Australian Government

CRC for Coastal Zone Estuary & Waterway Management

Sustainable Land Management and Wetlands Conservation on Freehold and Leasehold Land in the Great Barrier Reef Catchment

EXECUTIVE SUMMARY AND PROJECT

RECOMMENDATIONS

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This work is a SUMMARY of the 3 volumes:

Volume 1. *Capacity of NRM Regions and Local Governments in the Reef Catchment to Support Sustainable Land Management Practices and Conservation on Private and Leasehold Land*

Volume 2. *Review of Incentives Encouraging Improved Land Management In The GBR Catchment: Criteria For Effective Incentives*

Volume 3. *Landowner Attitudes to Wetlands and Wetland Conservation and Incentives*

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Acronyms and Abbreviations

ACF – Australian Conservation Foundation
AFSI – Australian Financial System Inquiry
CAMBA – China Australia Migratory Bird Agreement
COMPASS – Combining profitability and sustainability in sugar
CoP – Code of Practice
CSIRO- Commonwealth Scientific and Industrial Research Organisation
DAFF – Department of Agriculture, Fisheries and Forestry
DEWHA – Department of the Environment, Water, Heritage and the Arts
DNRW – Department of Natural Resources and Water
DPI&F – Department of Primary Industries and Fisheries
DRP – Drought Review Panel
DSD – Department of State Development
DSE – Department of Sustainability and Environment (Victoria)
EMS – Environmental Management Systems
EPA – Environmental Protection Agency
EPBC Act – Environment Protection and Biodiversity Conservation Act
ERA – Environmentally Relevant Activities
ESD – Ecologically Sustainable Development
FIS – Financial Incentive Scheme
FMS – Farm Management System
GA – Greening Australia
GBR – Great Barrier Reef
IPA – Integrated Planning Act
JAMBA – Japan Australia Migratory Bird Agreement
LFW – Land for Wildlife
LGAQ – Local Government Association Queensland
LWMP – Land and Water Management Plans
MLA – Meat and Livestock Australia
NAPSWQ – National Action Plan for Salinity and Water Quality
NGO – Non-government organisation
NHT – Natural Heritage Trust
NRM – Natural Resource Management
OOS – Organisation-Oriented Standard
PIPES – Primary Industry Productivity Enhancement Scheme
POS – Production-Oriented Standard
PRMP – Property Resource Management Plans
QFVG – Queensland Fruit and Vegetable Growers Organisation
QRAA – Queensland Rural Adjustment Authority
RBA – Reserve Bank of Australia
RDC – Research and Development Corporation
RWUEI – Rural Water Use Efficiency Initiative
SRLLS – State Rural Leasehold Land Strategy
WG – Water for Growth

Executive Summary

Introduction

The purpose of this study is to provide recommendations to the Department of the Environment, Water, Heritage and the Arts on an appropriate mix of incentives to increase sustainable land management practices on freehold and leasehold land, particularly with reference to wetland areas in the Great Barrier Reef catchment NRM regions. The study consists of three separate but linked investigations.

Volume 1 consists of a socio-economic and demographic profile of the Natural Resource Management regions (as defined under NHT2 and NAPWQS) in the Great Barrier Reef catchment; it also gives an assessment of the level of institutional support for sustainable land management as well as opportunities provided to private and leasehold land managers in each region for participation in planning.

Volume 2 provides a review of the existing incentives available in Queensland to address the failure of the market to protect the condition of the environment. It concentrates on incentives that encourage, through the application of a range of policy instruments, land management practices that improve the condition of the environment, especially those designed to improve water quality entering the Great Barrier Reef (GBR) lagoon. This analysis forms the basis for identifying criteria for effective incentive programs.

Volume 3 comprises an assessment of landowner knowledge, attitudes and participation in sustainable land management and conservation of wetlands; it also identifies underlying factors influencing landholders' adoption of sustainable land management practices. Current levels of awareness and participation in existing incentive schemes were examined.

Volume 1. Capacity of NRM Regions and Local Governments in the Reef Catchment to Promote Sustainable Land Management Practices and Conservation on Private Land

This report provides profiles of the Natural Resource Management (NRM) regions, which are catchment areas adjacent to the Great Barrier Reef (GBR) with an influence on the quality of water flowing to the GBR. The profiles provide summary information allowing an assessment to be made of the capacity of individual land managers, the NRM regional bodies and local authorities to undertake land management and conservation activities. The NRM regions of interest are:

1. Burnett–Mary
2. Fitzroy
3. Mackay–Whitsunday
4. Burdekin
5. Wet Tropics
6. Cape York.

Capacity has been defined as:

> the ability of actors (individuals, groups, organisations, institutions, countries) to perform specified functions (or pursue specified objectives) effectively, efficiently and sustainably (UNDP 1995: 14)

In the context of this report, capacity is defined as the ability of individual landholders to undertake sustainable land management on private and leasehold land and the ability of regional bodies, industry organisations and government institutions to facilitate and support sustainable land management outcomes.

Volume 1 is divided into two parts. Part 1 investigates the socio-economic and demographic factors affecting an individual's capacity to undertake sustainable land management, and it compares the NRM regions within the GBR catchment on the basis of these socio-economic factors. It provides information about differences and similarities between the regions that would affect the capacity to take-up natural resource management within them. The Goulburn–Broken catchment in Victoria has been adopted in this study as a catchment against which the GBR NRM regions can be compared. Part 2 looks at institutional factors that could influence the uptake of sustainable land management – including level of support for landholders undertaking sustainable land management activities and facilitator and co-ordinator networks – and compares them across NRM regions. Part 2 also provides an analysis of the opportunities to participate in planning provided to landholders in the GBR region.

The reef catchment is a broad geographic area and encompasses a range of land uses requiring substantially different land management practices, with different cost structures and showing variable returns on investment. As a result, there are considerable differences in the social and economic capacity of the regions to take up sustainable land management practices. This variability is important information for policy makers designing incentive programs to improve natural resource management. It is stressed at the outset of this volume that although information is provided at the NRM regional scale, there are marked differences at a sub-catchment scale – in industry, community and government capacity – that are likely to be critical in take-up of sustainable land management. Additionally, the level of effort from industry organisations and local governments varies between the regions, as does the existing capability of the NRM regional bodies to support and initiate sustainable land management practices.

Volume 1, Part 1. Social and economic capacity of the NRM regions

An assessment of the social and economic capacity of the regions to undertake sustainable natural resource management is difficult. Economic viability/resource sustainability, along with land management and community vitality, have been identified by Taylor et al. (2000) as factors that fundamentally affect capacity. Adequate financial resources are needed to begin action, and to sustain it the natural resource base needs to be viable.

Information about the differences and similarities between the regions relevant to their capacity to undertake natural resource management can be gained by considering land use and the structure of economies in the regions. Indicators include the sectoral distribution of gross output, the distribution of employment across industry sectors, the contribution of agriculture

to gross output, the diversity of agricultural activity, and the type of agricultural activity undertaken.

An important observation emerges from this profile of the economies of the GBR NRM regions: although agriculture accounts for the highest proportion of land use, the economies of the regions are by no means dominated by, or totally reliant on, agricultural production. Tourism and mining, in particular, contribute significantly more than agriculture to the gross value of production from the GBR catchment. Further, employment in agriculture has been declining over the past 10 years, whereas employment in a number of the service industries, in particular the trade sector, has been increasing. In general, the increase in employment in the trade industry is attributable to retail trade and is a reflection of the growing importance of tourism in the region.

The financial viability of a land manager's enterprise is a major factor influencing their capacity to take up resource management. A number of economic factors have been identified in this report as likely to influence enterprise viability, and these are summarised below.

Economic factors influencing the viability of land managers' enterprises

Limited financial capacity for NRM

The ABARE farm performance survey and an examination of the beef and sugar industries suggest that agricultural enterprises in the GBR catchments are constrained by low rates of return on invested capital and relatively high levels of debt. This could impact negatively on investment in NRM as farm profit is directed toward debt service and capital maintenance. In general, larger farms are in a better position to invest in NRM as they experience relatively high and more stable returns on invested capital and are able to maintain positive returns during periods of climatic instability (e.g., drought).

There does not appear to be a general consensus in predicting future profit levels. Farmers in the Burdekin and Wet Tropics seemed confident that profits were not falling. Conversely, in the Goulburn–Broken and Mackay–Whitsunday regions, a majority agreed that profits were falling. This could have implications for NRM because farmers who are pessimistic about future profit levels may be reluctant to invest in new infrastructure or investigate new management techniques.

Access to water

The availability of an assured and consistent supply of water for irrigation is vital for stabilising farm production and for allowing diversification into high value crops. However, facilitating access to water for irrigation needs to be weighed against the environmental costs. Increasing current water use efficiencies could reduce the need for new water infrastructure

Reliance on world commodity markets

A number of the agricultural industries within the GBR catchment rely heavily on prevailing world commodity prices (e.g., beef and sugar). According to ABARE (2003), commodity prices are likely to trend downwards in the immediate future. Substantial productivity gains and diversification into value-added sectors might partly counteract negative price movements on world markets.

Agricultural diversification in general could help to counteract the worrying characteristic of single sector reliance, evident particularly in the Mackay–Whitsunday (sugar cane) and to a

lesser extent in the Fitzroy region (beef). A crash in the price of either commodity would have a strong negative impact on regional economies.

Lack of value-added capacity for agricultural production

Apart from some limited processing of sugar and beef cattle products in a number of the GBR NRM regions, value adding to agricultural production – such as with fruit and vegetable processing or production of meat smallgoods – is limited. If value adding is not developed in the region in the future, agricultural industries will become increasingly reliant on world commodity markets and be more vulnerable to global economic fluctuations.

The agricultural market

Productivity gains and diversification into higher value crops have been proposed as possible solutions for farmers in financial difficulties. However, both these alternatives result in more produce entering the domestic market. This could lead to excess supply, with lower farm gate prices, thus leaving farmers worse off. Farmers need to be aware of the dynamics of the market into which they are considering moving. In some sectors, particularly fruit and vegetable production, the domestic market is saturated and new farmers entering may fail, at the same time eroding the profitability of existing producers. Exports could provide an alternative market. However, entry into these markets is often highly regulated and growers might have to compete against protected produce coming from the USA, Europe and Japan.

Comparison of land management techniques

Land Management

There are almost 10 million hectares of land under lease in the GBR catchment. There is anecdotal evidence suggesting that freehold land is more appropriately managed. If this were actually the case, then additional resources would need to be allocated to address sustainability issues, specifically on leasehold land.

The majority of irrigated land in the GBR catchment is devoted to sugar cane and a substantial part of this land is irrigated using potentially inefficient furrow techniques, and these may have a negative impact on surrounding waterways.

Zero till or minimal till are considered more sustainable cultivation techniques. These techniques are not used as frequently in the Burnett–Mary, Mackay–Whitsunday and Wet Tropics regions compared to the Goulbourn–Broken. However, when the whole GBR catchment is compared with the Goulburn–Broken, there is no appreciable difference. This suggests that there is a need for a regional awareness or information campaign targeting the Burnett–Mary, Mackay–Whitsunday and the Wet Tropics regions.

Environmental activities

Fencing, tree planting and salinity management are considered proactive approaches to on-farm improvements in the condition of the environment. Although tree planting in the GBR catchment has not been substantial compared to plantings in the Goulburn–Broken, in the longer-term protection and conservation of remnant native vegetation might be more important for the GBR catchment.

Over 150,000 ha of land in the GBR catchment is fenced in order to protect it from disturbance by trampling and associated erosion. Information is not available to identify the extent to which sensitive areas – such as riparian areas or gullies, which could mitigate erosion and nutrient run-off – are protected by fencing.

On farms with an acknowledged salinity problem, specific management plans are lacking. The Burdekin, Fitzroy and Burnett–Mary catchments have been identified as having potential saline problems. In these regions, salinity management strategies may need to be evaluated to raise the level of awareness.

Community vitality

Population and age structure

Although the current population growth rates for the GBR NRM region as a whole are comparable with the Queensland average, the growth rates within the Fitzroy and Wet Tropics regions are considerably lower than the state average. Population growth is confined largely to the major cities and coastal fringe, while inland rural, agricultural areas are, in general, experiencing population decline and ageing. This is an important consideration for NRM since local authorities, which have traditionally been given responsibility for environmental management at the local level, are now facing financial constraints as their rate-base contracts.

Ability to communicate with land managers

Education level and language skills are important factors when considering community engagement. The majority of the population across the GBR catchment has completed primary level education and is literate. A relatively insignificant proportion of the population is estimated to speak English poorly or not at all. Only about one-third of the population of the GBR catchment has access to a computer and the Internet, so the Internet is not a viable option for the communication of NRM information. Effective community engagement is therefore more likely through locally based NRM or industry groups, and by demonstration workshops and extension work. The Internet, however, is a potentially powerful, low-cost conduit for the provision of NRM information; therefore, facilitating access to information technology resources within the GBR catchment might improve awareness of NRM and increase adoption of sustainable management techniques.

Limitation of study

A major limitation of this study is that the socio-economic profiles were provided at the scale of NRM regions. Information at this scale effectively masks critical differences *within* the regions that affect their capacity to take up NRM. In addition, the reliability of the data used to compare the financial viability of land managers in the target NRM regions is a matter of concern. The sample size of the ABARE survey data varied widely across the regions and the sampling errors are likely to be high. Therefore, any assumptions and conclusions are largely speculative.

On a regional and catchment scale there appear to be substantial differences in land management practices and socio-economic characteristics between the different industries located within the GBR catchment and within industries. However, detailed information, in particular that related to the beef, sugar and horticulture industries, is not easily sourced. This makes formulating recommendations on a regional, industry-specific basis difficult.

Volume 1, Part 2. Profile of institutional activities to support the capacity of land managers to undertake sustainable land management

Land managers' capacity to undertake a sustainable land management practice is dependent on whether they have the skills, knowledge and will to respond effectively to NRM challenges. This capacity is therefore susceptible to diverse factors, including the socio-economic and demographic factors discussed above. In addition, their capacity to undertake sustainable land management is affected by the level of institutional support for sustainable land management activities. Part 2 provides a comparison of the institutional support provided in different GBR regions by examining:

- The level of effort by government and non-government sectors in initiating and supporting sustainable land management activities within each NRM region. It enumerates and describes the sustainable land management programs operating;
- The capacity of government and non-government organisations to provide opportunities and support for landholders in planning conservation outcomes, including sustainable land management for wetlands management;
- The level of participation by private landholders in environmental programs in the reef catchment and ascertaining the number of landcare groups and environmental NGOs;
- The number and funding levels of Envirofund (NHT2) projects; and
- Existing environmental education and training programs.

The Australian Government, Queensland Government, local governments, regional NRM bodies, industry bodies, and to a lesser extent conservation groups, all provide support to landholders to undertake sustainable land management. This support can take the form of financial incentives (inducements), education and extension (facilitative mechanisms) or regulatory controls.

Information about the major activities of each of these institutions was obtained from:

- semi-structured interviews with agency, industry, conservation organisations and NRM bodies
- written surveys of local councils and NRM bodies
- reviewing literature, web-sites and agency documents.

The level of institutional support and promotion of sustainable land management is not uniform across the GBR catchment. Direct comparisons between regions are difficult as NRM regions are not uniform in area or population. Additionally, the NRM regions themselves are not homogenous and there are a number of socio-economic, demographic and ecological differences within and between the regions. While this report highlights some of the differences between the regions, the factors influencing uptake of sustainable land management are so complex that it would be inappropriate to suggest that resources should be directed toward one region at the expense of another.

The major differences between regions with respect to the level of support (financial, number of programs and staff) for sustainable land management relate to:

- the dominant industries within the region;
- whether or not the region is an NAPSWQ priority region;
- the level of activity by local government councils within the region; and
- the number of facilitators and co-ordinators.

Based on the information gathered in this study, land managers within the National Action Plan for Salinity and Water Quality (NAPSWQ) regions of Burdekin and Fitzroy have access to more support for sustainable land management activities than those in the Burnett–Mary, Wet Tropics, Mackay–Whitsundays and Cape York regions. They have access to more programs and funding as a consequence of being NAPSWQ priority areas, have more facilitators and co-ordinators, and receive a reasonable level of support from councils.

The Wet Tropics region, while not being a NAPSWQ priority region, appears to have a high level of existing capacity to support sustainable land management practices. This is reflected by the number and diversity of programs offered by local government within the area, and the large number of existing environmental organisations. Council support, however, does not necessarily occur in those shires where there is a high level of agricultural activity (Herberton and Atherton for example). There is a consistently high level of Envirofund funding being directed toward this area, which reflects a healthy level of support for on-ground activities, although it is difficult to establish how much of this activity would relate to sustainable land management on private and leasehold land. The Wet Tropics NRM body is an amalgam of two pre-existing organisations, which may explain why they have a high number of facilitators and co-ordinators. While the NRM body appears to have fewer programs focussing specifically on sustainable land management on private and leasehold land, this may be a consequence of the higher proportion of land within this region being allocated for nature conservation (16%) and forestry (22%).

Ostensibly, the Burnett–Mary region has a high number of sustainable land management programs as a consequence of the NAPSWQ initiatives. However, the low level of local government support is a concern. This area has the highest overall population, with a greater number of landholders than the other regions, which suggests resources are more thinly distributed. In addition, the agricultural population is ageing and the region has the lowest farm income, possibly reducing the uptake of sustainable land management activities. It would appear that this region would benefit from increased, well-targeted support for sustainable land management activities.

The Mackay–Whitsunday region is significantly smaller than the other regions and the number of facilitators and co-ordinators seems appropriate for a region of that size. However, the regions almost complete dependence on sugar, and the reduced effort by local government, would indicate that there is some justification for increasing support to land managers in this region. It is interesting that this region was not successful in obtaining any Envirofund funding in the 2003/2004 funding round, despite being quite successful in the previous round. This could be a consequence of the small size of the region and the rules that preclude previous successful applicants from applying.

Land managers in the Cape York region receive very little support for sustainable land management activities. Whilst this area is sparsely populated, it would appear to be a key region to target increased support for sustainable land management activities. On a positive note, funding (Envirofund) for on-ground activities increased significantly, which may reflect

an increasing level of support for applicants and an improving environmental consciousness within the region.

With regard to participation in planning, it is evident that there are a number of mechanisms to facilitate, compel or induce participation in property-level planning and a number of opportunities for landholders to engage in the planning process. However, it has been recognised that landholders are feeling overwhelmed by the myriad of planning mechanisms and requirements; they would prefer a streamlined approach that enables them to meet the multiple objectives of different government agencies, industry groups, NRM bodies, the community and themselves. Industry groups and state government agencies, with involvement from some NRM bodies, are currently negotiating the best mechanism for achieving this.

In terms of opportunities to participate in broader planning activities, all NRM bodies, with the exception of Cape York, have made active attempts to engage landholders in the NRM planning process. The Cape York NRM body is at an earlier stage of planning than the other regions and will no doubt endeavour to involve landholders in their planning processes. State agencies do have formal consultation processes; however, levels of landholder participation and satisfaction with those processes have not been ascertained.

Volume 2. Review of incentives encouraging improved land management in the GBR catchment

This report reviews the existing incentives available in Queensland to address the market's inability to protect the condition of the environment. It concentrates on incentives that encourage, through the application of a range of policy instruments, improved land management practices, specifically referring to incentives designed to improve water quality entering the Great Barrier Reef (GBR) lagoon. It reviews regulations that incorporate penalties for failures to meet a basic duty of care and a range of voluntary, facilitative initiatives; it also examines programs and incentives that offer rewards for implementing improved land use management. Where appropriate, incentive programs implemented elsewhere in Australia or overseas are drawn on to demonstrate alternatives.

Government intervention in the market allocation of resources is generally regarded as justified when the market fails in some way. In terms of the production of public goods, markets fail to efficiently allocate resources if they are distorted by externalities unaccounted for in market transactions; another reason is incomplete or asymmetric information. Although market failure justifies government intervention, there is no guarantee that intervention will bring about economically efficient outcomes or environmental improvements. That is, although the aim of intervention may be to bring about more efficient allocation of resources, the outcome might move the economy even further away from this goal, particularly where there are unintended consequences arising from intervention.

The objective of this report is to identify criteria for the creation of new incentives, or for the adjustment of existing incentives that would improve their efficacy. This is approached by critically reviewing a range of incentive measures designed to enhance land management practices that would improve water quality entering the GBR lagoon. Although wetland conservation and restoration have been identified as primary targets for this study, the Reef Water Quality Protection Plan (2003) identifies land use practices such as "grazing practices in drier catchments and overgrazing in general, urban development, agricultural production,

water use practices, extensive vegetation clearing, wetland drainage on coastal plains, and development on acid sulphate soils" as contributing toward nutrient and sediment loads entering waterways. For the purpose of this report, effective incentives are defined as those having a relatively high take-up; minimal unintended outcomes and meeting their stated objectives.

Government agencies and industry organisations were interviewed to assist with identifying criteria for creating successful incentive programs. This information was particularly informative, providing a range of perspectives on incentive programs that was not available from published sources.

Policy design

Ideally, government policy should bring about changes that result in a collective gain for the greater community (Bromley 1997: 50); in other words, provide public goods. To achieve this aim, policy makers can use three basic mechanisms in attempting to modify behaviour: they can design policy that facilitates, induces or compels change (Bromley 1997: 50–51) or a combination of these mechanisms. In general, instruments that facilitate and induce are preferred to 'command and control' style laws or regulations that compel change.

Although the report categorises incentives according to whether they facilitate, induce or compel change, it is important at the outset to establish that, apart from regulations that set and enforce environmental standards, the incentives reviewed demonstrated elements of all three mechanisms. For example, although an incentive program might be directed towards inducing land managers to change their management practices by providing a financial incentive, there are often associated elements of compulsion that set the minimum standard that must be achieved as well as elements of facilitation that inform land managers about the merits of change. The following provides summary comment about incentives categorised as compelling, inducing or facilitating change.

Regulations compelling change

A strong point of regulations is that they assist in clarifying what is expected of land-managers (a point made by a number of industry groups). In addition, market-based instruments, such as water trading, nutrient trading or wetland-offset incentives, require that property rights over the resource in question be clearly delineated and enforced. This requires regulation to underpin the created market.

A limitation of regulations is that they only set minimum standards. These standards do not challenge current resource users to improve their performance, but aim to bring citizens or industries up to a minimum level. In addition, the regulations are generally directed at point sources of discharge rather than diffuse ones. Moreover, a lack of enforcement, evidenced by an absence of prosecutions (particularly for regulations pertaining to agricultural land management), reduces their efficacy.

A key issue for the management of wetland areas, largely overlooked in regulations, is that these areas are poorly defined. There is no commonly understood, mutually agreed definition of wetlands, apart from the very broad Ramsar definition. This makes legislation difficult for landholders to understand and for agencies to enforce.

Facilitative or voluntary mechanisms

Instruments that facilitate change, relying on moral suasion through community engagement, can encourage natural resource users to meet and exceed an environmental duty of care. Facilitative mechanisms (also known as motivational or suasive measures) involve policy designed to increase the supply of, or create a flow of, new and useful information (i.e., they are designed to educate and expand an individual's knowledge base).

Facilitative mechanisms are likely to be successful where it can be demonstrated that the desired behavioural modification will directly or indirectly result in increased returns to the targeted industry or individual (PC 2003: 189). That is, these mechanisms are most effective in situations where public interest and private benefits are closely aligned.

Compliance with facilitative policy is entirely voluntary. However, if utilised effectively, facilitative mechanisms have the potential to engage the community in resource management by marshalling the full range of incentives (specifically, regulations, financial incentives and informational tools) and providing a rationale of why they exist – essentially to ensure and facilitate sustainable use of natural resources. This broad base improves the uptake of programs.

A key problem with facilitative mechanisms is that it can be difficult to target a specific issue; monitoring of outcomes can also incur high administrative costs. Gunningham and Young (1997: 263) recommend that mechanisms supporting and harnessing altruism and respect for conservation play a supporting role in the mix of policies, but should not be used in isolation.

Incentives inducing change

Limitations of regulatory and facilitative mechanisms reinforce the need for incentives that induce change. Mechanisms that induce change are designed to encourage the implementation of sustainable management practices that subsequently contribute to an improvement in the condition of the environment.

Policies that seek to induce change are effective because they involve a financial incentive or penalty that depends on compliance. This type of policy is needed to "deal with the fact that farmers see no particular benefit from undertaking these new behaviours (Bromley 1997: 51)."

Policies designed to induce change include instruments such as tax incentives, fees, subsidies and grants, accreditation schemes, management payments, and offset schemes and tradeable permits. Market-based instruments, particularly tradeable permits, are popular with government and industry alike. 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. Instruments inducing change need to be underpinned by legislation and, to be wholly effective, they must be appropriately marketed towards resource users. A number of incentives were critiqued including the Rural Water Use Efficiency Initiative (RWUEI) and FarmBis; the following provides a summary of the findings.

The RWUEI represents an effective policy initiative because it has engaged its target audience via a mix of extension, research and development, and a financial incentives scheme. It has been coordinated by fruitful collaboration between industry, government and, to some extent,

the private sector. According to the Queensland Fruit and Vegetable Growers Association, the RWUEI symbolises "A fresh and proactive approach to implementing change on farm" (QFVG 2003: 7) and it is for this reason that the program is appealing. The RWUEI is not without its challenges. A problem with the RWUEI, and the financial incentive scheme in particular, is that there appears to have been no specific attempt to quantify the environmental benefits from improved on-farm water use. Without public benefits in the form of environmental outcomes, there seems little justification to subsidise, with public funds, private expenditure on water infrastructure. The coordinating industry bodies have made a number of recommendations to further improve the program.

FarmBis is a training program that "provides subsidies to primary producers, spouses, farm family members, partners and professional farm managers to improve their business and natural resource management skills to meet the challenges and opportunities ahead."[1] Queensland DPI&F and Greening Australia have both suggested that the marketing of the FarmBis program needs to be improved. Both organisations indicated that FarmBis could be more effective as an information delivery mechanism if the full range of available programs were marketed as relevant to the development of viable and profitable farm businesses, as opposed to just those programs dealing directly with financial matters and productivity. Further, the Drought Review Panel (2004: 52) suggested that government "may wish to … ensure that the program's focus includes business, production, risk and natural resource management components, superannuation, climate forecasting tools and drought recovery."

FarmBis training programs are conducted by external training organisations operating to make a profit. These organisations are primarily responsible for marketing FarmBis modules. However, these organisations must incorporate their costs (including marketing costs) into the price of the module, making it more expensive and therefore less desirable to primary producers. It could be more cost-effective for either the Australian Government or state facilitators of the program (government or non-government organisations and industry groups) to market FarmBis in the context outlined above, rather than putting the onus on the individual training organisations.

The FarmBis program provides subsidised training courses emphasising the economic value of wetland ecosystems to agricultural production (and the possible future value with regard to markets for biodiversity). Overall, it has the potential to be an important vehicle to promote wetland preservation and management.

Greening Australia Victoria currently runs a one-week, highly comprehensive wetland ecology and management course that is eligible for FarmBis funding. A similar, abbreviated course is offered in Queensland. However, the main participants appear to be from industry (i.e., construction and housing, power plants, water treatment, local councils, etc.) rather than primary producers (pers. comm., Greening Australia).

Many farmers appear to be either unaware of, or uninterested in, opportunities for improving their management of wetlands[2]. The reasons for this are not obvious. An effective awareness campaign highlighting the benefits of on-farm wetlands could increase interest in relevant courses and subsequently inform land managers of management, construction and rehabilitation techniques.

[1] http://www.daff.gov.au/agriculture-food/aaa/farmbis
[2] This is supported by the findings of the attitudinal survey conducted as part of Volume 3.

Findings

In general, the incentives reviewed were not designed to be region-specific; actions undertaken in one region may result in unintended outcomes in a different region. Further, the efficacy of incentives varied when applied in the same way but in a different geographical location. In addition, environmental outcomes were rarely acknowledged in an incentive's objectives.

A central finding of this study is that all the incentive programs reviewed have positive elements. However, some existing programs require an evaluation to identify how they could be adjusted, and in some cases, redesigned, to improve their efficacy. These programs are ones that have not been taken-up, have the potential to result in unintended consequences, or in which it is difficult to determine if the incentive can (or will) meet its stated objective. Minor adjustment to existing incentives might be all that is required to address deficiencies. For example, where the take-up or participation is poor, marketing (say, via extension) may be a simple way of improving take-up.

Incentives offering an inducement, incentives facilitating change or regulations relying on compulsion can all result in improvements in sustainable land management. However, their efficacy could be substantially improved when at least one other mechanism and preferably all three are incorporated within the same program.

Key criteria to consider when designing an effective incentive program for natural resource management on private land include:

Public benefit

The role of funding for NRM payments should be restricted to a *contribution* to the provision of public goods. Private benefits should not be funded from the public purse. Financial incentives should only be used as a 'circuit breaker'.

Provision should be incorporated within incentives for ongoing management payments to ensure the continued supply of public benefits.

Monitoring of outcomes

On-going monitoring of on-ground outcomes associated with incentive payments is essential. Monitoring provides justification for the provision of public funding and data collection facilitates determination of whether regional or catchment targets, as well as program objectives, are being met.

If the outcomes from incentive programs are to be monitored in terms of NRM, then the objective of the program must be made explicit at the outset.

Flexibility

Industry consultation has identified a number of components of flexibility associated with access, delivery and eligible on-farm works that would improve the effectiveness of incentive programs.

Means testing is important when providing income support. However, when applied to programs designed to bring about public benefits, it is less applicable. Means testing can result in an artificial allocation of funding with little or no relevance to the level of public benefits. Where funding for NRM is allocated for specific purposes, then a number of criteria, including level of ecosystem services to be provided, are recommended. However, broad-based projects, such as the Commonwealth EMS incentive scheme, should not be means tested.

Flexibility in terms of how the incentive funding can be spent at the farm level is also important. Programs that incorporate flexibility (RWUEI, FarmBis) appear to have been extremely successful at achieving high take-up rates.

Incentive payments also need to be flexible to adjust to changing community preferences and to allow for scientific uncertainty. A combination of top-down and bottom-up implementation processes is likely to be the most flexible, with local or regional groups being given more scope for discretionary funding.

Marketing incentives: Extension, education and community engagement

An essential ingredient for the successful take-up of incentives is marketing. Incentives need to be marketed and they need to be marketed directly to the target resource users.

Discussions with industry suggest that if the importance of specific NRM management techniques is conveyed effectively, the need for financial inducements might be reduced and, conversely, enforcement of regulation made much easier.

Comprehensive risk analysis

An effective risk analysis is an important ingredient for all incentives as it has the potential to identify outcomes (intended and unintended) that might occur. It is critical that the risk analysis extends beyond the government agency or division responsible for implementing the policy or incentive program to include all relevant stakeholders.

A well-conducted risk analysis could avoid unnecessary re-evaluation and review. Incentives subjected to reviews and refurbishment to correct avoidable outcomes run the risk of losing credibility, both with the industry groups charged with their promotion and with resource users who regard government commitment to incentives as critical for their involvement.

Volume 3. Landowner attitudes to sustainable land management

This report comprises an assessment of landowner knowledge, attitudes and participation in sustainable land management and conservation of coastal wetlands and identifies underlying factors influencing landholders' adoption of sustainable land management practices. In addition, current levels of awareness and participation in existing voluntary conservation incentive schemes were examined.

For this component of the overall research project, two research methods were utilised:

1. During February 2004, focus group discussions were held in five of the six NRM regions of interest to this study. These primarily involved private landholders and

representatives of peak bodies and were structured around exploring landholder perspectives and experiences of (1) major issues in relation to land and water management; (2) schemes and programs in relation to water quality; and

2. Landholder surveys administered by telephone to nearly 800 private landholders in the GBR catchment. This was designed to provide data on landholder socio-demographic background, awareness of current programs and incentives, participation in government sponsored schemes, communication and information networks, and perceived barriers and incentives to adopting sustainable land management practices and conservation.

Focus group results

Factors identified by the focus groups as influencing the uptake of sustainable land management practices and conservation on private land included:

Profitability of enterprise. Profitability of current farming enterprises was a major factor in the adoption of new practices by landholders. Concerns about future industry viability and sense of financial security were important in gauging their perceived capacity to adopt particular practices.

Protection of property rights. Landholders will only make financial investments if they have secure and long-term rights to their property and its natural resources. Concerns expressed by participants over threats to property rights related to changes in legislation, and the introduction of stricter regulation and harsher penalties.

Certainty in outcomes. Given the lengthy time lags in observing benefits, landholders wanted credible information and confidence in their actions before undertaking new practices. Consistency in information received from government sources would assist in creating credibility.

Maintenance of productivity. The protection of landholders' economic viability while adopting new practices was highlighted. Promotion of 'win-win' outcomes to landholders and showing them the environmental and production benefits of sustainable land management and conservation practices was suggested.

Understanding of sustainable farming. The uptake of sustainable land management and conservation practices on private land requires landholders to have a good understanding of what constitutes 'sustainable farming'.

Other factors influencing adoption by landholders. These include: development of greater confidence and trust in government; good science without selective application or interference by commercial interests; information and communication of environmental outcomes and costs; longer term financial assistance to support changes in practices and property adjustment; a balanced production and environmental protection approach; and landholder rewards for the protection of public assets through the adoption of sustainable land and water practices and schemes.

Factors impeding the uptake of different programs and incentives included:

Risk associated with program uptake. Risk was defined in three ways: uncertainty of costs or benefits involved, risk to capital and invested resources when adopting new practices, and risk to current property productivity. The burden of risk was seen as residing solely with individual landholders. A preference for risk to be shared, through financial payments, with government and the wider community was highly favoured.

Establishing trust. New practices were viewed cautiously by landholders as a result of past experiences with agricultural research, government policy and extension systems. The source and credibility of information was important in adoption, along with explicit written agreements.

Recognition of private investment. Private investment made by landholders (in terms of labour, resources and lost production) in order to protect and manage public resources often went unrecognised by the wider community. Recognition through financial payment, visual recognition through signage and positive media coverage were some solutions promoted.

Other factors influencing program uptake. These covered both 'program factors' and 'landholder factors'. 'Program factors' included financial incentives offered, duration and continuity of program, flexibility, and information and education provision. 'Landholder factors' included property characteristics and landholder features. Program factors were the predominant focus of participants' concerns.

Communication and information networks. From the focus group responses it appeared that networks played an important role in the construction of environmental issues and solutions, and in the current farming 'culture'. Communication networks were focused at the local scale and they operated through NRM groups and peak producer organisations. Networks acted to link landholders, NRM groups, industry organisations and government officers. In particular, local information networks ('knowledge networks') were strongly supported as preferred and trusted sources of information by focus group participants. This finding was supported by the survey results, where friends or neighbours were commonly identified as sources of information. People preferred to obtain information through talking with local people and local technical experts for specific information to inform their property-level decision-making. Local knowledge was highly valued and assisted landholders in understanding the local conditions, farming environments, and available sustainable land and water management practices and schemes.

Preferred aspects of coastal wetland protection incentive programs

The aspects identified included:

- *One-off payments and adequate resources* to meet landholder demand;
- *Streamlined and simple application processes* through a regional delivery mechanism;
- *Range of economic incentives and subsidies* to enable individuals to optimise financial support;
- *Education and information about NRM issues and solutions* from both technical and economic perspectives;

- *Full disclosure* of future land use restrictions and management requirements;
- *Diverse programs* to target individuals and groups;
- *Programs recognising and acknowledging landholder ownership and personal investment;*
- *Coordination between different programs and participants* to improve efficiency and reduce conflicting information;
- *Longer-term programs* able to accommodate changing environmental and social conditions and to monitor outcomes; and
- *Flexible programs* that may be modified to suit local conditions through negotiation (e.g., to resolve restrictions on land use).

Regional summaries of focus groups

The NRM issues identified by focus group participants and common to most regions were:

- water quantity and availability;
- declining water quality;
- pests (animals and plants);
- soil erosion;
- land clearing;
- wetlands degradation;
- sediment in waterways;
- loss and damage to riparian areas;
- global environmental issues (e.g. climate change); and
- urban impacts (e.g., population growth, stormwater).

Most regions also mentioned issues concerning economic viability of their industry, problems with government operations (e.g., mistrust, lack of credible information) and an inflexible bureaucracy. Not all of these issues were considered relevant in Cape York and here the main issues were: soil erosion, water quality, biodiversity loss, weed and pest problems, wetland degradation, future development, and unmanaged lands and poor land management.

Features specific to the different regions included:

- a water quality and water efficiency focus on water valuing, re-use and recycling (*Burnett–Mary*);
- adoption of water quality as a whole-of-community (including government) problem in needing attention for future sustainability (*Fitzroy*);
- defining wetlands, credible scientific information on the production and ecological value of wetlands and the positives and negatives of ponded pastures (*Mackay–Whitsunday*);
- provision of information to and education of the wider community about NRM issues and information on ecosystem processes sp that landholders can progress sustainable land management and wetlands conservation (*Burdekin*);
- industry and economic viability, especially in relation to balancing of productivity and environmental protection, and the protection of property rights (a particularly strong opinion in the *Wet Tropics*); and

- the establishment of institutional arrangements to support indigenous NRM and to build the capacity for involvement of the current landholders and traditional owners in Landcare (*Cape York*).

Those programs favoured by participants across the regions were those (predominantly) which: delivered through regional structures and organisations, offered multi-purpose incentives, provided information and long-term certainty, and shared risk between private and public interests.

Regional summaries given in Appendix 2 provide a more detailed coverage of the six NRM regions studied in the GBR catchment.

Landholder survey results

A total of 766 respondents were interviewed, 61% of whom came from households that derived income from agriculture; the major enterprises were grazing (n = 230), sugar (n = 141) and horticulture (n = 116). The majority of respondents who drew an income from agriculture were concerned about the long-term viability of their businesses and were heavily reliant on off-farm income.

Attitudes to environmental impacts and regulation

Examination was done of attitudes towards the extent of off-site impacts from land management activities, costs and benefits of conservation, government regulation, compensation for restrictions on property rights, and the regional importance of a range of environmental issues. This showed that:

- There were no statistically significant differences between the attitudes of farmers and non-farmers, or between residents of the different NRM regions;
- Most landholders believed their activities to have significant impacts on other businesses but little impact on marine water quality. This contrasts with a basic assumption of the Great Barrier Reef Water Quality Protection Plan (that improved private land management will improve water quality on the reef);
- Despite widespread acceptance of the need for and the practicality of investing in conservation measures, a substantial minority believed there is little financial incentive to protect natural resources such as wetlands and remnant vegetation; and
- The majority of people agreed that government should take a more proactive role in regulating and policing poor land management practices.

While there was overwhelming support for compensation for any government regulations that restricted landholders' perceived property rights, there was also strong support for the proposition that landholders should show themselves to be using resources efficiently and sustainably before compensation is paid.

Factors influencing the perceived importance of environmental issues

All environmental issues listed above were perceived to be at least *somewhat important* by almost all respondents. Nevertheless, the most important environmental issues were perceived to be soil erosion and water use and efficiency. These were followed by plant and animal pest problems, chemical runoff into waterways and soil salinity. The least important issues were perceived to be loss of wetlands, environmental flows and vegetation.

Respondents' overall perception of the importance of environmental issues was positively related to involvement in conservation groups and negatively related to the area of landholdings and involvement in farm/business productivity groups. All these relationships were, however, relatively weak.

Factors influencing the implementation of conservation practices

The most widely implemented environmental management practice was to set aside areas for conservation. This had been implemented by 62% of respondents, and was followed by soil conservation measures (59%), property management plans (47%), fencing to protect land (41%) and environmental management systems (36%).

Overall levels of implementation were positively influenced by:

- Involvement in landcare or catchment management groups;
- Participation in training for land and water conservation;
- Participation in training for farm or business productivity;
- Involvement of the landholder in deriving an income from agriculture;
- Confidence in the long-term financial viability of the farm business;
- Awareness of conservation schemes; and
- Involvement in conservation schemes including Land for Wildlife, Landcare tax rebates and the Rural Water Use Efficiency Scheme.

Levels of implementation were negatively influenced by involvement in farm/business productivity groups.

Again, the strength of these relationships was relatively weak. Nevertheless, it is important to note that participation in training, community groups and government programs to promote voluntary conservation all had significant impacts on adoption of conservation practices, whereas a number of socio-demographic and attitudinal variables such as age, education and the perceived importance of environmental issues did not.

Factors influencing awareness of conservation schemes

Awareness of, and participation in, conservation programs was low. Basic awareness levels of the programs included in the survey were: Land for Wildlife (50%), Rural Water Use Efficiency Initiative (43%), Landcare tax rebates (31%), Community Grants Scheme (21%) and Envirofund (10%).

By far the most common source of initial awareness of these programs was friends or neighbours. Government agencies, the media and personal observations played a role in some cases. Environment or community groups and the Internet played very minor roles.

Those people who had higher rates of implementation of environmental practices were more likely to be aware of voluntary conservation schemes.

Factors influencing participation in conservation schemes

Among those programs included in the survey, the only scheme that a reasonable proportion of the sample had participated in was the Rural Water Use Efficiency Initiative in which 10% had been involved. Levels of involvement for all other schemes were about 1–2%.

Environmental benefits, financial support, long-term productivity benefits, technical support and ease of application were all rated as important factors influencing a person's decision to get involved in voluntary conservation schemes.

The most important factor inhibiting involvement in voluntary conservation schemes was identified as the availability of time or labour.

Participants generally expressed strong environmental values and argued that rural landholders are, on the whole, responsible and competent natural resource managers. However, the uptake and effectiveness of schemes to promote voluntary conservation were limited by:

- Extremely low levels of awareness of, and participation in, voluntary conservation schemes;
- Widespread fear and mistrust of government intervention;
- Non-acceptance of the proposition that rural landholders have significant impacts on marine water quality;
- A belief that compensation arrangements for conservation efforts are inadequate; and
- Low levels of confidence in the financial viability of agricultural businesses and heavy reliance on off-farm work and income.

Factors that were seen necessary to improve program uptake included risk sharing, establishment of trust, recognition of private investment and simple, flexible, regionally delivered programs.

Some involvement in conservation schemes had clear and measurable impacts on the willingness to adopt conservation practices on the participant's own property. However, the landscape-scale impact of these schemes appears severely constrained by generally low levels of involvement.

Participants perceived involvement in conservation schemes to be limited both by program features (financial constraints, inflexibility, complicated application procedures) and by a lack of congruence between program outcomes and the desired features of land management practices (profitability, protection of property rights, certainty in outcomes and maintenance of productivity).

General Conclusions

This study indicated that there were recognisable socio-economic and demographic differences between the NRM regions as well as differences in the current level of institutional support for sustainable land management. However, because of the unreliability of the underlying socio-economic data, the high level of variability within regions, and the difficulty in establishing the links between levels of support and actual landholder capacity, differentiating between the NRM regions in terms of incentive packages cannot be justified at this stage.

The results of the landholder attitudinal survey aligned with the review of incentive measures ie both identified the same major impediments to participation in existing incentive schemes and proposed similar mechanisms to overcome them. The main impediments identified were the low levels of awareness about the schemes themselves, limited understanding of the consequences of land management on wetlands and water quality, mistrust of government processes and a dissatisfaction with the administration of incentive schemes.

To overcoming these impediments, the main suggestion was that natural resource management incentive programs would be more effective if delivered at a local level and supported by a targeted marketing strategy. In addition, the program should involve a mix of mechanisms that facilitate, compel or induce changed land management practices.

Project Recommendations

The overarching purpose of this project is to provide recommendations on how to increase uptake of sustainable land management so that the objectives of the Great Barrier Reef Coastal Wetlands Program (GBRCWP) can be met. The recommendations comprise a suite of measures and suggestions of how they may be applied.

A key priority of the GBRCWP is the protection and restoration of privately owned wetlands, since these contribute to water quality and have significant habitat values. This study looked at the socio-economic, demographic and attitudinal factors influencing the uptake of sustainable land management practices and wetlands conservation. In addition it investigated the effectiveness of existing incentive measures designed with this goal in mind.

A central finding of this study is that all the incentive programs reviewed have positive elements. Even those existing programs that have not been taken-up require an evaluation to identify how they could be adjusted, and in some cases, redesigned, to improve their efficacy; a similar comment applies to those programs that have the potential to result in unintended consequences or to those where it is difficult to determine if the incentive can (or will) meet its stated objective. In these cases, minor adjustments might be all that is required to address the deficiencies. In particular, where the take-up or participation is poor, marketing through well directed community engagement, for example extension work, is likely to substantially improve take-up.

Incentives offering an inducement, incentives that facilitate change or regulations relying on compulsion can result in improvements in sustainable land management. However, their efficacy could be substantially improved when at least one other mechanism, and preferably all three, are incorporated within the same program.

Key criteria to consider when designing an effective incentive program for natural resource management on private land include:

Public benefit

Public funding for NRM incentives is a scarce resource. Available funds should therefore be allocated to produce the most economically efficient and environmentally effective outcome.

Where financial incentives are provided to private landholders, payments should be restricted to *contributions* to public goods. Private benefits should not be funded from the public purse. Financial incentives should only be used as a ‘circuit breaker’ – that is, offered for a limited period of time and be set at a level that provides encouragement but does not provide full funding for on-ground, capital works.

When financial incentives are provided for capital works, the longevity of the initial investment is important. This is particularly relevant to wetlands, where the long term provision of the ecosystem services provided by these areas can be easily lost (e.g., by weed infestation). To ensure the continued supply of public benefits, incentives should incorporate on-going management payments. Depositing funds into a trust account could address the effect of changes in political direction by ensuring long term funding.

Monitoring of outcomes

An essential ingredient for the success of any incentive program is on-going monitoring of on-ground outcomes associated with incentive payments. Monitoring provides clear justification for the provision of public funding, and data collection helps determine whether regional or catchment targets, and program objectives, are being met. Often, on-going monitoring of property-level processes and management tools is non-existent. For example, the myriad of property management plans currently required from resource users are checked only once; subsequently, no monitoring is undertaken to determine whether documented plans have been implemented, making an assessment of outcomes against stated NRM targets difficult.

Monitoring and data collection, analysis and compilation would aid the evaluation of current incentive programs and, in the future, assist in the creation of new, more cost-effective programs.

If the outcomes from incentive programs are to be monitored in terms of NRM, then the objective of the program must be made explicit. Moreover, a statement of what aspect of the program is to be monitored will encourage policy makers to be explicit about the purpose of the incentives. For example, if the objective is for all land managers to develop property management plans then monitoring would focus on the number of properties with plans in place. If the objective is for the plans to be implemented and natural resources to respond accordingly, then monitoring would be directed towards identifying on-ground progress towards meeting NRM targets.

Flexibility

Industry consultation identified a number of aspects of flexibility associated with access, delivery and eligible on-farm works, and attending to these aspects would improve the effectiveness of incentive programs.

Access to financial incentives is often means tested, thereby excluding those whose earnings or capital assets exceed a certain threshold. Means testing effectively rewards less efficient producers while ignoring industry standouts (i.e., those earning above the threshold rate). Although means testing may be relevant when providing income support, however it is less useful when applied to programs designed to bring about public benefits. Means testing can result in an unrealistic allocation of funds with little or no relevance to the level of public benefits likely to be earned. Where funding for NRM is allocated for specific purposes, then use of a number of criteria, including level of ecosystem services to be provided, is recommended. However, broad-based projects, such as the Australian government's EMS incentive scheme, should not be means tested.

Flexibility with regard to how incentive funding can be spent at the farm level is also important. Those programs that incorporate this aspect of flexibility (RWUEI, FarmBis) appear to have been extremely successful at achieving high take-up rates. For example, FarmBis provides subsidised payments for enrolment in a wide range of business and NRM management courses, but leaves the individual to decide in which particular courses to enrol. Further, the RWUEI included a financial incentive scheme that provided funding for

investment in water use efficiencies. How the money was spent at the farm level was left largely to the discretion of the land manager (however, decisions were often informed by the assistance of an industry or government-supplied extension officer).

Landholders and farmers are often suspicious of government implementation of policy and incentive programs and tended to resent the perceived 'top-down' approach used by policy makers. To some extent this can be overcome by building capacity at the local, catchment and regional level and delegating responsibility for the implementation of policy initiatives to the lowest possible effective level. A combination of top-down and bottom-up implementation processes is likely to be the most flexible, with local or regional groups having more capacity for discretionary funding than organisations centred in Canberra or Brisbane.

Incentive payments also need to be flexible 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, in the future it may be difficult for conservation to be regarded as part of a duty of care. These changes could seriously undermine confidence in an incentive system.

Marketing incentives: Extension, education and community engagement

Marketing is an essential component of successful incentive programs. Incentives need to be marketed and they need to be marketed directly to the target resource users. It is not enough for programs to be announced through the popular media, nor is it enough simply to announce that funding is available for a particular purpose. It should be explained why an incentive is being offered, and why landholder involvement is important. For example, announcing the availability of funding for restoration of wetland areas would be largely ineffective for improving water quality entering the GBR lagoon unless landholders are informed of the benefit of wetlands protection for water quality outcomes and the potential role they can play in the protection of wetlands.

Marketing broad-based programs (such as FarmBis) in a manner that overcomes 'unconscious incompetence' is extremely important. It is unrealistic to expect land managers to enrol in a course in sustainable production or NRM if they have no understanding of why this would be beneficial to their farm business. For example, the FarmBis program, although highly successful in terms of overall participation, needs to encourage enrolment across the entire range of courses (i.e., NRM, marketing, management), as opposed to participation in financial management courses only.

It is essential that marketing of the Reef Water Quality Program clearly promotes to landholders the link between on-farm actions and the quality of water entering the reef. This is vital if incentives to improve the quality of water entering the GBR lagoon are going to be effective. Additionally, the link between unsustainable management practices and loss of farm resources needs to be made clear, as landowners surveyed for Volume 3 identified profitability and maintenance of productivity as their major land management objectives.

Education and community engagement should be managed and implemented at the local level. Land managers appear to respond favourably to direct engagement through workshops and grower group meetings where there is peer motivation and exchange of local knowledge.

Discussions with industry suggest that if the importance of specific NRM management techniques is conveyed effectively, the need for financial inducements might be reduced and enforcement of regulation made much easier.

Comprehensive risk analysis

An effective risk analysis is an important ingredient for all incentives as it has the potential to identify outcomes (intended and unintended) that might occur. It is critical that the risk analysis extends beyond the government agency or division responsible for implementing the policy or incentive program to include all relevant stakeholders. This should include other divisions within the responsible government department, other government departments, industry, the community and landholders.

Comprehensive risk analysis is potentially time consuming. Any imperative to 'get something out quickly', particularly when the incentive is reactive rather than proactive, means that frequently the risk analysis is far from comprehensive. A well-conducted risk analysis could avoid unnecessary re-evaluation and review and increase trust. Incentives subjected to reviews and refurbishment to rectify avoidable outcomes run the risk of losing credibility, both with industry charged with their promotion and with resource users who regard government commitment to incentives as critical for their involvement.

Concluding comment

In conclusion, any program aimed at increasing the uptake of sustainable land management and at wetlands protection and restoration should involve a mix of mechanisms that facilitate, compel or induce changed land management practices. The program should be delivered at a local level and be supported by an effective, targeted marketing strategy.

In addition to the recommendations relating to incentive programs outlined above, there are some general recommendations, as well as the identification of some potential areas for further research or action, that could well assist in overcoming several impediments to the uptake of incentives for conserving wetlands.

Both the review of incentives and the attitudinal survey suggested that delivery of any package needs to be at a local scale, although it is not clear what type of organisation would be the most appropriate. Industry organisations have a good track record in the delivering incentive programs; however, landholders often participate in more than one industry and there is often more than one type of landholder relevant to wetland impacts.

In general, responses from the focus groups indicated that NRM groups were seen as an effective mechanism for delivery of natural resource management initiatives. This was particularly favoured where the actual delivery was highly localised, for example in the Fitzroy Basin Association Neighbourhood Catchment Program. However, discussions with industry organisations, and even with NRM bodies themselves, indicated there is a perception by some landholders that NRM bodies are "another arm of government" or they have no long-term future.

Therefore, delivery via a partnership between NRM bodies and industry organisations may be the most effective mechanism, provided it is undertaken at a sufficiently local scale. To optimise these partnerships, it would be useful to assess how the different industries operate in different regions. For example, detailed information, in particular relating to the beef and horticulture industries, is not provided on a regional and sub-catchment level. This information is important, as there are substantial differences in land management practices and socio-economic characteristics between the different industries on a regional and catchment scale. It would also be useful to assess the effectiveness of existing sub-catchment programs initiated by NRM bodies.

Local government could potentially deliver incentive packages; however, with some notable exceptions, their capacity appears to be limited at this stage. This is being addressed and, again, a partnership approach with NRM bodies and regional groups might be appropriate.

In terms of developing an appropriate incentive package for the GBR catchment, or modifying existing packages, the factors outlined above are important in ensuring that the schemes meet their objectives and do not result in unintended outcomes. However, from this research it would appear that a key factor constraining participation in existing incentive schemes within the Great Barrier Reef catchment is the very low level of awareness of the schemes. This low level of awareness results in very low participation rates, which makes it difficult to assess their effectiveness for changing on-farm behaviour. Improving the awareness of existing schemes would be a good first step toward increasing participation. This in itself may go some way toward the protection and restoration of significant privately owned wetlands. After participation rates increase, it would then be useful to assess the effectiveness of existing incentive schemes identified in this study, not just in terms of participation, but also in terms of implementation and achievement of natural resource management objectives.