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CRC for Coastal Zone
Estuary & Waterway Management

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

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Landholder Attitudes to Wetlands and Wetland Conservation Programs and Incentives

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1. Introduction

Coastal wetlands management requires an understanding of the social factors and processes that enable adoption of conservation measures at local scale, together with the recognition of the regional context in which sustainable land management is practiced and the legislative framework in which they exist. Natural resource management decision-making at a property level is constrained by the decision-making environment, which includes social, economic and physical factors. The literature on factors influencing landholder decision-making, adoption of sustainable land management and conservation programs and understanding landholder shift to sustainable practices is extensive and offers insight into understanding some, if not all, of the factors influencing individual landholder behaviour.

While the focus of the study was on improving coastal wetland conservation by private landholders, it was important to understand the broader context of landholder adoption of sustainable land management practices. Policy makers are also increasingly interested in the means by which landowners can be encouraged to participate in sustainable land management practices and conservation of wetlands.

This is a summary report on the outcomes of the focus groups, informal discussions and survey undertaken in six coastal catchments situated along the Great Barrier Reef Lagoon. This report covers the key findings arising from both the qualitative and quantitative research and presents findings identifying:

1. the factors that influence uptake of sustainable land management practices and conservation on private land in Queensland;
2. the factors that impede and facilitate the uptake of different programs and incentives; and
3. the preferred aspects of coastal wetland protection programs (including additions or improvements to existing schemes).

1.2 Research objectives

The five research objectives were:

1. Measure landholder knowledge of relevant regulations and awareness of existing land management and conservation schemes;
2. Measure landholder attitudes toward the concepts of sustainable land management and wetland conservation;
3. Measure landholder level of participation in sustainable land management programs and uptake of incentives for conservation and their attitude toward these programs;
4. Analyse landholders' perceptions of current & proposed conservation schemes and programs and identify preferred aspects of coastal wetland protection programs. Identify what factors inform their decision to participate in sustainable land management and conservation schemes; and
5. Move beyond current approaches to inform the development of a suite of integrated programs and incentives for wetland conservation on private and leasehold land in the coastal catchments.

1.3 Research into adoption of conservation practices

Research into the adoption of improved farm management practices has generally been based on a social-psychological model of individual decision-making involving awareness, information, evaluation, trial and adoption (Vanclay 1992). Applying this perspective, early adoption studies of the 1940s and 50s found that adoption behaviour was normally distributed, and often associated with variables indicative of socio-economic status, education and social participation (Buttel et al. 1990). Identification of those farmers located at different points of this distribution was found to be of practical use in the development of extension strategies to promote innovative practices. However, this research was also extensively criticised for its: (1) over-emphasis on associations between variables and failure to identify or theorise causal relationships; (2) naïve acceptance of the desirability of new technologies and lack of attention to processes of resistance; (3) tendency to blame farmers for a lack of adoption rather than questioning the effectiveness or desirability of the innovation; (4) lack of attention to the inter-relationships between processes involved in technology generation and utilisation; and (5) inability to deal with complex packages of technological innovation (Buttel et al. 1990; Ruttan, 1996).

The ability of adoption studies to identify individual characteristics associated with adoption behaviour appears to have declined since the 1970s for two broad reasons. The first of these is the increasing normalisation of technological change (Buttel et al., 1990). The second is the shift of emphasis from technologies oriented towards improving farm productivity and profitability to practices designed to enhance environmental management. A number of studies since the late 1970s have found that the adoption of 'environmental innovations' cannot be predicted using the same variables as those associated with the adoption of 'commercial innovations' (Buttel et al. 1990). According to Vanclay (1992), this can be accounted for, in part, by the manner in which environmental innovations require individual land managers to bear the cost of implementation while benefits are often long-term, indefinite, and off-farm. Environmental practices also often require major changes in land use and farm layout. Additionally, according to Saltiel et al. (1994), environmental outcomes often may be achieved through a variety of approaches, none of which may be represented as the only viable path to sustainability. The problem for those seeking to promote improved agricultural practices seems to have shifted from a need to improve communication processes and to identify those farmers with social-psychological characteristics likely to promote resistance to discrete technological innovations, to a need to assist in the optimisation of complex management systems (Lockie et al., 1995).

One of the responses to these emergent difficulties in studying adoption has been to shift focus from the characteristics of land managers to the characteristics of practices and programs promoted to them for adoption. Vanclay (1992) summarises the characteristics of practices that have been found to influence their adoption. These are:

- Complexity: complex innovations and programs require greater management skill and detailed understanding of processes. This increases resistance and the possibility that land managers will not accept the premises upon which practices and programs are based;
- Congruence: compatibility with farm and personal objectives reduces the likelihood of innovations conflicting with existing practices and increases commitment to making changes where this is the case;
- Divisibility: allows partial adoption in order to trial practices on a small scale or to adopt those components compatible with existing practices and objectives;
- Economics: while it is reasonable to expect that the more economic an innovation is,

the greater will be its adoption, other factors come into play in relation to environmental innovations for which economic returns are long-term and indirect;

- Risk and uncertainty: all innovation involves an element of risk, the perception of which is amplified where uncertainty exists over the likelihood of particular costs and benefits over time, thus reducing adoption;
- Conflicting information: all practices and programs are subject to debate over applicability and effectiveness. Where debate is extensive, non-adoption or participation is often an appropriate response;
- Capital implementation cost: in addition to the overall economic costs and benefits it is necessary to consider capital outlay necessary to initiate adoption or participation and the opportunity cost of this capital;
- Intellectual implementation cost: may innovations and programs require land managers to invest considerable time learn news ways of doing things;
- Flexibility: maintaining flexibility is an important risk management strategy. Locking land managers into a particular land use may encounter resistance due to the perceived loss of flexibility;
- Physical and social infrastructure: in addition to infrastructure for marketing, transport and so on, land managers require appropriate sources of information and support. Due to the importance most land managers place on other land managers as sources of information, acceptance of practices and programs by peers facilitates adoption; and
- Environmental perception and media promotion: adoption and participation is enhanced when land managers perceive themselves personally to be at risk from environmental degradation. Many media depictions of environmental degradation, however, are so extreme that landholders do not relate to them, either believing themselves not to have such a problem or becoming fatalistic about their ability to address it.

Other useful references include: Dutcher et al. (2004), Soderqvist (2003), Cary et al. (2002), Guerin (2000), Morris et al. (2000), Salamon et al. (1997), Wilson (1997) and Hoag et al (1996).

2. Research methods

A mix of qualitative and quantitative techniques was used, together with consultation with resource managers to inform this report. The data collected in Task 1 and Task 2 informed the type of information collected as it built a picture of the existing regulatory framework, programs and incentives currently utilised in Australia and the reef catchment, and the existing level of participation in such programs within the reef catchment. To achieve objectives (i) – (iv) outlined data was collected using the following two research methods: focus groups and a survey.

2.1. Focus group discussion

Focus groups and informal discussions in each of the six NRM regions in the Great Barrier Reef catchment area were undertaken during February 2004. The focus groups consisted mainly of private landowners and representatives of peak bodies. Selection of the focus group participants was through regional NRM groups, Landcare groups and peak producer organisations in each region to obtain a list of landholder contacts. Snowball technique was used to identify further

potential participants and to get a balance of genders, ages and farming interests. To supplement the focus groups there were targeted informal discussions with private landholders engaged in wetlands conservation and sustainable land and water management, and on-ground resource management support staff to capture a range of perspectives. These informal discussions involved site visits with private landholders, local government and regional NRM staff to view management and conservation activities of artificial and natural wetlands, and waterways.

The focus groups were vital to ensure key issues influencing landholder's decisions were identified in depth and to also ensure the questionnaire asked relevant questions. When designing the focus groups there was consultation with the task leaders from Task 1 and 2. Task 1 data provided useful baseline information about regional differences upon which the focus groups built further understanding. Outcomes from Task 2 provided information on the range of incentive programs to explore with the focus groups.

Each focus group meeting was two hours long, conducted in the regional centre and facilitated by the Chief Investigator. CQU human research ethics clearance was approved prior to the commencement of the study. Participants were provided with an information sheet outlining the purpose of the study before committing to attend and consent forms were collected from participants at the start of each focus group meeting. The introduction section of the focus group meeting provided further information to participants about the study's purpose, how the data would be used, the meeting process and ethical issues. Due to the large size of the focus groups, it was not possible to tape record the meetings. The Research Officer took notes and information written on sheets was collected from participants. The focus group discussions were structured around three main themes:

1. Identifying the major issues in relation to sustainable land management and discussing what issues participants believed to have broad landholder acceptance and those they considered in need of further landholder acceptance;
2. Identifying what schemes and programs relating to water quality participants were aware of and, of these, which ones they regarded as major disappointments and which ones had significant potential to improve water quality; and
3. Identifying characteristics of those potential water quality schemes, which were desired, and those characteristics that should be avoided.

Discussions with the coordinator of the Cape York Natural Heritage Trust were undertaken in place of a focus group meeting. This method of data collection was used due to the large geographical size of the region and small dispersed population base, current wet season ground access problems and limited researcher time and resources, which made it impractical to conduct a focus group in the Cape York NRM region. Information collected from this key informant covered the historical aspects of the region (agreements and projects), geographical background, previous and current NRM activities at a variety of spatial scales (property, catchment, sub-regional, regional), social and economic aspects affecting NRM planning and management and major land management issues for water quality in the GBR lagoon. Regional summaries for each of the six coastal regions studied are provided in Appendix 2.

Additionally, the research team conducted site visits near each of the focus group meetings to familiarise themselves with local initiatives in coastal wetland conservation and management.

2.2 Landholder survey

The data collected from the focus group discussions and Tasks 1 and 2 was used to inform the development of a survey instrument to be administered by telephone to landholders. A sample of landholders was obtained through use of a commercial database providing access to individuals owning rural property in the six coastal catchments. A pilot questionnaire was delivered to a number of participants and refined. The refined questionnaire was administered using Computer Assisted Telephone Interviewing (CATI) techniques to 746 private landholders in the six coastal catchments along the Great Barrier Reef. A survey of this size allowed for sample stratification and provided a high level of statistical confidence. The sample was stratified by geographic regions, which were defined by the results of Task 1.

The survey tool was advantageous as it was able to target a large sample of landholders in the reef catchments. To increase the likelihood of obtaining a response, selected landholders were dialed at different times of the day (morning, noon and evening). The survey also allowed industry data collected in the Task 2 activities on the uptake of programs and incentives to be checked for reliability.

The survey instrument was designed to measure landholder socio-demographic background, awareness of current programs and incentives, knowledge of relevant existing regulations, participation in government sponsored schemes, communication and information networks, and perceived barriers and incentives to adopting sustainable land management and practices and conservation. The survey included responses to opinion questions, which were categorised on a 5-point Likert-type scale with a central neutral category. A copy of the survey instrument is provided in Appendix 1.

Analysis of the data was conducted to provide information on landholder socio-demographic background, awareness of current programs and incentives, knowledge of relevant existing regulations, participation in government sponsored schemes, communication and information networks, factors that influence uptake and perceived barriers to adopting sustainable land management practices and wetland conservation protection.

3. Focus group results

This section presents and discusses the data collected from the focus group meetings and key informant discussions conducted in the six coastal catchments. Factors influencing the uptake of sustainable land and water management practices and conservation on private land are discussed before proceeding on to a more detailed discussion of the factors impeding and facilitating the uptake of different programmes and incentives. Information about the preferred aspects of coastal wetland protection programs is then presented to inform future program modification and development. Next, the social infrastructure, in terms of the communication and information networks is discussed. At the end of this section there are regional summaries providing specific information about each region.

The following six regional summaries provide insight into the different coastal regions studied in the Great Barrier Reef catchment (see Appendix 2 for full details).

In the Burnett Mary NRM region, sustainability and a healthy environment were very important to participants as landholders recognised the connection between the economic and ecological viability of their environment. Much emphasis was given to the use of state government control

to manage water quality and to provide better incentives to motivate water efficiency. Participants supported the use of new incentives to get community (including industry) to value, re-use and recycle water through modified processes and new technology. There was generally good awareness of the different activities and structures relating to water quality planning and management, and participants favoured a range of federal, state and local programs and incentives. Participants also believed there to be a lack of riparian and wetland incentives available for landholders.

In the Fitzroy NRM region, government functioning in terms of policy (programs and schemes), control and processes was identified as a problem. Participants highlighted the need for water quality to be accepted as a community-wide problem. Future sustainability of the natural and social environment through urban planning and natural resource management was of main importance. While NHT programs were criticised due to their administration, funding allocation, application process and state level decision-making, the regional devolved grant scheme administered through the region's NRM organisation was favoured because of the funding, access to education and negotiation available.

In the Mackay-Whitsunday NRM region, water issues concerning stormwater quality, impoundments and extraction, availability and chemical use, sediment runoff, riparian loss and wetland degradation were issues common to the other regions. Mistrust of government operations, in relation to certainty of information and accountability, was also common to most regions, along with concerns about voluntary practices being made mandatory. Issues for landholders were the lack of education about NRM issues for landholders and the community, changing regulations, lack of government consultation and the absence of a one-stop-shop for information gathering and sharing. The definition of wetlands and the production and ecological value of wetlands was important for participants who wanted further research on the positive and negatives of ponded pastures, and wetland values. Programs and schemes favoured by participants were those offering: regional on-ground focus, one-stop-shop, multi-purpose incentives, shared risk, better networking and information and certainty (continuity and longevity).

In the Burdekin Dry Tropics region the main NRM issues mentioned by participants were government functioning, information and education, resource management, and environmental sustainability. Of these issues, the need for communication of NRM issues to inform the wider community and for landholder education on ecosystem processes were highlighted. Awareness of water quality programs was highest for federally funded policies, programs and incentives. Also important were the non-government organisations, such as Greening Australia and Conservation Volunteers. Programs favoured by participants were those which provided better communication and cooperation between stakeholders, less duplication, certainty in funding and had political support, long-term vision and commitment by funders, teams of experts to give advice to landholders and uncomplicated administrative processes.

The participants from the Wet Tropics region were strongly focused on industry viability, the availability of science and issues of sustainability. In particular, the focus was on balancing productivity against environmental protection, where economic value and industry viability over the long term were protected. Protection of property rights with secure land and water access for landholders was also important. The programs and schemes identified were mainly financial incentive schemes and a few voluntary conservation schemes. Landholders in this region made clear distinctions between private and public assets and responsibilities, and they believed monetary incentives for voluntary work to management public assets was necessary.

The Cape York NRM region is significantly different to the other five regions from a geographical, social and economic perspective. The Cape York region covers an extensive geographical area and has a sparse population of approximately 18,000 people, of which approximately 60% are Indigenous and 40% non-Indigenous. Economic enterprises are limited to tourism, pastoralism and mining activities. Past NRM activities have been based on agreements between the different regional interests (pastoralists, conservationists, Indigenous) and the identification of a common scale of reference and operation. Issues confronting NRM in this region included: lack of Indigenous models of NRM, limited capacity for involvement, limited economic activities for Indigenous people and limited management by Indigenous Land Trusts. Weeds and pests are a key problem for the region, especially on unmanaged lands. Future options for water quality management and wetlands conservation rely on such arrangement as: formation of partnerships between state government and Traditional Owner groups, on-going support for the Land and Sea Management Program and Indigenous Land and Sea Management Centres, appropriate property level and catchment level approaches to implement landcare, and capacity building initiatives to support peoples' involvement and awareness of NRM issues.

3.1 Factors influencing the uptake of sustainable land management practices and conservation on private land

3.1.1 Profitability of enterprise

The profitability of landholders' current farming enterprises was a seen by participants as a major factor in their ability to adopt new practices. Participants frequently mentioned the inability to 'act green' when their financial outlook was poor. Also, threats to future industry viability, whether real or perceived, were recognised impediments to the adoption of new practices by landholders. The future profitability of their farms and sense of financial security appeared to be important considerations in measuring their capacity to adopt particular practices. Rarely did participants report any financial benefits to adopting sustainable land management practices and undertaking conservation on their property.

3.1.2 Protection of property rights

Property rights appeared an important factor in the adoption of sustainable land management practices and conservation on private land. Many improved natural resource management practices for sustainability require long-term investments, and landholders will only make these financial investments if they have sufficiently secure and long-term rights to their land and its natural resources. If property rights are secure then they know they will reap the benefits of their investment. When property rights are well established landholders have an incentive to manage their land so as to maintain its natural resources and value into the future. Participants in the focus groups expressed concern over threats to their property rights by changes in legislation, and the introduction of stricter regulation and harsher penalties.

3.1.3 Certainty in outcomes

Reliability of information and knowledge that undertaking new practices would result in the desired outcomes to ameliorate the problem was a common factor influencing participants. Landholders stated that they wanted to receive credible information and have confidence in their actions, given the often-lengthy time lags in observing benefits. Consistency in information to landholders from government and confidence in government's understanding of the issues was important for participants in creating this credibility.

3.1.4 Maintenance of productivity

The objective of landholders is to maintain or improve production on their property. With this in mind, landholders will adopt new practices if real future benefits exist and any periodic or permanent loss of production is supported. A major point raised was that of protecting the economic viability of landholders. While participants recognized that landholders generally tried to be good environmental stewards, they highlighted the capital outlay necessary to take up improved land management practices and conservation, and the need to maintain farming production and on-farm profitability. Many participants mentioned the usefulness of communicating the environmental and production benefits of adopting sustainable land management and conservation practices to landholders to illustrate the 'win-win' outcomes possible. Also, the ease of implementing new practices, which are compatible with existing property practices, further assists the uptake process and minimizes disruption to production.

3.1.5 Understanding sustainable farming

Also important in the uptake of sustainable land management and conservation practices on private land is the understanding by landholders of what defines and constitutes 'sustainable farming'. Participants highlighted the need for greater landholder attention to understanding and achieving sustainability for future viability as a basis for the future uptake of practices.

3.1.6 Other factors influencing adoption by landholders

The factors identified by participants as influential in the uptake of sustainable land management practices and conservation on private land included:

- Greater confidence and trust in government by landholders;
- Reliable and credible science, without selective application of science or commercial interest inference;
- Provision of information and communication of the environmental outcomes and costs to private landholders (including production benefits at property level, off-site benefits, productivity loss to landholders). If the benefits are visible then landholders are more likely to undertaken actions for longer time durations;
- Longer term financial assistance to support change in practices and property adjustments. Strengthening incentives to favour long- over short-term benefits as a greater enticement to landholders;
- Balanced production versus environmental protection approach; and
- Rewards for sustainable land management practices and conservation by landholders to protect public assets (e.g., property value, rate charges).

Economic support for landholders was widely favoured and viewed as essential, particularly in being able to obtain labour to assist any on-ground works. Other positive support would be compensation for permanent or periodic loss of production. Stricter regulation and penalties were viewed as negative and inappropriate in securing landholder adoption.

Finally, by adopting a positive perspective and promoting the solution as a shared responsibility between public and private interests this helps to influence landholders to act. This approach shifts the attention from 'blame' and 'problem focus' to one that recognises past government policy and landholder action has resulted in environment issues that require a joint collaborative effort for a sustainable farming future.

3.2 Factors impeding and facilitating the uptake of different programs and Incentives

This section seeks to outline the key factors identified as impeding and facilitating the uptake of sustainable land management and wetland conservation programs and incentives in coastal catchments. While a number of factors were discussed by focus group participants the three most common factors were: risk of adoption without full knowledge of the costs to productivity and the tangible benefits; trust in terms of the credibility and source of the information; and, recognition of private investment and risk incurred by landholders. These factors are discussed in more detail next.

3.2.1 Risk associated with program uptake

Risk refers to the uncertainty about likely benefits or costs when new practices are adopted and the end results are yet to be realised. The concept of risk was frequently mentioned by participants in terms of the required capital and resource investment in adopting new practices, and when the risk to current on-property productivity was not known. Often participants viewed the burden of risk as residing solely with individual landholders. Ways of managing this risk include, making the risk implications of different sustainable practices explicit through education and taking a shared risk approach. Preference for risk to be shared with others, such as government and the wider community, was highly favoured. Sharing risk generally meant a payment to landholders in recognition for their actions and possible future losses.

3.2.2 Establishing trust

Landholders are often sceptical about new practices being promoted as a result of past experiences with agricultural research, government policy and extension systems. Information being promoted is no longer immediately accepted as factual and the credibility of the research is under scrutiny. The credibility of the information received and the source of the information were important aspects for participants. Landholders want concrete and reliable evidence on such issues as the ecological value of ponded pastures and the ecosystem services and production values provided by wetlands. One method of establishing trust with landholders is through the recognition and use of local knowledge in programs. Also, by using written agreements that explicitly outline issues, such as the nature of the landholder's involvement and any future loss of land use.

3.2.3 Recognition of private investment

Landholders adopt new practices at considerable personal risk to their financial stability and future. Often landholders expend funds and resources in the anticipation of environmental and productivity benefits and outcomes, but also because they recognise the need to be good stewards. The private investment made by landholders in terms of loss of production, labour and resources is frequently not recognised by the wider community. Recognition in the form of financial payment for their involvement, visual recognition through signage and positive media were some of a few ideas put forward by participants to acknowledge the contribution made by landholders to protect and manage public resources and assets.

3.2.4 Other factors influencing adoption

Factors influencing landholder adoption of sustainable land management practices and conservation programs and incentives on private land are complex, necessitating the consideration of both 'program factors' and 'landholder factors' to establish an understanding. 'Program factors' refer to the structure and features of the program, including schemes and initiatives, and may include positive and negative factors supporting landholder uptake and

adaptation. These program factors may include financial incentives offered, duration and continuity of the program, flexibility (ability to be used in a variety of enterprises and farming regimes), logistics, and information and education provision. 'Landholder factors' broadly cover landholder features and property characteristics, such as financial stability, attitude to the environment, stewardship/conservation ethic, social dynamics within the local area and location in the catchment. In terms of preventing adoption of waterway management practices, such as fencing, research has shown financial factors to be a major barrier (Rhodes et al. 2002).

Program factors were the predominant focus of participants' concern regarding sustainable land and water management and wetlands conservation programs. While landholder factors were identified as important and contributed to the uptake or non-uptake of programs and incentives, they generally pertained to maintaining financial viability, recognition of landholder in-kind contributions and supporting the environmental stewardship or conservation ethic of landholders. Further details about landholder factors will be discussed in the survey results section.

It is also important to recognise that landholders do not appear to be autonomous actors, and in fact, their decisions to participate in different programs, schemes and initiatives, are taken in an environment, which is complex and dynamic. Wilson (1997) highlights the need to be cognisant of the information environment and dynamics within farm districts in understanding the motives, values and attitudes of farmer decision-making processes. The information environment and dynamics within the local area of landholders is important in formulating decisions, as evident from the identified sources used to inform property level farming decision-making discussed in the sub-section Communication and Information Networks.

3.2.5 Other factors facilitating the uptake of programs and incentives

Program factors encompassed the structure, features and administration of the programs offered, and other associated aspects such as the overall approach and scale of delivery. In summary, factors identified through the focus group meetings as facilitating the uptake of different programs and incentives included:

- *holistic/integrated approach* – use of a range of complementary programs to target catchment-wide activities for a whole-of-catchment approach and use of a coordinated and collaborative approach
- *positive program features* – offer continuity and long-term support to landholders, strategic use of resources, clear outcomes and good communication of outcomes, address a number of related issues with no single issue focus, offers a range of incentives, greater flexibility in program administration, increased education and incentives to encourage uptake as opposed to regulation and penalties, provision for labour assistance to landholders, diverse in offering individual or group applications, financial and technical support for landholders to collect long-term data to monitor changes and to act as an education tool, action based on shared risk between landholders, government and community, better resourcing and use of human and financial resources, landholder management payments for conservation practices, provision of technical information, landholders have ownership of project/activity, use of voluntary agreements between landholders and government (avoidance of shift to mandatory status)
- *communication and education* – communicates positive results to other landholders and wider community, greater information dissemination to landholders to improve basic knowledge and understanding of issues
- *regionally based programs* – improved networking, single mechanism for delivery of information and funds, long-term government and political support, allows

flexibility and negotiation between regional group funding the activity and private landholders, regional level decision-making provides greater consistency.

Participants saw adopting a regional approach by using regional NRM groups as a delivery mechanism for investment of funds for on-ground works as facilitating the uptake of programs and incentives. A regional NRM approach also targets a variety of spatial scales from sub-regional to property. Regional NRM groups have the added advantage of involving most target individuals and groups within regions, and having developed communication and information networks. Furthermore, they are viewed as separate to government, even though they rely on and are accountable to government for funding. In the Mackay-Whitsunday NRM region, participants favoured the use of regional NRM groups to act as project proponents with landholders contracted into undertaking studies and on-ground activities.

3.2.6 Factors limiting the uptake of programs and incentives

Discussions concerning the factors limiting program and incentive uptake covered program and incentive factors, as well as broader institutional factors concerning funding cycles and issues with the wider community. Generally, those factors identified by focus group participants as limiting the uptake of programs and incentives included:

- structure of programs and incentives - inadequate funding, length of program life, lack of continuity in programs for on-going implementation and monitoring of results, insecure long-term funding for programs, no team of experts to provide technical and scientific assistance to landholders, outdated incentives on offer, level of incentives too low for uptake, issue of poor coordination between government agencies and level of government;
- administration of programs and incentives - large volume of paperwork, complex and confusing process to access incentives, inadequate delivery mechanisms;
- regional and network support - lack of long-term funding for NRM groups beyond a 12 month cycle, poor communication between government agencies and community due to the lack of extension officers; and
- community support and education - no recognition of landholder input and in-kind contribution on landcare activities, absence of interest and concern for environmental problems, conflicting values between production and conservation, low level of public understanding and support.

Participants believed the administration of programs and application processes needs to be streamlined and made more user-friendly for private landholders to encourage their involvement. Bureaucratic red tape frequently frustrates those wanting to access programs and incentives. Problems they perceived with the application process concerned the level of expertise expected of applicants in the submission of proposals for on-ground work, the lack of feedback on unsuccessful applications and the large investment of time by landholders in writing applications. Often absent from these processes was the scope for landholders to negotiate with funders to achieve better environmental and landholder outcomes. An exception to this issue was identified in the Fitzroy region, where a rural landholder successfully negotiated with the regional NRM group to undertaken on-ground work that provided optimal outcomes for both the waterway and landholder. This process allowed local knowledge to be utilised and for the flexible implementation of actions.

A common factor identified by participants across the regions limiting the uptake of programs and incentives was the amount, availability and continuity of money for program activities (e.g. education, on-ground action) and incentives. Issues regarding funding and financial incentives were seen as a major limitation to conservation work. Problems listed by participants included:

inadequate incentives, lack of funding continuity between program cycles, level of incentive offered to individuals, inadequate amount of funds for the number of participants and the limited number of incentives on offer.

A further factor viewed as impeding the uptake of programs for wetlands conservation was the lack of an all encompassing definition of what constitutes a wetland, and understanding of wetland values. Within communities there are widely varying views about wetlands. A greater understanding of the values wetlands provided to landholders and the general community is needed. In particular, the values provided by the less tangible ecosystem services, such as water filtration, biodiversity conservation, nutrient and sediment retention.

Some key points from the focus group discussions were:

1. Need for community to perceive wastes and discharges as a resource, which has value for further re-use. Examples used were stormwater and water from industry;
2. Need for aquatic weed and pest control to be a collective action encompassing public and private lands, and including government and landholder action. In the past this issue has been construed as the sole responsibility of private landholders;
3. Need for a strategic and balanced approach to program implementation and funding, with planning flowing on to on-ground actions. There was a broad concern across the regions by landholders that programs focus too much on regional planning and producing action documents;
4. Need to reconcile the public versus private good and responsibility issue regarding wetland conservation for an equitable outcome;
5. Overall, there are inadequate resources (people and money) to ameliorate the problems and implement solutions; and
6. Perception by participants that the program results and solutions put forward by government do not meet with what the community wants. This suggests a disjunct between the expectations and understanding of policy-makers and the ability or desire of private landholders to adopt new practices.

3.2.7 External factors influencing uptake of program and incentives

Factors beyond the individual programs and incentives features were also discussed in the focus group meetings. Participants argued that government failures and organisational issues were impediments to the uptake and effectiveness of sustainable land management and conservation programs and incentives. In all six regions studied there were numerous issues raised by participants concerning the functioning of government and the effect on the success of programs. Issues raised covered: lack of continuity of government personnel, interference in programs, inadequate enforcement of legislated regulations, insufficient resourcing of programs, and a lack of extension officers to assist landholders and facilitate communication. Also, most focus groups highlighted the need for better examples of land and water management on state land, and for government to lead by example.

In relation to economic instruments, such as carbon credits, these environmental schemes were viewed as failures. They failed to meet expectations and produced disappointing outcomes to landholders. The exact nature of the problem with this instrument probably relates to market efficiency, issues of risk-sharing benefits and the feasibility for landholders to deal with generating and marketing the credits. In the case of economic instruments (incentives or market stimuli available to persuade landholders to change their practices), the factors impeding the uptake of sustainable practices through these schemes may relate to legislative failure to establish appropriate market mechanisms, uncertainty over property rights or the lack of

appropriate management of trading schemes (e.g. water trading, carbon credits).

The voluntary incentives which seek to facilitate change in wetland management practices, such as Land for Wildlife schemes and conservation covenants on private land, received only limited recognition by participants in the focus groups. The reason for this may be due to the limited coverage of the scheme at local government level, lack of consistency in their application and the limited number of local extension officers to provide information and support to landholders. While the Ramsar Convention on Wetlands was mentioned in discussions, its use by private landholders to protect wetlands appeared to be extremely low. Non-government organisations and private landholders may initiate a site nomination for the wetland to be designated as a Wetland of International Importance and submit this to the Common wealth Minister for consideration.

Focus group participants repeatedly discussed a number of issues, which warrant further attention, to facilitate uptake and to deal with non-adoption of programs and incentives. The first issue raised was the best way to reward landholders who are good managers, and the most appropriate way to punish those who are bad land managers. Participants in the Wet Tropics NRM region identified the option of allowing longer leases to good managers based on the Land Act's requirement for a duty of care to be taken with leasehold of land. A number of participants also suggested another way to reward landholders practicing good management was to adjust land values to reflect their use of sustainable land and water management activities, and for them to pay lower land rates (or for 'bad' landowners to pay higher rates) However, governments do not use land revaluation as a conservation tool but may instead rezone or use differential rating as a methods of rewarding good management. Also, valuing of improved land could be reflected in market values. Second issue was the concern about voluntary practices undertaken by landholders being made mandatory through legislative enforcement. Fear of mandatory measures replacing voluntary actions was high. The establishment of voluntary agreements as a formal recognition of trust between landholders and government was one option put forward. The final issue was that of property rights and responsibilities, especially in legislation. There is an associated need for a better understanding of the interaction between property rights and collective action institutions, such as government agencies, which constrain or enable uptake of programs and incentives.

3.3 Preferred aspects of coastal wetland protection programs

Specific discussions in the different regions about a number of voluntary conservation and water quality programs available for coastal wetland protection inform this next sub-section on the programs favoured and those preferred aspects of programs.

A mix of programs was viewed positively by participants in the focus groups, particularly the regional-based programs delivered by the regional NRM groups. These ICM/regional devolved grants and regional initiatives were favoured for their implementation flexibility, use and availability of local knowledge, consistency in approach, and their importance and relevance for wetland conservation. The other program delivered through regional NRM groups was the National Action Plan for Salinity and Water Quality, but it was only valued by the NAPSWQ regions. Another Federally funded program viewed positively by many participants was EnviroFund, which enables groups and individuals to apply for grants of up to $30,000 to carry out on-ground work to address local problems. The identified benefit of this program was its funding of individuals. In general, any individual landholder projects or incentives for individuals to undertake on-ground actions at the property level were highly valued, and this included local government incentives. Taxation and financial incentives were also widely

mentioned and favoured, but deficiencies with current incentives and taxation schemes were viewed as limiting their effectiveness and uptake. The deficiencies mentioned included such issues as: lack of long-term incentives (e.g. longer than two years), inadequate amount of financial incentive offered and inconsistencies across different local government boundaries. An environmental tax levied at the wider community was given merit by participants as a scheme for funding long term conservation projects, increasing awareness of environment issues and sharing the responsibility for the environment. A program providing positive benefit for coastal wetland protection and frequently mentioned by participants was the Rural Water Use Efficiency Initiative, which was established to improve the use and management of irrigation water. This industry-government driven program has proven to be effective, due to its high level of industry acceptance and implementation. In summary, the preferred programs to protect and manage coastal wetlands possess features of being focused on the individual/property level, involving financial incentives, being delivered through local mechanisms (local government, regional-based groups) and utilising existing networks.

The preferred aspects of wetland conservation programs identified through the focus group discussions included:

- *One-off payments and adequate resourcing* – the delivery of programs would be more effective if a single payment method was used and programs had sufficient resources (human and financial) allocated to deal with the number of landholders with wetlands. The ability of current program resources to meet landholder demands was viewed as inadequate;
- *Streamline and simplify application processes through a regional delivery mechanism* – the value of simplifying and streamlining program is that it removes a major impediment to landholders and minimises the amount of time landholders must invest in application skills and activities. Added complexity and difficulty only frustrates landholders. Regional arrangements for program delivery are strongly supported and compatible with current NRM regionalisation occurring across Australia. The use of existing regional NRM structures would also advance the 'one-stop shop' desired by many landholders;
- *Range of economic incentives and subsidies offered* – landholders preferred programs that offered a number of economic incentives and subsidies (e.g. management fee, rate rebate, tax rebates) because they enabled individuals to optimise on financial support and allowed a number of options;
- *Education and information about NRM issues and solutions* – education is important in assisting landholders construct their own knowledge of NRM issues and solutions. To do this they need both technical and scientific information, along with information on the costs and benefits of different activities. Landholders viewed education and information provision as essential elements of programs;
- *Full disclosure* – landholders often want explicit recognition of future land use restrictions, management requirements and an assurance of voluntary basis of programs before committing to becoming involved. Such concerns could be dealt with through the provision of an appropriate information package to landholders before uptake of the program;
- *Diverse programs to target individuals and group involvement* – while recognising the usefulness of using group extension and the necessity to address conservation on a large spatial scale, there was also the strong support for programs to offer incentives to individuals. The advantage of this two-pronged approach is it supports the participation of those individuals who, for whatever reason, are not members of a Landcare or NRM group;
- *Programs fostering landholder ownership and personal investment* – when

landholders have a sense of ownership and their actions are recognised by others then landholders feel valued. Programs where there is social recognition of landholders' contributions and environmental stewardship have an advantage;

- *Coordination between different programs and participants* – by removing the complexity across programs, government agencies and NRM organisations, there is greater efficiency and less chance of conflicting information between different sources;
- *Longer-term programs* – programs with longer durations are favoured because they are better able to accommodate changing environmental and social conditions, and allow monitoring of outcomes and the feedback on their success; and
- *Flexible programs* – programs which support flexibility offer advantages to landholders who are able to modify programs to local conditions and to undertake negotiation for the best outcomes (e.g., to resolve restrictions on land use).

This list of preferred aspects covers those main features viewed as important for wetland conservation programs. For programs to be favoured and taken up by landholders they also need to be recognised as part of 'good farm management' and doing the 'right thing'. The social context in which programs are offered and taken up is also very important. Contributing to this is the social infrastructure, otherwise known as the networks, which are used to inform and influence landholder decisions. Local and industry-based networks were mentioned as important sources of environmental and production information and they would be essential in the promotion of wetland conservation programs. Then there is the use of extension, which remains highly valued by landholders, especially in the provision of information about programs and assistance in accessing funding.

Landholders operate in an uncertain environment of changing commodity markets and climatic conditions. Programs, which enable flexibility in their implementation and on-going management activities, are more likely to appeal to landholders. Along with dealing with uncertainty, there is the issue of risk to landholders adopting conservation activities. Landholders want assurance and knowledge of the anticipated environmental benefits and outcomes from undertaking conservation practices, particularly where a loss in production is foreseen. Sharing the risk with government and the wider community lessens the financial burden carried by the landholder, and acknowledges the shared responsibility for the problem and solution. Often the environmental stewardship and personal contribution made by landholders is not recognised and valued by the wider community. The negative image participants believed to be presented of landholders in the media and view of landholders as 'environmental vandals' was a real concern for many participants. Programs providing positive public recognition of landholder efforts and resultant outcomes further promote programs to other landholders, and builds better awareness and understanding by the urban community.

3.4 Communication and information networks

Sources of information for most of the focus group participants were local networks, which consisted of landcare groups, extension officers, industry groups, regional groups and state government agencies located in the region. People preferred to gain information through talking with local people and technical experts to gain specific information about local conditions to inform property level decision-making. Talking with local people was useful for communicating communication with other landholders in the area about codes of practices, available conservation schemes, sustainable land management practices and local contacts. Government agencies and experts enable access to maps, land use studies and local ecological information (e.g. climate, soil and vegetation types). People appear to construct an

understanding of the local conditions and farming environment through talking with other landholders about their own personal experiences and obtaining written information about the land and water resource issues from other local sources. Local knowledge was a highly valued and important source of information. This corresponded with participants' interest in site-specific information in relation to sustainable land and water management practices, programs and ecology.

Information networks were viewed as channels to link landholders, NRM groups (landcare and regional), industry organisations, state government extension officers and local government. Local networks functioned as trusted sources of information and as a method of accessing the knowledge of others. In particular, landholders appear to rely on other landholders in their local area for information. This local knowledge arising from personal experiences of trial and error was seen as highly relevant.

Communication networks were focused at the local scale and used to inform landholders and others of available resources, programs and up-coming events. These networks were established through NRM groups (Landcare and regional) and peak producer organisations. These more participatory, bottom-up approaches to communication and information transfer contrast the linear, top-down approaches used in the past by government. It is obvious from the responses that networks are very important in the construction of environmental issues and solutions, and play a role in the farming 'culture'. By further examining such 'knowledge networks', it would provide insight into how these networks influence responses to sustainable land and water management policies and programs on private land.

4. Survey results

4.1 Description of sample

A total of 766 respondents were interviewed. As Table 1 shows, these were drawn more or less evenly from across the six NRM regions of interest with the exception of Cape York, where the smaller population base resulted in a lower sampling frequency. The large number of unknowns reflects lack of knowledge among respondents about the regions in which they were located. While the sampling frame used to the survey enabled us to draw names and phone numbers exclusively within the area of interest, these names and their locations cannot be correlated with the survey results due to the need to ensure anonymity of response.

Table 1 Regional distribution of survey sample

Region	Frequency	Percentage
Burnett-Mary	99	12.9
Fitzroy	113	14.8
Mackay/Whitsunday	139	18.2
Burdekin Dry Tropics	113	14.8
Wet Tropics	126	16.5
Cape York	23	3.0
Unknown	153	19.9
Total	766	100

The mean age of respondents was 51 years with a standard deviation of 14 years. There was no difference in the age profiles of farmers and non-farmers. Table 2 shows education levels for the sample. Again, there were no significant differences between the education levels of farmers and non-farmers.

Table 2 Education levels of respondents

Education level	Frequency	
Primary	51	6.7
Part secondary	258	33.7
Complete secondary	118	15.4
Trade or TAFE certificate	144	18.8
Diploma or degree	132	17.2
Post-graduate	35	4.6
Don't know/no response	28	3.6

Table 3 Agricultural enterprises operated by respondents on a commercial scale

Enterprise	Frequency	Percentage
Grazing	230	30.0
Sugar	141	18.4
Horticulture	116	15.1
Grains	29	3.8
Dairy	8	1.0

Table 4 Level of concern for financial viability of farm business

Level of concern	Frequency	Percentage
Very concerned	144	31.5
A little concerned	114	24.9
Reasonably confident	127	27.8
Very confident	50	10.9
Don't' know/no response	14	4.8
Total	457	100.0

Table 5 Importance of off-farm income to viability of farm business

Level of importance	Frequency	Percentage
Very important	267	58.4
Somewhat important	62	13.6
Not very important	34	7.4
Not at all important	80	17.5
Don't know/no response	14	3.1
Total	457	100.0

The size of landholdings managed by respondents ranged from 0.2 hectares to 120,000 hectares. Consequently, while the mean area of landholdings for the sample was 949 hectare,

the standard deviation was extremely high at 7,737 hectares. Not surprisingly, those deriving incomes solely from agriculture controlled significantly greater landholdings.

Exactly 61.2% of respondents came from households that derived income from agriculture. Table 3 shows those enterprises operated on a commercial scale by respondents. Tables 4 and 5 show that among those deriving an income from agriculture, concerns about financial viability were prominent, as was dependence on off-farm income.

4.2 Attitudinal and behavioural overview

4.2.1 Attitudinal profile

Examination of attitudes towards the extent of off-farm impacts from land management activities, the costs and benefits of implementing conservation practices, the role of government regulation and compensation for restrictions on perceived private property rights reveal a number of issues of importance to the design of effective conservation incentive measures and programs. Before exploring these, it is important to point out two features of these results. First, there are almost no significant or meaningful differences between the views of farmers and other rural landholders. Second, landholders express what appear, at face value, to be a number of contradictory beliefs about these issues. For this reason, attitudes do not emerge as a useful basis on which actually to predict involvement in conservation programs or implementation of conservation practices.

Table 6 Extent of off-site impacts from land management activities (% of sample)

Question	Strongly agree	Agree	Disagree	Strongly disagree	Don't know/no response
On the whole, what rural landholders do on their own properties has very little impact on other businesses	5.4	25.4	48.7	13.1	7.5
Agricultural activities in this region have relatively little negative impact on marine water quality	8.8	35.0	35.6	10.3	10.3

Table 6 shows that while most landholders believe their activities to have significant impacts on other businesses, comparatively few believe this impact extends to marine water quality. It appears, therefore, that they would contest one of the basic assumptions of programs such as the Great Barrier Reef Water Quality Protection Plan that improved private land management is a priority issue in improving water quality on the reef.

Table 7 shows that while almost all landholders accept the basic proposition that investment in conservation is necessary to ensure long term profitability, and that farmers have a range of options available to them, a substantial minority believe there is little financial incentive to protect natural resources such as wetlands and remnant vegetation for which the relationships between productivity and conservation may appear somewhat intangible.

Table 7 Costs and benefits of conservation (% of sample)

Question	Strongly agree	Agree	Disagree	Strongly disagree	Don't know/no response
There is little financial benefit from conserving natural resources such as remnant vegetation or wetlands.	6.2	28.6	37.8	13.5	13.9
Farmers and other landholders have many options to implement practices that are economically viable and protect the environment.	10.2	60.4	18.4	2.2	8.9
Investment by landholders in conservation practices is important to ensure future profitability.	20.5	70.2	3.6	.9	4.8

Table 8 Government regulation (% of sample)

Question	Strongly agree	Agree	Disagree	Strongly disagree	Don't know/no response
Penalties should be imposed on people who cause environmental damage.	27.4	52.7	7.7	1.0	11.2
Governments should do more to stamp out land use practices that harm other landholders and industries.	16.2	61.0	9.8	0.9	12.1

Table 8 suggests that the vast majority of people agree that governments should take a far more proactive role in regulating and policing poor land management practices. This may seem surprising in light both of the strong dissatisfaction expressed in the focus groups about government attempts to regulate tree clearing and the associated infringements on what participants believed to be their private property rights.

Table 9 shows attitudes towards compensation for restrictions on property rights. The majority of questions in this scale are taken from Reeve (2001). Results shown in Table 9 appear to support the focus group results with generally high levels of support for compensation over restrictions on land use, but they also show high levels of support for the idea that land managers should prove they are managing competently before being eligible to receive compensation. In other words, despite the polarised rhetoric evident in public debates over property rights and government regulation, when contacted in private the majority of land managers take a more moderate position and express the view that while government intervention is generally undesirable there clearly are cases where it is justified. Further, they place the onus just as much on private landholders to show that they are 'doing the right thing' as they do on governments to monitor land management.

Table 9 Compensation for restrictions on property rights (% of sample)

Question	Strongly agree	Agree	Disagree	Strongly disagree	Don't know/no response
It is only fair that owners of rural land should be fully compensated for any changes they have to make to their management for environmental reasons.	20.7	55.9	13.0	1.8	8.6
If restrictions on clearing or irrigation mean a potential loss of future income for rural landholders, they have every right to be fully compensated.	28.8	54.4	10.1	.9	5.8
Compensation for restrictions on land use should only be paid where landholders can show they are already using resources efficiently and sustainably.	13.1	63.6	13.6	1.8	7.7
If government have decided that the rivers need more water for environmental purposes, it is unfair to expect irrigators to give up their water without being compensated for their losses.	17.9	51.5	16.7	3.2	10.7
Environmental laws have imposed many uncompensated restrictions on businesses in the cities to improve the environmental quality for everyone, so rural businesses should not expect compensation for similar restrictions on them.	1.6	25.7	42.3	8.9	21.6
Landholders have gained many benefits from clearing much of their country, so they should not expect to be compensated for leaving remaining bits of bush untouched.	5.0	41.1	32.8	6.6	14.5

4.2.2 Importance of environmental issues

Table 10 shows the level of importance respondents attributed to a range of environmental issues potentially affecting rural landholders in their region. While all issues are considered important, loss of wetlands, environmental flows and vegetation do rank significantly below the others.

Importantly, there is enough consistency in the way respondents answered these questions to enable construction of an overall scale of 'importance of addressing environmental issues'. This is indicated by Cronbach's alpha, a statistic based on the average inter-item correlation with high values (between 0.5 and 1.0) indicating a satisfactory scale (Reeve & Black 1993). This scale is used in subsequent analysis with the removal of one item (plant and animal pests) which improves the reliability of the scale to Cronbach's alpha = 0.772.

Table 10 Importance of addressing environmental issues in region (% of sample)

Issue	Very important	Somewhat important	Not very important	Not at all important	Don't know/ no response
Soil erosion	75.3	15.7	5.2	3.2	0.7
Water use and efficiency	74.6	16.9	3.9	3.2	1.4
Plant & animal pests	68.5	24.0	4.1	1.3	2.0
Chemical runoff in waterways	67.1	20.5	6.1	4.6	1.8
Soil salinity	64.6	16.6	8.4	7.6	3.0
Loss of wetlands	52.6	24.7	9.3	8.9	4.5
Loss of environmental flows	51.5	26.3	8.2	6.2	7.7
Vegetation loss from clearing	41.4	29.6	13.9	8.5	6.5

Reliability: Cronbach's alpha = 0.764

4.2.3 Implementation of conservation practices

Respondents were asked to indicate whether they had implemented, or intended to implement, a small number of environmental management practices believed relevant to the majority of landholdings. Scale reliability for implementation of conservation practices is also satisfactory and improves to alpha = 0.5203 when 'set aside areas for conservation' is deleted. This may be because setting aside areas may be implemented almost by default simply by not developing land while all other practices involve active management.

Table11 Implementation of environmental management practices (% of sample)

Practice	Implemented	Intend to implement	Have not implemented	Don't know/ no response
Set aside areas for conservation	62.3	4.1	32.1	1.4
Soil conservation	59.4	3.7	33.8	3.1
Property management plan	47.1	10.8	39.6	2.5
Fencing to protect land	40.5	5.7	50.7	3.3
Environmental management system	35.8	9.2	50.1	4.8

Cronbach's alpha = 0.5124

In interpreting Table 11 it is important to consider whether there has been any over-reporting of implementation, especially of environmental management systems. Over-reporting is possible due both to differences in understanding regarding what is meant by, or entailed in, certain practices and to possible appreciation of the positive attributes of these practices and/or the extent to which they are promoted, and a subsequent temptation to give the 'socially desirable' answer. While over-reporting of adoption is almost inevitable, its extent should not be exaggerated. Although extension agents and others involved in the promotion of these practices may consider claimed levels of use for some high, it is important to recognise that not all landholders reporting use of a practice will necessarily use that practice over their entire farming operation. As Vanclay and Lawrence (1995) note, partial adoption is a widespread and rational phenomenon – especially in relation to novel or complex innovations. Other studies that have undertaken extensive face-to-face interviewing with farmers have found sophisticated knowledge of the practices promoted by government agencies even in those circumstances where landholders adopt a cautious and timed approach to their implementation (Lockie et al. 1995). Further, there is little incentive in an anonymous survey of this nature for participants to deliberately misrepresent what they do. Were this to occur to any great degree it would by unlikely that the patterns revealed in adoption behaviour reliability analysis would have emerged.

4.2.4 Participation in conservation programs

The conservation programs included in this survey were chosen on the basis of the importance attributed to them by focus group participants and stakeholders within the natural resource management sector. No programs were chosen for which the research team expected to find extremely low levels of awareness on the basis that including such programs would enable little scope to explore the factors that influence participation. Nevertheless, as Figure 1 shows, levels of basic awareness of programs were poor. Ironically, those schemes that were valued most highly by focus group participants, Envirofund and the Community Grants Scheme, were those that had the lowest levels of awareness. Extremely low levels of awareness of landcare tax measures may also be considered surprising in light of the regular monitoring of these by the Commonwealth (e.g. Mues et al. 1994).

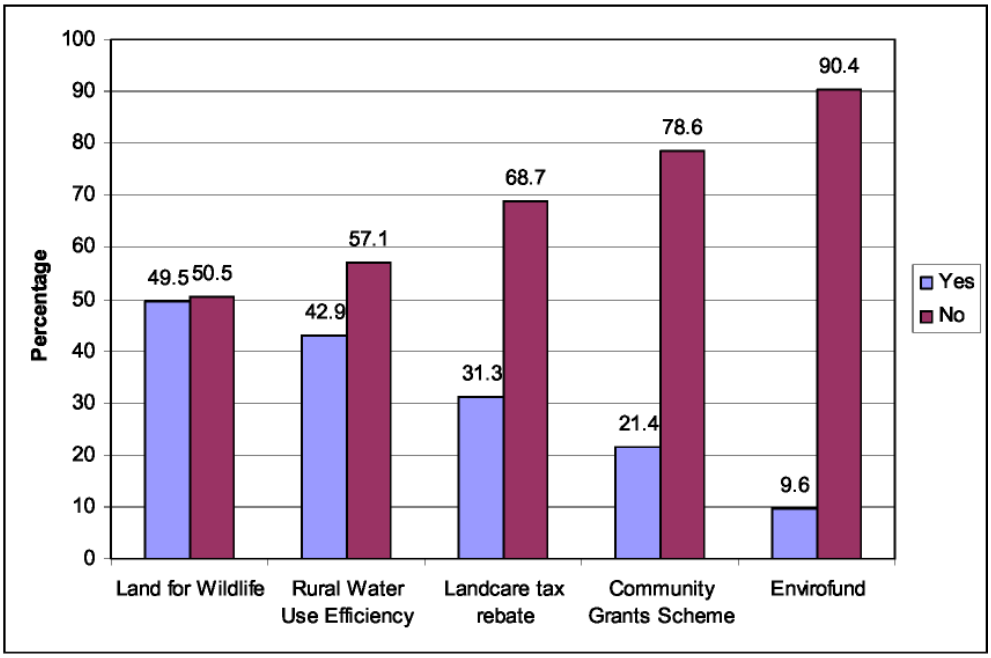

Figure 1 Awareness of measures to encourage voluntary conservation.

Table 12 examines where people heard about these schemes. It shows that by far the most important source of information in alerting people to the availability of these schemes was friends and neighbours, followed by government agencies, then personal observation and the media. Environmental and community groups, and the internet, were generally not responsible for initial awareness raising. These results suggest, in concert with the low levels of awareness of most of these programs that formal avenues of communication are failing to alert people to the presence of these schemes. The exception to this pattern is the Land for Wildlife scheme that has had higher levels of awareness, it seems, through the media. This may reflect either more overt use of the media by proponents of this scheme or the status of Land for Wildlife as a more media-friendly product.

Table 12 Where respondents heard about voluntary conservation schemes (% of sample)

Information source	Land for Wildlife	Rural Water Use Efficiency	Landcare tax rebate	Community Grants Scheme	Envirofund
Friends or neighbours	15.5	44.6	50.5	47.6	39.3
Government agency	8.3	27.3	16.8	22.8	26.2
Personal observation	13.3	10.7	12.3	14.5	13.1
Media	47.8	14.0	15.0	11.7	6.6
Environment or community group	11.0	0.4	0.5	0.7	4.9
Internet	0.6	2.6	3.6	2.1	9.8
Don’t know	3.6	0.4	1.4	0.7	0.0

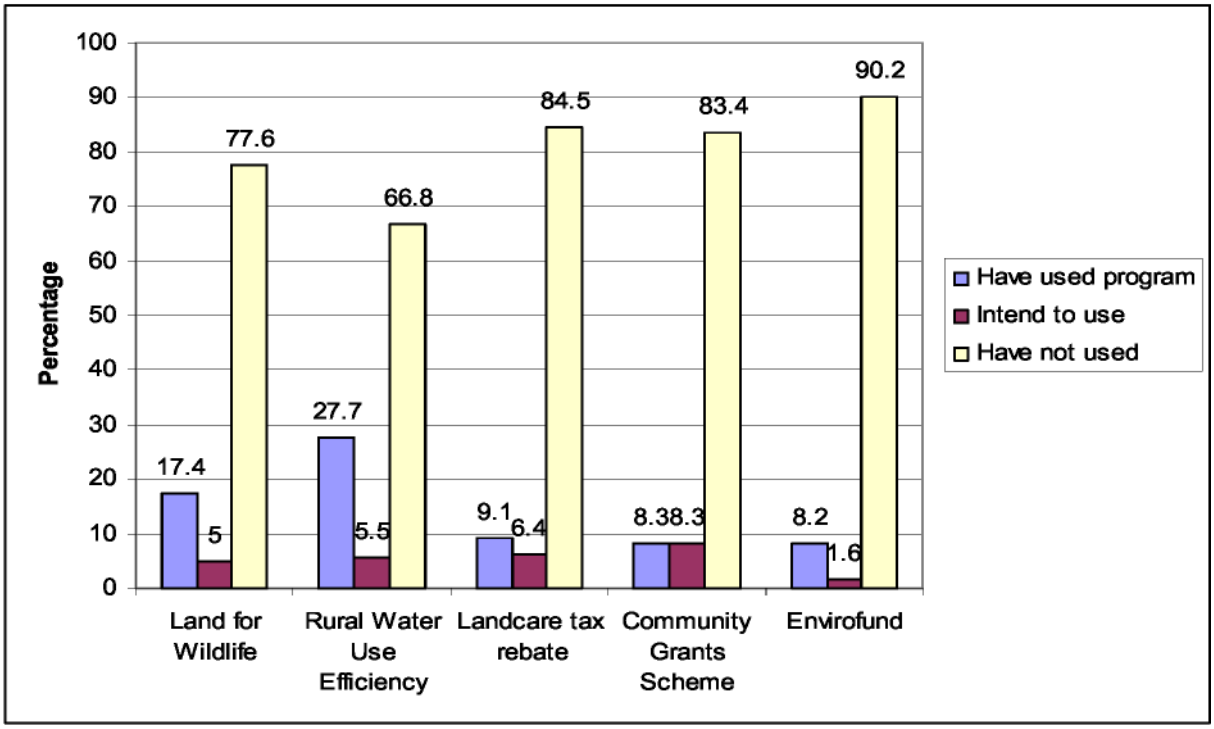

Figure 2. Levels of involvement in voluntary conservation schemes among those aware of these schemes.

Figure 2 summarises the levels of involvement reported for each of the schemes by those respondents who were aware of them. It shows that even among those respondents aware of these programs, rates of involvement were also extremely low. In fact, the only scheme that has involved a reasonable proportion of the sample was the Rural Water Use Efficiency Initiative in which 75 people, or just under 10% of the entire sample, had been involved. Overall, levels of involvement for all other schemes are in the order of 1–2%.

Given the low levels of involvement in voluntary conservation schemes it is particularly pertinent to examine respondents' justifications for their decisions either to, or not to, get involved. Tables 13 and 14 report on how important respondents believed a range of rationalisations for participation and non-participation provided by focus group participants were to their own decisions. Data in these tables was collected only from those respondents who had heard of the schemes. This means that the sample sizes for these tables is small and some care must be taken in interpreting the results. Also, for ease of presentation the responses 'very important' and 'somewhat important' are aggregated.

Table 13 shows that all those factors identified by focus group participants as important in encouraging participation in voluntary conservation schemes were influential in relation to their own decisions. It is also clear, however, that participants in schemes like Land for Wildlife are motivated less by financial considerations than are participants in other schemes.

Table 13 Important factors in influencing decision to participate in scheme (% of sample)

Rationale	Land for Wildlife	Rural Water Use Efficiency	Landcare tax rebates	Community Grants Scheme	Envirofund
Environmental benefits	86.4	71.1	73.5	66.7	66.7
Availability of financial support	35.8	64.4	41.2	79.2	83.3
Improvement in long-term productivity	n.a.	77.8	69.7	75	33.3
Availability of technical support or information	59.3	62.2	n.a.	58.3	100
Ease of application	60.5	62.2	42.2	62.5	33.3

Table 14 suggests that respondents were less inclined to agree with focus group participants regarding the main barriers to participation. This may, to some extent, reflect reluctance to nominate less altruistic reasons as rationalisations for respondents own behaviour. Nevertheless, the relative importance of time and labour availability is an important outcome that is consistent with the heavy reliance of most farming participants on off-farm sources of income. It may well be that much of the influence of financial costs on participation in voluntary conservation schemes is indirect in the sense that the need of landholders to focus their energies on maintaining viability reduces the time and labour they have available for other activities.

Table 14 Important factors in influencing decision *not* to participate in schemes (% of sample)

Rationale	Land for Wildlife	Rural Water Use Efficiency	Landcare tax rebates	Community Grants Scheme	Envirofund
Availability of time or labour	41.3	27.1	na	35	36.4
Financial cost/reduced productivity/insufficient funds to cover costs	24.2	19.9	19.4	24	25.5
Limited or uncertain environmental benefits	23.1	18.8	na	19	25.5
Complicated application process	19.2	18.8	20.4	21.7	29.1
Inflexible guidelines	18.5	18.2	16.7	19.2	23.6
Not relevant to property or business	32.4	na	na	na	na
No relevant expenditure	na	na	16.1	na	na
Didn't pay sufficient tax to claim	na	na	21.5	na	na

4.2.5 Participation in training and community groups

Participants were asked whether they had participated in any training related to farm or business productivity or land and water conservation over the last three years. About 28.9% of respondents claimed to have participated in productivity training and 26.9% in land and water conservation training. As a potential source of information on voluntary conservation practices and schemes, training opportunities such as those offered formerly by Farmbis, Landcare appear not to have been used by the majority of landholders.

Participants were also asked whether they participated in community and industry groups. While national rates of participation are not available for production or conservation groups, the reported levels of participation in Landcare groups are well below the national rate of 34% of farm businesses in 1995–96 and the Queensland rate of 25% for the same year (Mues et al. 1998).

Table 15 Levels of participation in productivity, Landcare and conservation groups (% of sample)

	Total members	Active members
Farm or business productivity	22.8	15.5
Landcare or catchment management	17.5	9.1
Other conservation groups such as Greening Australia or the Queensland Conservation Council	7.4	3.7

Relatively low rates of participation in training activities and relevant industry and community groups is potentially significant in the light of findings from other studies that these often are associated with adoption of improved management practices (Lockie et al. 2002).

4.3 Factors influencing implementation and involvement

Preceding sections have provided a largely descriptive overview of the survey data. This section is concerned with the relationships between variables and what they might tell us about those factors that, in addition to the rationalisations provided by people for their involvement, influence:

- Perceptions of the seriousness of environmental issues;
- The implementation of conservation practices;
- Familiarity with conservation schemes; and
- Involvement in conservation schemes.

4.3.1 Factors influencing the perceived importance of environmental issues

A scale was created to measure respondents' overall levels of concern regarding environmental issues including soil erosion, water use and efficiency, chemical runoff in waterways, soil salinity, loss of wetlands, loss of environmental flows and loss of vegetation from clearing (Chronbach's alpha = 0.772). A range of independent variables was tested for their influence on this scale including all demographic variables and participation in training and community groups. Of these the only variables for which statistically significant relationships were found were:

- *Area of landholding*: a small negative relationship (r = –0.180, p = 0.) is evident between the size of landholdings and the perceived seriousness of environmental issues;
- *Involvement in farm/business productivity groups*: a small negative relationship (r = 0.131, p =.000***) exists between involvement in productivity groups and concern regarding environmental issues; and
- *Involvement in conservation groups*: a small positive relationship (r = –0.072, p = 0.049*) exists between involvement in conservation groups and concern regarding environmental issues.

4.3.2 Factors influencing the implementation of conservation practices

A scale was created to measure respondent's overall levels of adoption of conservation practices including soil conservation measures, property management planning, fencing to protect land and implementation of environmental management systems (Chronbach's alpha = 0.520). The range of independent variables tested for their influence on this scale including all demographic variables, participation in training and community groups, the perceived importance of environmental issues, and participation in conservation schemes. Variables for which there were significant relationships included:

- Involvement in farm/business productivity groups: again, a small negative relationship (r = –0.189, p = 0 .000***) exists between involvement in productivity groups and implementation of conservation practices;
- Involvement with Landcare or catchment management groups: a small positive relationship (r = 0.081, p = 0.026*) between involvement in Landcare or catchment management groups and conservation practices;

- Participation in training for land and water conservation: those who had participated in training for land and water conservation had a mean score of 4.2 compared to 3.8 among those who had not ($t = 2.171$, $p = 0.000$);
- Participation in training for farm or business productivity: those who had participated in productivity training also had a higher mean score (4.2) than those who had not (3.8) ($t = 2.171$, $p = 0.000$);
- Deriving income from agriculture: farmers had a higher mean score on the implementation scale (4.1) than non-farmers (3.7) ($t = 4.327$, $p = 0.000$);
- Viability of farm business: farmers who were confident about their long-term financial viability were more likely to implement conservation practices than those who were not ($r = 0.108$, $p = 0.021$*);
- Awareness of conservation schemes: participants who were aware of Land for Wildlife ($t = –2.632$, $p = 0.009$**), Landcare tax provision ($t = –3.617$, $p = 0.000$***), Community Grants Scheme ($t = –2.987$, $p = 0.003$**) and the Rural Water Use Efficiency Scheme ($t = –3.249$, $p = 0.001$**) were more likely to have implemented conservation measures;
- Participation in Land for Wildlife: participants in Land for Wildlife had a mean score of 4.2 compared to 4.0 among those who had not ($t = –3.023$, $p = 0.003$**);
- Use of the Landcare tax rebates: respondents who had utilised Landcare tax rebates had a mean score of 4.4 compared to 4.1 among those who had not ($t = –2.024$, $p = 0.044$*); and
- Participation in Rural Water Use Efficiency Scheme: participants in the Rural Water Use Efficiency Scheme had a mean score of 4.2 compared to 4.0 among those who had not ($t = –2.669$, $p = 0.008$**).

It is important to note here that although these relationships appear to make sense, the magnitude of the effects is relatively small. If it is the case that there has been a certain level of over-reporting of conservation practice implementation then it may be the case that these relationships are, in reality, slightly stronger.

It is also important to note that a number of variables were not significant that commonly are assumed to have major influences on the adoption of conservation practices. These include demographic variables such as age and education and the attitudinal scale perceived importance of environmental issues. While these results may seem counter-intuitive they are consistent with the results of other adoption studies which show: first, that socio-demographic differences between landholders seldom have a substantial impact on management practices; and second, that there is no simple and direct relationship between attitudes, stimuli and responses (Vanclay & Lawrence 1995).

The overall picture that emerges is one in which participation in training, community groups and government programs to promote voluntary conservation all have significant impacts on adoption of conservation practices.

4.3.3 Factors influencing awareness of and involvement in conservation schemes

Given the positive influence involvement in conservation schemes had on implementation of conservation practices it is important to explore what influences awareness and participation in these schemes. While familiarity with conservation schemes, and participation in those schemes, were both significantly related to implementation of conservation measures it is difficult to determine the direction in which the major lines of causality lie. No other significant

relationships were found between awareness and involvement and the other data collected through this survey. This is not to say that social factors influencing awareness and participation do not exist, but that the small numbers of respondents who had heard of these programs makes it difficult to identify such factors from this data.

5. Conclusion

Participants expressed strong environmental values and argued that rural landholders are, on the whole, responsible and competent natural resource managers. They believed that efforts to conserve and manage important and vulnerable natural resources have traditionally focused largely on legal prohibitions and regulation or on economic rewards or penalties. Current programs and incentives appear inadequate in signalling the importance and value of wetlands to private landholders and the wider community in a number of ways. Particular issues include:

- 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 seen as necessary to improve program uptake included risk sharing, establishment of trust, recognition of private investment, and simple, flexible, regionally-delivered programs. Greater information sharing and education of landholders and the wider community is essential to improving program uptake and supporting landholder efforts to conserve wetlands and manage land sustainably. The supply of credible scientific information will assist landholders to understand risks associated with program uptake and new practices.

While water quality management and wetlands conservation needs landscape level action, most participants favoured programs and schemes focused at landholder/property level. Regional NRM organisations play a critical role, along with local networks, in the sharing of information and providing appropriate structures for the administration of programs and coordination of on-ground action. They also have the capacity to operate as a one-stop-shop for information gathering and dissemination. Along with being able to assist landholders to access government funds, understanding government process and meeting funding requirements. The advantage of regionally-delivered programs is the ability to tailor programs and incentive schemes to suit the landholders and their particular social and economic circumstances. Financial and economic incentive schemes appear to be best administered through state and federal government to delivery consistency across local government boundaries and provide for long-term continuity.

While involvement in conservation schemes has clear and measurable impacts on the adoption of conservation practices among those who participate, the landscape scale impact of these schemes appears severely constrained by the low levels of involvement. In addition to the reasons for low participation in schemes identified by focus group participants (financial constraints, inflexibility, complicated application procedures etc), it is also apparent that they do not recognise the goals of current schemes as consistent with those features of land

management practices they identified as particularly desirable. Those features included profitability, protection of property rights, certainty in outcomes and maintenance of productivity. Retention and protection of property rights for landholders was particularly important and appears to be somewhat associated with perceived uncertainty over voluntary actions becoming mandatory, mistrust of government and maintaining economic viability in a changing industry environment.

There is a need for private incentives to be manipulated to achieve desired outcomes, for both private landholders and the community. These incentives to encourage uptake of programs may be financial payments for removing land from production, rate relief, public recognition or other rewards.

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APPENDIX 1. Survey questionnaire

SUSTAINABLE LAND AND WATER MANAGEMENT, AND WETLANDS CONSERVATION IN COASTAL CATCHMENTS OF THE GBR LAGOON

In which of the following regions is your property located?

1. 1 Burnett Mary
2. 2 Fitzroy
3. 3 Mackay/Whitsunday
4. 4 Burdekin Dry Tropics
5. 5 Wet Tropics
6. 6 Cape York
7. 7 Other

I am now going to read out a number of statements that relate to your personal outlook on rural land management and conservation. After I read out each statement, can you tell me whether you: strongly agree, agree, disagree, strongly disagree with the statement, or don't know

- On the whole, what rural landholders do on their own properties has very little impact on other businesses.
- It is only fair that owners of rural land should be fully compensated for any changes they have to make to their management for environmental reasons.
- Penalties should be imposed on people who cause environmental damage.
- If restrictions on clearing or irrigation mean a potential loss of future income for rural landholders, they have every right to be fully compensated.
- Compensation for restrictions on land use should only be paid where landholders can show they are already using resources efficiently and sustainably.
- There is little financial benefit from conserving natural resources such as remnant vegetation or wetlands.
- If government have decided that the rivers need more water for environmental purposes, it is unfair to expect irrigators to give up their water without being compensated for their losses.
- Agricultural activities in this region have relatively little negative impact on marine water quality.
- Farmers and other landholders have many options to implement practices that are economically viable and protect the environment.
- Environmental laws have imposed many uncompensated restrictions on businesses in the cities to improve the environmental quality for everyone, so rural businesses should not expect compensation for similar restrictions on them.
- Investment by landholders in conservation practices is important to ensure future profitability.
- Landholders have gained many benefits from clearing much of their country, so they should not expect to be compensated for leaving remaining bits of bush untouched.
- Governments should do more to stamp out land use practices that harm other landholders and industries.

We are interested in how important you think a number of high profile environmental issues actually are in your region.

How important do you think it is that the regional community addresses:
The answers you can give are: Very important, Somewhat important, Not very important, Not at all important, Don't know, or No Response

- Soil salinity
- Vegetation loss from clearing
- Soil erosion
- Agricultural chemical and nutrient runoff into waterways
- Plant and animal pests
- Water use and efficiency
- Loss of environmental flows in waterways
- Loss of wetland areas

We are now going to ask some questions about specific programs…

Have you heard about Land for Wildlife?

1. Yes
2. No
3. Don't Know
4. No Response

Where did you hear about Land for Wildlife?

1. Personal observation (eg. roadside sign)
2. Friends or neighbours
3. Media
4. Government agency
5. Environment or community group
6. Internet website
7. Don't know
8. No Response

Which of the following statements best describes your level of involvement in Land for Wildlife?

1. I am not involved
2. I intend to apply
3. I am currently involved or was in the past

How important were the following factors in influencing your decision not to get involved in Land for Wildlife?
The answers you can give are: Very important, Somewhat important, Not very important, Not at all important, Don't know, or No Response

- Financial cost/reduced productivity
- Limited or uncertain environmental benefits
- Availability of time and labour
- Complicated application process
- Inflexible guidelines
- Not relevant to property/ business
- Were there any other factors influencing your decision?

How important were the following factors in influencing your decision to get involved in Land for Wildlife?

The answers you can give are: Very important, Somewhat important, Not very important, Not at all important, Don't know, or No Response

- Availability of financial support (eg. rate rebate, grant money)
- Availability of technical support/information
- Environmental benefits
- Ease of application

Were there any other factors influencing your decision?

Have you heard about landcare tax rebates?

1. Yes
2. No
3. Don't Know
4. No Response

Where did you learn about landcare tax provisions?

1. Friends or neighbours
2. Media
3. Government agency
4. Environment or community group
5. Internet website
6. Don't know
7. No Response

Which of the following statements best describes your level involvement in the landcare tax provisions?

1. I have not used it
2. I intent to apply
3. I am currently using it or have used it in the past

How important were the following factors in influencing your decision not to claim landcare tax provisions?
The answers you can give are: Very important, Somewhat important, Not very important, Not at all important, Don't know, or No Response

- Financial cost/reduced productivity from claimable activities
- No relevant expenditure
- Didn't pay sufficient tax to claim a benefit
- Complicated application process
- Inflexible guidelines
- Were there any other factors influencing your decision?

How important were the following factors in influencing your decision to claim landcare Tax Provisions?
The answers you can give are: Very important, Somewhat important, Not very important, Not at all important, Don't know, or No Response

- Availability of financial support
- Environmental benefits
- Ease of application
- Improvement in long-term productivity

Were there any other factors influencing your decision?

Have you heard about EnviroFund?

1. Yes
2. No
3. Don't Know
4. No Response

Where did you learn about EnviroFund?

1. Friends or neighbours
2. Media
3. Government agency
4. Environment or community group
5. Internet website
6. Don't know
7. No Response

Which of the following statements best describes your involvement in the EnviroFund?

1. I have not used it
2. I intend on applying
3. I am currently using it or have used it in the past

How important were the following factors in influencing your decision not to apply for EnviroFund?
The answers you can give are: Very important, Somewhat important, Not very important, Not at all important, Don't know, or No Response

- Insufficient funding to cover costs
- Limited or uncertain environmental benefits
- Availability of time and labour
- Complicated application process
- Inflexible guidelines

Were there any other factors influencing your decision?

How important were the following factors in influencing your decision to apply for EnviroFund?
The answers you can give are: Very important, Somewhat important, Not very important, Not at all important, Don't know, or No Response

- Availability of financial support
- Availability of technical support/information
- Environmental benefits
- Ease of application
- Improvement in long-term productivity

Were there any other factors influencing your decision?

Have you heard about the community grants scheme offered by regional groups?

1. Yes
2. No
3. Don't Know
4. No Response

Where did you learn about the community grants scheme offered by regional groups?

1. Friends or neighbours
2. Media
3. Government agency
4. Environment or community group
5. Internet website
6. Don't know
7. No Response

Which of the following statements best describes your involvement in the community grants scheme offered by regional groups?

1. I have not used it
2. I intend on applying
3. I am currently using it or have used it in the past

How important were the following factors in influencing your decision not to apply for community grants scheme offered by regional groups?
The answers you can give are: Very important, Somewhat important, Not very important, Not at all important, Don't know, or No Response

- Insufficient funding to cover costs
- Limited or uncertain environmental benefits
- Availability of time and labour
- Complicated application process
- Inflexible guidelines

Were there any other factors influencing your decision?

How important were the following factors in influencing your decision to get apply for the community grants scheme offered by regional groups?
The answers you can give are: Very important, Somewhat important, Not very important, Not at all important, Don't know, or No Response

- Availability of financial support (eg. grant)
- Availability of technical support/information
- Environmental benefits
- Ease of application
- Improvement in long-term productivity

Were there any other factors influencing your decision?

Have you heard about the Rural Water Use Efficiency Initiative?

1. Yes
2. No
3. Don't Know
4. No Response

Where did you learn about the Rural Water Use Efficiency Initiative?

1. Friends or neighbours
2. Media
3. Government agency
4. Environment or community group

5. Internet website
6. Don't know
7. No Response

Which of the following statements best describes your level of involvement in the Rural Water Use Efficiency Initiative?

1. I have not used it
2. I intend to apply
3. I am currently using it or have used it in the past

How important were the following factors in influencing your decision to not use the Rural Water Use Efficiency Initiative?
The answers you can give are: Very important, Somewhat important, Not very important, Not at all important, Don't know, or No Response

- Insufficient funding to cover costs
- Limited or uncertain environmental benefits
- Availability of time and labour
- Complicated application process
- Inflexible guidelines

Were there any other factors influencing your decision?

How important were the following factors in influencing your decision to use the Rural Water Use Efficiency Initiative?
The answers you can give are: Very important, Somewhat important, Not very important, Not at all important, Don't know, or No Response

- Availability of financial support (eg. grant)
- Availability of technical support/information
- Environmental benefits
- Ease of application
- Improvement in long-term productivity

Were there any other factors influencing your decision?

We would like to know whether you have or intend to implement any of the following practices on your property?
After I read out each practice, can you tell me whether you: 1. Have done it; 2. Intend to do it; 3. Have not done it; 4. Don't know 5. No response

- Setting aside areas for conservation
- Fence areas to protect land (e.g. stream banks, degraded areas)
- Soil conservation works (including earthworks, minimum tillage, trash blanketing)
- Implementing a Property Management Plan (including maps,
- land capability, improvements, business plans etc.)
- Implementing an Environmental Management System

The remaining questions are personal questions about you and, if relevant, your farm business. Please remember that your answers are confidential, and that your participation in this survey is voluntary, meaning you do not have to answer any questions you do not want to.

What is your age?

What is the total area of your landholdings (in hectares or acres)?

What is your highest level of formal education?

1. Primary school
2. Part of secondary school
3. Completion of secondary school
4. Trade or certificate course (TAFE, agricultural or technical college)
5. Diploma or Degree
6. Post-graduate tertiary training
7. Don't know
8. No response

We are interested also in less formal education. Could you tell me whether you've participated in any training (eg. field days, short courses)in the last three years on topics related to: Yes, No, Don't know, No Response

- Land and water conservation
- Farm or business productivity (e.g. FarmBis)

We are also interested in how involved people are in local organisations in your area. For each of the following groups, could you tell us whether you are: an office bearer or group leader, an active member, a non-active member, not a member, don't know, or no response

- Farm or industry productivity groups
- Landcare or catchment management group
- Conservation groups such as Greening Australia, Qld Conservation Council

Does your household derive an income from agriculture?
Yes/No

As a primary producer, which of the following enterprises do you operate on a commercial scale?

- Grazing
- Sugar
- Horticulture (fruits and vegetables)
- Grains
- Dairy

Any other commercial activity? [please specify]

What percentage, if any, of the area you farm do you lease from someone else?
0 = Does not lease any
1% to 100%

Which of the following statements best describes how you feel about the long-term financial viability of your farm over the next 10–15 years?

1. Very confident
2. Reasonably confident
3. A little concerned
4. Very concerned

5. Don’t know
6. No response

How important is off-farm income to the viability of your business? The answers you can give are: Very important, Somewhat important, Not very important, Not at all important, Don't know, or No Response

Thankyou - That is all the questions for the survey, we appreciate your time and participation in this study. Your input is very important to us.

APPENDIX 2. Regional summaries

This appendix provides summaries of the individual focus groups and discussions undertaken in each of the six coastal regions covered in the study.

Burnett Mary NRM Region

The 12 participants involved in the focus group were from:

- State government agency (Environmental Protection Authority);
- regional NRM group (Burnett Mary Regional Group);
- conservation Council (Wide Bay Conservation Council)
- Landcare groups and Land for Wildlife;
- peak producer organisation (Canegrowers); and
- individual landholders from across the Burnett Mary catchment with production and landcare interests

Participants identified a number of useful information sources to assist in the management of property resources from local networks with landcare groups, extension officers, regional groups and state government agencies, to local information gathered through land use studies and property assessments. The focus was on local level information and networks by using local people to provide locally-specific information, with a mix of technical and on-ground experience.

A large range of sustainable land and water management issues were identified by participants. These issues ranged from on-ground problems of biodiversity loss, salinity, weeds and pests, to specific management issues of riparian fencing, vegetation and soil management, pollution control, to broader global issues and changes. Other issues covered social and economic aspects, and government policies and regulation. Social issues raised included: landholder and community attitudes and perceptions of sustainable land and water management practices, demographics of the rural population, lifestyle changes required, and education in the broader community of sustainable farming. The economic issues pertained to: economic viability, influence of global markets and loss of productive farm area. Participants did not elaborate on the issues concerning government policies and regulation, but there was concern over the lack of real understanding by landholders and government regarding what sustainable farming is.

Sustainability and a healthy environment were central themes that participants identified as having broad landholder acceptance. Landholders recognised the connection between the economic and ecological viability of their environment, where a healthy environment provides economic returns and values. Likewise, to manage a healthy environment it has to be economically viable. Also, participants identified that landholders have accepted the importance of water quality, quantity, supply and use, and are focused on rewards for efficient systems. The concepts of sustainability and sustainable farming, in particular defining, understanding and implementing sustainability, were again highlighted by participants as areas landholders needed to give more attention. Participants believed there is a need for greater attention to building community and government understanding of sustainable farming.

The other issue highlighted for attention was water quality and the management regimes and responsibilities needed to manage water quality in an integrated manner at the catchment level and across different stakeholder organisations. The emphasis on water quality highlighted the

importance and demand for good drinking water quality in the region. Different perspectives on water quality decline exist and they are associated with the land–water connections. For example, issues of topsoil loss, pesticide overuse etc. relate to water quality loss. Participants recognised that water quality decline in rivers and the reef lagoon was the outcome of current land and water issues in upper catchment areas. Management of water quality was needed on a river/catchment scale and to be under state government control.

Water efficiency was also viewed as an issue, especially for urban communities. Better incentives to motivate water efficiency were seen as crucial by participants and current user pay approaches had shortcomings. The setting of a monetary value on water to address the current perceived undervaluing of water was a suggestion made to produce behavioural change. New incentives to get community (including industry) to value water, to re-use and recycle water through modified practices and the uptake of new technology was recommended.

A large range of water quality related programs and schemes were identified by participants and this suggests people have a good awareness of the different activities and structures relating to water quality planning and management. There was a mix of legislation, policy, regulation, guidelines, programs, plans and organisations mentioned. For example, these included the *Water Act* 2000 (Qld), Natural Heritage Trust 2, local government regulations, ANZECC water quality limits, Rural Water Use Efficiency Initiative, Reef Water Quality Protection Plan 2003 and the Great Barrier Reef Marine Park Authority. However, it was unclear as to participants' level of knowledge and understanding of these various plans and schemes.

The programs and initiatives identified by participants as being major disappointments were extensive, and included:

- regional water use and stormwater management plans
- programs for aquatic weed control
- legislation (*Fisheries Act* 1994 (Qld)) and the Ramsar Convention
- federal government NAP and NHT2 programs.

Also mentioned was the lack of landholder riparian and wetland incentives on offer. For instance, participants criticised the construction of stormwater as a waste or water quality problem, when it needs to be reconceptualised by community and government as a resource for further use in the system.

Programs and incentives viewed favourably by participants as having significant potential to improve water quality included:

- National Action Plan for Salinity and National/State Water Quality Guidelines
- *Environmental Protection Act* 1994 (Qld) – licensing environmentally relevant activities (ERAs)
- Rural Water Use Efficiency Initiative
- Riparian/landcare incentives (NHT1)
- Wetland incentives for landholders funded through NHT1
- Priority actions and future implementation of NRM plans (Burnett Mary Regional Group).

Those programs and incentives identified by the Burnett Mary participants reflects the past, current and future activities in the region being funded by regional, state and federal level organisations.

Fitzroy NRM Region

The 20 participants involved in the focus group were from:

- State government agencies (Queensland Parks & Wildlife Service, Department of Primary Industry – Fisheries)
- local government (Rockhampton City Council)
- regional NRM group (Fitzroy Basin Association)
- Indigenous organisation (Fitzroy Basin Elders Committee)
- individual landholders from across the Lower Fitzroy catchment with production and Landcare interests (predominantly cattle/grazing).

Of the large range of sustainable land and water management issues and impacts identified by participants there were the common issues of sediment runoff, land clearing, weeds and pests, chemical use etc. mentioned. There was also a large number issues relating to government functioning. These issues related to government policy, control and processes, and general comment of program and scheme deficiencies. Social and economic issues were mentioned in relation to maintaining viable rural and urban communities in areas experiencing population changes. Two interesting issue mentioned was the lack of understanding of the Great Barrier Reef water quality issues and the need for holistic understanding of the environmental system. Discussions also focused on allocating blame to urban development or activities conducted higher in the catchment. Participants expressed the need for the problem of water quality decline to be accepted as a community-wide problem and not to deal with private rural landholders in isolation to other landholders and sector interests.

Fitzroy focus group participants identified four issues with broad landholder acceptance. These issues were (1) population growth control and the associated increasing extraction of water; (2) sustainability of current urban growth and the dependencies between urban and rural communities; (3) best management practices in agricultural industries, such as grazing; and (4) weeds. The underlying theme to these issues is the future sustainability of natural and social environment through planning of urban growth and management of natural resources.

Those issues requiring greater landholder attention were varied and consisted of: control of sediment runoff; dealing with the rural and urban divide of cultures and values; government control, inconsistencies and general understanding of issues; and water quality issues. Many of these issues raised by the participants do not relate to private landholders, such as government control and the urban/rural divide of communities.

In the Fitzroy, the programs and initiatives identified covered those offered by federal, state and local government and regional NRM group. These programs were directed at delivering sustainable land and water management through grants, industry support and subsidies.

Those programs and initiative identified in the Fitzroy region as being a major disappointment to landholders included:

- Natural Heritage Trust program
- Weeds of National Significance program.

Criticisms of the NHT program were directed at the administration, funding allocation, application process and state level decision-making process features. Similarly, the Weeds of National Significance program was viewed as lacking sufficient funds and the application preparation process was problematic

Programs and incentives participants viewed as having significant potential to improve water quality, while being a disappointment, were:

- Regional NRM group devolved grant scheme funded through NHT (e.g. Fitzroy Basin Association's riparian zone fencing) Funded through NHT
- Local government initiatives
- EnviroFund through NHT.

It was no surprise that participants identified the Fitzroy Basin Association's regional devolved grant scheme, given it is one of the more progressive regions in the Great Barrier Reef lagoon catchment in terms of development and delivery of their regional NRM plan.

Participants identified positive features associated with these programs and incentives which assisted in the implementation phase, such as funding, access to education and negotiation between landholder and funder for optimal outcomes.

Mackay-Whitsunday NRM Region

The 18 participants involved in the focus group were from:

- local government (Mackay City Council)
- regional NRM group (Mackay-Whitsunday NRM group)
- peak producer organisations (Cangrowers Mackay, AGFORCE)
- Landcare groups and Land For Wildlife
- Waterwatch
- Individual landholders from across the Mackay-Whitsunday catchment.

The Mackay-Whitsunday participants identified a number of useful information sources to assist in the management of property resources such as networks with NRM groups and organisations at a local level, local knowledge from landholders with similar properties, and expert sources of information from state government agencies to access maps and local ecological information (e.g. climate, rainfall history, soil and vegetation types). At the property level, participants suggested the need to conduct an infrastructure and natural resource inventory and business plan. These responses were similar to those presented by participants from the Burnett Mary region. The most useful and sought after information comes from local sources and relates to understanding the local conditions in order to focus farm activities and work within limitations.

Participants in the Mackay-Whitsunday region listed a large number of sustainable land and water issues, of which half were related to water quality and quantity and associated land impacts and the other half covered problems relating to natural resource and environmental planning and management. Water issues were about stormwater quality, impoundments and extraction, availability and issues of chemical use, sediment runoff, riparian vegetation loss, and creek and wetland degradation. Many of these issues are common to the other regions studies. The other issues focused on perceived inadequacies of government to coordinate and integrate, to enforce regulation about pollution and public access, to educate the community. The distrust of government agencies was mentioned and it was discussed as a problem by participants in other regions in regard to government's inability to offer certainty and accountability. As a result, many participants expressed concerns about voluntary practices being made mandatory, with the view of being cautious of voluntary compliance. The participants also highlighted the problem of unequal distribution of federal money across the different regions. By not being a salinity and water quality region, the Mackay-Whitsunday region received a lower level of funding.

Issues with broad landholder acceptance in the Mackay-Whitsunday region were identified as: Weed control, lack of education of NRM issues for landholders and the general public; changes

in regulations affecting property management and viability; and the lack of government consultation with landholders over regulatory changes. Landholders recognise the change in government's approach to management of natural resources by enforcing regulation in a non-consultative environment, without the sharing of information and consideration of the future economic viability of landholders.

The three issues participants viewed as needing greater landholder attention were: (1) diffuse runoff of nutrients and chemicals; (2) one-stop-shop for information gathering and sharing; and (3) changing the negative public perception of landholders by community through improved communication. While participants recognised greater attention is needed to address water quality decline through diffuse source runoff, such as with agricultural practices, they allocated responsibility for the problem to the upper catchment and to the pollutants from urban development and community as a major contributor. This suggests landholders are focusing more on problem identification and allocating blame, as opposed to implementation of solutions through on-ground activities. The negative image of agricultural landholders constructed in the media obviously contributes to the attention landholders give to deflecting blame for environmental damage, when the environmental problems are complex and involve a large number of stakeholders across a wide spatial area, and result in delayed and cumulative impacts.

The highlighted need for a one-stop-shop was mostly likely associated with the environment of misinformation landholders view currently, need for greater education about NRM issues, better communication and improved coordination across government agencies.

Defining wetlands and the production and ecological value of wetlands were important aspects discussed. Participants identified wetlands as the area from the mangrove line upwards and including areas upstream of flood plains to the creek systems, farm dams, and ponded pastures. In the past, there has been controversy over the status of ponded pastures as wetlands and the benefits in retaining or removing them. There was some debate over the ecological value of ponded pastures and the distinction between ponded pastures and artificial wetlands. The perception of participants was that there is a range of different information on ponded pastures and some misinformation in the public domain. The conclusion reached by participants was that there is an absence of proper scientific data on ponded pastures, and further research is needed to investigate the positives and negatives of ponded pastures, along with the general ecological and production value of wetlands.

The programs and schemes listed by participants which they were aware of or involved in covered a diverse number of programs and incentive schemes administered at federal, state and local levels by government, regional NRM groups and peak industry bodies. Programs such as Landcare, Land for Wildlife and nature refuges were frequently mentioned. Financial schemes providing monetary incentives to landholders included local council levies, landcare tax rebates, Natural Heritage Trust funds, EnviroFund, Canegrowers hymnanachne incentives and devolved grants from regional NRM groups.

Discussion of the three most important programs and schemes covered: (1) Sustainable Landscape Project administered by the regional NRM group; (2) Path – CQ a revegetation initiative through Integrated Catchment Management devolved grants; and (3) taxation incentives. The positive aspects of the Sustainable Landscape Project were its regional on-ground focus on priority areas, effective delivery method through a 'one-stop-shop' and multi-purpose incentives, which also provided for capacity building. The Path – CQ initiative was seen as providing better networking, communication and understanding of issues to landholders, and it shared the risk so the burden was not only on landholders. The taxation incentives were advantages in allowing direct action by landholders who would be normally constrained by the financial cost.

Negative aspects or weaknesses participants found with these programs and schemes ranged from the uncertainty and insecure nature of the federally funded program, as in the Sustainable Landscape Project, to the lack of on-going long-term monitoring and communication difficulties between government agencies and community due to insufficient extension officers for the Path – CQ initiative. The longevity and continuity of these two programs was viewed by participants as being under threat from the federal government. For the taxation incentives the issues were numerous and were an overly complex and confusing process, lack of coordination between government agencies and strong government control and outdated incentives (insufficient funds for the number of landholders). These government concerns arose because participants perceived government agencies to be acting in isolation to one another without sufficient communication and coordination. Also, state government were viewed as the most appropriate government to take control of incentives, instead of differential use of rebates by local governments.

While each of these programs and incentives had issues and weaknesses, participants identified many opportunities for improvement through greater landholder input into project development, publicising the wins and positives of programs, and better cooperation between interests.

Burdekin Dry Tropics NRM Region

The 12 participants involved in the focus group were from:

- state government agency (Department of Primary Industries – Fisheries)
- regional NRM group
- conservation groups (Greening Australia, Bowen Conservation)
- peak producer organisations (Canegrowers)
- individual landholders from across the Burdekin region with production and landcare interests (grazing, canegrowers).

In the Burdekin Dry Tropics NRM region the main information sources which participants identified as useful in land and water management at the property level were networks with local landcare groups, local industry and agriculture organisations, local council, the Burdekin Dry Tropics Group and extension officers from the local Environmental Protection Agency and Department of Primary Industry offices. Information most useful to landholders is best obtained from other landholders in the area, local ecological information (climate, soil types, crops and vegetation, soil and water quality) and local information on codes of practice, available conservation schemes, sustainable farm management practices and information on environmental regulations. The emphasis for landholders was on sourcing and using local information to inform decision-making at the property level.

The participants listed a large number of NRM issues for the Burdekin Dry Tropics Region, most of which were also common to the other NRM regions discussed. These issues can be summarised as:

- government functioning (e.g. bureaucratic red tape, lack of leadership and policy)
- information and education (e.g. lack effective information dissemination of unbiased credible scientific evidence, location specific information, education of landholders and community of ecosystem processes and sustainable practices)
- resource management (e.g. unmanaged state land, chemical use, stormwater)
- environmental sustainability (e.g. wetland degradation, unsustainable land practices (clearing), water use and efficiency, economic versus ecological and social).

The issues which participants put forward as having broad landholder acceptance centred around awareness of landholders' operating environment and the need for greater communication of issues and information to the wider community. The issues were: (1) the lack of broader information, education and communication of issues to landholders and the community about research and on-ground activities; and (2) understanding the economics and values of landholders, and the difficulty of acting environmentally sustainably when financially constrained.

Those issues landholders need to give more attention to were: (1) education on ecosystem processes to improve their understanding; (2) the social expectations community places on landholders to provide and protect the public good (e.g. to produce environmental outcomes, conservation of large areas) and the need for community education; and (3) land management issues of land clearing, weed management, salinity and feral animal control. The assumption is greater education, awareness and debate over issues will lead to improvements in the management of land and water resources.

The range of water quality programs participants were aware of covered federally funded policies (e.g. National Action Plan for Salinity and Water Quality, Reef Water Quality Protection Plan), programs (e.g. Waterwatch, Coastcare, Landcare, Weeds of National Significance) and incentives (e.g. EnviroFund). Participants in the Burdekin Dry Tropics region also mentioned many non-government organisations, such as Greening Australia, and Conservation Volunteers, and local government initiatives in the forms of levies and subsidy schemes.

The two water quality related programs discussed in detail by participants were the Creek to Coral and National Action Plan for Salinity and Water Quality. The Creek to Coral program was viewed favourably by participants for its integrated and collaborative approach, better cooperation and communication between stakeholders, and less duplication and doubling up of resources. The opportunity to better use human and financial resources and to coordinate funding were also important points. The main concerns with this program that participants highlighted were the interagency competition, uncertainty of funding and threat from political changes, and the lack of long-term vision and commitment by funders. The National Action Plan for Salinity and Water Quality, of which the Burdekin Dry Tropics is one of the priority regions, was viewed as positive in being able to address a number of NRM issues, provide sufficient funding, operate in a planned and coordinated approach and have government/political support. Opportunities which participants identified were the useful case study examples for use in the media, ability to provide a range of incentive and planning for continuity and on-ground outcomes. Areas of weakness were the short program life and timelines for completion, continuity between programs and people, administrative paperwork and the absence of teams of experts to advise landholders.

Wet Tropics NRM Region

The 12 participants involved in the focus group were from:

- State government agencies (Environmental Protection Agency, Department of Natural Resources and Water);
- Local government (Hebert River Shire);
- Commonwealth statutory body (Great Barrier Reef Marine Park Authority);
- Peak producer organisations (AGFORCE);
- Individuals involved in Landcare or with wetlands on their property; and
- Individual landholders from across the region involved in production activities.

The Wet Tropics participants provided similar responses to sources and types of information for property level management of resources. The use of networks to seek local advice and information on local programs was frequently mentioned as a means of understanding the major

issues in the area and looking at economic viability and ecological sustainability. Information from peak industry organisations about standard industry practices and best management practice was also favoured.

The NRM issues in the Wet Tropics region, which participants raised in the discussion, were strongly focused around problems relating to government functioning, industry viability, availability of science and its use in planning and assessment, natural resource problems and issues of sustainability. The natural resource problems covered the common issues of overgrazing, land clearing, stormwater runoff, plant and animal pests and use of chemicals. There were other issues such as urban encroachment and loss of productive agricultural land, lack of environmental awareness, inappropriate land use and environmental flows for water quality and quantity, and the access and allocation of water. Of particular interest, was the focus on balancing productivity versus environmental protection.

The four issues identified by participants as having broad landholder acceptance were: (1) government inertia and lack of responsibility and accountability under law for the condition of natural resources and their management; (2) plant and animal pest control; (3) requirement for sound science and resource data on water quality being communicated to broader audiences (e.g. decision-makers) over the long-term on identified priorities; and (4) secure land and water access for landholders.

In terms of issues in need of greater landholder attention the participants identified: (1) landholders need to take environmental protection more seriously and at a political level there needs to be recognition of how this affects a landholder's economic viability; (2) proper planning assessment focusing on current and future use, and with consideration of site specific characteristics and the political environment; and (3) landholders need to take more seriously the balance between production and protection, especially to maintain a property's economic viability. Much of the focus appears to be on creating an operating environment where the economic values and viability of industry production is maintained while implementing environmental protection. To achieve this balance between production and environmental protection participants recognise support is needed from the political level to enable this to occur.

The programs and schemes identified by participants covered mainly financial incentive schemes (e.g. local government rate rebate, tax incentives for soil conservation, machinery subsidies) and a few voluntary conservation schemes (e.g. Land for Wildlife). Participants strongly supported the provision of management fees being paid to landholders for conservation practices and wetlands on private property, subsidised water monitoring and other monetary incentives for voluntary conservation and management where any cost or responsibility is place on landholders to manage a public asset (e.g. wetlands) or resource (e.g. water). This suggests landholders in this region make a clear distinction between private and public assets and responsibilities. Participants were cautious of any on-farm monitoring of water quality due to the cost and responsibility, and the government's possible legal response to bad water quality.

The programs and initiatives participants viewed as being a major disappointment included:

- rate rebate by local council
- establishment of carbon credits scheme
- best management practices.

These disappointments were attributed to the inconsistent use of rate rebate by various local councils across regions, perceived problems with the carbon credit scheme, and the inadequate government assistance provided for the adoption of best management practice, such as environmental management systems.

The programs and initiatives, which have the significant potential to improve water quality, were found to be the following:

- management fee paid to landholders for conservation practices
- environmental tax for long term profitability to do conservation
- individual landholder projects.

A common feature of these programs and initiatives is the financial support provided to landholders to undertake conservation and management activities. An environmental tax would be funded by the Australian public to protect public assets and resources, but this initiative could be viewed negatively as another tax, along with the risk of administration costs consuming a large proportion of the money going to consolidated revenue. The focus on individual involvement and financial payments was the strongest in this region, suggesting the best future programs and incentives may be those targeting individual landholders through economic incentives (including motivation incentives of information and rewards).

Cape York NRM Region

Information from discussions about the Cape York NRM region will be useful in developing future programs and incentives to assist landholders to adopt sustainable land and water management practices, conserve wetlands in the region and improve the water quality entering the Great Barrier Reef Lagoon from the various large river systems. A number of problems with current NRM planning management processes were also documented.

The Cape York region is special in that there is a large Indigenous population (approximately 60% Indigenous) and a number of Indigenous Land Trusts own and manage the land for the Traditional Owners of the area. Most of the remaining Cape York area is owned by the state government as parks, reserves and pastoral properties. To a lesser extent there is some land leased by individual pastoralists. The focus of past NRM activities has been on producing an agreement between the different regional interests (pastoralists, conservationists, Indigenous) and developing and implementing the Cape York NHT Plan. Since 1999, the Cape York Property Planning strategy, one strategy from the Cape York NHT plan, has been worked on but problems with finding a common scale for operation, geographical scatter of the pilot properties and different preferred operating approaches by the various interests exist.

The main NRM issues identified for the region include:

- sediment runoff into rivers
- grazing pressure and impacts
- localised erosion due to lack of fenced riparian areas
- reduction in native pastures and biodiversity
- weed and pest problems
- feral pig destruction of wetlands
- feral horses and cattle
- unmanaged lands
- lack of active management in some areas covered by Land Trusts
- poor management of land
- fire contributing to sediment loads and declining water quality

- increased tourism pressure in the south-east part of the region (e.g. Cooktown)
- lack of Indigenous models of NRM
- restricted economic activities for Indigenous people
- limited capacity for Indigenous people and graziers to get involved in NRM planning
- lack of agreement among pastoralists, conservationists and Traditional owners on the appropriate scale to plan and management natural resources.

Management options viewed as possible for wetlands and for sustainable land and water resources include:

- Management partnerships between the state government agency, Environmental Protection Authority, and Traditional Owners
- Support for the established Land & Sea Management Program with the establishment of Indigenous Land & Sea management Centres in the four sub-regions (Injinoo, Lockhart, Coen, Kalpowar). The Land and Sea Management Centres and their coordinators would provide useful networks for the communication of information
- Grazing Land Management Area Model as a vehicle to implement improved NRM
- At the property level the use of Property Planning would be useful to help in the management of leasehold land if an appropriate scale for implementation could be agreed on.
- Develop further an appropriate landcare approach at the catchment scale within the catchments of the Laura-Norman, Cooktown and Bloomfield, which recognises the geographical distance and cultural diversity of the community.
- Assist in the development of Indigenous models of NRM, which recognise and incorporate the alternatives frameworks of spiritual attachment and meaning to land and sea by the Traditional Owners.
- Capacity building initiatives to resource peoples' involvement and awareness of the NRM issues and broader picture.