management as information became available and would assist irrigators to take responsibility for their regulated use. Irrigators too, recognised that it was in their best interest to have well-managed water resources. Transparent co-management incorporating direct feedback on use and aquifer levels through metering, monitoring across the valley, and more informed sub-catchment decision-making, would alleviate concerns of inequity. Co-management could provide a framework for their input, replacing insecurity about unproven regulations with a process over which they had more control. Such a process though is dependent on NRW being convinced that co-management will achieve MWRP objectives and Queensland’s commitments under the Intergovernmental Agreement on the National Water Initiative (COA 2004), relying on the LWUF to convince NRW that it would be a legitimate and accountable group to lead the process.

Design principles and rules for self-governing institutions of common pool resources, developed through examination of hundreds of cases of successful self-governing institutions (Ostrom 1992, 2005), could be applied in the Lockyer to ensure success of the co-management proposal (Sarker et al. in press). These rules can be used to moderate the short-term self-interest of users with the long-term collective interest of the user community, providing the sense of control over destiny sought by landholders and accountability sought by government. The LWUF proposal built in certain governance attributes recommended in Ostrom’s (1992) rules for self-governance of common pool resources, such as monitoring, enforcement.
and conflict resolution, recognising for example, that agreement on a safe yield for the aquifer is likely to be a major issue for sub-catchment negotiations.

Without going into detail about Ostrom et al.’s (1992, 2005) eight design principles, the co-management proposal accepted by government is either inconsistent with or not addressing four of the principles. There are two areas where the LWUF proposed co-management concept is consistent with Ostrom’s principles but not accepted by government. First, an initial ‘Ostrom’ principle is that the area of the groundwater system and access rights are clearly defined. According to the MWRP, the Central Lockyer which is already regulated will be excluded from the area subject to co-management. There is thus a risk of continuing inequity within the same system. Secondly, the fourth ‘Ostrom’ principle is that monitors should be accountable to the users or are the users themselves. LWUF proposed owning water meters with an independent auditor to monitor resource conditions, irrigator behaviours and compliance. NRW however insisted on compliance with its State-wide Metering Policy which mandates government ownership and maintenance of meters and control of monitoring. This challenges the irrigators’ desire for self-sufficiency and independence and is contrary to the thinking that meters give users a sense of control and accountability over extraction patterns, with adaptation of use accordingly. Such structural interventions may not succeed if they are perceived as costly, unfair and infringing on individual freedom (Van Vugt and Samuelson 1999).

In addition, there are two unaddressed principles. There has been no discussion between LWUF and NRW in relation to the second principle which relates to proportional equivalence between benefits and costs, i.e. water extraction should be costed proportional to benefits from use. While charges for metering have been discussed, user charges for the amount of water taken or administration of the co-management system have not. Water pricing can encourage efficiencies, but irrigators were also concerned that paying for water would place unnecessary strain on those farmers already affected by drought and divert funds from introducing more efficient irrigation equipment. Water pricing was seen as a threat to irrigators’ economic well-being and to long-term community sustainability.

Furthermore another ‘Ostrom’ principle (the third) involves extraction rules being negotiated within sub-catchment management area groups – ‘collective-choice arrangements’, to tailor rules to local circumstances and devise rules that are considered fair by participants. This is a huge unknown in relation to the Lockyer proposal. Until co-management details are agreed between NRW and LWUF, the extent of irrigator control or input in negotiations about water allocation and management may simply be rhetoric.

Co-management is intended to put responsibility for sub-catchment management of groundwater in the hands of irrigators, with government support and over-arching regulation through the ROP yet to be developed. There are contentious value-based issues yet to be resolved. It challenges NRW to ease control. LWUF is still establishing itself as a respected peak body supported by all irrigators. Unless there is adequate organisational support for LWUF to enable equitable negotiations within the Valley and with NRW, co-management is likely to be token.

Groundwater in the Lockyer was once thought to be bounteous like the Magic Pudding. Just as rules were needed to manage the ‘treacherous’ Magic Pudding, protecting it from thieves, and maintaining social norms, Ostrom’s rules for self-governance may be suitably adapted for Lockyer co-management. These rules illustrate the tensions about how the ‘Pudding’ – groundwater – should be managed. Values-based rules would go a long way towards achieving long-term sustainable resource use, economic viability, fairness, and a sense of community – core values of the Lockyer irrigation community. In the absence of value-based rules Lockyer irrigators are placed in a ‘treacherous’ position where the benefits of the magic pudding are put at risk for all.

(Endnote)
1 The methodology is explained in greater detail in Baldwin, C and H Ross (2006) and Baldwin, C. (under review).

References


CoA 2004. Intergovernmental Agreement on a National Water Initiative between the Commonwealth of Australia, and the Governments of New South Wales, Victoria, Queensland, South Australia, the Australian Capital Territory and the Northern Territory Canberra, Commonwealth of Australia. Canberra.


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This work was carried out with the assistance of the Cooperative Research Centre for Irrigation Futures (CRCIF).