

Designing Suites of Incentives to Encourage Sustainable Land Management in Rural Queensland

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Abstract:

Agricultural practices including “grazing and overgrazing in general, agricultural production, water use practices, extensive vegetation clearing, wetland drainage on coastal plains, and development on acid sulphate soils” have been identified in the Reef Water Quality Protection Plan (Australian Government and Queensland Government 2009) as contributing towards nutrient, sediment and toxicant loads entering waterways. The management of the discharge of diffuse or non-point sources of discharge from agricultural land into waterways in Queensland has become a matter of increasing concern to all stakeholders. This paper reviews a number of currently available incentives that are designed to coerce, facilitate or induce modifications to the behaviour of land managers in Queensland to achieve an improvement in the condition of the environment. The findings from the review facilitate the identification of an approach to the design of a policy framework that draws on the strengths of individual incentives and suggests how integration with other incentives employing different mechanisms for take-up enhances the overall efficacy of management. Some suggestions are offered to describe how the approach could be applied in Queensland to improve land management impacting on water quality.

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1.0 Introduction

Local, State and Commonwealth governments in Australia allocate substantial budgets to the management of natural resources and the environment. For example, in its first five years (from July 2008 to June 2013), the Australian Government will invest \$2.25 billion through *Caring for our Country* to environmental programs. These programs employ coercion, facilitative and inducement mechanisms to encourage land managers to engage in sustainable management practices. Achievable outcomes associated with the investment have been stipulated but, to date, evaluation of the outcomes from these programs has been limited although the *Reef Water Quality Protection Plan* does have a recently released *Monitoring and Evaluation Strategy* (Australian Government and Queensland Government, 2010).

Government intervention in the market allocation of resources is generally regarded as justified when the market fails in some way. Markets frequently fail to efficiently allocate resources to the production of public goods; can be distorted by externalities that are unaccounted for in market transactions; and fail to efficiently allocate resources due to incomplete or asymmetric information. Although market failure provides a justification for government intervention, there is no guarantee that intervention will bring about the desired environmental improvement or an economically efficient outcome. In short, although the objective of intervention may be to bring about a more efficient allocation of resources, the outcome might have the effect of moving the economy even further away from this goal, particularly when unintended consequences arise from intervention. Modifications to drought assistance programs for Western Australia were introduced in 2010 to add provision for payments to affected farmers conditional on submission of business plans to estimate their viability. Farmers not viable were encouraged to leave the industry. Ideally, government policy should be designed to bring about change that results in a collective gain for the greater community (Bromley 1997: 50), that is, the provision of public benefits. To achieve this aim, policy makers attempting to modify behaviour commonly use three basic mechanisms: namely those that facilitate, induce or compel change (Bromley 1997: 50-51). For the most part, current resource management policies incorporate a combination of these mechanisms.

Mechanisms relying on compulsion, in particular legal incentives and regulations targeting agricultural land management, can be effective in setting environmental standards and penalising gross breaches of an environmental duty of care. In conjunction with strict

monitoring and enforcement, they can guarantee compliance when compared to other non-regulatory mechanisms. However, regulation is most effective where the polluter is known and the pollution is easily measured. Where the source of pollution is diffuse, regulation is largely ineffective because it is prohibitively expensive to enforce. Failing support for legal incentives is due to the additional costs they impose on regulator and regulated, the perception that regulations erode existing property rights and that those bearing the costs of compliance rarely have exclusive rights to benefits arising from any improvement in the condition of the environment. In short, the implementation of legal incentives, on their own, is largely ineffective for regulating diffuse sources of environmental damage and is unlikely to achieve best management practice.

Voluntary incentives or incentives that use moral suasion to facilitate sustainable resource management encompass those mechanisms that use landholders' altruistic desire or appeal to their self interest to maintain the land in good condition and those mechanisms that convey information to landholders that facilitate compliance with codes of practice and regulatory requirements. These incentives facilitate self-regulation which land managers find less invasive than coercion. Programs that rely on altruism bestow few direct financial benefits on primary producers and, therefore, are unlikely to be widely adopted. Informational mechanisms are likely to be most effective where implementation requires minimal capital investment and results in easily captured short term financial benefits. Where the private benefits are difficult to quantify, are realised in the long term and involve considerable financial investment, widespread change is unlikely. The limitations of legal and voluntary incentives used in isolation reinforce the need for financial incentives to provide an inducement to implement sustainable management practices that contribute to an improvement in the environment.

Policies designed to induce change include economic incentives such as tax incentives, fees, subsidies and grants, management payments, tradeable permits and product accreditation schemes. Economic incentives offering financial assistance are popular with land managers but are inappropriate when used to subsidise normal operating and maintenance activities for private gain. Market based economic incentives (MBIs), particularly tradeable permits, are popular with government and industry alike because a well-designed market mechanism reduces the need for government intervention while leaving the industry free to determine the

path of least cost via the market. Economic incentives need to be underpinned by legislation and to be wholly effective they must be adequately brokered or marketed.

To date, the selection, design and application of legal, voluntary and economic incentives has largely been *ad hoc*. For the most part, incentives have been implemented outside of an integrated management framework with a specific objective in mind. Limited consideration has been paid to how suites of instruments could enhance the efficacy of management when used to support each other. In addition, the management of environmental damage from diffuse sources has been limited. This paper suggests an integrated design of policy. The approach draws on the strengths of individual incentives to determine the selection and design of combinations of incentives that simultaneously coerce, facilitate and induce land users to manage their resources sustainably.

The following 3 sections of this paper review legal, voluntary and economic incentives to improve land management currently available in Queensland for the purpose of clarifying their individual strengths and limitations with respect to their efficacy for managing diffuse sources of environmental pollution. Section 5 suggests an integrated approach to design policy based on suites of incentives. Section 6 makes a number of suggestions about how this integrated framework could be applied to manage diffuse sources of nutrient, toxicant and sediment discharge into the waterways of Queensland. The final section makes a number of concluding observations about improving the efficacy of existing incentives currently implemented in Queensland.

2.0 Legal Incentives

For the purpose of this paper, legal incentives are defined as those incentives that rely primarily on coercion based on the threat of punitive legal action to motivate or moderate behaviour. Regulations, such as *Environmental Protection Regulation 2008*, serve to support and implement the intent of Acts of parliament.

Environmental law has a long history of this style of regulation. Harm prevention is the basis of Queensland's key environmental law, the *Environmental Protection Act 1994* (EP Act). It has its origins in common law and early criminal and planning law where the objective was to prevent harm or nuisance. The EP Act protects the environment by requiring individuals and

bodies corporate to take all ‘reasonable and practicable’ steps to avoid harm both to other individuals and the environment in the course of their operations. The key defence to a charge of unlawfully causing environmental harm is for the defendant to prove that he/she complied with the “general environmental duty” (GED). The duty includes a requirement that “a person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm” (EP Act, s319).

A characteristic strength, evident in the GED and throughout the body of the EP Act is its intentionally broad approach to defining obligations under the Act based on “notions of environment and of harm” (Fisher 2003: 116). The Act makes use of a variety of policy mechanisms underpinned by a regulatory framework to ensure compliance and is ultimately “a complex set of arrangements for protecting the environment from harm qualified by a reference to the principles of ecologically sustainable development” (Fisher 2003: 116). The broad definitional approach exemplified by the GED, referred to, as “one of the most outstanding features of the Act” (McGrath 2002: 13) is also an inherent weakness particularly with respect to the regulation of diffuse pollution, because it makes the legislation difficult to enforce (Fisher 2003: 116):

The more general the provision, the more difficult it is for it to be linked to specific circumstances with a sufficient degree of certainty to satisfy the legal and scientific standards of proof.

This is illustrated with reference to the environmentally relevant activities (ERAs) subject to mandatory licensing under the EP Act. There are 85 identified ERAs focused entirely on industrial activities and intensive agriculture such as feed-lots classified as point sources of pollution. Point sources are generally easy to monitor and proving non-compliance is relatively straightforward with reference to the licensing conditions. On the other hand, regulating diffuse pollution sources such as broadscale agriculture is beset by difficulties, because these activities are not subject to mandatory licensing. The area requiring monitoring is large (e.g., Queensland encompasses approximately 23,000 farming properties characterised by highly variable size, spread over 150 million hectares). The cause and effect of like activities carried out in disparate geographical areas is poorly understood and often characterised by hysteresis. Essentially, the information requirements coupled with the

logistics of regulating diffuse sources of pollution suggest that the costs of monitoring and enforcement are prohibitively high.

Under the Act, broadacre agriculture is subject to regulation through compliance with the GED and for this purpose the Act recognises approved industry codes of practice (CoPs), which are essentially manuals detailing best management. Compliance with a CoP, which is voluntary, is an indication of acquiescence with the GED but there is no requirement to monitor the performance of the land manager against the code. The codes are not specific for individual farms and therefore are unlikely to address location specific environmental issues. Where a prosecution is imminent, there is a requirement under the Act (s436: 3b) to show “to the extent it is relevant, the defendant complied with the code”. How a defendant would demonstrate compliance with the CoP is unclear and conversely, how a plaintiff would prove non-compliance is equally unclear for at least two reasons. Firstly, because this provision does not include quantifiable measures and secondly, it has not been tested in court. Given that agricultural activities are directly or indirectly responsible for a substantial volume of the pollutants discharging to waterways (as high as 80% according to GBRMPA (Productivity Commission 2003: 28)), the lack of enforcement, or even an attempt to test the relevant provisions under the EP Act is disturbing and indicative of regulatory failure.

Historically, regulation of agricultural land in Queensland has been inadequate. McGrath (2002: 31) refers to agriculture as one of three ‘sacred cows’ of Queensland environmental law, immune from regulation. However, it reflects also a recognition by government of the inequity and possible hardship involved in placing the burden of addressing externalities arising from agricultural production solely on the shoulders of land managers. Recently, however, there is some evidence to suggest that the State government is taking a harder line in response to biodiversity loss on agricultural land. Queensland’s *Vegetation Management Act 1999* (VM Act) is one example of regulation with the potential to retain sustainable levels of vegetation which has been coupled with some compensation payments to land managers. Originally, the Act intended to retain 30% of Queensland’s pre-1788 regional ecosystems. This figure was in keeping with contemporaneous review of the scientific basis for vegetation protection which found that:

On available evidence, 30% is the minimum benchmark for the rate of retention of regional ecosystems to ensure against substantial extinction in the longer term (Boulter 2000).

However, there were broad concerns in Queensland for the additional costs this would place on landholders. As a result, the VM Act was amended to protect 10% of pre-1788 regional ecosystems. While there are suggestions that this level of protection may yet be expanded, the initial response to the Act illustrates that meeting the longer term goals of sustainability will require major shifts from current practices and thinking. More importantly, regulations are relatively inflexible. Not only are they costly to revise but constant revision erodes their credibility which could lead to further non-compliance.

This discussion has intimated that regulations, as a stand-alone management device, are largely ineffective for the management of diffuse sources of pollutants from broadacre agriculture; however, they serve a very important role. A strength of regulations, a point made by a number of industry groups, is that regulations assist in clarifying what is expected of land-managers. In addition, market-based instruments, such as water trading, require property rights over the resource in question to be clearly delineated and enforced. This requires regulation to underpin the created market.

3.0 Voluntary Incentives

Voluntary incentives are non-coercive. They describe a range of approaches to natural resource management that rely on moral suasion through the provision of information to keep land managers informed and to encourage the ongoing enthusiasm and goodwill of participants. Voluntary programs can be effective in assisting compliance with legal duties and encouraging participants to engage in good land management practices, avoiding potential future regulation, particularly if intrusive regulations are imminent. Although they do not provide direct financial assistance to achieve sustainable practices they promote land management that has the capability of earning participants private benefits and are positioned to assist with the dissemination of information to land managers about where funding could be accessed.

Voluntary approaches for natural resource managers seeking to influence activities on privately owned land and to manage non-point sources of environmental degradation are important particularly in view of the limitations of regulations. This is highly relevant for the management of environmental issues associated with rural landuse in Queensland among which runoff of sediments, nutrients and pesticides are of key importance.

The dissemination of information to land managers, particularly through industry support organisations facilitates the delivery of information that is regarded by land managers as relevant and credible. Land managers are likely to be more responsive to land management information when the delivery is non confrontational and where private gains, including cost savings and productivity gains, can be demonstrated. Two voluntary incentives for rural environmental management in Queensland are discussed in this paper, namely industry codes of practice and property resource management plans (DERM, 2003).

3.1 Codes of Practice

An industry code of practice (CoP) is a collection of voluntary rules or procedures drafted by an industry to communicate to its members how to apply best management practices. Compliance with a CoP is voluntary although benefits to landholders espoused by various CoPs include: more efficient use of farm resources, reduction of wastes, recognition by the community and purchasers as an environmentally sustainable industry, and improved aesthetics (Australian Prawn Farmers Association 2001; Canegrowers 1998; Queensland Fruit and Vegetable Growers 1998). Most importantly, compliance with a CoP approved under s219 of the EP Act forms a defence against a charge of causing environmental harm by providing evidence that a defendant has complied with the GED.

Some codes, including the CoP for Agriculture, which is an umbrella document for the other codes, use expected environmental outcomes (EEOs) to guide management practices. EEOs are principles or goals that assist land managers in adopting sustainable practices. They focus on the adoption of all reasonable and practicable measures to prevent or minimise environmental harm.

The Bureau of Sugar Experiment Stations survey of Queensland cane growers in 2001 reported that 79% were aware of their code, 62% had a copy, and 85% of those that had a copy considered it useful in making farm management decisions (O'Grady and Christiansen 2001). Approximately 53% of respondents indicated that their decisions were influenced by referral to the code. Informal assessments indicate that other CoPs are not currently widely recognised or used and do not drive implementation of sustainable land management practices. It would appear that these have been superseded by property resource management planning (PRMP).

One reason for the low level of uptake and implementation of CoPs is that broad, non-specific advice on environmental management is offered without some specific best practice solutions. In addition, the CoPs have been developed by the industry bodies and are therefore not necessarily catchment or region specific. It cannot be expected that all land managers are working within the same socio-economic environment or that the environmental issues are the same across all regions. A region or even catchment specific CoP might be more appropriate.

The most crucial factor limiting the take-up of CoPs is that the EP Act has not been adequately enforced so that farmers have minimal incentive to adopt their industry code to avoid prosecution. In addition, financial incentives to implement sustainable practices recommended in the CoPs are inadequate. The high cost of many management solutions offering minimal returns on investment, and the public nature of the benefits act as disincentives to comply. For the most part, they provide guidelines for best practice management but do not provide a basis for landholders to meet the financial costs. Such tools will therefore be effective only if used within a broader policy framework.

3.2 Property Resource Management Planning

Property resource management plans (PRMPs) are another tool to encourage sustainable management that rely primarily on voluntary uptake. A property management plan (PMP) is a document prepared by a landholder containing information about the current condition and proposed changes to their property. While all landholders will plan their business activities in some way, a PMP formalises the planning process using advice prepared by government agencies. There are numerous types of PMPs administered in Queensland by five agencies, under several Acts. Development and implementation of some types of PMP is required under legislation, but others are fully voluntary.

Property management plans cover a diverse range of issues ranging from water and vegetation management to business and succession planning. While some programs provide linkages with other PMPs (e.g. Futureprofit, the Australian Landcare Management System, and the draft 'OnePlan' Guidelines) (Caltabiano 2003), integration is poor.

There is little information available on the impact of the PLMP process in Queensland. Anecdotal evidence suggests that implementation has been highly variable between regions

and properties. Cary *et al* (2002) report a positive relationship between the presence of plans and the adoption of some sustainable practices. Common criticisms are similar to those for CoPs including a lack of measurable objectives, limited formal review mechanisms and a critical lack of links to economic incentives. Even when plans are created, there is minimal emphasis on their implementation. Implementation needs to be structured under an integrated framework that links not only the varying types of PMPs but also regulatory and economic instruments, and other voluntary tools such as CoPs.

3.3 Lessons from Codes of Practice and Property Level Management Plans

While CoPs and PLMP have strengths they also have serious flaws that inhibit their effectiveness in encouraging sustainable practices. Some industries have taken notice of these flaws and developed parallel incentives that overcome recognised problems.

The Australian Cotton Industry Best Management Practices Manual (Cotton BMP) provides a phased approach starting with small voluntary workshops at which landholder complete a self assessment handbook. Associated guide books provide specific objectives and practices based on the self assessment. Also included are 'Action Plan' proformas that encourage landholders to plan how each issue will be managed on their property. The program focuses on high priority issues for the industry (mainly pesticide use) enabling information to be focused and practical. In the second phase of the program a voluntary certification process, based on the self-assessment, is undertaken by auditors from within the industry.

The success of the Cotton BMP can be judged in part by the fact that approximately 17% of growers were audited in its first year and 25% were booked for audits in the second. However, the program has been criticised for being limited to a small range of environmental issues. The Cotton BMP provides tailored and specific information in a non-threatening and informative format and provides a direct link to property planning. The program went a step further than CoPs and PMPs in providing a means of certification for growers who adopted better practices. However it has been criticised for not providing for independent auditors.

A similar approach has been trialed by the Canegrowers Association and the Bureau of Sugar Experimental Stations. The program called Combining Profitability and Sustainability in Sugar (COMPASS) is a self-assessment handbook covering ten priority issues (Azzopardi *et*

al., 2001). There are currently no auditing processes or specific financial incentives developed for COMPASS although they are being considered for the future.

Despite the availability of voluntary approaches to rural environmental management, they are generally under-used. An important factor is the lack of integration of information from industry groups and government agencies leading to diminished land manager confidence to implement resource management advocated by these approaches. Where broad, overarching documents are available, for example CoPs, there is little specific and pragmatic advice for on-ground implementation and in particular for sourcing of funding to undertake on-ground work. What is required is an overarching framework that links voluntary approaches with regulatory requirements and economic incentives providing landholders with assurance that outcomes will be meaningful in the eyes of their customers, regulators and the community in general.

4.0 Economic Incentives

In an environmental management context, economic incentives aim to address market failures to improve the economically efficient and environmentally sustainable allocation of resources. They provide financial inducements to land managers to manage their land to minimise the adverse spillover effects on the environment and to enhance the provision of ecosystem goods and services as public goods.

Externalities or spillover effects include the costs and or benefits of environmental degradation or improvement that are not necessarily borne by, or accrue to, those creating the degradation or environmental improvement. This can result in the land manager producing more or less than they would if they had to pay, or were paid, for the environmental costs or benefits they created. The lack of appropriation of externalities is viewed as the primary contributor to poor management of environmental problems. Ideally economic incentives realign private and public interests by encouraging behaviour that is both profitable to the individual and environmentally sustainable. In short, land managers are unlikely to take on sustainable resource management, however well promoted, unless there is some form of financial reward or penalty for compliance or non-compliance.

Economic incentives fall into two broad categories; those that offer financial inducements including taxes and subsidies and, those that are market-based, involving the allocation and sale of private property rights. Both require a strong regulatory framework and a credible information base to be effective. The Rural Water Use Efficiency Initiative (RWUEI) and Farmbis are discussed as examples of financial incentives. Markets in ecosystem services as well as product differentiation are considered as examples of market-based approaches.

4.1 Financial incentives

Rural Water Use Efficiency Initiative

The stated aim of the Rural Water Use Efficiency Initiative (RWUEI) is to improve water productivity on farms in the sugar, cotton, grains, dairy, lucerne and horticulture industries. The initiative included a joint government and industry extension program, a financial incentives scheme (FIS) as well as a research and development program and the compilation of a database of irrigation fact sheets. The RWUEI engaged almost its entire target audience adopting both voluntary incentives, including extension work, and financial incentives to assist the funding of infrastructure requirements. A positive aspect of this initiative is that it has effected significant change in the way people value water. This is noted as a key outcome by Coutts and Bell, in an independent evaluation of the initiative (2003: 38):

Perhaps more important than the actual physical changes made to date, are the changes in people's 'values' in relation to water use efficiency. In some ways, immediate equipment and practice change are the easy gains. Sustainable change – or continuous improvement in water efficiency – will depend more on irrigators' understanding and motivation about the issue.

The RWUEI has been successful because it has used a range of communicative mechanisms, largely conducted through individual peak industry bodies, together with financial incentives and, from the outset, ensured effective stakeholder consultation.

There is the potential for realisation of public benefits and therefore some justification for financial support from the Government. By returning 'saved' water to the river systems as environmental flows, supported by a redemption of established water rights, this initiative forms the basis for a valid claim for financial support, particularly on the grounds of equity. However, to date no reduction of water allocations in line with efficiency savings has been instituted. Not only does this remove the possibility of a realisation of a key public benefit but it creates a potential conflict when various Resource Operation Plans and Water Management Plans come into effect across Queensland.

Farmbis

The FarmBis program is designed to promote a culture of continuous learning by providing “subsidies to primary producers, spouses, farm family members, partners and professional farm managers” to undertake training to “enhance the profitability and/or competitiveness and/or sustainability” of farm business enterprises and improve natural resource management. To the extent that programs undertaken by land managers address information asymmetries, then this program can be justified.

The rationale for a dedicated education subsidy program was based on the Rural Adjustment Review Committee’s conclusion that:

there are several impediments to farmers accessing relevant education and training which warrant government intervention on efficiency grounds. These impediments relate to attitudes to skills development, particularly a need to develop a learning culture in the farm sector, and in some circumstances, to the costs of accessing training (DPIE 1997: 43).

The supply of FarmBis training activities is essentially driven by popular demand. As a result, they are skewed heavily towards general business and human resource management courses. That these courses are likely to earn private benefits for participants rather than encourage sustainable farm management practices earning public benefits is a matter of concern.

4.2 Market-based approaches

An alternative to subsidies, fees and charges is the creation of tradeable property rights such as tradeable water rights. Tradeable water rights are required by the COAG water reform agenda and the National Competition Policy. In Queensland, tradeable water rights have been trialled in a number of irrigation areas but sales have not been impressive. The RWUEI has the potential to realise major water savings to irrigators and could lead to trades in water rights as irrigators adopt efficient watering practices. The majority of Australia’s market-based programs, are still being trialled including the salinity trading schemes in NSW and the Murray Darling Basin. More programs are currently underway through the \$10 million initiative of the National Action Plan for Water Quality and Salinity to trial market-based methods for salinity reduction.

Markets for ecosystem services

Ecosystem services are public goods. They are defined as “the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life” (Daily 1997). They include all the ongoing benefits society derives from ecosystems at no private cost such as nutrient cycling, flora and fauna habitat areas and climate stabilisation. Valuing ecosystem services would enable more meaningful evaluation of public sector investment projects and also be the means for determining appropriate incentive payments to landholders who generate ecosystem services. Although the Rural Industries Research and Development Corporation (RIRDC) has put forward an investment framework for ecosystem services that envisions payments delivered predominantly through market mechanisms including ethical investment, carbon credits and salinity credits (Binning *et al.*, 2002), workable markets are someway off. The Productivity Commission acknowledges that markets for ecosystem services may be feasible for some environmental problems, such as climate change (through carbon credits), but others, like biodiversity loss, are much less amenable to the creation of a single market (Murtough *et al.*, 2002).

Auctions of conservation contracts are a more recent market-based approach to provide financial incentives to land managers to meet the requirements of the VM Act to conserve vegetation on their properties or other forms of natural capital. This approach involves asking landholders to submit bids or tenders nominating a management plan for conserving a part of their property and a price for undertaking the plan. An index enabling properties to be ranked according to their ecological significance is constructed to evaluate the ecological significance of a property if the proposed management was implemented. Auctions could be based on desirable environmental outcomes from a range of management activities leading to the production of ecosystem goods and services. A single index could conceivably be targeted at more than one outcome.

The greatest advantage of an auction process is that it is likely to be more cost efficient than a flat fee stewardship payment, as the level of funding needed by the landholder is revealed in the tendering process. Competition helps ensure the heterogeneous opportunity costs of landholders are reflected in their bids. Some circumstances favour the use of auctions of conservation contracts. Preferably, there should be a number of sellers to foster competition and thus cost-effectiveness; as well, information needs to be made available to land managers

to facilitate effective tendering. However, auctions over diverse areas, encompassing a number of different ecosystems are likely to be too complex to manage.

There are a number of factors which limit the legitimacy and scope of the ecosystem services approach to provide incentive payments. For the most part, these factors centre on the clear identification and measurement of the ecosystem services a resource user may produce and the separation of benefits into private and public. Some land management practices are currently discouraged to avoid harm in compliance with a GED with the benefits of avoiding harm being primarily public. It is reasonable to expect that landholders who go beyond a GED to manage the land and produce public benefits should be eligible for ecosystem service payments. In this regard, the Productivity Commission suggested that a clear definition of property rights, including the duty of care, would help determine whether payments for practices exceeding existing obligations and producing public benefits should be rewarded by the government (Aretino *et al.*, 2001). In reality, incentive payments are unlikely to cover the full cost of all conservation activities. The separation and appropriation of benefits as private or public is a factor limiting the efficacy of the ecosystem services approach.

Markets for ecosystem services, where a competitive market determines the price paid for the provision of services, is still some way off. Until governments legislate to create a demand for services, such as carbon sequestration, nutrient cycling or nursery habitat areas for fish, markets will not produce these services, and it is likely that resources will not be efficiently allocated without substantial reliance on punitive legal incentives and substantial financial subsidies.

Product accreditation

Eco-labelling and Environmental Management Systems (EMS) offer environmentally sustainable producers the opportunity to differentiate their product from others in the market and to gain a price premium. Eco-labels are designed to enable consumers to discriminate between like goods that are produced to minimize an environmental impact. The use of eco-labels can potentially help overcome environmental degradation by incorporating the cost of producing a positive externality within the market price as a price premium and passing it on to the consumer who consequently contributes via the price mechanism for the preservation of the environment.

An EMS is an organisation oriented standard where the producer is required to meet specified environmental obligations through the adoption of sustainable management practices. EMS encourages a whole of system approach to farming including natural resource management as well as financial and human resources, with the potential to provide financial benefits in the form of efficiency savings. When compared to eco-labels, a certified EMS has the capacity to provide a stronger guarantee of sustainability with a single label, no matter what the product is, or where it is produced despite the fact that the techniques and technologies employed may be different. An eco-label signifies that a product is, or might be meeting the guidelines prescribed by the conditions of the label, but is relatively inflexible in terms of ease of application (geographically and climatically) and in terms of minimizing the number of labels required for 'like' products.

EMS has the potential to streamline quality assurance and food safety compliance by incorporating these issues into the EMS management and certification process. It provides a way of informing government and the business sector interested in purchasing public-good ecosystem services. It can be used as a marketing tool or to facilitate a legitimate business expense (i.e., paying for ecosystem services that produce clean water replacing the need for mechanical filtration).

The reliability and legitimacy of accredited products is vital for any form of product differentiation to capture market share. Not only is there a lead role for industry groups working with producers and with regulators to ensure that the labels on products are legitimate, but Pahl (2004) suggests that appropriate communication to consumers about the environmental assurance scheme is vital.

Both a strong regulatory framework and a credible information base are required for economic incentives to be fully effective.

5.0 Approach to the design of an integrate policy: legal, voluntary and economic incentives

The preceding 3 sections have described the intent, strengths and limitation of three broad policy mechanisms. Punitive legal incentives are designed to prevent irreplaceable loss of biodiversity and to set a GED. To date they have been largely ineffective at achieving change, particularly in the case of non-point sources of damage, because they are expensive to

monitor and enforce. Voluntary incentives such as CoPs and integrated PLMPs encourage BMP through the provision of reliable information but often lack a clear environmental objective and are not routinely coupled with economic incentives that would portray attaining BMP financially achievable. Economic incentives are effective at encouraging sustainable practices and inducing land managers to go beyond BMP. However their efficacy could be improved if BMP was underpinned by scientifically valid prescription and legal certification. More importantly, a strong information base is required to support and market or broker the availability of these incentives.

Each policy response is appropriate in different circumstances but *ad hoc* application of policies without attention to complementarity with other policies and the incentives offered increases the risk of creating a complex and confusing policy regime. A more structured approach could help coordination (see figure 1). Such an approach would facilitate the design of suites of programs combining a range of incentives adopting coercive, facilitative, and inducement mechanisms to motivate land managers to implement and go beyond BMP.

In the context of this paper, a structured approach would use regulation and penalties to set and enforce minimum environmental standards which would be supported by voluntary incentives backed by industry bodies operating at a catchment or regional level. As well, economic incentives would be required to provide sufficient financial support to induce land managers to implement required on-ground works and to enable them to reap the rewards from producing environmental benefits.

Individually, or in isolation, incentives offering an inducement, incentives that facilitate change and regulations relying on compulsion *do* result in improvements in sustainable land management. However, their efficacy could be substantially improved and unintended outcomes reduced when at least one other mechanism and preferably all three are implemented within the same environmental management program.

The basis for determining the level of dependence and mix of policy mechanisms is the extent to which land managers are currently implementing BMP and the distribution of benefits arising from improved management between private and public. The role of coercive regulation is reduced when encouraging sustainable practices beyond environmental harm.

Beyond that regulation primarily supports and enables other incentives including setting caps to encourage trade and establishing the rules for sale of property rights to facilitate BMP.

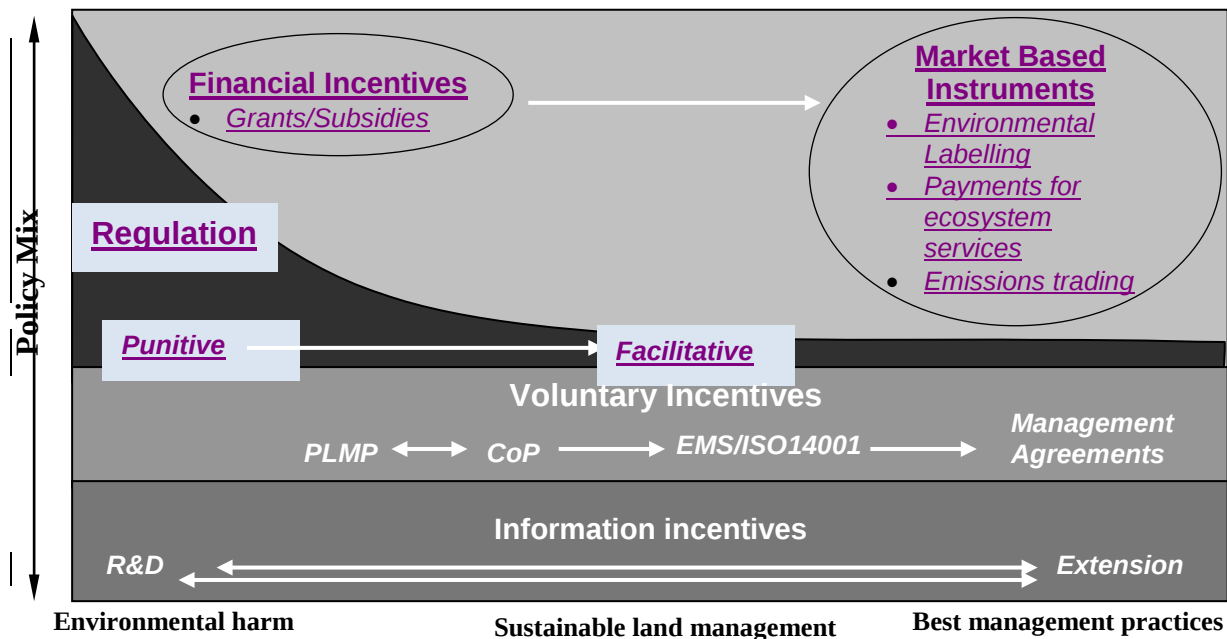


Figure 1 Conceptual mix of policy mechanisms to motivate improved environmental management within a structured policy framework

Voluntary incentives provide a means to bridge the information gap between regulation and financial and market-based incentives. Whereas regulations inhibit clearly demonstrated harm and economic incentives reward clearly demonstrated benefits, voluntary incentives have less onerous requirements. They can help landholders and companies achieve and demonstrate their GED and provide an introduction to a planning process to implement, monitor and review impacts on the environment. Landholders should then be able to use a similar process to certify the delivery of environmental benefits to attract economic incentives.

Although it can be argued that landholders should generally bear the cost, either through avoiding the harm or paying fees, for actions that fall below their GED, assistance could be provided to disseminate appropriate information to land managers about BMP to avoid environmental harm and to provide financial encouragement for implementation of required on-ground works that lie outside of normal operating and maintenance activities. It can be further argued that exceedances of BMP and attainment of measurable environmental

objectives would need to be demonstrated to attract financial reward. Financial incentives would assist with the transition to BMP where coercive regulation and penalties would create hardship.

Establishing the GED and BMP for agricultural industries requires careful consideration from multidisciplinary teams encompassing biophysical and social scientists together with industry, regional and community groups. Broad state-wide or national principles will need to encompass community attitudes on what reasonable environmental obligations can be imposed on all citizens. These principles should then be transposed for individual properties as PLMPs, within individual industries specifically for individual regions or catchments based on best available science. Once the GED and BMPs to comply with the GED are defined, the prevention of harm through regulation can proceed. Regulation needs to be supported by financial inducements for required on-ground works where public benefits can be clearly identified and by non confrontational encouragement from information sourced from peak industry groups, government agencies and regional NRM groups.

6.0 Managing agricultural land use

The management of the discharge of diffuse or non-point sources of sediments, nutrients and toxicants from agricultural land into waterways in Queensland has become a matter of increasing concern to authorities. Agricultural practices including “grazing and overgrazing in general, agricultural production, water use practices, extensive vegetation clearing, wetland drainage on coastal plains, and development on acid sulphate soils” have all been identified in the Reef Water Quality Protection Plan (Australian Government and Queensland Government 2009) as contributing towards the nutrient and sediment loads entering the waterways. Issues with land-use practices impacting on the health of the waterways in South East Queensland have previously been raised by *The South East Queensland Healthy Waterways Strategy 2007-2012* (Healthy Waterways) (2010).

To control sediment and nutrient run-off from agricultural areas requires improved water management, the retention, rehabilitation or establishment of riparian vegetation and wetland areas as well as controlled stock access to gullies and river and stream banks susceptible to erosion. Currently, the negative externalities associated with sediment and nutrient contamination of watercourses are complicated by spatial considerations, in that those

contributing to reduced water quality are not paying the cost to the environment from their actions and conversely, those expected to bear the cost of managing riparian areas are not the sole beneficiaries. Economic tools should therefore be directed towards internalising benefits to farmers who engage in environmental stewardship and sharing the cost amongst the beneficiaries. Sharing of the cost of rehabilitation of riparian areas is recognised by Healthy Waterways (2010) which acknowledges that there are benefits to local and downstream stakeholders.

The problem that would need to be addressed in relation to agricultural land use and erosion needs to be seen in the context of diffuse non-point source pollution and protection of riparian and wetland areas that are primarily held as freehold title. As such, the management tools appropriate to address this problem should be directed towards providing incentives for agricultural producers to seek or be provided with information to assist them engage in improved land management practices including the establishment and rehabilitation of riparian areas and wetlands. In particular, natural resource management courses currently offered through Farmbis would need to be promoted and attendance subsidised. Financial subsidies for on-ground works such as tree planting and fencing accessed through Envirofund would need to be brokered. Increasingly, scientific models are being developed and refined to enable prosecution of recalcitrant land managers who ignore or who are ignorant of the environmental harm resulting from sediments and nutrients entering waterways. These models need to be tested through a prosecution under the EP Act. A prosecution under the Act is likely to coerce land managers to take appropriate action.

An important consideration for choice of tools or tool for management of agricultural land-use is the financial constraint of landholders and local authorities. Financial incentives based on tax incentives will have limited effectiveness where farms, operated as commercial enterprises, are not earning a sufficient income to lodge an income tax return. It has been estimated that the cost of fencing, providing off-stream watering and rehabilitation of riparian areas on an 'average' property would be in excess of \$50,000. Farmers have indicated that they could not afford to undertake this magnitude of investment. Similarly, recent restoration and rehabilitation of a riparian area in an urban area has cost a local authority in the vicinity of \$100,000 for work over one kilometre of stream bank (Healthy Waterways, 2010). The high cost associated with restoring and rehabilitating riparian areas is likely to be outside the capacity of landowners in the area. At the same time, it cannot be expected that local councils

fund the work entirely from rates and levies imposed on ratepayers. In short, cost sharing is required.

Although freehold tenure or private ownership over riparian areas suggests a possible conflict of interest between the productive use of riparian areas and their contribution to the ecological health of a waterway, a recent report by Maher *et al* (2000: 50) suggests that public ownership does not ensure balanced management of these areas. Indeed, the report states that “public lands are not necessarily better cared for”. Although the powers of legislation to protect riparian areas have increased considerably, the report suggests that the statutory framework for riparian management must clearly define the ecological objectives and make full use of the legislation. Given sufficient incentives or support arrangements, private property owners are likely to achieve considerably more success in effectively managing riparian areas than a command and control approach.

The EP Act could be used to set and enforce land-use practices providing a minimum environmental duty based on current and reliable scientific information. For example, recommended widths for riparian areas have been identified by the Department of Natural Resources (1998). Although these have been adopted by a number of industry bodies in their CoP, there is minimal evidence of compliance. More importantly, the guidelines have not been enforced or used as the basis to prosecute those not in compliance. Lack of enforcement could be due to rent seeking from land managers as well as government. The former arguing that enforcement would erode property rights and adversely impact on the financial viability of land managers currently struggling to remain viable in an economic climate that is characterised by rising input costs and falling commodity markets, and the latter unwilling to expedite action that does not have popular support.

In some measure, these misgivings could be overcome through facilitative incentives designed to disseminate information about appropriate land management practices, offering managers a range of approaches to riparian management including the provision of vegetation and wetland areas. In many cases, one-on-one extension work would need to be undertaken with critical areas identified and recommended actions suggested. For maximum effect, information should be directed towards demonstrating the private gains to land managers and, where there are demonstrable public benefits, to identify and market sources of funding, such as Envirofund, for required on-ground works.

For land managers who have met and even exceeded their GED and are compliant with their industry's BMP, inducements that reward their activities would encourage continued compliance and further improvements. In particular, market-based economic incentives based on accredited product identification including ISO 14001 would be appropriate. It is important to acknowledge that product accreditation or labelling requires existing product labelling legislation to be enforced to protect compliant land managers from impostors and to provide surety for consumers. In addition, a further and equally important role for facilitation is in the dissemination of information to consumers to market accredited production.

The design of policy described in this paper suggests that an appropriate policy mix would include direct regulation as well as a range of facilitative and economic incentives implemented to strengthen and support each other. For the most part, the required incentives are currently in place but to date not implemented to greatest effect due primarily to lack of monitoring and enforcement as well as poor brokering or marketing.

7.0 Concluding comment

Encouraging agricultural producers to take-up sustainable land management practices involves the correction of market failure. This requires suites of carefully designed incentives, based on robust science, embedded within a comprehensive legal framework but using facilitative mechanisms to educate and promote land-use change as well as a range of financial and market-based economic incentives to kick-start and then reward actions that realise or have the potential to realise an improvement in the condition of the environment. The key to the effective take-up of improved land management practices is acknowledgement that incentives relying solely on coercion, facilitation or inducement are likely to fail or at least fall short of their full potential. Further, reliance on the protection of the environment through the clear specification and enforcement of a duty of care is unrealistic, as it is impractical to specify a duty of care for individual land managers and prohibitively expensive to monitor and enforce when the source of damage is diffuse.

A factor limiting the legitimacy of incentives; regulatory, voluntary and economic, is the need for flexibility to adjust to changing community preferences and to allow for scientific uncertainty. Incentive programs, particularly those subsidised by the government, can

entrench current practices. For example, if a landholder conserves and maintains habitat in order to obtain ecosystem service payments, it may be difficult in the future for conservation to be regarded as part of the GED. These changes could seriously undermine confidence in an incentive system.

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