

## IMPROVING GOVERNANCE ARRANGEMENTS FOR SUSTAINABLE AGRICULTURE: GROUNDWATER AS AN ILLUSTRATION

PAUL MARTIN AND NEIL GUNNINGHAM<sup>1</sup>

*The aim of this article is to provide a balanced assessment of the critiques of environmental regulation as it affects the rural sector and of the main proposed alternatives: deregulation or the use of markets. We argue that the deregulatory and free market alternatives tend to overstate the costs and understate the benefits of regulation and that they do not provide clear insights into what is “efficient” because the methods tend to aggregate necessary and intended costs, collateral and unintended costs, opportunity costs and transaction costs. However despite these significant caveats it is clear that it is in the public interest to create laws that do work better and are less costly. We suggest that one measure to achieve effectiveness and efficiency must be robust review and reform of the system of laws, not just individual laws. We also argue that the pursuit of sustainability must involve a synergistic relationship between traditional and more contemporary governance approaches and that any treatment of them as alternative rather than complementary instruments unnecessarily narrows strategic options for effective resource management. Further, intrinsic to far more effective regulation is managing total transacting systems using a variety of instruments and behavioural interventions, rather than focusing on a limited set of transactions with a limited set of interventions. This represents a significant change to natural resource management (and particularly natural resource regulatory practice) but it is essential if we are to move beyond the present unsatisfactory situation.*

One of the crucial issues of our time is how to avoid serious and, perhaps cataclysmic, damage to the natural environment. The causes of such damage are complex and sometimes controversial. They arise from a wide variety of social and economic pressures. The evidence that pollution, land degradation, deforestation, climate change, misallocation of water and the loss of biological diversity are inflicting serious and in some cases irreversible damage is increasingly compelling. It is generally considered that it is in the public interest to minimize such environmental harm, but in ways that are compatible with other interests of society in its use of nature. One challenge is how to achieve a reasonable balance between the need for environmental protection and the needs of those who pursue their livelihood in reliance upon the use of the environment without undue interference or unreasonable financial burdens. Different forms of regulation, including attaching an economic value to uses of the

---

<sup>1</sup> Professor Paul Martin is Director at the Australian Centre for Agriculture and Law at the University of New England. Professor Neil Gunningham is Director for the National Research Centre for Occupational Health and Safety Regulation at the Australian National University.

This paper was produced with the support of an Australian Research Council grant on Compliance and enforcement of non-urban water extraction in New South Wales, with whom Professor Gunningham is a Chief Investigator and the Australian Research Council’s Linkage research project ‘Next Generation Rural Landscape Governance’, for which Professor Martin is a Chief Investigator.

environment to discourage harm-doing or rewarding restoration, are used to try to achieve this balance between use and protection.

Major environmental governance bodies have begun to shift attention away from developing regulatory instruments to a concern for the effectiveness of the system of legal governance as a whole. The Rio+20 outcome document “The Future We Want”<sup>2</sup> highlighted that the achieved results of a vast array of legal instruments fall well short of their goals and signals that the next frontier must be governance effectiveness. The UNEP has also begun to shift in this way<sup>3</sup> and the IUCN has initiated a governance program which possesses the mandate to assess the effectiveness of legal arrangements within the system of natural resource governance.<sup>4</sup> What all these initiatives point to is that environmental law is making a shift from narrow instrumentalism towards a concern for governance systems effectiveness. In this paper we want to consider some reasons why environmental law may be proving to be less effective than it ought to be and to suggest directions for improvement. The paper does not set out to provide empirical data, rather it addresses possible directions for systematic improvement in the effectiveness of legal arrangements for environmental governance and to ‘ground’ the observations by linking them to a particular environmental law issue which illustrates basic challenges for effective legal governance. We believe that undertaking this enquiry will be most beneficial to the development of environmental law scholarship which is beginning to grapple with the widening focus of our field.

A key endeavour in the governance of natural resources is to design rules that produce social and environmental gain at the lowest possible cost to individuals and to society as a whole. These objectives have traditionally been pursued through government regulation, although increasingly the use of environmental markets (e.g. creating a tradeable private right to extract water) is finding favour as a means to balance these public and private interests. There are strong reasons of principle why those who use or harm the environment should pay for doing so, as a means for motivating stewardship norms of behaviour. The argument is usually couched in terms of the ‘polluter pays’ or ‘user pays’ principles. It is in the public interest to require (and governments increasingly do require) those who would otherwise ‘externalise’ some of the ecological costs of production (i.e. pass them on to others, such as users of polluted water downstream, or future generations) to ‘internalise’ those costs. However even market instruments generally rely (in part) upon a regulatory framework so as to form the basis for a market attaching a price to environmental use.<sup>5</sup> Ultimately the use of least-cost and effective regulation remains a cornerstone of many forms of environmental governance, regardless of whether they rely upon implementation directly by the state or through the workings of the market.

Regulation and its implementation are conventionally evaluated against three objectives: effectiveness (success in achieving policy objectives), efficiency (ensuring those objectives are

---

<sup>2</sup> United Nations General Assembly, *The Future We Want*, GA Res 66/288, 66<sup>th</sup> sess, 123<sup>rd</sup> plen mtg, Agenda Item 19, UN Doc A/RES/66/288, (11 September 2012, adopted 27 July 2012)..

<sup>3</sup> A summary brochure is available: Division of Environmental Law and Conventions Masa Nagai, United Nations Environment Programme, *Environmental Governance Factsheet* (United Nations Environment Programme, c2009) <<http://www.unep.org/pdf/brochures/EnvironmentalGovernance.pdf>>.

<sup>4</sup> A summary brochure for the program is: International Union for Conservation of Nature, *IUCN Knowledge Products: The Basis for a Partnership to Support the Functions and Work Programme of IPBES* (IUCN, 2012) <<http://data.iucn.org/dbtw-wpd/edocs/2012-015.pdf>>.

<sup>5</sup> Clifford Shearing, 'A Constitutive Conception of Regulation' in John Braithwaite and Peter Grabosky (eds), *Business Regulation and Australia's Future* (Australian Institute of Criminology, 1993) 67.

achieved at least cost to the regulated community and regulators themselves) and legitimacy (often viewed in terms of community acceptability and fairness, or 'equity').<sup>6</sup> In this article we discuss some reasons why the rules intended to produce more sustainable primary production often fall short of achieving these objectives. We also outline some directions that could lead to an improvement. To illustrate the recommendations we focus on one concrete, important and topical example: rules to ensure sustainability of groundwater based farming systems.

The gap between the 'ideal' of effective, efficient and legitimate regulation, and the reality, is graphically illustrated by the case of Peter Spencer. Peter Spencer is a farmer who sought compensation when his freedom to use his land was eroded by the accumulation of regulatory restrictions that in his view are a socially unjustifiable interference with his capacity to earn a living. He argued that particular laws about land clearing, protection of biodiversity and carbon markets cumulatively reduced his freedom to exploit his asset as he wished and that these restrictions interacted with other factors (both specific to his situation and common to many other farmers) to make his farming operation no longer viable for him.<sup>7</sup> His plight has evoked sympathy from many, including the judges through whom he has unsuccessfully sought compensation, though attitudes to his situation are polarized between environmental and farming interests.

Without commenting on the legitimacy of his legal or moral claims, his story does illustrate the public policy challenges of designing and implementing good environmental regulation to protect the public interest. Many would concede the importance of laws to preserve the environment and to restrict harmful farming practices or other activities that will deprive future generations of their natural heritage. On the other hand, they would deplore regulation that could threaten the viability of agricultural enterprises and the livelihood of farmers. 'Why', we might ask, 'isn't it possible to create laws that achieve their public policy goals (effectiveness) but do so in such a way as is efficient (minimizing costs to landholders)?' In turn, laws that achieved both these two objectives would be much more likely to be perceived by the wider community as 'fair' or legitimate.

The short answer is that it *is* possible to create laws (and other forms of social policy) that do a much better job of delivering effectiveness, efficiency and legitimacy but that policy makers rarely seem capable of doing so in practice. There are far too many natural resource management laws that impose a high cost on landholders and others, while achieving too little in terms of conservation and the restoration of natural resources and which fail to meet the legitimate expectations of landholders, environmentalists or the broader community. Australians are too often incurring a high cost of regulation for too little environmental gain.

## I LOOKING TO AN IMPROVED SYSTEM OF RULES

Environmental regulation falls far short of the ideal, not least because of ineptitude, history and the dynamics of environmental politics. A plethora of badly designed and poorly implemented laws and regulations has grown up and not been the subject of systematic reform. It is also the case that effectiveness, efficiency and legitimacy are sometimes in tension and trade-offs must be made between them. What is likely to be most environmentally effective may also be the

---

<sup>6</sup> See for example, Michael Jacobs, *The Green Economy: Environment, Sustainable Development and the Politics of the Future* (UBC Press, 1993), 152; and Pieter Winsemius and Ulrich Guntram, 'Responding to Environmental Challenge' (1992) 35(2) *Business Horizons* 12, 12.

<sup>7</sup> The original case is *Spencer v NSW Minister for Climate Change, Environment and Water* [2008] NSWSC 1059; For a potted history of the issues see *Spencer v Commonwealth of Australia* [2010] HCA 28.

most costly (and thus not efficient). What is both efficient and effective may not have community or political support and so may not be seen as legitimate.

In this article we propose ways to substantially improve the effectiveness, efficiency and legitimacy of legal arrangements to protect the ecological systems upon which we (and our children) will depend. We suggest ways of steering a path between these different objectives so as to achieve, if not an 'optimal' approach to environmental policy, at least one that substantially improves on the regulatory *status quo*. We illustrate our arguments with a focus on groundwater-based agriculture but could equally focus on biodiversity law, laws to control invasive species, or any of a large number of other environmental rules to illustrate the same points.

Why select groundwater as an illustration? The scientific evidence is that groundwater is being over-extracted. This poses a risk to future farming uses and to groundwater dependent ecosystems.<sup>8</sup> The National Water Commission has highlighted the challenges of dealing with complex interconnected systems where the dynamics of that system are ill-understood. It has suggested as an interim approach (pending better science) that the conservative assumption be made that surface and groundwater systems be treated as intrinsically interconnected.<sup>9</sup> The *Guide to the Murray Darling Basin Plan* proposes significant reductions of the groundwater Sustainable Diversion Limits in some areas, the consequences of which are acknowledged to be costly and painful to a large number of farmers and dependent communities.<sup>10</sup> That Guide was intended to 'kick off' a period of consultation and refinement to create binding arrangements through regulation and markets which in turn bring water extraction back to more sustainable levels. However that period has proven fraught, highlighting deficiencies in the process and the legislation itself and foreshadowing future conflict in the courts and political arena. We wish to contribute some constructive ideas to this important debate, going beyond narrow discussions about the wording of laws to engage with larger issues of substantial reform of the law from a systems perspective. This approach will reflect the contribution that was made by Land & Water Australia in suggesting innovative approaches to address otherwise intractable challenges of landscape-scale sustainability.

One key to getting better value from regulation is to understand just how much of it there is and to shift from a focus on individual statutes (laws) to considering how to make law as a whole work better. The rules that regulate agriculture are no longer confined to statutes. Agriculture operates within a network of rules, 'soft' as well as 'hard' and only some are imposed by government. As well as statutes at a national and state level, subordinate regulations provide the implementation arrangements. Regulations also operate at the local government level (such as the zoning, noise and nuisance controls on peri-urban irrigators, or the water access and pricing arrangements that govern their activities).

Coupled with these are delegated controls created through the administration of laws and regulations, such as annual water allocations, or approval for water trades across irrigation districts. To illustrate, a comprehensive understanding of the laws governing groundwater in the Murray Darling system would need to take into account the *Water Act 2007* (Cth), the State

---

<sup>8</sup> Jennifer McKay, 'Groundwater as the Cinderella of Water Laws, Policies, and Institutions in Australia' (Paper presented at the International Symposium on Groundwater Sustainability, Alicante, Spain, 24-27 January 2006); Murray Darling Basin Authority, *Guide to the proposed Basin Plan Volume 1* (Murray Darling Basin Authority, 2010), Ch 9.

<sup>9</sup> National Water Commission, *Australian Water Reform 2009: Second Biennial Assessment of Progress in Implementation of the National Water Initiative* (National Water Commission, 2009).

<sup>10</sup> Murray-Darling Basin Authority, above n 8.

rules for groundwater licenses and regional groundwater arrangements (such as those developed under the Murray Darling Plan<sup>11</sup>). However, water rules do not stand alone on governing the use of this resource. To understand the constraints on a groundwater irrigator's decisions, water-specific rules would need to be considered alongside requirements for the protection of habitats and species, land use, land-clearing, control of feral species and other laws that collectively establish the legal boundaries of farming. These create a web of regulation with which a responsible farmer needs to comply. In 2002 there were more than 250 national and state level statutes that overtly control the use of natural resources, with over forty in Victoria alone.<sup>12</sup> Our observation is that rather than being streamlined, the number of regulatory instruments has been increasing. Each is underpinned by regulations and (in many cases) by administrative rule-making and implementation arrangements.

There are also rules implemented by private bodies that can have equivalent force to laws of the state, or which reflect a partnership between government and the private sector. The combination of these rules are sometimes referred to as *quasi-law*. In terms of agricultural sustainability, industry standards, certification schemes and industry codes of practice that impose environmental restrictions are the most obvious examples. A groundwater irrigator who is an organic farmer is expected to comply with the certification schemes of Biological Farmers Australia; a cotton grower may be implementing Cotton Australia Best Management Practices (BMP) or another form of Environment Management System; or a Queensland farmer leaseholder may be subject to the Delbessie Agreement which incorporates a duty of care to the environment.<sup>13</sup> In some regions, the rules of a district irrigation authority may also apply. Some farmers may also be subject to specific rules imposed by the supply chain, as different retailers seek to strengthen their sustainability credentials with consumers. Most farmers will also be subject to a variety of contractual obligations, such as to their financier, which also may have ecological management implications. It is not unusual for neighbouring farms producing similar products to be subject to differing rules reflecting different business strategies.

With water, the nationally agreed paradigm is the use of markets to control over-extraction and to allocate the scarce resource. Market mechanisms that enable its purchase by those who value it most highly, are seen to help the seller, buyer and society realize the value of an endowed asset, a productive input and a social good, respectively. Under the National Water Initiative, the intention is to properly apply the market to groundwater. A farmer using groundwater will have a valuable and perhaps tradeable entitlement, but that private interest depends on rules that govern water use and the basis for trading, registration and protection of that interest. Increasingly, as well as surface or groundwater licenses, the agricultural enterprise may involve environmental property rights such as biodiversity banking credits, or perhaps salinity or carbon credits.

'Environmental goods or services' markets rely on an underpinning of regulation, notably in the form of property rights created through statute and governance arrangements to protect private contracts. Property rights depend on laws to define and protect the owner's interest and, with the proliferation of markets for ecological services, the complexity of rural proprietorship arrangements has escalated. The systems used to transact property involve many legal rules. Often market instruments rely upon government managing the transaction mechanisms,

---

<sup>11</sup> Murray Darling Basin Authority, *Basin Plan* (Murray Darling Basin Authority, 2012).

<sup>12</sup> Victorian Competition and Efficiency Commission, 'A Sustainable Future for Victoria: Getting Environmental Regulation Right' (Final Report July 2009).

<sup>13</sup> Edward Barbier, Joanne C Burgess and Carl Folke, *Paradise Lost? The Ecological Economics of Biodiversity* (Earthscan Publications Ltd, 1994).

intervening in the market to ensure that the ecological and economic values are preserved and being the 'risk-underwriter of last resort'. The ways in which government has managed the risks associated with groundwater is a controversial feature of management to date and is likely to be no less so as we tackle the challenge of sustainable groundwater use.

Water trading regimes also rely on controls against water theft or fraud and for protection of the integrity of the market. The laws controlling the water market intersect with other natural resource management regimes discussed above. These include rules governing land use, native vegetation protection, regional natural resource management and biodiversity conservation. Such rules intersect with the administrative approvals that are pre-requisites for some water trading or other farming activities. The intersecting rules often set the boundaries that constrain how water is used and conserved. The clearest example is peri-urban irrigators who are subject to many legal controls based on use zoning and the protection of residential amenity.

What this description suggests is that regulatory arrangements for the protection of rural natural resources have become cumbersome and that the trend is towards greater rather than less complexity. Some of this complexity is attributable to the increasing variety and sophistication of the issues and the management approaches being used, but a substantial part is attributable to a failure to address the structure and administrative efficiency of the ways in which rules are being created and implemented. We would argue that excessive structural complexity mitigates against efficiency, effectiveness and acceptability.

Whilst there will often be benefit in improving particular laws and environmental markets, this first part of our essay has demonstrated the limitations of *any* approach that is based only on considering the detailed rules governing particular issues. The experience in Australia and overseas is that such an approach results in an unwieldy proliferation of acts and regulations and quasi-laws. It becomes likely that each new policy approach, or the failure of a law in practice automatically leads to a new law rather than to rationalization of the system of rules. Over time the result is to make it difficult for landholders and others to identify what their obligations are and increasingly (and unnecessarily) expensive to comply. Such an approach arguably encourages too much reliance on state regulation and rather too little on developing and supporting norms of stewardship. It reflects a world-view in which virtue as a motivator for action is discounted and belief in the power of government to manage what is happening 'on the front line' is elevated to unrealistic levels given available resources and the scale of the supervisory challenge. This may be a relatively ineffective mechanism for protecting natural resources.

The above discussion serves to highlight one way in which Australia might improve its regulatory approach: by shifting from an approach almost exclusively focused on individual laws and market mechanisms to one that considers systemic inter-connections between laws, markets and other frameworks to shape natural resources use and conservation. In environmental sciences great improvement has been achieved by grafting an understanding of system interactions onto the traditional focus on reductionist understanding of particular species.<sup>14</sup> Systems science has become an important source of innovation in resource management, as it has in understanding complex socio-economic endeavours. Thinking about laws as part of a system that shapes behaviour would lead to a greater emphasis on the

---

<sup>14</sup> Mark A Burgman et al, 'Designing Regulation for Conservation and Biosecurity' (2009) 13(1) *The Australasian Journal of Natural Resources Law and Policy* 93.

‘architecture’ of laws and their interaction with other instruments and to a greater concern for the overall efficiency and effectiveness of the system. It would almost certainly lead to major reform to address complexity and overlap as well as a better structure for considering where law reform might achieve improved environmental outcomes, reduced regulatory cost and greater fairness.

A more productive approach would be to concentrate on instruments such as groundwater entitlements or regulation at the same time as improving the dynamic interaction between different instruments and between them and the broader context within which these operate. This simple-to-describe shift, to consider system-wide rules reform, is in practice likely to be daunting to achieve. It would ultimately require fundamental reforms to the architecture of environmental laws and the processes used to create these laws. It would involve re-thinking laws that have been the result of hard-fought battles. However the economic and social case for major reform is strong and in the next section we set out this case.

## II A BALANCED ARGUMENT FOR SIGNIFICANT REFORM

Our challenge is how to get ecological benefit from our suite of laws at less cost, while also ensuring fairness and legitimacy in the eyes of the community. A starting point is to have a clear perspective on why regulation is imposed, what is its costs, who bears that cost and what parts of this cost are unnecessary (i.e. inefficiencies). It is also important to understand the strengths and limitations of the alternative strategies to traditional regulation that are proposed by its’ antagonists, such as deregulation and the use of environmental markets.

The core function of regulation is to prevent some people from doing things that they would otherwise wish to, where the activity is judged by Parliament to be harmful to the larger public interest. A regulation should be judged to be effective if it achieves Parliament’s intent by precluding or restricting the designated activity, even if this imposes a cost of foregone economic opportunity. These costs are not inefficiencies, as they demonstrate that Parliament has exercised its rightful role in our society and judged that this loss of opportunities is in the public interest.

However, costs imposed by regulation that go beyond those necessary to achieve its public interest goals are inefficient and therefore undesirable. So too are ill-targeted laws that extend constraints beyond the activities they are intended to curb and intrude into other socially legitimate activities, imposing unnecessary collateral costs. Such impositions can be correctly considered as inefficient, supporting calls for reform in the interests of efficiency and legitimacy.

For example, across Australia it has been judged to be in the public interest to prohibit land-clearing to protect native biodiversity. Given the tragic loss of biodiversity the arguments for this prohibition are strong. However, critics of these laws have argued among other things that they sometimes prevent farmers from controlling invasive native plants that are weeds in the farming context and from changing farming activities, where such constraints do not materially aid biodiversity.<sup>15</sup> To the extent that these claims are correct, they point to a wasteful consequence. Farmers like Peter Spencer also point to the cumulative but unintended effect of a variety of laws as making it less feasible to operate the farm as a productive unit. This would indicate that at least in some situations the costs go well beyond what is needed to achieve the Parliamentary intent. To the extent that this is true, it is an undesirable inefficiency.

As well as the costs of constraint, there are also the costs to government of implementation and, to both citizens and government, a wide variety of transaction costs. These include the costs of verifying whether the land-clearing laws apply to a particular site or activity, costs of permit-seeking and the costs to government of ensuring compliance and enforcement. Furthermore, because costs and constraints will impact on different people to different degrees, there is always the potential for unfairness in how the costs of regulation are distributed.

What is the cost of having 250 separate laws and the myriad of regulations and quasi-laws and what is the level of inefficiency in this system? We cannot know. It is not possible with the available research to ‘unbundle’ the direct costs of regulation to distinguish those that are efficient demonstrations of Parliamentary intentions to control particular harms, from those that arise as collateral but unproductive constraints. Further it is not possible from the studies

### Box 1: Studies of regulatory cost

These studies are indicative of Australian regulatory cost research to date. Whilst many studies suggest that both overall cost and waste are significant issues, all suffer from deficiencies in terms of assessment and categorization of cost and in terms of objective cost/benefit assessment.

- Based on 351 farmer interviews, ABARE identified that native vegetation law had an opportunity cost of between \$26 and \$838/hectare, with a median of \$217,000 per farm.
- The Regulation Taskforce 2006, indicated that compliance matters can consume up to 25% of the time of senior management of large companies. The report noted that regulatory cost study estimates should be treated with caution and that;
- The Victorian Competition and Efficiency Commission (VCEC) suggests that the total environmental expenditure by businesses in Australia may be 0.2–0.4 per cent of the total value of production. Unlike other studies, the VCEC also sought to quantify the benefits of this regulation.

<sup>15</sup>Arguments presented in National Farmers’ Federation, Submission No 128 to Productivity Commission, *Inquiry into the Impacts of Native Vegetation and Biodiversity Regulations*, 2003, <<http://www.pc.gov.au/inquiry/nativevegetation/subs/sub128.pdf>>; see also The Australian Government, *Response to Recommendations in the Productivity Commission Inquiry into the Impacts of Native Vegetation and Biodiversity Regulations* (Commonwealth of Australia, 2004).

that have been done to distinguish transaction costs from other costs, nor to have a complete evaluation including both private and public costs.

The failure to distinguish between transaction costs and the direct costs of regulation is significant. The strategies to reduce transaction costs in either markets or regulation are quite distinct from the strategies to reduce direct costs. They speak rather to the need to streamline administration than to the need to reduce substantive environmental safeguards. However, even whilst we are dubious about many of the cost of regulation studies themselves, the clear message is of the need to create a system of environmental law that is less costly and at the same time more potent.

Some analysts (particularly from a neo-liberal viewpoint) point to the costs of regulation such as those identified above, in order to support arguments for deregulation.<sup>16</sup> Deregulation in this context generally means removing the direct constraints of regulation, both those that are determined by Parliament as necessary in the public interest and those that are incidental to the useful constraints. The principal arguments for deregulation are that regulation is unjustifiably costly and that approximately the same social outcome could be achieved by less interventionist means, namely the free market. One can hear echoes of the pre-GFC claims of some finance market analysts in this argument.

As to the argument that regulation is *unduly* costly, because a public activity is costly does not imply that it is not a good investment. There are many costly public investments that add greatly to the public good, such as schools, hospitals, defence, support for the arts, roads and infrastructures. The relevant economic and social question is whether the value achieved justifies that investment and, even if it does, whether greater value can be achieved at lower cost. Parliament (on behalf of the people) has already answered the first question in the affirmative for the laws and other instruments it has created. Advocates of deregulation might contest this judgment, but they all too frequently do so by pointing to the costs of regulation (which are relatively easily calculated) while heavily discounting or ignoring the benefits (which are not so calculable). Whilst cost is readily denominated in dollars, ecological value to current and future generations is not. Neither is it possible to account for the value of a democratic system under which (arguably) functionally irrational choices can be made by the people through democratic processes – are the resulting constraints inefficient if there is a payoff in terms of maintaining the hegemony of the majority, through active democratic institutions? Issues of value intrinsically involve consideration of values. Even the best available techniques are complex and contestable, as the embryonic ecosystems services literature and contingent valuation techniques attest.

Many studies of the costs of regulation, rather than justifying less environmental protection, on closer examination indicate the need for more sophisticated and streamlined approaches to environment protection.<sup>17</sup> They point particularly to the idea that the pursuit of structural

---

<sup>16</sup> See for example, Philip Hampton, 'Reducing Administrative Burdens: Effective Inspection and Enforcement' (Final Report, Her Majesty's Stationary Office (UK), March 2005); The Liberal Party of Australia and the National Party of Australia, 'The Coalition's Policy to Boost Productivity and Reduce Regulation' (Policy Document, The Liberal Party and The National Party, July 2013) <<http://www.liberal.org.au/boosting-productivity-and-reducing-regulation>>.

<sup>17</sup> Martin, P et al, 'Developing a Good Regulatory Practice Model for Environmental Regulations Impacting on Farmers' (Full Report, Australian Farm Institute and Land and Water Australia, September 2007); see also Lisa Heinzerling and Frank Ackerman, *Pricing the Priceless: Cost-Benefit Calculations of Environmental Protection* (Georgetown Environmental Law and Policy Institute, 2002) <

efficiency in regulation, rather than deregulation *per se*, ought to be given more consideration. We would suggest that the experiences of financial markets, added to the arguments we make below, indicate that to rush to the conclusion that deregulation or reliance on markets are a reliable answer to concerns about regulatory cost and inefficiencies may in many cases fit the situation identified by Henry Louis Mencken: *For every complex problem, there is a solution that is simple, neat, and wrong.*

Proponents of deregulation who do believe in the need for some intervention suggest the use of markets instead of regulation. This raises the question: are free markets intrinsically better than environmental regulation? “Free market environmentalists” seek greater efficiency by replacing traditional regulation with the use of markets that they argue will be sufficient in themselves to protect natural resources. For example, they advocate the allocation of private property-rights for natural resources that are under threat and trading of these interests, so that these under-valued resources come to have a higher economic value. In its full-blown form this approach proposes that all environmental outcomes should be determined by the accumulation of bargains struck between individual owners of natural resource property-rights.

Falling short of the full-blown approach but increasingly common are market mechanisms that in part rely on government regulation to limit over-exploitation but then use markets to allocate these limited use rights. These are a “middle way” between free markets and government regulation. Such approaches include ‘cap and trade’ or ‘tradeable permits’ markets, or auctions for temporary access. Other approaches that combine regulation and markets include Pigouvian taxes and access pricing arrangements such as royalties. Also increasingly used are “market-like” arrangements such as auctions to more efficiently allocate government or private environmental investments or supports.

The particular virtue of market based approaches is that:

[r]egulatory instruments require the central authority to determine the best course of action, whereas economic instruments decentralise much of the decision-making to the [individual duty holder], which typically has better information for determining the appropriate individual response to given economic conditions.<sup>18</sup>

The regulatory role of government varies with the market approach that is adopted. Even in the most free market approaches there is a role for government in creating and protecting individual property-rights and in protecting the integrity of the market by outlawing deception. Frequently government is also called upon to ensure that there is a reliable trading and registration ‘platform’ and to intervene as a market participant (for example by buying back interests to meet public policy goals). Government is also involved creating the legal frameworks for ‘unbundling’ environmental interests from land and registration and documentation of interests. To treat regulation and markets as alternative rather than complementary instruments is, in many ways, misleading.<sup>19</sup>

---

B%20pamphlet%20final.pdf>; and William A Pizer and Raymond Kopp, 'Calculating the Costs of Environmental Regulation' (Discussion Paper No 03–06, Resources for the Future, March 2003).

<sup>18</sup> Barbier, Burgess and Folke, above n 13, 182.

<sup>19</sup> Albert Lin, 'Evangelizing Climate Change' (2009) 17 *New York University Environmental Law Journal* 1135; see also Pearl Eliadis, Margaret Hill and Michael Howlett (eds), *Designing Government: From Instruments to Governance* (McGill-Queen's University Press, 2004); Michael Faure, 'Instruments for Environmental Governance: What Works?' (Paper presented at the Seventh Annual IUCN Academy of Environmental Law Colloquium, Wuhan, China, 1-5 November 2009).

Environmental markets have proven to be far less reliable in practice than they are often predicted to be in theory.<sup>20</sup> The impediments to success include less than perfect market information, high transaction costs and difficulties in pricing collective goods so as to 'internalise the externalities' in the price of the interests that are created.<sup>21</sup> To no small degree, failures of market instruments can be tied to failures of regulation and other traditional government roles.

Economic instruments generally require significant investment by government in regulation and in creation of strong and efficient institutions. Failing such investment the probability of them being effective falls. Potential shortcomings of economic instruments include the risk that markets themselves may fail and that firms may not respond as expected to price signals and the need to align the water or other natural resources regime with the requirements of sustainability. This may be because of many factors that have been shown to subvert market mechanisms including high transaction costs, lack of confidence in the market, an economic or legal incapacity to adjust to the changed economic conditions, or the influence of countervailing economic or social forces. We make these points not to suggest that traditional regulation is generally to be preferred over economic instruments. Rather they indicate that there are risks and costs with all types of instrumental intervention and that reliance on a limited suite of interventions to change a complex socio-economic system that is shaped by a very diverse set of transactions does carry risks of failure.

The downward spiral in the state of our national environment continues even in the face of a large investment in regulation, substantial direct investments in landscapes and rivers by both the public and the private sector, the growing use of environmental market instruments and increasing consumer pressure towards sustainability. That we need a better way to stem the losses and restore the environment and that significantly more effective and efficient environmental law will be a necessary part of this revolution, is to us self-evident. In the balance of this essay we will point to some directions for environmental law reform that, based on our research and that of many other colleagues across the world, have the potential to lead us to a system that better integrates and streamlines regulation, market instruments and other forms of public and private action to advance sustainability.

### III REFORM PRINCIPLES

The protection of the environment in Australia (as in the rest of the world) has proceeded through a couple of generations of government intervention. The first generation can be characterized as using regulation as the tool of choice (although too rarely effectively enforced), married to direct works by government that were largely prioritised and carried out with a focus on scientific and technical considerations. The emphasis was upon advice and persuasion, upon direct action like soil conservation and weed control and upon the delivery of technical advice to rural landowners. Overwhelmed by the extent of the challenge, the limitations of resources and resistance to regulation from agricultural producers, this first generation has evolved into a paradigm in which market instruments, large-scale voluntarism and the use of market-like mechanisms such as auctions of government subsidies have come

---

<sup>20</sup> Kate Crowley and K J Walker (eds), *Environmental Policy Failure* (Tilde University Press, 2011) 220; Michael Blumm, 'The Fallacies of Free Market Environmentalism' (1992) 15 *Harvard Journal of Law and Public Policy* 371.

<sup>21</sup> For an economic analysis relating specifically to the Murray Darling, see John Quiggin, 'Environmental Economics and the Murray Darling River System' (2001) 45 *The Australian Journal of Agricultural and Resource Economics* 67.

to the fore. This new paradigm has required significant innovations that have proven to be useful and efficient in many settings where the first generation approaches proved wanting. But as we have demonstrated, this second generation also contains a number of inefficiencies and the potential for failure and will have to be supplemented with a next generation of strategies. It is toward the creation of this third generation that we turn our attention.

We wish to use the balance of this essay to outline proposals about how this reform might be pursued to achieve radical improvement in environmental governance. In a variety of previous studies we have developed concepts that ought to lead to marked improvement in the system of environmental laws. These are summarised in Box 2. What is particularly of note is that these concepts are not about how particular laws might be drafted, they are about how the system of laws and other instruments might be reformed as a whole. They focus on a better system of law, going beyond a consideration of the laws themselves to take into account institutions, processes and strategies. Whilst improvement at the level of specific instruments is necessary, this is insufficient to achieve the effectiveness, efficiency and equity that is required. The legal architecture, institutions and the processes to create and review laws also need to be markedly improved.

Einstein's reputed aphorism that "*no problem can be solved from the same level of consciousness that created it*" seems nowhere more appropriate than in consideration of the challenges of achieving more effective and economical environmental regulation. The thinking that has characterized the creation of the problems we have discussed is to identify a particular decision and action (or set of decisions and actions), 'problematise' these and then create an instrument intended to directly control the aspects of these transactions that are considered undesirable. This thinking (coupled with our fragmented heritage of legal and governmental institutions) has often led us to respond to any failure of prior rules with an additional set of equally fragmented controls. At the same time, other agencies in other parts of government may be deploying incentives to encourage specific desired behaviours, or creating distinct rules to deal with perhaps related problems. The result can be that one arm of government is encouraging actions that run counter to the purposes of another arm. Through such mis-coordination we end up with a complex web of administrative and implementation arrangements that is far from coherent.

This approach has lost sight of the fact that any transaction is embedded within a network of other transactions that have preceded it in time and which will follow it. Thus, a farmer deciding to what extent they will extract groundwater will be heavily influenced by the legacy of infrastructures and enterprise activities that they have, shaping their management options. Their actions will be shaped by economic and institutional constraints and by information that they have at the time from a variety of sources. Their decisions will be shaped by their perception of future transactions, such as their anticipation of what the market will reward and what the physical environment such as climate will do. In this calculus their moral values and personal or family needs will form part of their reasoning and collectively the flows of information, calculations of potential gains or losses and weighting by values will determine their actions. The law may be one consideration, but it is at best only one factor and each farmer will be responding to their distinct beliefs, influences and constraints.

Thus, the farmer's decisions and actions will be substantially shaped by transactions carried out by many other people and by the farmer's perception of what these people might do. The influence of bankers, neighbours, the purchasing chain, accountants, family and many others directly or indirectly linked to the farmer will either support or frustrate the intention of

environmental laws. In some cases this variety of factors may make it impossible for the farmer to do what the regulators would wish, or cause these responses to be far slower than policy makers expect.

In practice, compliance with environmental rules will be least costly and most comprehensive when the dictates of the law are supported by the flows of information and incentives and by the embedded values and decision-making approaches that characterize this total transacting system. This observation applies equally to market-based instruments. Their success is also likely to be shaped by the context of transactions and institutions that surround them and which shape decisions to use them (or not).

#### IV IMPROVING GROUNDWATER REGULATION

The core of the National Water Initiative, the *Water Act 2007* (Cth) and the principles for the Murray Darling Basin Plan announced in October 2010 is a commitment to the market as the organizing instrument for water use. The combination of the *Water Act* and additional regulations (particularly additional water trading rules) in the Murray Basin Plan focus management on one instrument, the tradeable license to extract a capped volume of water. Expressly, government will be largely prohibited from direct intervention in this market other than as a buyer on behalf of the environment. Government will develop economic adjustment plans to address the social harms that may arise and the regulatory structure of metering, observation and licensing will continue in force to support that market. The implicit belief is that groundwater users will be willing and able to rapidly adjust their water use in response to the economic signals, so that the plan goals will be achieved in a reasonable time.

These observations make us sceptical that the proposed approaches to groundwater use are optimal, in large part because they are dependent on a limited set of interventions that address only some of the transactions that shape groundwater use. The behavioural instruments are directed to only some parts of the complex transacting system that shapes water use. A comprehensive approach to align as many transactions and forces as possible to support the proposed water regime would seem to be a more robust approach. It is possible to envisage, for example, an integrated strategy that combines groundwater cap and trade with a precisely targeted social intervention and an industry-based performance improvement programme. Such an approach would involve a variety of interventions throughout the system of transactions that shapes water use. What has tended to happen is that various elements do tend to evolve but not in an integrated and coordinated manner.

We have proposed ten design concepts for improved regulation (see Box 2 below) that are intended to operate at two levels. We propose in effect a major restructure of the architecture of environmental law, including rationalization of the number of laws and their implementation at a national, state and local level.<sup>22</sup> We also propose a changed approach when addressing particular issues. That approach involves a shift towards the integration of markets, regulation and other interventions in a more systematic 'smart' manner than has been traditionally used. We demonstrate an issue-specific application of the concepts with reference to groundwater regulation.

---

<sup>22</sup> See also Allan Hawke, 'The Australian Environment Act' (Final Report, Independent Review of the Environment Protection and Biodiversity Conservation Act 1999, 31 October 2009) <<http://www.environment.gov.au/system/files/resources/5f3fdad6-30ba-48f7-ab17-c99e8bcc8d78/files/final-report.pdf>>.

We believe that both traditional regulation and more modern environmental market instruments are prone to fail more often than advocates of either approach acknowledge. Variables that can retard (or, if properly aligned, support) change include institutional incapacity, the inability or unwillingness of the users of resource to alter their behaviour, the high cost of securing information needed to make the instrument work and an overall imbalance of incentives towards consumption rather than protection. What makes an instrument of any type work is not only the design and choice of the instrument, but also a variety of factors related to the environmental and social systems within which the intervention takes place. Reliance on the instrument alone, without addressing systemic relationships, does not seem to be a robust approach in the light of real world experience. The potential exists to increase the effectiveness of groundwater management and reduce the cost of achieving change by better aligning the elements in the transacting system towards the goals of reducing water extraction whilst improving economic returns from that water. This approach, using multiple instruments of a variety of types to shift the total social or economic system, is the essence of “Smart Regulation”.<sup>23</sup>

### **Box 2: Ten concepts to improve Australian regulation**

1. Focus on shaping the systems that generate unsustainable outcomes, not creating instruments to address only some of the symptoms of the systemic problem.
2. Embrace the principles of ‘smart regulation’, using multiple instruments of different types simultaneously to achieve maximum effect.
3. Increase the behavioural sophistication of laws (and other instruments) so that we are likely to obtain better outcomes from our interventions.
4. Streamline the architecture of the laws and market arrangements we use, to reduce the inefficiencies that arise from complexity.
5. Improve the processes of regulatory evaluation and review, including more rigorous regulatory impact assessment that takes into account implementation feasibility and the social impacts of new regulations and market interventions.
6. Make greater use of the opportunities for ‘collaborative governance’ and ‘co-regulation’, whilst improving public confidence in such approaches by ensuring objective scrutiny and accountability.
7. Provide more opportunities for private citizens to take direct action in defence of the public interest in the environment.
8. Manage transaction costs, so as to create more effective laws and market instruments that operate more efficiently.
9. Evaluate and manage environmental policy risk more explicitly, including the use of commercial risk management approaches and more thorough evaluation of the risks of proposed instruments.
10. Apply the scientific model to improving environmental law, being more explicit about the theories that underpin proposed interventions and more scientific in evaluating and learning from real-world experience in implementing these theories.

---

<sup>23</sup>Neil Gunningham and Peter Grabosky, *Smart Regulation: Designing Environmental Policy* (Oxford University Press, 1998).

Of course, careful attention has to be given to the interaction between concepts and particularly between the general concepts (Principles 1-5 and 9-10) and the more specific ones (Principles 6-8). For the most part, there will be a complementarity between the different principles but this cannot be assumed in all cases. For example, collaborative governance implies a cluster of characteristics including participatory dialogue and deliberation, devolved decision-making, flexibility rather than uniformity, inclusiveness, transparency and institutionalised consensus-building practices. Most of these characteristics fit comfortably with the other concepts set out above. They fit squarely within concept 7 and do not preclude the use of multiple instruments as contemplated by concept 2 or input of the scientific model or environmental risk management as part of the decision-making process, as contemplated by concepts 9 and 10 (although stakeholders may not prioritise these in the decision-making process). However, collaboration is usually resource intensive and so may increase transaction costs (contrary to concept 8) and does not sit comfortably with concepts 4 (streamlining) or 5 (regulatory impact assessment). This suggests there may need to be a trade-off between different principles in some circumstances. This is hardly a new challenge. Indeed policymakers frequently have to make trade-offs between the three overarching principles of efficiency, effectiveness and legitimacy and the above dilemmas are examples of these trade-offs in particular circumstances.

The broader point is that strategies to address environmental degradation are context-specific. What sorts of policies work will be highly dependent upon the characteristics of the environmental issue under consideration. As a result, it would be futile to attempt to construct a single optimal regulatory solution that would be applicable to a wide variety of circumstances. Moreover, there are so many possible permutations of instrument and institutional interactions as to make the task of producing a general causal model of relationships between the multiple variables impractical even if problems of context specificity were overcome.<sup>24</sup> Notwithstanding the context-specific nature of most environmental problems, it is possible to build a *process and principle based framework* for designing environmental regulation in any given circumstances. By this we mean an approach which, while falling short of providing determinative regulatory solutions, leads policymakers to ask the crucially important questions (processes) and assess their decisions against a set of criteria (our ten concepts) which form the basis for reaching preferred policy outcomes.<sup>25</sup>

For example, applying this approach to dealing with groundwater, might involve grafting onto the proposed market for water, a collaborative governance model involving irrigators, farmer organizations, farm financiers and the wholesale/retain buying chains and organizations who provide frameworks such as certification, standards and Environment Management Systems. Our prior work has suggested that it is possible to negotiate credible co-regulation, backed by transparent public scrutiny and firm sanctions against failure, which could harness market

---

<sup>24</sup> As Bressers and Klok put it, 'theories based on the joint influence of possible combinations of circumstances rather than the isolated influences of individual circumstances tend to become tremendously complex' Hans Bressers and Pieter-Jan Klok, 'Fundamentals for a Theory of Policy Instruments' (1988) 15(3-4) *International Journal of Social Economics* 22.

<sup>25</sup> A benefit of this approach is that policymakers will avoid expending scarce resources exploring in detail inappropriate and unproductive regulatory strategies at the early stages of the design process, thus reserving resources for a more detailed assessment once the available options have been refined down to a short-list. For example, McGarity refers to a 'phased system of reducing options' whereby regulators begin with 'a large number of options initially' and 'as options are rejected, the remaining options should be analysed with increasing thoroughness' Thomas O McGarity, 'Regulatory Analysis and Regulatory Reform' (1987) 65 *Texas Law Review* 1243.

forces and the goodwill of many producers and consumers.<sup>26</sup> Experience in other sectors (such as finance markets and packaged goods producers), in Australia and overseas, does suggest that such smart approaches can be powerful and economical complements or alternatives to either regulation or market instruments.<sup>27</sup>

Such thinking also suggests the need to become far more sophisticated in the behavioural design of interventions. Users of groundwater are not homogeneous. They are a highly segmented group of people implementing varied strategies in response to quite different conditions, motivations and values. What is feasible and attractive for a multinational grazing corporation in the Great Artesian Basin is likely to be quite different to what will stimulate the willing involvement of a struggling family business dependent on groundwater in Western Victoria. In turn this is different to what might work with an Aboriginal pastoral company in Central Australia. One only needs to look to the demonstrated power of marketing in its various forms to see the potential for more behaviourally sophisticated approaches to regulation and market instruments .than has been thus far demonstrated in Australia. The few instances where social marketing approaches have been married to regulation provide empirical evidence of the potential to improve the effectiveness and reduce the costs of regulation by applied behavioural science.<sup>28</sup> This is perhaps best illustrated with the multi-faceted strategies that have evolved to control smoking. In doing so, we need to be particularly sensitive to the considerable extent to which the behaviour of individuals may deviate from that of the 'rational actor' of mainstream economic theory.

For us, what is most interesting about the approach to the management of groundwater under the *Water Act 2007* (Cth) and the Murray Darling Basin Plan is what is missing from the regime. The mechanism used to adjust groundwater use to more sustainable limits is a cap-and-trade approach, of necessity linked to policing and administrative arrangements to preserve the integrity of the cap and provide good governance for the trades. The role of government is explicitly constrained to creating and protecting the market and the provision of adjustment support (outside the core framework), as it is prohibited from intervention in the workings of the water directly.

At least four considerations that will influence the effectiveness of the implementation of the chosen instruments seem to have been given little attention in this strategy.

1. The economic and other capacity of the groundwater users to respond rapidly to these opportunities (and costs). The data on economic and social characteristics of the groundwater dependent farming communities of inland Australia suggest that there are many potential inhibitors to their ability to do so. These include relative disadvantage

---

<sup>26</sup> Gunningham and Grabosky, above n 23; Neil Gunningham, Martin Phillipson and Peter Grabosky, 'Harnessing Third Parties as Surrogate Regulators: Achieving Environmental Outcomes by Alternative Means' (1999) 8 *Business Strategy and the Environment* 211; Neil Gunningham and Darren Sinclair, *Leaders and Laggards: Next Generation Environmental Regulation* (Greenleaf Press, 2002), 204; Cameron Holley, Neil Gunningham and Clifford Shearing, *The New Environmental Governance* (Earthscan, 2012).

<sup>27</sup> Reena Aggarwal, 'Demutualization and Corporate Governance of Stock Exchanges' (2002) 15(1) *Journal of Applied Corporate Finance* 105; Ada S Rousso and Shvetank P Shah, 'Packaging Taxes and Recycling Incentives: The German Green Dot Program: Introduction' (1994) 47 *National Tax Journal* 689; Jonathan Cave, Chris Marsden and Steve Simmons, 'Options for and Effectiveness of Internet Self- and Co-Regulation' (Technical Report No TR-566-EC, RAND Corporation (Europe) and the European Commission, 2008) <[http://www.rand.org/content/dam/rand/pubs/technical\\_reports/2008/RAND\\_TR566.pdf](http://www.rand.org/content/dam/rand/pubs/technical_reports/2008/RAND_TR566.pdf)>.

<sup>28</sup> Amanda Kennedy, 'Using Community-Based Social Marketing Techniques to Enhance Environmental Regulation' (2010) 2 *Sustainability* 1138.

in education, wealth and access to professional services to support decision-making. An optimized approach would consider complementary programs and expand the population of water users who are enabled to adjust to the new regimes and to exploit the opportunities that are meant to drive the shift to sustainability.

2. The role of private institutions in this transition, including banks and investors, produce buyers and investors in the environment. The power of financiers and the supply/purchasing chain and the potential role of industry and consumer standards, to shape what happens could be substantial. Engaging the private sector in shaping the transitions that are needed could significantly accelerate change.
3. The interaction between these new groundwater rules and other institutional and legal arrangements, such as regional natural resource management arrangements and regulations. Based on experience in other water quality and quantity markets it is likely that unexpected 'details' will reduce the ability of groundwater users to make necessary changes. To at least some degree these will likely be the unintended consequences of other arrangements intended to advance sustainability or productivity, or protect (particularly indigenous) welfare. An optimizing approach would engage with these issues and seek to streamline the total suite of arrangements before it becomes an inhibitor of change.
4. The role of farmer and other peers in shaping attitudes and developing capacity. Formal bodies like industry organisations, informal peer groups and industry standards and practice change, all have the potential to contribute to (or retard) desirable change. A systematic approach that moved beyond a focus on instruments would aim to integrate social change and non-state regulation or persuasion with the instrumental strategy. Such considerations are lacking from the approaches announced to date.

Empirical evidence supports the proposition that a key to greater cost-effectiveness is to reduce the transaction costs of the regulatory and market instruments that are used. This issue operates at two levels. The first is to reduce the transaction costs associated with the particular instruments that are deployed and, the second, is to reduce the transaction costs of the total regulatory or market system that is encountered by the citizen. It is not within the scope of this article to document the transacting and regulatory system, but even surface water trading is proving to be an excessively complex operation for many irrigators. The indications are that the challenges of groundwater markets will be even greater. Some of the reasons include scientific uncertainty about key issues such as the state of groundwater resources, their connectivity and recharge, the limits of reliable metering and the absence of automated reliable information to support both trading and regulation.

The appointment of the Bureau of Meteorology to manage the data and intelligence aspects of national water markets speaks of the importance of the information issues, but the investment and time frames involved in their resolution do suggest that transaction costs are likely to be a serious impediment to effective and efficient groundwater management for some time. Public under-investment in solving these detailed issues is likely to be reflected in under-performance of groundwater management because of excessive cost and complexity being borne by those who are expected to alter their behaviour in response to the new policy settings.

## V REFORMING THE NATIONAL LEGAL ARCHITECTURE

Many of the ten concepts relate to reform of the national legal architecture for natural resource management. Overlaid on any consideration of how to better regulate a particular issue like groundwater is consideration of the transaction costs challenge associated with the over-

arching regulatory and market ‘architecture’ for natural resource management, of which groundwater management is only one dimension. We have outlined early in this paper the various elements of this system that involves state and federal (and occasionally local) government laws; administrative regulation; and a variety of private rules. We have elsewhere documented the effects that this ‘higgledy-piggledy’ structure is likely to have on the cost-effectiveness and fairness of natural resources regulation. As has been demonstrated by business law reform it is possible to reduce complexity and cost by reducing the number of instruments, even without altering the balance between the interests of those who pursue conservation and those who most value productive use of our natural resources. It is possible to envisage a structure in which we have a handful of environmental laws that incorporate all of the key elements of the hundreds that we have today, which provide the same levels of protection but far less of complexity.

One of the triggers for such reforms would be a more robust system of regulatory review, that considers not only the commercial benefit/cost effects of the particular proposed instrument, but also considers such things as the implementation resources that will be required.

Our earlier discussion of the different ‘market segments’ of the citizens who depend upon groundwater suggests that at least some segments are likely to be vulnerable, or at least at a disadvantage compared to others who are subject to the same management regime. One would expect, on the basis of history and demographics of the Great Artesian Basin, that the people most likely to be exposed are Aboriginal people in remote locations. A thorough risk-evaluation of the emerging groundwater regime is likely to indicate the need for targeted intervention to avoid the likely social spillovers and to equip less-advantaged citizens with the knowledge and resources that they will need to participate in whatever economic opportunities may arise from groundwater management through the market. From the information that has been released about the Murray Darling Basin Plan it seems that a detailed social risk review of groundwater management instruments has yet to occur. It is suggested that the strategy to manage such risks as will inevitably arise will be developed over time in consultation with communities and state agencies, but this does seem to be leaving one core issue, risks from the intervention, to an afterthought.

This is not intended to be particularly critical of the authorities charged with this work, for policy risk evaluation of the type we suggest is not required in any jurisdiction in Australia. The methods for doing so are not well developed. Deficiencies in processes for regulatory evaluation (and particularly assessing the risks of failure or perverse effects) explain why progress in creating regulation that is efficient, effective and fair has not been adequate in Australia or elsewhere. Without the stimulus that stronger review processes provide, it is hard to see how environmental regulation will benefit from a strong scientific approach to continuous improvement.

The limits of government funding and the effects of politics on the ability of government agencies to defend the environment are matters of practical importance. The move to greater use of markets rather than government regulation in part reflects this concern. The pursuit of private philanthropic funds and the use of ‘green consumer’ pressures is a further illustration of a shift towards private market action to replace or supplement government funds. This ought to raise the question of the extent to which private legal action in defence of the environment or social justice values ought to be enabled, for this too is a private market approach that relieves responsibility from government. Whilst many support the use of private market instruments for other purposes, providing greater scope for citizen litigation is likely to be

contentious even among free market environmentalists who are otherwise strong advocates of the private interest being harnessed to achieve public good and of the benefits of 'getting government out of the environment'. It could be argued that, as the *Water Act* and the Murray Darling Basin Plan have limited the role of government in direct intervention other than as a trader, society needs to strengthen other mechanisms to protect the public interest and to ensure that those charged with managing the system do what is required in the public interest.

## VI CONCLUSIONS

In this article we have tried to provide a balanced assessment of the critiques of environmental regulation as it affects the rural sector and of the main proposed alternatives: deregulation or the use of markets. We have argued that the deregulatory and free market alternatives tend to overstate the costs and understate the benefits of regulation and that they do not provide clear insights into what is 'efficient' because the methods tend to aggregate costs that are necessary and intended, collateral and unintended costs, opportunity costs and transaction costs. However, even given these significant caveats it is clear that it is in the public interest to create laws that do work better and are less costly. We have identified that one key to the pursuit of effectiveness and efficiency must be robust review and reform of the system of laws, not just individual laws.

The evidence is that neither deregulation nor the use of markets can be sufficient to replace effective environmental regulation. This is in part because of their own limitations, but also because of the intrinsic links between good regulation and effective markets. The reality is that the pursuit of sustainability must involve a synergistic relationship between traditional and more contemporary governance approaches. Any treatment of them as alternative rather than complementary instruments unnecessarily narrows strategic options for effective resource management. A philosophical bias in favour of one or the other is not very useful.

We have argued that all instruments carry the risk of failure and that often it is the same sorts of things that will determine their effectiveness. Contextual conditions such as the capacity of those whose behaviours are being managed to alter what they do and the influence of the many surrounding transactions and interests that shape response to markets or regulation are significant among these. So too are issues such as the capacity and efficiency of the institutions charged with implementing the interventions. We have proposed that intrinsic to far more effective regulation and markets is the importance of managing total transacting systems using a variety of instruments and behavioural interventions, rather than focusing only a limited set of transactions with a limited set of interventions. This represents a significant change to natural resource management (and particularly natural resource regulatory) practice but it is essential if we are to move beyond the present unsatisfactory situation.

The ten regulatory reform concepts we have outlined provide at least a starting point for considering how Australia might proceed to a more fruitful approach to regulation and markets and we have demonstrated in the case of groundwater some of the ways that this might be approached.